Instruction Manual

PN : 435058-001

Version : 1.0.1

Spectrophotometer
2nd generation

LC-INSTRU SAS

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Table of Contents

Safety Information

Please follow the guidelines below, and read this manual in its entirety to ensure safe operation of the unit.

- Do not open the device.
- Disconnect the device from the mains supply before carrying out maintenance work or changing the fuses.
- The inside of the device is a high-voltage area Danger!
- Do not use the device if it is damaged, especially if the main power cable way is in any damaged or defective.
- Repairs may only be carried out by the service technicians from us and authorized contractual partners.
- The device must be connected to a power outlet that has a protective ground connection.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

- Do not allow any liquid to enter into the device.
- Do not operate the device in a hazardous location or potentially explosive environment.

Package Contents

Description	**Quantity**
Spectrophotometer	1PC
Glass Cuvette	4PCS
Quartz Cuvette (UV/VISIBLE models only)	2PCS
Power Cord	1PC
Instruction Manual	1PC
Dust Cover	1PC

Unpacking

Open the package, according to carefully check the packaging packing list items, if found inside the packaging are missing or damaged items please contact us and authorized contractual partners.

Installation

Placement

Place the instrument on the stable table carefully.

Install printer (Optional)

Check to confirm instrument power switch is turned off, connect the printer's data cable to the Instrument's serial/USB port.

> ***Information*** ***The spectrophotometer supports USB printers using the HP PCL3 GUI print description language.***

Connect the power cord

Check to confirm instrument power switch is turned off, the power cord plug into two separate power interface and power supply socket apparatus.

Symbols and Conventions

The following chart is an illustrated glossary of the symbols that are used in this manual.

	**CAUTION** This symbol indicates a potential risk and alerts you to proceed with caution
	**CAUTION** This symbol indicates the presence of high voltage and warns the user to proceed with caution
	**CAUTION** This symbol indicates risks associated with hot surfaces

Specifications

Paste Specifications
&
Model Description

Overview

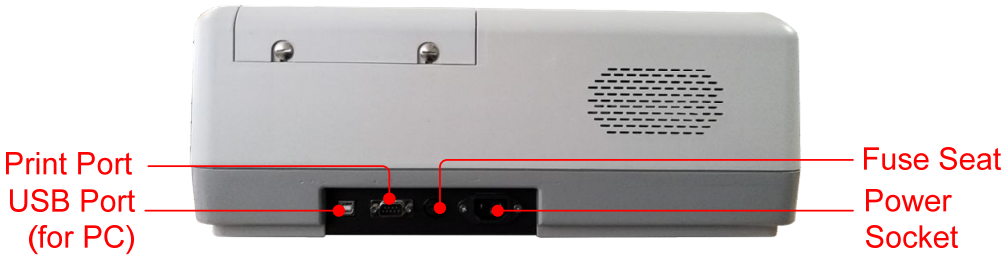
This model of spectrophotometer used in Chemistry, Pharmaceuticals, Biochemical, Metallurgy, Light Industry, Textile, Material, Environments, Medical, Education and some other fields for Quality Control laboratories.

Description of Buttons and Switches

Front View

Right View

Rear View



Getting Started

The following chart describes the basic operation of the instrument.

Turn On and Self-check

Switch on the power. Self-check includes the following steps: Turn On Lamp → Locating Filter Disc → Locating Automatic Sample Holder (If Installed) → Get Dark Current → Locating Wavelength → Check Energy → Check System baseline.

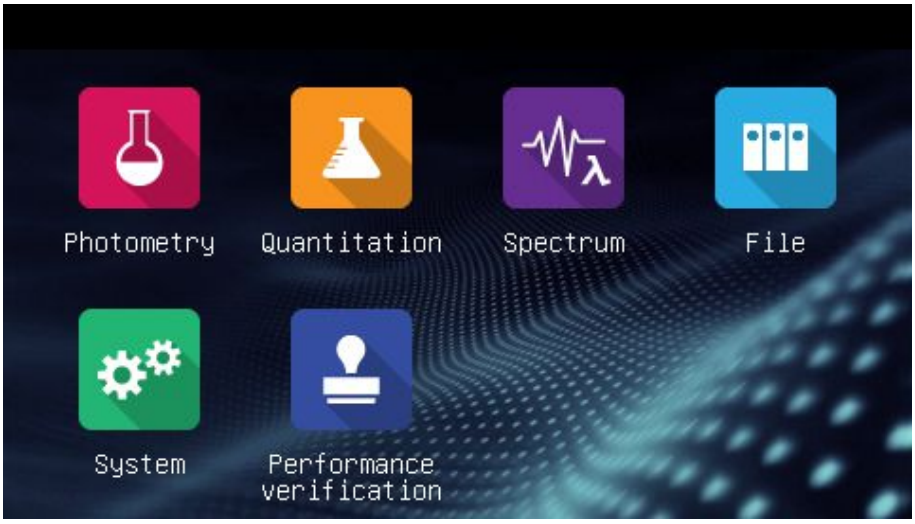
General Operating Instructions

Touch Screen Using Tips

The entire screen can be started with a touch. To make a choice, use your nails, fingertips, pencil, or stylus to press the screen. Don't press the screen with sharp objects (such as ball point).

Select Application

Main Interface, press the icon to select application.



	**Photometry** Measure the absorbance or transmittance of the sample.
	**Quantitation** Establish the standard curve and measure the concentration of the sample.
	**Spectrum** Scan the sample in a wavelength range.
	**File** Manage files stored in the instrument or USB disk.
	**System** System calibration and setup.
	**Performance verification** Verify the performance of the instrument.

Basic Operation

	**Home** Back to main interface.
	**Return** Back to the previous interface.
	**Page Up/Down** Go to previous/next page.

Measurement Results Operation

	**Open** Open result(s) from internal/USB memory.
	**Save** Save result(s) to internal/USB memory.
	**Print** Print result(s).
	**Delete** Delete selected result(s).

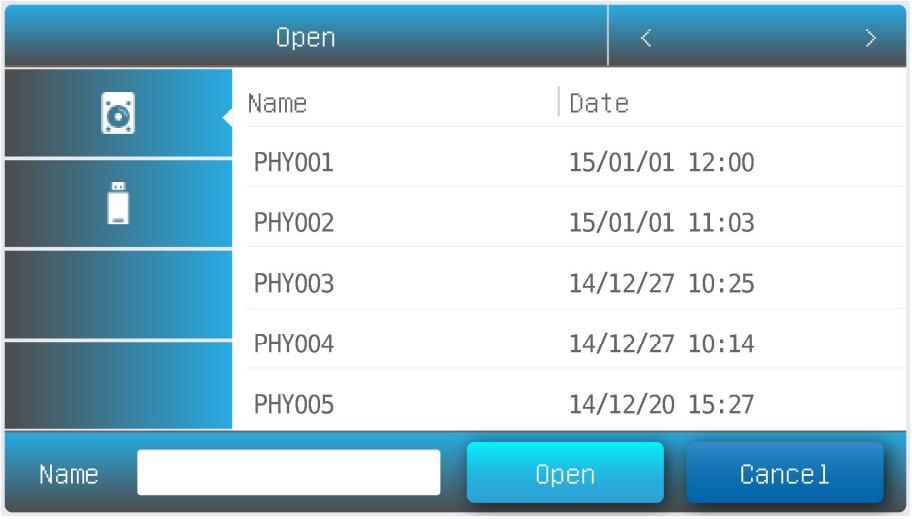
Rename, Print and Delete Results

Rename a Sample: **List** interface, press the area **Name**, key in the sample name (Up to 8 characters).

Print the Measurement Report: **List** interface, press the icon .

Delete sample(s): **List** interface, press the **Check Box**, and press the icon .

