



UV-Vis Spectrophotometer

Operation Manual

(Please read this manual carefully before operating the instrument)

Preface

Thank you for choosing the StonyLab UV-Vis Spectrophotometer.

This manual provides essential information for the proper installation, operation, and use of the instrument. It includes an overview of the measurement principle, technical specifications, instrument components, operating procedures, measurement functions, and system settings.

Before operating the instrument, please read this manual carefully and become familiar with the controls, operating procedures, and applicable precautions. Proper installation and operation will help ensure reliable measurement performance and consistent results.

Upon receiving the instrument, inspect the package and its contents according to the packing list. If any component is missing or damaged, or if the package shows signs of shipping damage, contact StonyLab team before operating the instrument.

The information in this manual is based on the current product configuration. StonyLab reserves the right to make technical improvements or product modifications without prior notice. If the actual instrument differs from the descriptions or illustrations in this manual, please contact StonyLab for technical support.

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1. Overview

1.1 Instrument Overview

The UV-Visible Spectrophotometer features a wide wavelength range, high sensitivity, powerful functions, ease of operation, a simple structure, and a practical design. The instrument is equipped with a large-screen LCD display, a high-precision A/D converter, and non-volatile memory, providing distinctive advantages among spectrophotometers of the same class.

The instrument is suitable for chemical, pharmaceutical, biochemical, materials, environmental, industrial, research, and educational laboratory applications. It can be used for routine spectrophotometric analysis and laboratory quality-control applications.

1.2 Measurement Principle

Spectrophotometric analysis is based on the selective absorption of light at different wavelengths by a sample. By analyzing the absorption characteristics of a sample, qualitative and quantitative analyses can be performed, and information regarding the structure and chemical composition of substances can be obtained from their absorption spectra.

The instrument operates according to the principle of relative measurement. During measurement, an appropriate reference, such as air, distilled water, or a reagent blank, is used to establish the reference signal. Its transmittance (T) is set to 100%, and the transmittance of the test sample is then measured relative to the reference.

Within a certain range, the absorbance of the test sample has a specific relationship with its concentration. This relationship conforms to the Lambert-Beer Law within the applicable range and provides the basis for quantitative spectrophotometric analysis.

1.3 Measurement Equations

The transmittance of the sample is calculated as:

$$T = I / I_0$$

The absorbance is calculated according to:

$$A = KCL = -\log T = -\log(I / I_0)$$

Where:

Symbol	Description
T	Transmittance
A	Absorbance
C	Solution concentration
K	Absorption coefficient of the solution
L	Optical path length of the liquid layer
I	Light intensity reaching the photoelectric converter through the test sample
I ₀	Light intensity reaching the photoelectric converter through the reference sample

Within the applicable measurement range, absorbance is proportional to the solution concentration and optical path length according to the Lambert-Beer Law:

$$A = KCL$$

This relationship provides the basis for quantitative analysis by UV-Visible spectrophotometry.

2. Technical Specifications and Functions

2.1 Key Technical Specifications

The key technical specifications of the UV-Visible Spectrophotometer are as follows:

Item	Specification
Optical System	Single Beam
Light Source	Tungsten Lamp; Deuterium Lamp
Spectral Bandwidth	2.0 nm
Wavelength Range	190-1100 nm
Wavelength Accuracy	±0.5 nm
Wavelength Repeatability	≤0.2 nm
Photometric Range	-0.3 to 3.0 A; 0-200%T
Stray Light	≤0.05%T @ 220 nm
Photometric Accuracy	±0.002 A @ 0.5 A; ±0.004 A @ 1.0 A; ±0.5%T @ 100%T
Photometric Repeatability	≤0.001 A @ 0.5 A; ≤0.002 A @ 1.0 A; ≤0.2%T @ 100%T
Baseline Drift	≤0.001 A/h @ 500 nm (after 1-hour warm-up)
Sample Compartment	Four-cell holder, 10 mm path length
Display	Dot-matrix LCD
Data Output	USB Port; Printer Port
Power Requirements	AC 110 V, 60 Hz or AC 220 V, 50 Hz; 160 W
Dimensions (L x W x H)	490 x 360 x 240 mm
Weight	14.5 kg

2.2 Key Functions

The UV-Visible Spectrophotometer provides three major functional categories: photometric measurement, quantitative measurement, and system functions.