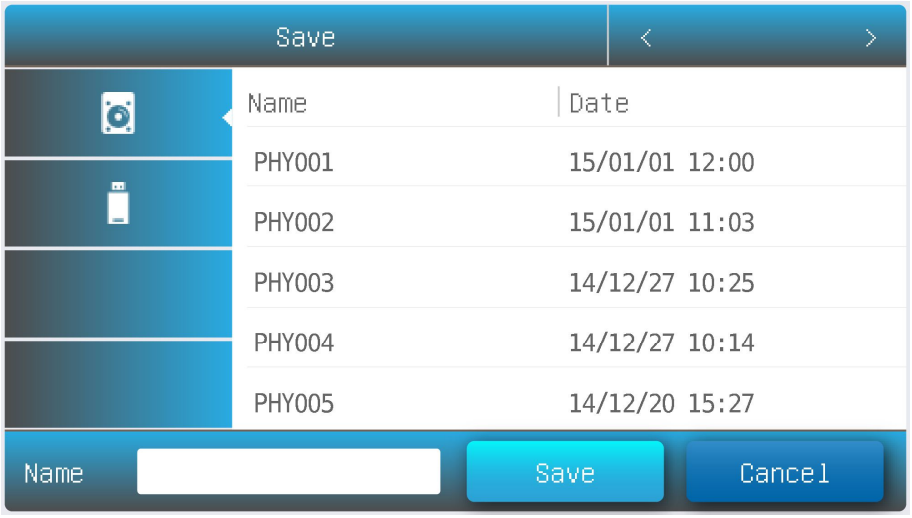
Open Results



Open:

1. **List** interface, press the icon .
2. Press the icon **internal memory/USB memory** to select the memory which the file saved.
3. Press file lists to select, press the button **Open**.

Save Results



Save:

1. **List** interface, press the icon **Save**.
2. Press the icon / to select the Internal/USB memory which the file to save.
3. Type in the file name, press the button **Save**.

Files Operation

	Internal Memory Internal memory of the spectrophotometer.
	USB Memory USB extended mass memory.
	Copy Copy the selected file(s) from internal /USB memory to USB/internal memory.
	Export csv Export file(s) to *.csv format
	Export txt Export file(s) to *.txt format
	Delete Delete the selected file(s).

Rename, Import, Export and Delete Files

Rename a File:	**File management** interface, press the area **Name**, key in the file name (Up to 8 characters).
Copy File(s) From/To Internal Memory/USB Memory:	**File management** interface, press the **Check Box**, press the button  (Need USB disk) .
Export File(s) To *.csv Format	**File management** interface, press the **Check Box**, press the button  (Need USB disk) .
Export File(s) To *.txt Format	**File management** interface, press the **Check Box**, press the button  (Need USB disk) .
Delete File(s):	**File management** interface, press the **Check Box**, and press the icon  .

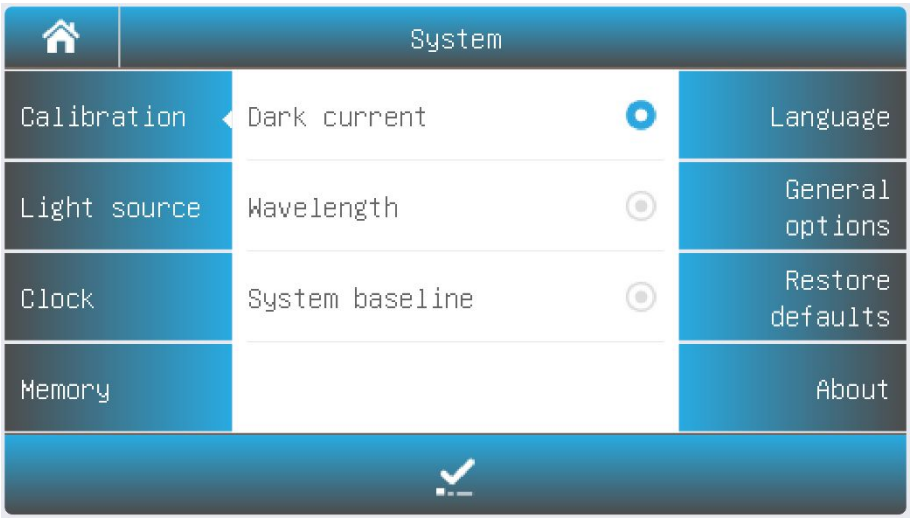
Calibration and System Settings

Select the icon  in the main interface. Display options to calibrate the system and configure the basic instrument settings.

Calibration

	**Calibrate** Start to do calibration.

Select Tab **Calibration** in the **System** interface. Remove something in the measurement channel, close the sample chamber cover, select the item **Dark current**, **Wavelength** or **System baseline**, press the icon  to do calibration.



Settings of Light Source

	**Tungsten lamp reset** Reset the Tungsten lamp usage.
	**Deuterium lamp reset** Reset the Deuterium lamp usage.

Select Tab **Light source** in the **System** interface. The light source information is displayed on the screen.

Visible models

UV/VISIBLE models

On/Off lamp: Press the icon  to turn on/off the Tungsten lamp/Deuterium lamp.

Change the lamp switching point: Press the value of lamp switching point. Input the new value.

Reset the lamp usage: Press the icon  /  to reset the Tungsten lamp/Deuterium lamp usage time.

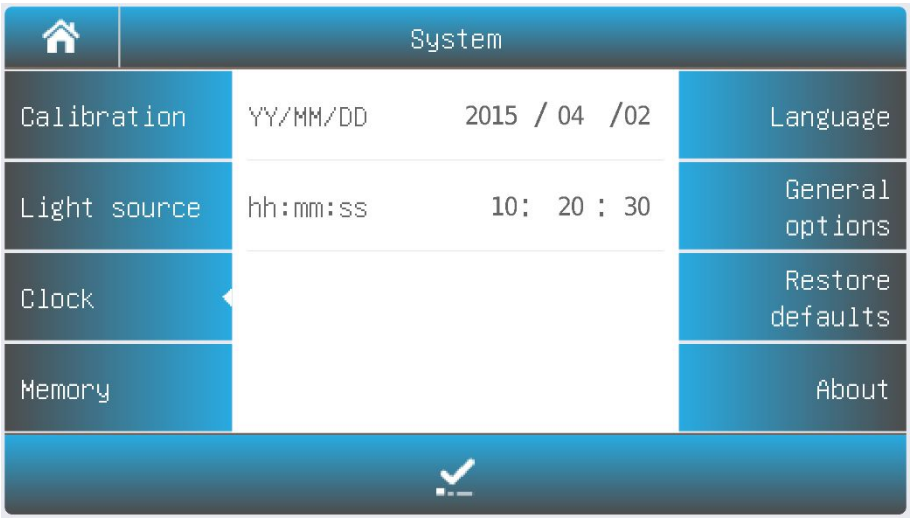
Important information

1. ***If only one of the light sources is used in for a long period of time, please turn off another light source to save energy.***
2. ***If the lamp switching point is changed, the system baseline must be recalibrated.***

Edit Clock

	**Accept** Accept the new value.

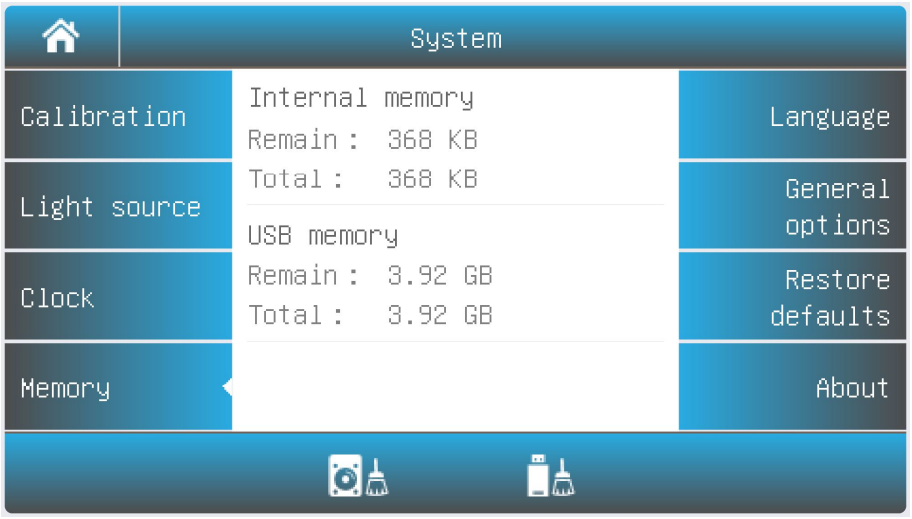
Select Tab **Clock** in the **System** interface. Press the value of year, month, date, hour, minute or second to change. Press the icon  to accept new value.



Memory Management

	**Format Internal Memory** Format the internal memory of the spectrophotometer.
	**Format USB Memory** Format the USB mass storage.

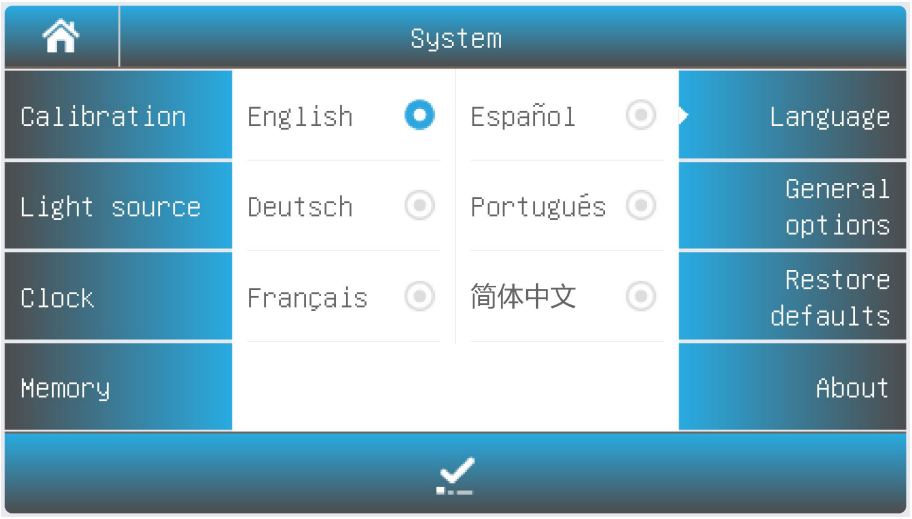
Select Tab **Memory** in the **System** interface. The use of the internal and USB memory (If inserted) are show. Press the icon  /  to format internal memory/USB memory.



Language Selection

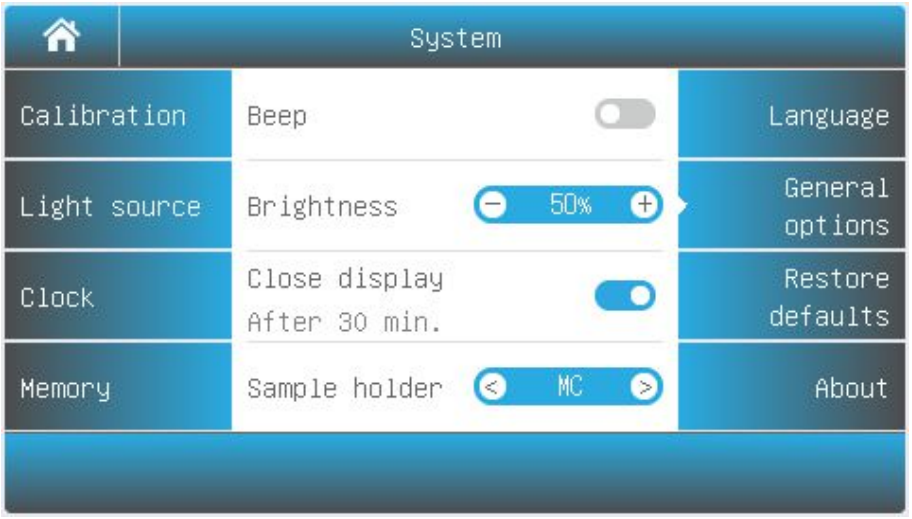
	**Accept** Accept the new language.

Select Tab **Language** in the **System** interface. Select a language, press the icon  to change.



General Options

Select Tab **General Options** in the **System** interface.



Beep: Press the icon to turn on/off the beep.

Brightness: Press the icon 50% to decrease/increase the brightness of the LCD display.

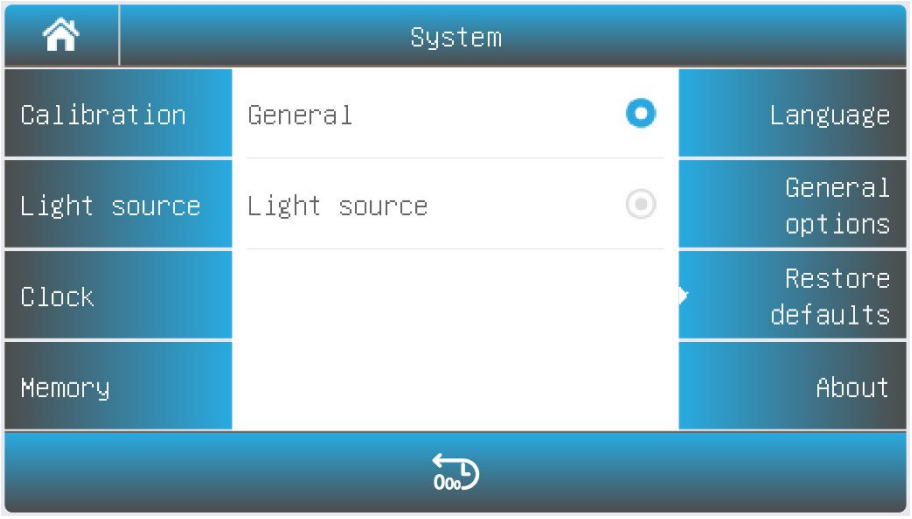
Close display: Press the icon to turn on/off. If turned on, the display will close automatically if no operation for 30 minutes.

Select sample holder If the instrument is equipped with an automatic sample cell holder, you need to press MC before the first use to set the type of automatic sample cell holder provided (Auto Five-cell Holder: AC-5 or Automatic Eight-cell Holder: AC-8

Restore Defaults

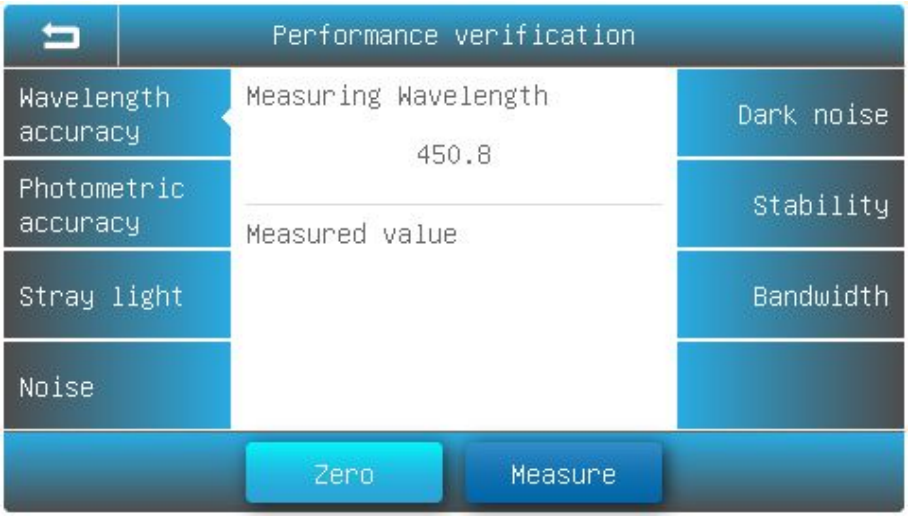
	Restore Restore the parameters to factory settings.

Select Tab **Restore defaults** in the **System** interface. Select an item, press the icon to restore.



Performance Verification

Select the icon  in the main interface. Display options to verify the performance of the instrument.