2.2.1 Photometric Measurement

The instrument provides selectable measurement modes, including absorbance, transmittance, and energy.

Up to 200 groups of measurement results can be stored in the instrument's memory and printed.

2.2.2 Quantitative Measurement

The instrument can establish a standard curve using either the coefficient method or the standard sample calibration method.

The regression equation and measurement results can be stored in the instrument's memory or printed. Up to 200 groups of data can be stored.

2.2.3 System Functions

The system functions include:

- Turning the deuterium and tungsten lamps on or off
- Dark-current calibration
- Wavelength calibration
- Data export
- Measurement mode selection
- Restoring factory settings

3. Instrument Installation

3.1 Environmental Requirements

The UV-Visible Spectrophotometer is designed with consideration of the effects of environmental conditions on instrument performance. Before installation, check the installation environment to ensure proper operation and help maintain the service life of the instrument.

The following environmental conditions are recommended for normal operation:

(1) Temperature and Humidity

Install and operate the instrument away from high-temperature and high-humidity environments.

- Operating temperature: 16-35°C
- Relative humidity: 45-80% RH

(2) Electromagnetic Interference

Install the instrument away from sources of magnetic fields, electric fields, and high-frequency electromagnetic interference. Keep the instrument as far as practicable from electronic devices that may generate such interference.

(3) Corrosive Gases

Do not install or operate the instrument in an environment where corrosive gases are present at concentrations that significantly exceed applicable standards.

Examples of corrosive gases include chlorine, hydrogen chloride, hydrogen sulfide, and sulfurous acid gases.

(4) Installation Surface and Ventilation

Place the instrument on a stable, level, and vibration-free surface.

Ensure that the ventilation openings and fan are not obstructed and that sufficient clearance is provided for proper heat dissipation and ventilation.

(5) Power Supply

The instrument requires one of the following power supplies for normal operation:

- AC 220 ± 22 V, 50 ± 1 Hz
- AC 110 ± 11 V, 60 ± 1 Hz

(6) Grounding

Use a dedicated power outlet whenever possible. Ensure that the power supply is properly grounded to help prevent abnormal instrument operation and improve electrical safety.

(7) Voltage Stability

If the local power supply voltage is unstable, use a regulated power supply to ensure stable instrument operation.

(8) Protection from Direct Sunlight

Install the instrument away from direct sunlight.

(9) Dust Control

Maintain a clean and dust-free environment around the instrument. Avoid installing the instrument in areas with excessive dust.

3.2 Power Supply Check

NOTE: The supply voltage may vary significantly from one country or region to another. Before installation, verify that the local power supply voltage and frequency are compatible with the instrument's specified power requirements.

3.3 Installation Procedure

The installation of the UV-Visible Spectrophotometer is straightforward. Follow the steps below to complete the installation.

Step 1. Check the Package Contents

Open the package carefully and check all contents against the packing list.

If any item is missing or damaged, please contact the StonyLab Team immediately for assistance.

Step 2. Place the Instrument

Remove the instrument from the package and carefully place it on a stable and level surface.

Ensure that the installation location meets the environmental requirements specified in Section 3.1.

Step 3. Connect the Power Cable

Make sure that the instrument is switched OFF.

Connect the power cable to the power connection of the instrument and the power supply socket.

Step 4. Connect the Power Supply

Check that all connections are secure and properly connected.

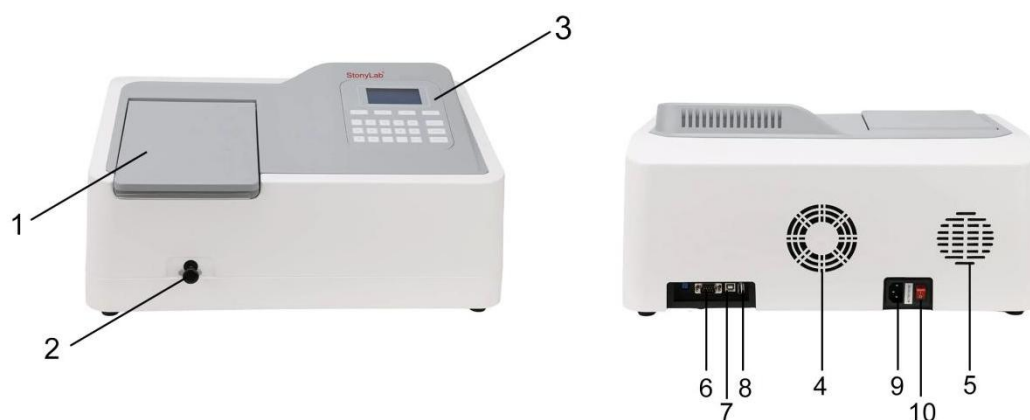
Switch ON the instrument. After the self-test is completed, the instrument is ready

for normal operation.