Important information ***Before verifying the performance, the instrument needs to be preheated for 30 minutes, and then re-measure dark current.***

Verifying Wavelength Accuracy and Wavelength Repeatability

Select Tab **Wavelength accuracy** in the **Performance verification** interface.

Standard Sample: Holmium oxide solution or equivalent filter

Measurement:

1. Remove something in the measurement channel, close the sample chamber cover, press the wavelength value, type in the wavelength of measurement, press the button **Zero**;
2. Put the **Standard Sample** in the measurement channel, press the button **Measure**;
3. Repeat step 2 to do measurement three times. The difference between the average of the three measurements and the standard value is the single-point wavelength tolerance. The difference between the maximum and minimum values of the three measurements is single point wavelength repeatability;
4. Repeat step 1-3 to do measurement single-point wavelength tolerance one by one. The maximum value in the single-point wavelength tolerance is wavelength accuracy. The maximum value in the single-point wavelength reproducibility is wavelength repeatability.

Verifying Photometric Accuracy and Photometric Repeatability

Select Tab **Photometric accuracy** in the **Performance verification** interface.

Standard Sample: NIST 930D or equivalent filter

Measurement:

1. Remove something in the measurement channel, close the sample chamber cover, press the wavelength value, type in the wavelength of measurement, press the button **Zero**;

2. Put the **Standard Sample** in the measurement channel, press the button **Measure**;
3. Repeat step 2 to do measurement three times. The difference between the average of the three measurements and the standard value is the single-point photometric tolerance. The difference between the maximum and minimum values of the three measurements is single point photometric repeatability;
4. Repeat step 1-3 to do measurement single-point photometric tolerance one by one. The maximum value in the single-point photometric tolerance is photometric accuracy. The maximum value in the single-point photometric reproducibility is photometric repeatability.

Verifying Stray Light

Select Tab **Stray light** in the **Performance verification** interface.

Standard Sample: 10g/L NaI solution or equivalent filter (220nm, **UV/VISIBLE models only**), 50g/L NaNo2 solution or equivalent filter (340 or 360nm)

Measurement:

1. Remove something in the measurement channel, close the sample chamber cover, press the wavelength value, type in the wavelength of measurement;
2. Put the **Reference** in the measurement channel, press the button **Zero**;
3. Put the **Standard Sample** in the measurement channel, press the button **Measure**, the result is the stray light of this wavelength.

Verifying Noise

Select Tab **Noise** in the **Performance verification** interface.

Standard Sample: None

Measurement:

1. Remove something in the measurement channel, close the sample chamber cover, press the wavelength value, type in the wavelength of measurement, press the button **Zero**;
2. Press the button **Measure**, the result is the noise of this wavelength.

Verifying Dark Noise

Select Tab Dark **Noise** in the **Performance verification** interface.

Standard Sample: Block

Measurement:

1. Remove something in the measurement channel, close the sample chamber cover, press the wavelength value, type in the wavelength of measurement, press the button **Zero**;
2. Put the **Block** in the measurement channel, press the button **Measure**, the result is the dark noise of this wavelength.

Verifying Stability

Select Tab **Noise** in the **Performance verification** interface.

Standard Sample: None

Measurement:

1. Remove something in the measurement channel, close the sample

chamber cover, press the wavelength value, type in the wavelength 500, press the button **Zero**;
2. Press the button **Measure**, the result is the noise of 500nm.

Verifying Bandwidth

Select Tab Dark **Noise** in the **Performance verification** interface.

Standard Sample:	Low pressure quartz mercury lamp
Measurement:	1. Open the lamp cover, put the low pressure quartz mercury lamp into the lamp seat, and turn it on. 2. Remove something in the measurement channel, close the sample chamber cover, press the wavelength value, type in the wavelength 546.1; 3. Press the button **Measure**, the result is the bandwidth.

Measurement

Important Guidelines

- Reagents and dilution buffers can cause cauterization and other damage to health.
- Samples (nucleic acids, proteins, bacteria cultures) can be infectious and cause serious damage to health.
- During sample preparation, measuring procedures and maintenance and cleaning work, observe all local laboratory safety precautions (e.g. wear protective clothing and gloves, use of disinfectant) regarding the handling of sample material.
- Dispose of measuring solutions and cleaning and disinfectant materials in accordance with the relevant local laboratory regulations.

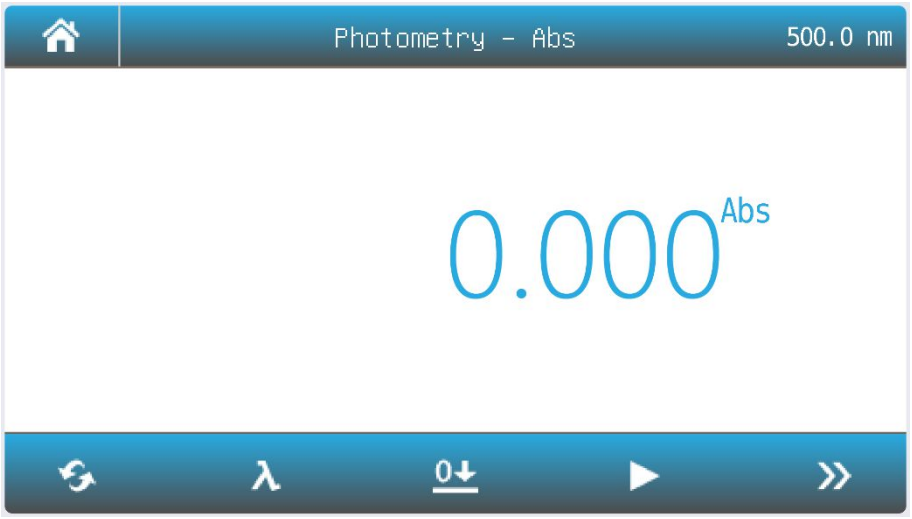
Check the cuvettes

The cuvettes must be clear and there's no remains of the samples on the surface of it. **Only Quartz cuvettes are permitted to be used in the range of UV area.**

Photometry

Photometry mode is used to measure the absorbance or transmissivity of the sample.

1. **Main** interface, press the icon  to start a **Photometry** application.



	Mode Switch measurement mode to %T, Abs or Energy.
	Wavelength Set measurement wavelength.
	Zero Do 0Abs/100%T.
	Read Measure sample and record the result.
	List View the result(s) list.
	Increase/Decrease Increase/Decrease the gain of signal. Only for **Energy** mode.

2. Press the icon to switch to the measurement mode.

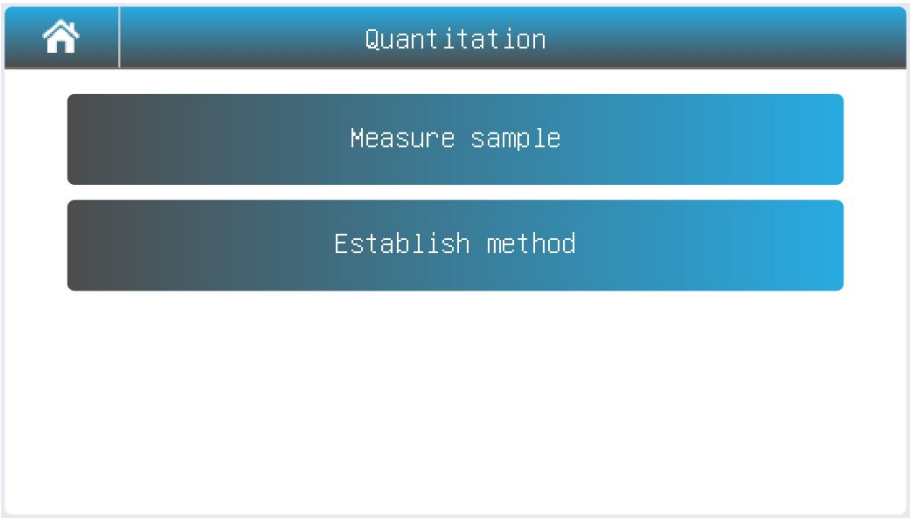
Abs	Measure absorbance value of the sample(s).
%T	Measure transmittance value of the sample(s).
E	Measure energy value of the sample(s).