4. Instrument Description

4.1 Instrument Components

The main components and interfaces of the UV-Visible Spectrophotometer are shown in the figures below.



No.	Component	No.	Component
1	Sample Chamber Cover	6	Printer Port
2	Pull Rod	7	USB Type-B Port (Software Connection)
3	Operating Panel	8	USB Port
4	Cooling Fan	9	Power Socket
5	Louver Cover	10	Power Switch

4.2 Operating Panel

The operating panel consists of the following main components:



No.	Component	No.	Component
1	LCD Display	2	Keypad

4.3 Key Description

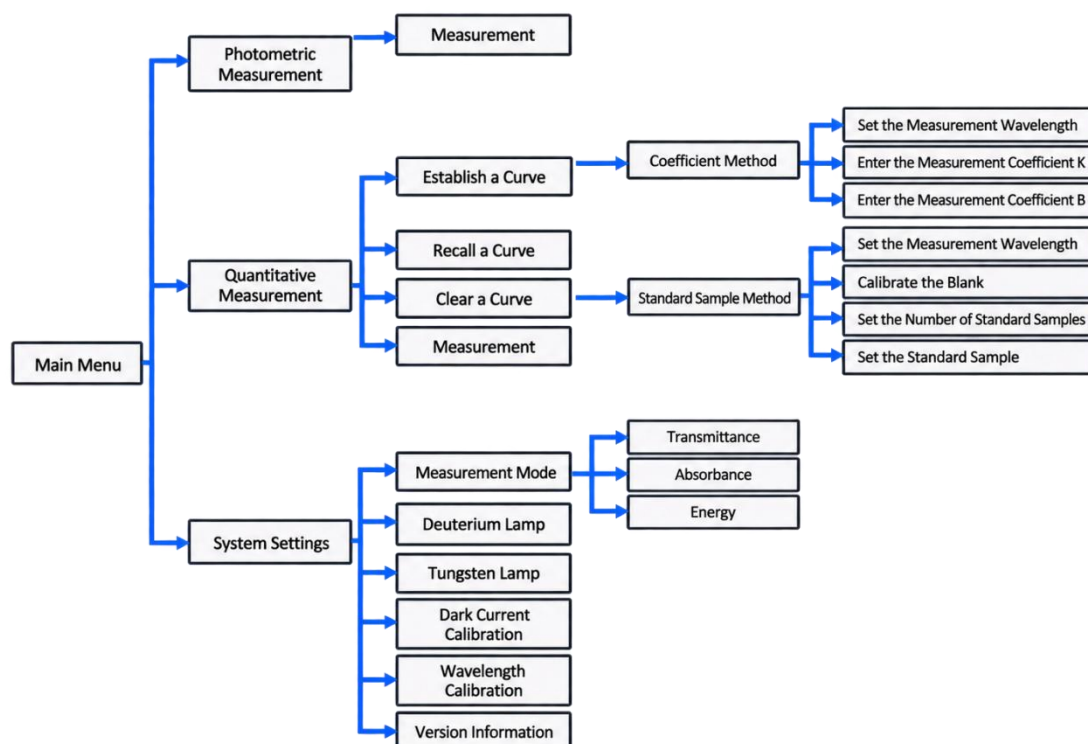
The functions of the operating keys are described below:

	Set the measurement parameters
	Set the wavelength
	Calibrate 100%T / 0 Abs
	Print the data
	Performs the function shown above the key on the current screen
	Scroll down through menu options or move to the next data page
	Scroll up through menu options or move to the previous data page
	Confirm the entered value or setting
	Clear the entered or saved data
<0-9> <.> <->	Enter numerical data, such as wavelength, concentration, and time

5. Instrument Use

5.1 Software System

The software system of the UV-Visible Spectrophotometer is shown below.