3. Press the icon to set wavelength, key in the measurement wavelength.
4. Put the reference in the measurement channel, press the icon to do zero.
5. Put the sample in the measurement channel, press the icon to measure a sample and record the result.
6. Press the icon to browse the result(s).

Quantitation

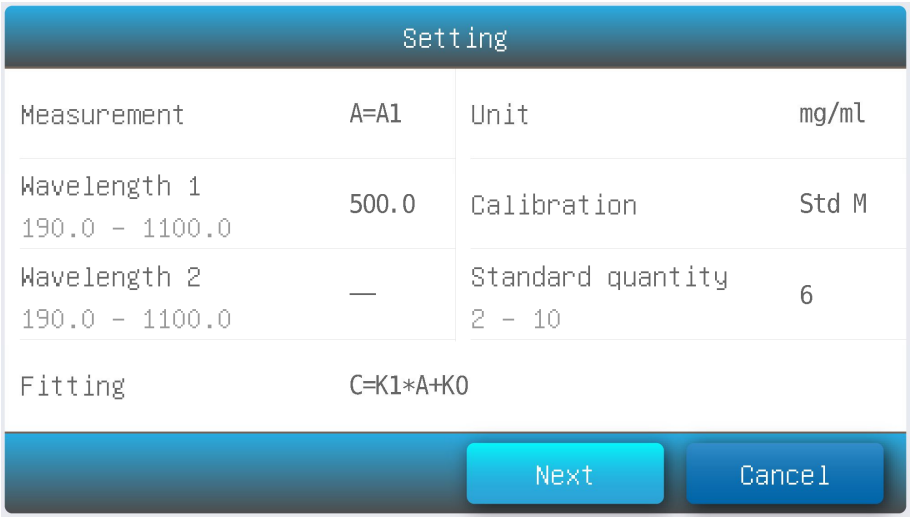
Quantitation mode is used to measure the concentration of the sample(s).

1 **Main** interface, press the icon  to start a **Quantitation** application.



2 Establish Method

2.1 **Quantitation** interface, press the button **Establish method**.



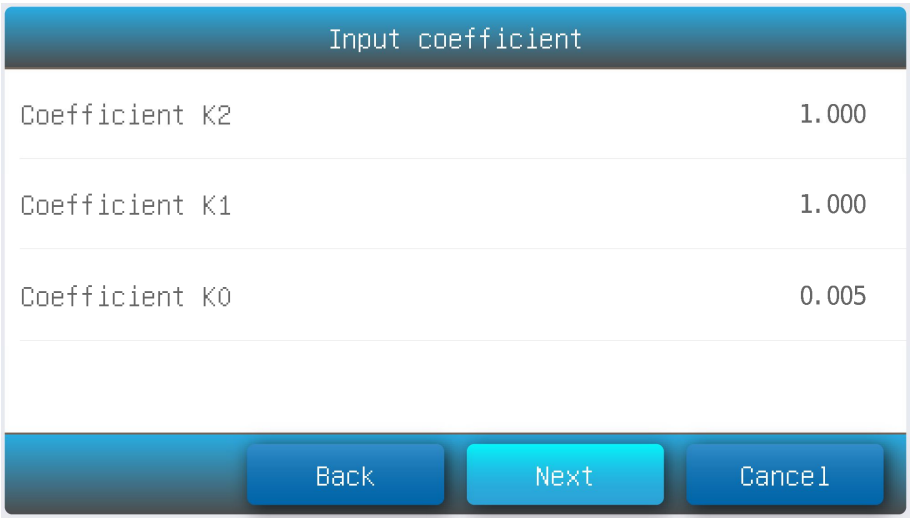
Measurement	**A=A1:** Absorbance is equal to the measured absorbance value of the measured wavelength 1 **A=A1-m*A2:** Absorbance is equal to the difference between the absorbance value of the measured absorbance at the wavelength 1 and the wavelength 2, m is the Coefficient **A=A1/A2:** Absorbance is equal to the ratio of the measured absorbance value of the measured wavelength 1 and 2
Wavelength 1	Measurement wavelength 1
Wavelength 2	Measurement wavelength 2
Fitting	**LIN-0:** Linear to zero **LIN:** Linear. **QUA:** Quadratic.
Unit	- (No Unit), %, ppm, ppb, g/L, mg/L, µg/L, ng/L, g/dL, mg/dL, µg/dL, mg/mL, µg/mL, ng/mL, µg/µL, ng/µL, mol/L, mmol/L, IU, Custom(User input, Up to 8 characters).
Calibration	**Coe K:** Input equation coefficient. **Std M:** Measure standard sample(s) **Std I:** Input standard sample(s)
Standard quantity	Standard sample number (Up to 10)

2.2 Press the item to set measurement parameters.

2.3 After all the parameters are set up, press the button **Next** to start establishing the standard curve. If the item **Calibration** is set to the parameter Coe K, Std M or Std I, please refer to 2.3.1, 2.3.2 or 2.3.3.

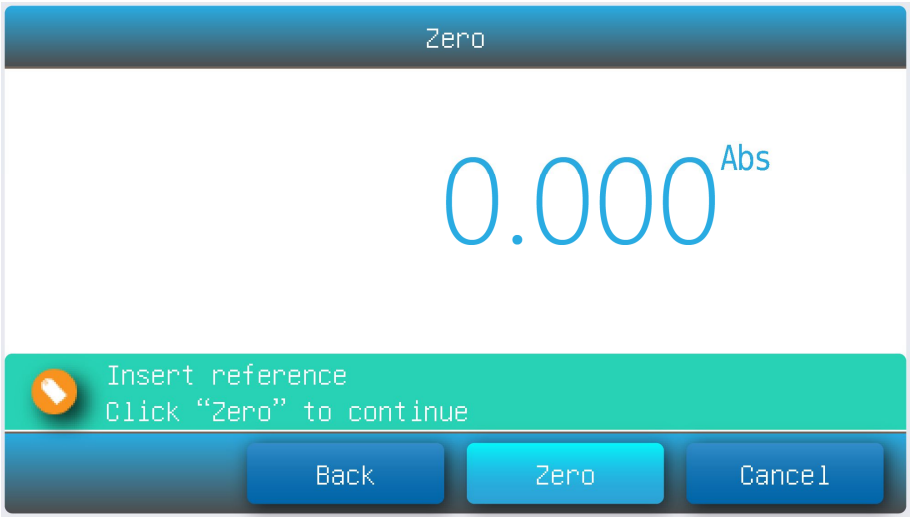
2.3.1 Input equation coefficient to establish standard curve.

(1) Input equation coefficient K0 ~ K3. Press button **Next**.

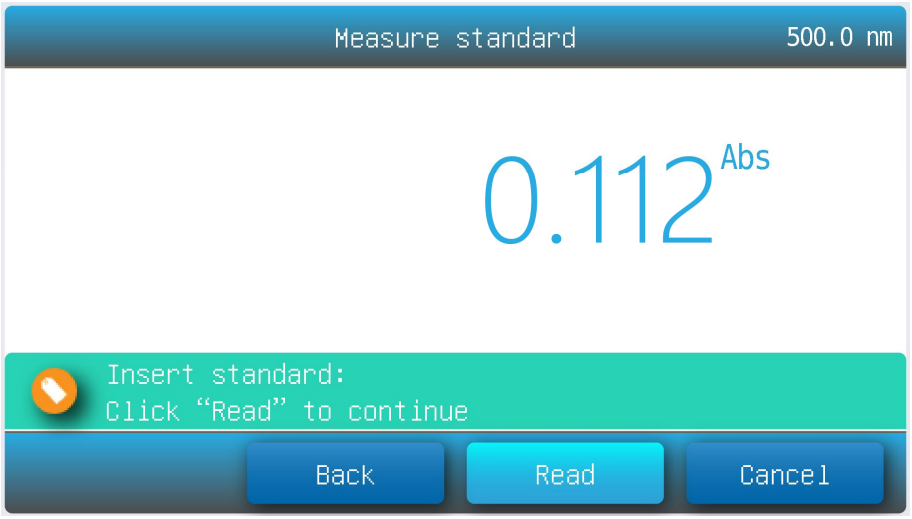


2.3.2 Measure standard sample to establish standard curve

(1) Put the reference in the measurement channel, press the button **Zero** to do zero.

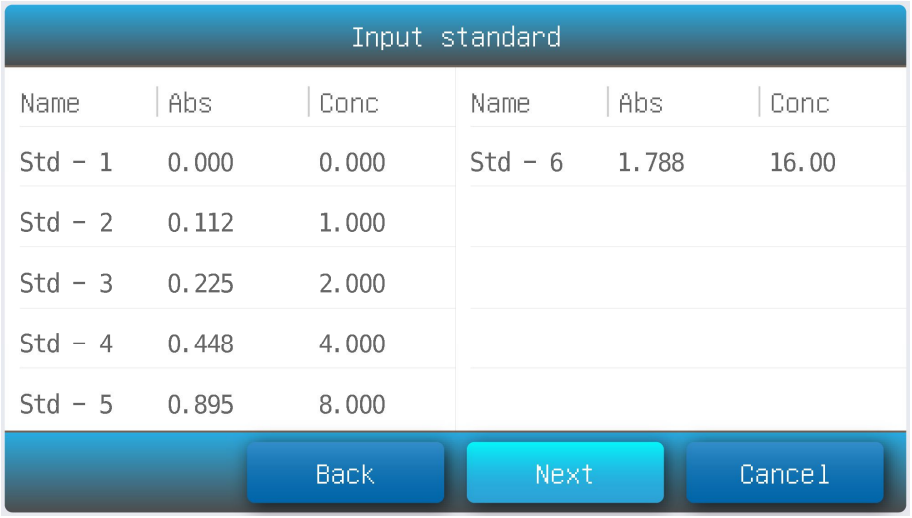


(2) Put the 1# standard sample in the measurement channel, press the button **Read** to measure.



(3) Repeat step 3.3 to measure other of the standard samples.

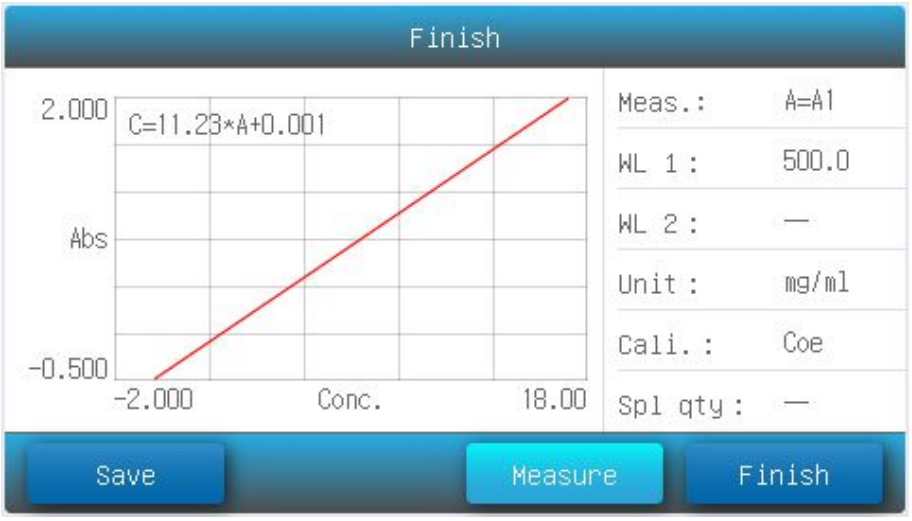
(4) Press the item to input concentration of standard samples, press the button **Next**.



2.3.3 Input standard sample to establish standard curve

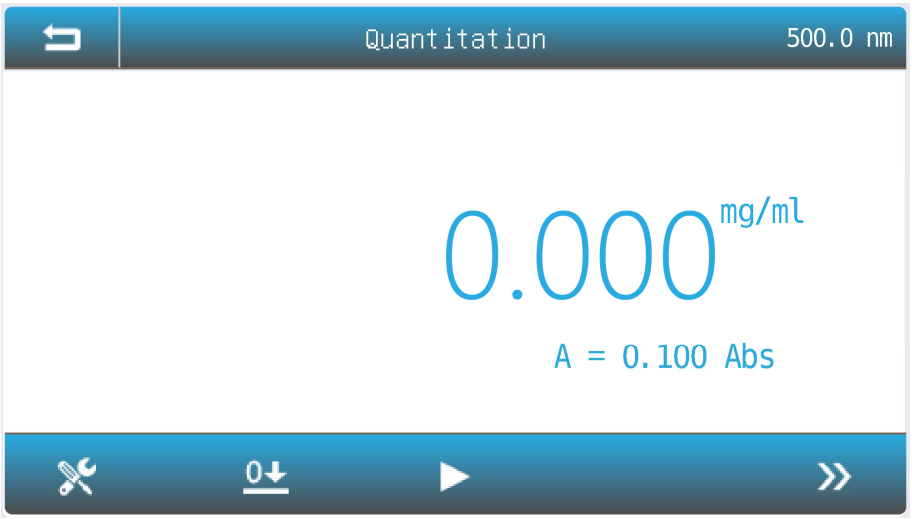
(1) Press the item **Abs** and **Conc** to input absorbance and concentration of standard samples, press the button **Next**.

2.4 Finished establish method. Press the button **Save** to save the method, press the button **Measure** to accept the new method and go to the **measurement interface**, Press the button **Finish** to exit.



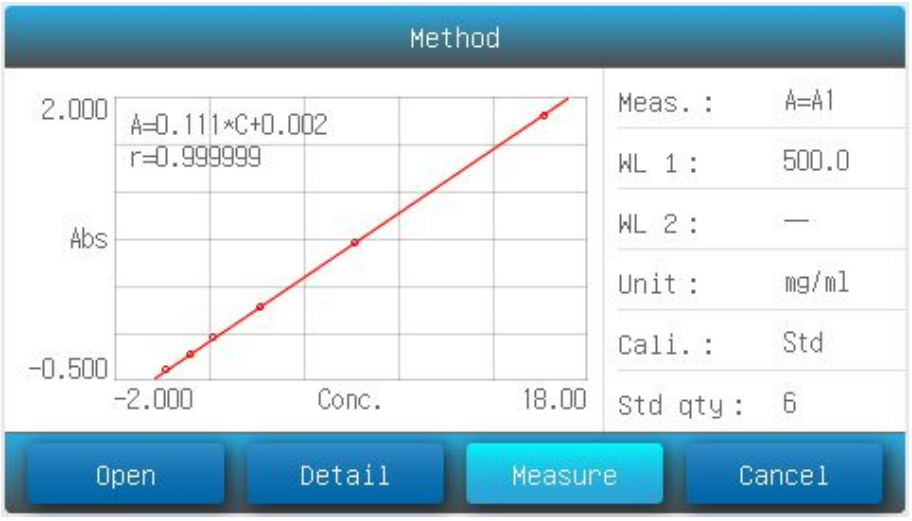
3 Measure Sample

3.1 **Quantitation** interface, press the button **Measure sample**.



	**Method** Select measurement method.
	**Zero** Do 0Abs/100%T.
	**Read** Measure the sample and record the result.
	**List** View the result(s) list.