5.2 Basic Operations

5.2.1 Measurement Mode Selection

On the main interface, press the corresponding function key  to enter the desired measurement mode.

5.2.2 Wavelength Setting

On the keypad, press the wavelength setting key  to enter the wavelength setting interface.

Press the corresponding keys ( or ) to adjust the entered wavelength value.

Press the left function key  to proceed with the selected wavelength and

automatically perform 100%T / 0 Abs calibration.

5.2.3 Parameter Setting

Press the parameter setting key  to enter the parameter setting interface.

Press the corresponding keys ( or ) to select the required settings or enter the parameters, then press the left function key  to confirm.

5.2.4 Deleting Measurement Results and Stored Data

If the instrument's local memory is full and all saved data needs to be cleared, press and hold the corresponding key  in the data-viewing interface to delete all data.

5.2.5 100%T / 0Abs Calibration

Place the reference in the light path and press the corresponding key  to calibrate 100%T / 0Abs.

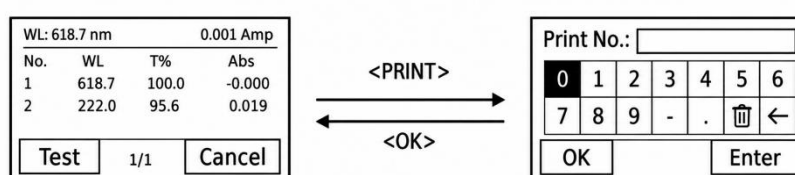
5.2.6 Sample Measurement

Place the sample in the light path and press the left function key  to measure the sample.

5.2.7 Printing Measurement Results

On the measurement interface, briefly press the print key  to enter the print settings.

Enter the data number to be printed, then press the left function key  to print the corresponding test result.



5.3 Preparations Before Measurement

5.3.1 Power-On Self-Test

(1) Prepare the Instrument

Ensure that the light path is clear and close the sample chamber cover.

(2) Start the Self-Test

Turn on the power switch on the instrument to start the self-test.

(3) Perform the Self-Test

During the self-test, the instrument automatically checks the following items:

- Color filter
- Lamp switch
- Detector
- Deuterium lamp
- Tungsten lamp
- Wavelength calibration
- Dark-current calibration



(4) Check for Errors

If an error is detected during the self-test, the instrument will beep and display the item associated with the error.

Press any key to continue the self-test process.

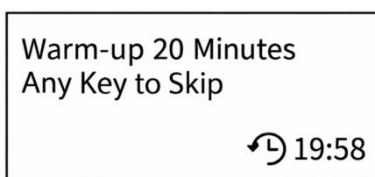
After the self-test is completed, access the system functions for further inspection and calibration.

If the error persists, please contact the StonyLab Team for assistance.

5.3.2 Preheating

After the self-test is completed, the instrument enters the preheating state.

Allow the instrument to preheat for 20-30 minutes to ensure accurate measurement.



5.3.3 Confirm the Colorimeter Cell

Before placing the sample into the colorimeter cell, confirm that the cell is clean and free of any residue.

- (1) Inspect the colorimeter cell and ensure that it is clean and free of residues before use.
- (2) If the wavelength to be tested is below 400 nm, use a quartz cell.

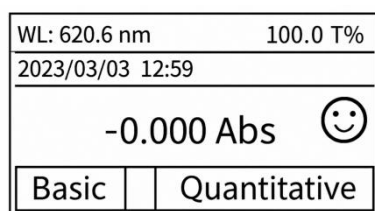
5.4 Measurement

5.4.1 Photometric Measurement

Photometric measurement is used to measure the absorbance or transmittance of a sample at a fixed wavelength.

- (1) Enter the Photometric Measurement Interface

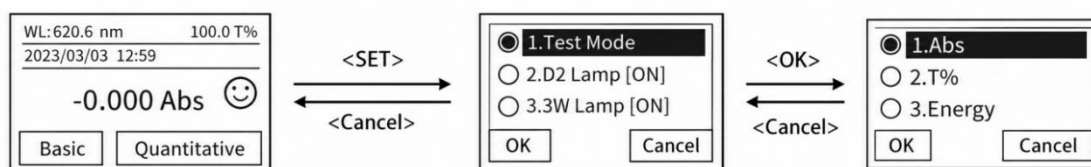
After the self-test and preheating are completed, the instrument automatically enters the main interface of the photometric measurement mode, as shown below:



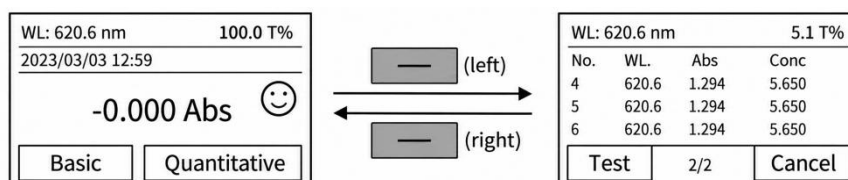
Press the  key and  (left) to enter the working mode interface.

Press  or  to select the desired working mode, such as Absorbance,

Transmittance, or Energy. After selecting the desired mode, press  (right) to confirm and return to the main interface.

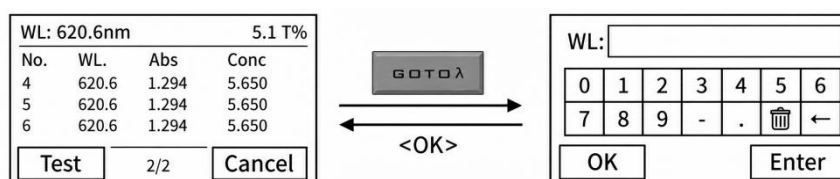


On the Main Interface, press (left) and select Basic.



(2) Set the Wavelength

Press to enter the wavelength setting interface. Press or to enter the desired wavelength value, then press (left) to confirm and proceed with the set wavelength.



The valid wavelength range is 190-1100 nm. If an invalid value is entered, the instrument will beep three times and return to the main interface of the photometric measurement mode.

(3) Calibrate 100%T / 0Abs

Place the reference sample in the light path and wait until the stability indicator appears. Then, press to calibrate 100%T / 0Abs.

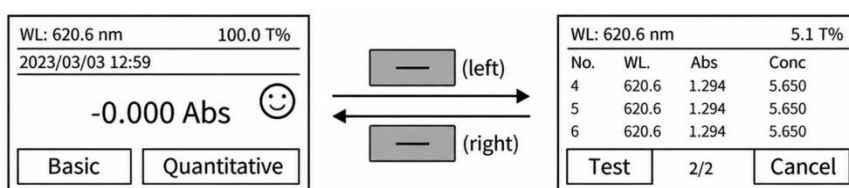
NOTE: Always place the reference sample in the light path before performing the blank calibration. Otherwise, the measurement results may be inaccurate.

(4) Measure the Samples

Place the sample in the light path and wait until the stability indicator appears.

Press (left) to enter the measurement interface, then press the (test) key again to obtain the measurement result. The reading will be displayed in the data list.

Repeat this operation to complete the measurement of all samples.



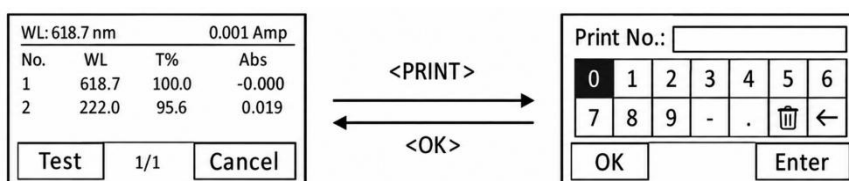
Each page can display up to three data records. Press or to view data on other pages.

The wavelength can also be adjusted in the measurement interface. If the wavelength is changed, 100%T / 0Abs calibration must be performed again; otherwise, the measurement results may be inaccurate.

(5) Print the Data

In the measurement interface, short-press to enter the print settings.

Enter the data number to be printed, then press (left) to print the corresponding measurement result.



(6) Delete the Data

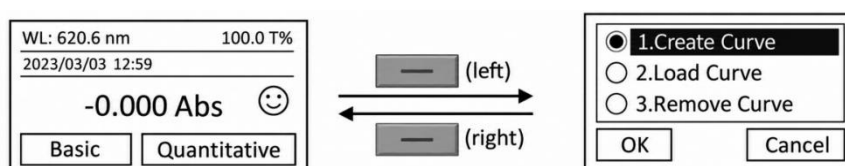
If the local memory is full and you want to clear all saved data, long-press in the Data View interface to delete all saved data.