3.2 Press the icon  to select method.



3.3 Press the button **Open** to load measurement method stored in the internal memory/USB disk.

3.4 Press the button **Measure** to accept the new measurement method and back to **measurement interface**.

3.5 Put the reference in the measurement channel, press the icon  to do zero.

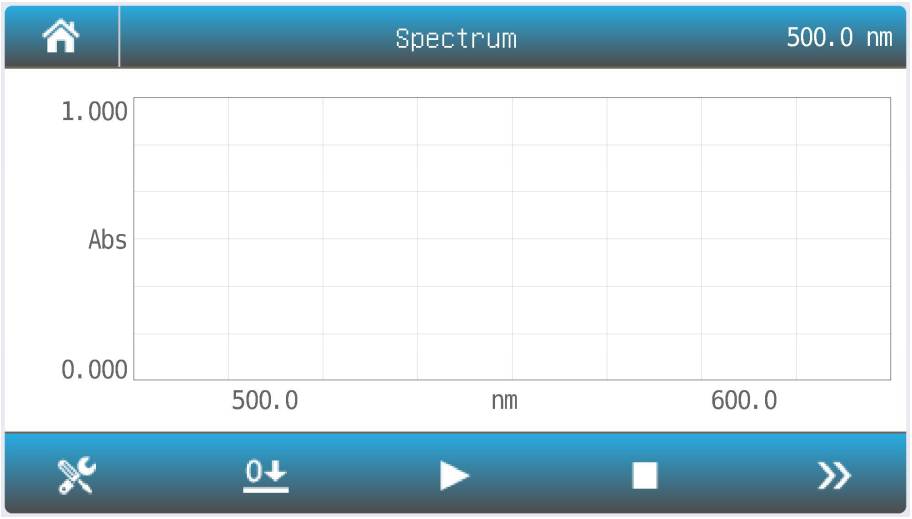
3.6 Put the sample in the measurement channel, press the icon  to measure a sample and record the result.

3.7 Press the icon  to browse the result(s).

Spectrum

Spectrum mode is used to scan the absorbance or transmissivity of the sample in a wavelength range.

1. **Main** interface, press the icon  to start a **Spectrum** application.



	Method Set the measurement parameters.
	Zero Scan baseline.
	Read Scan the sample and draw curve.
	Stop Stop scanning.
	List View the result(s) list.

2. Press the icon to setup the measurement parameters.

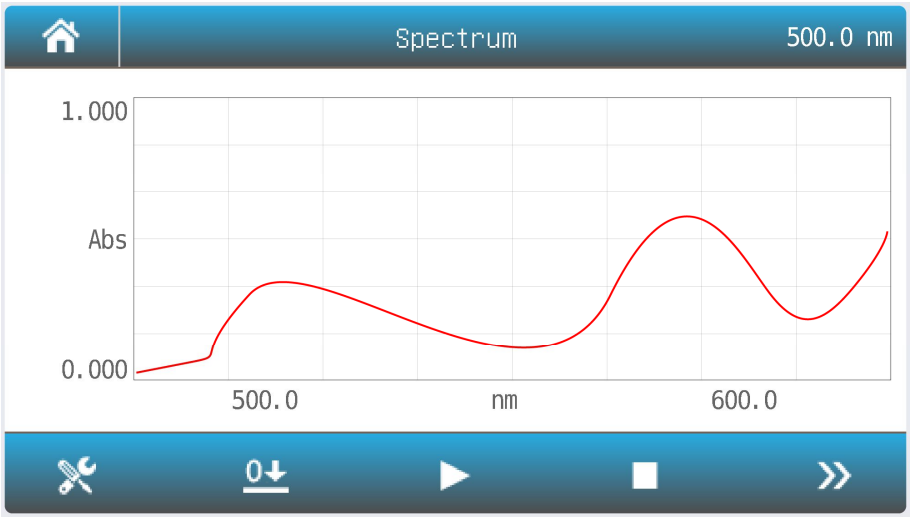
Start wavelength	Scan start wavelength
End wavelength	Scan end wavelength
Step	Scan interval: 0.1,0.2, 0.5, 1.0,2.0, 5.0,10.0 nm
Speed	**HS:** High speed **MS:** Medium speed **LS:** Low speed
Photometry mode	**Abs:** absorbance

	%T: transmissivity
Y minimum	Minimum ordinate
Y maximum	Maximum ordinate

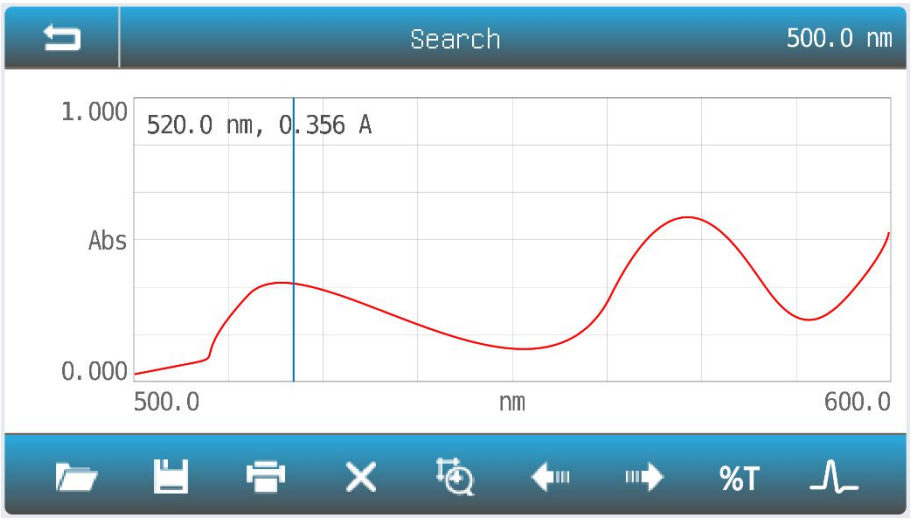
3. Press the item to select or key in the parameters, press the button **Measure** to accept the new parameters and back to **measurement** interface.

4. Put the reference in the measurement channel, press the icon  to scan baseline.

5. Put the sample in the measurement channel, press the icon  to scan a sample and record the result.



6. Press the icon  to browse the curve and result(s).



	**Scale** Set the Coordinate value.
	**Left** Moves the cursor to the left point (peak) to point(peak).
	**Right** Moves the cursor to the left point (peak) to point(peak).
	**Mode %T** Change the mode to %T.
	**Mode Abs** Change the mode to Abs.
	**Point/Peak** Peak Change the search mode point/peak.

Troubleshooting

Review the information in the table below to troubleshoot operating problems.

Problem	**Cause**	**Solution**
Power on, no response	Power cord connection is not reliable	Improve connectivity
	Fuse burning	Replace fuse
Measurement uncertainty	Sample is not Stable	Improve the sample
	Glass cuvettes used in UV Range	Use quartz cuvettes
	The concentration of sample is too high	Diluted sample
	Power Supply Voltage Low or not Stable	Improve the Power Supply
	Lamp damage or lamp life maturity	Replace lamp
Dark Current Error when self-check	The lid of the compartment is open during self-check	Close the lid, restart
System Calibrate Failed	Something block the Light path	Remove it, calibrate again
Measurements inaccurate	Cuvettes were contaminated	Clean cuvettes
	Samples were contaminated	Improve samples
	Worse matching of the cuvettes	Improve the matching of the cuvettes
	Dark current error	Resample dark current

Repair and Maintenance

Daily Maintain

Check the compartment

After measurement, the cuvettes with sample solutions should be taken out of the compartment in time. Or the volatilization of the solution would make the mirror go moldy. Users must pay more attention to the corrosive sample and liquid easy to volatilize. Any solution remains in the compartment should be wipe off immediately.

Surface clean

The cover of the instrument is with paint. Please use wet towel to wipe off the drips on the surface immediately. Organic solution is forbidden to be used to clean the cover. Please wipe off the dirt on the cover timely.

Clean the cuvettes

After every test or after a solution change, the cuvettes should be cleaned carefully, or the remains on the surface would cause measuring error.

Spare Parts Replacement

Replace the fuse

Danger! ***Be sure to switch off the power and unplug the socket before replacement!***

1. **Tools preparation**

   Prepare a 3×75 Flat Blade screwdriver.

2. **Switch Off the power supply**

   Switch off the power supply, and unplug the socket.

3. **Take out the Fuse Seat**

   Push the fuse case by using the screwdriver, and turn it counterclockwise, the fuse seat will pop out when released.

4. **Replace a new fuse**

   Pick out the spare fuse (3.15A/250V) and replace it.

5. **Reset the fuse seat**

   Replace the fuse seat in the power socket. Push the fuse case by using the screwdriver, and turn it clockwise, the fuse seat will be locked when released.

6. **Switch on the power**

   Plug the socket and switch on the power.

Replace lamps

Hot! ***Wait 20 minutes before open the lamp chamber after power off to avoid scald!***

1. **Tools preparation**

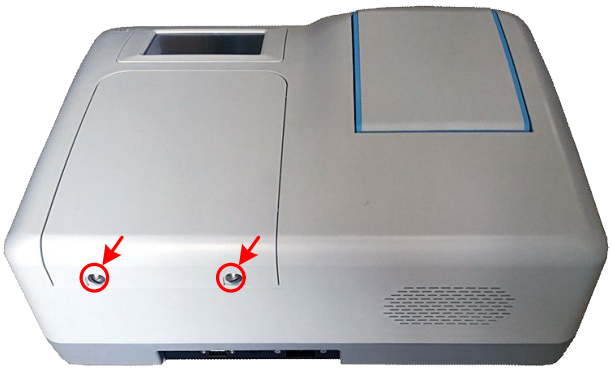
   Prepare a 6×150mm Flat Blade screwdriver and a pair of glove.

2. **Power Off**

   Switch off the power supply and unplug the socket.

3. **Open the cover**

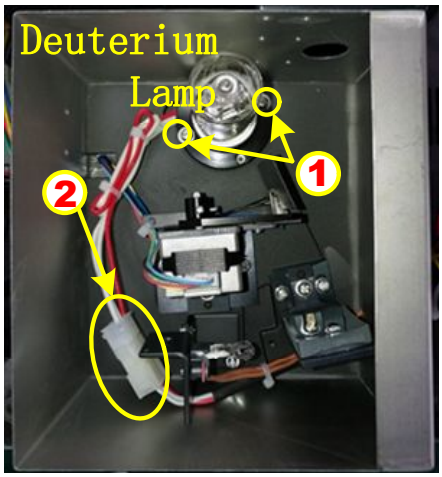
   Loosen the indicated two screws and remove the lamp cover.



4. **Replace the D2 lamp**

   If your spectrophotometer is visible model, please skip to step 5.

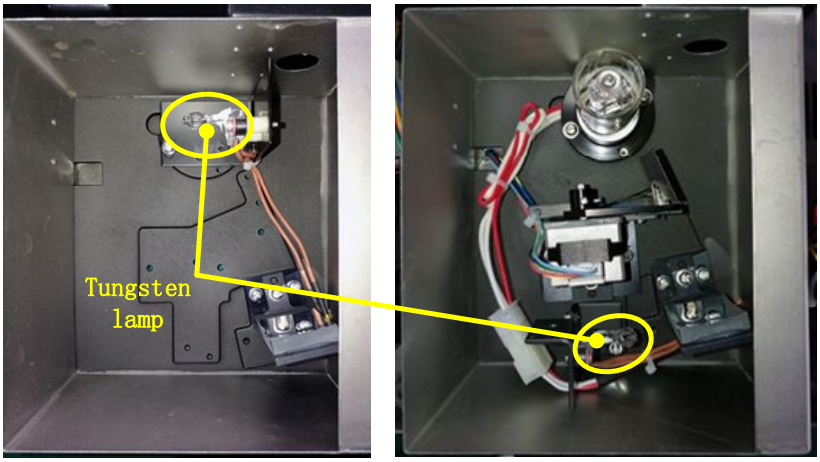
   Unplug the connector (No. 2) .Unscrew the 2 screws on the D2 Flange (No.1) and remove the D2 lamp. Draw on the cotton glove and replace a new lamp. Fix the 2 screws and plug the connector again.



5. Replace W lamp

The Tungsten lamp is equipped with a blue-grey silicon coating by manufacturer. This coating is only a transport safety device. It can be removed with the first exchange of lamp.

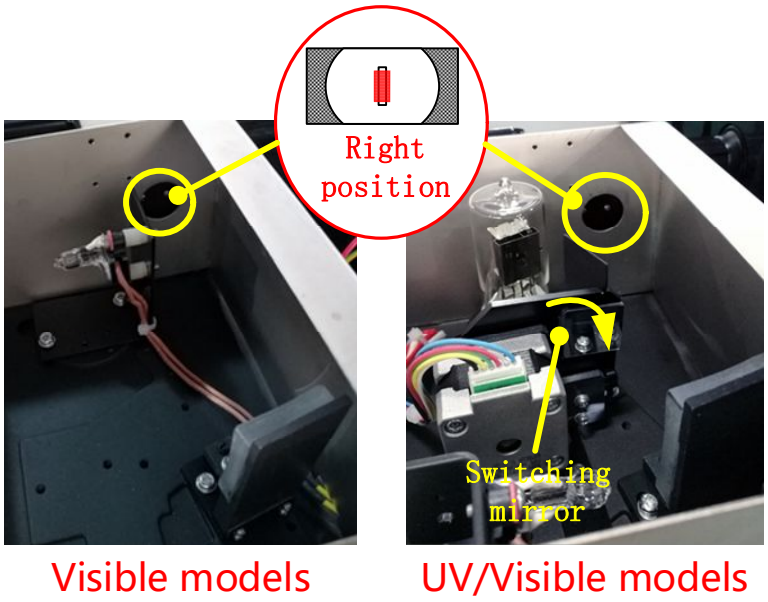
Pull out the defected W lamp and draw on the cotton glove. Insert the new W lamp as deep as possible on the lamp seat. Be sure to keep the filament in the same direction as the old one face.



Visible models UV/Visible models

6. Adjust the position of the W lamp

Switch on the power(the Switch Mirror should be placed to the position as indicates). Observe the entrance facular, and it should in the center of the entrance hole. If the facular deviate to Left or Right, then loosen the two screws and move the lamp seat to Left or Right until it focus on the center of the slot. Then fix the screws.



7. Finish

Reset the cover of the light chamber and fix the screws. Reset the cover of the lamp room and fix the screws.

Warranty

We warrants that this product will be free from defects in material and workmanship for a period of one (1) year from date of delivery except the lamps. Lamps have a warranty of 1000 h lamp usage time or 6 months max. If a defect is present, WE will, at its option and cost, repair, replace, or refund the purchase price of this product to the customer, provided it is returned during the warranty period. This warranty does not apply if the product has been damaged by accident, abuse, misuse, or misapplication, or from ordinary wear and tear. If the required maintenance and inspection services are not performed according to the manuals and any local regulations, such warranty turns invalid, except to the extent, the defect of the product is not due to such non-performance.

Items being returned must be insured by the customer against possible damage or loss. This warranty shall be limited to the aforementioned remedies. IT IS EXPRESSLY AGREED THAT THIS WARRANTY WILL BE IN LIEU OF ALL WARRANTIES OF FITNESS AND IN LIEU OF THE WARRANTY OF MERCHANTABILITY.

Compliance with local laws and regulations

The customer is responsible for applying for and obtaining the necessary regulatory approvals or other authorizations necessary to run or use the Product in its local environment. WE will not be held liable for any related omission or for not obtaining the required approval or authorization, unless any refusal is due to a defect of the product.

Equipment Disposal

This equipment is marked with the crossed out wheeled bin symbol to indicate that this equipment must not be disposed of with unsorted waste.

Instead it's your responsibility to correctly dispose of your equipment at lifecycle -end by handling it over to an authorized facility for separate collection and recycling. It's also your responsibility to decontaminate the equipment in case of biological, chemical and/or radiological contamination, so as to protect from health hazards the persons involved in the disposal and recycling of the equipment.

For more information about where you can drop off your waste of equipment, please contact your local dealer from whom you originally purchased this equipment.

By doing so, you will help to conserve natural and environmental resources and you will ensure that your equipment is recycled in a manner that protects human health.

Thank you!