5.4.2 Quantitative measurement

Quantitative measurement uses standard samples with known concentrations to establish a standard curve, which can then be used to determine the concentrations of similar samples. If the coefficients K and B are known in advance, the standard curve can also be established using the coefficient method.

(1) Enter the Quantitative Measurement Interface

On the Main Interface, press (right) to select "Quantitative Measurement".

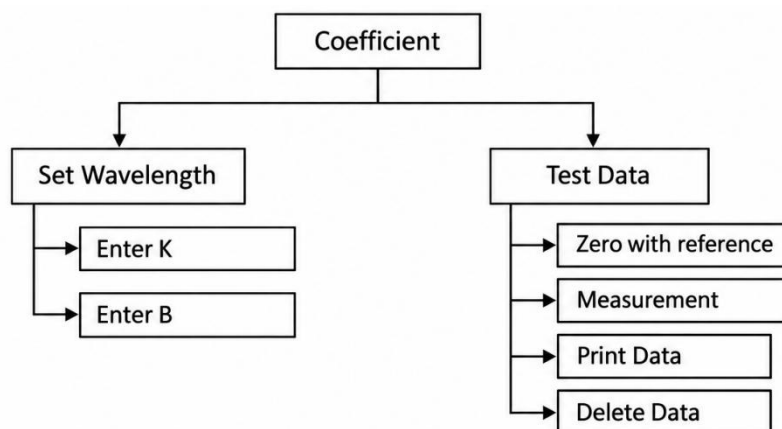


(2) Establish or Load the Standard Curve

There are two methods available for establishing a standard curve. Select the appropriate method according to the measurement requirements.

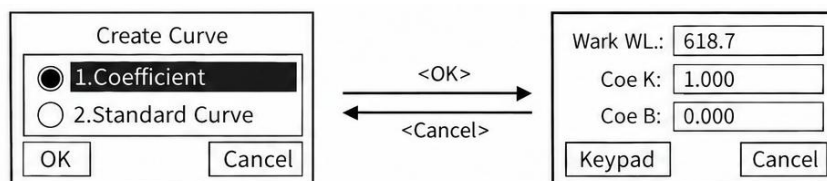
- **Coefficient Method**

The coefficient method is a simple approach to quantitative measurement. It calculates the concentration based on the absorbance measured by the spectrophotometer and the preset coefficients K and B.



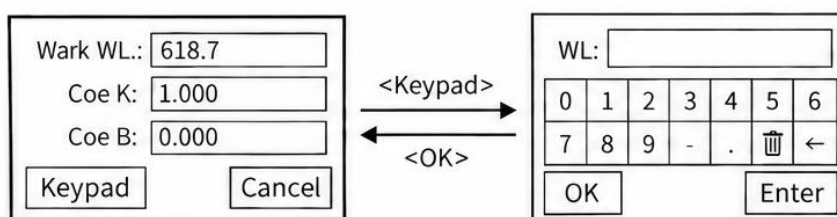
A. Select the Coefficient Method

Press or to select "Create Curve", then press or to select "Coefficient Method".



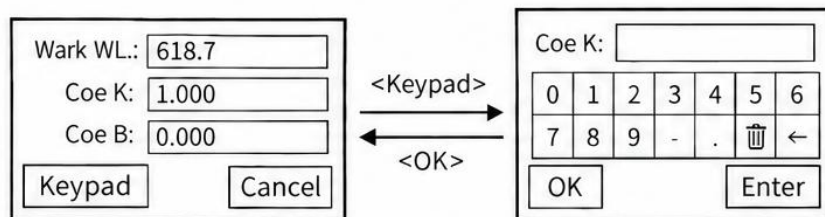
B. Set the Measurement Wavelength

Press or to enter the desired wavelength value, then press (left) to confirm and return to the previous interface.



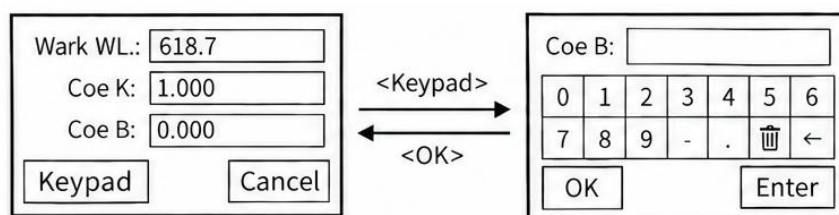
C. Set the Measurement Coefficient K

Press or to enter the K value, then press (left) to confirm and return to the previous interface.



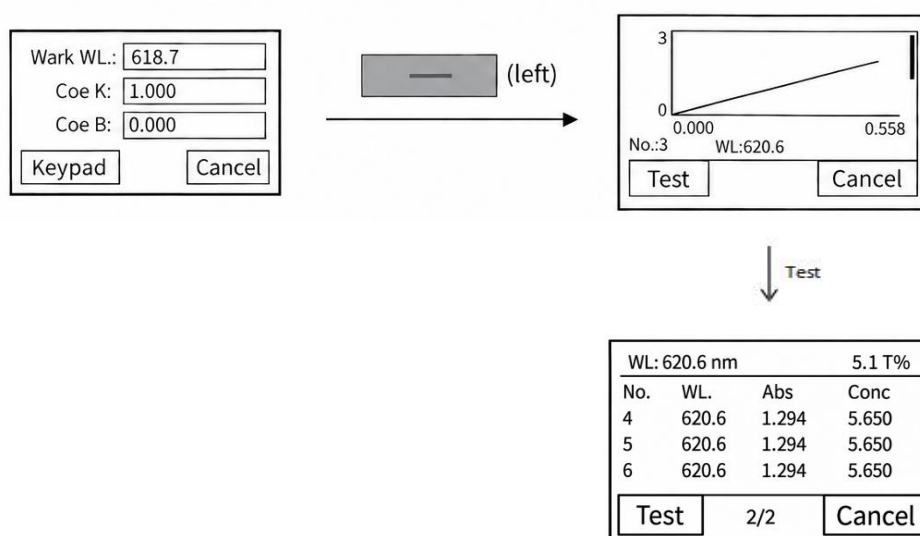
D. Set the Measurement Coefficient B

Press or to enter the B value, then press (left) to confirm and return to the previous interface.



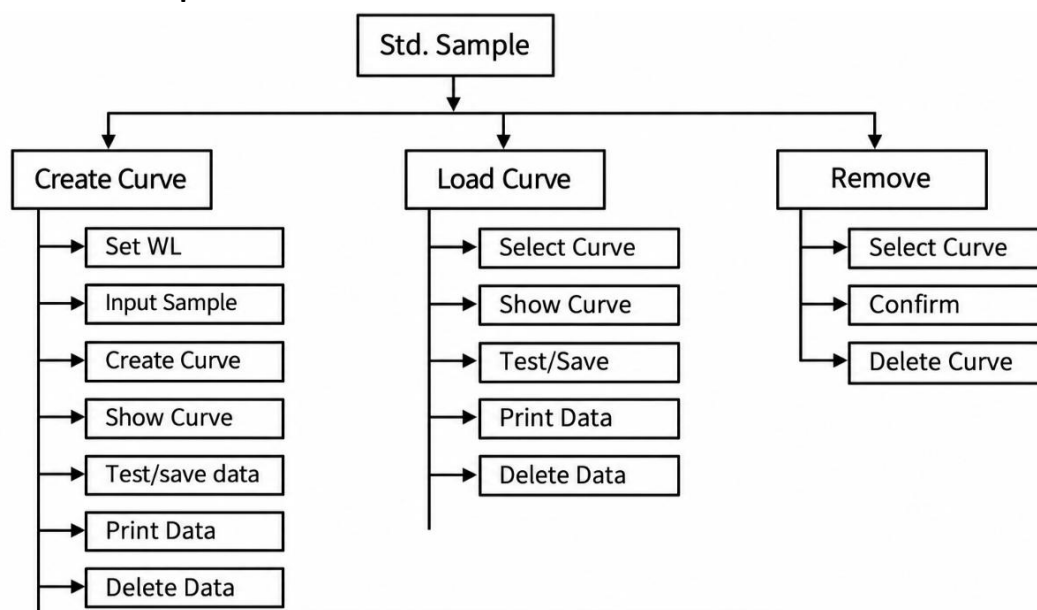
Continue pressing or until Keypad changes to OK, then press (left) to confirm and complete the coefficient method settings.

The instrument will then display the newly established curve. You can proceed with the sample measurements.



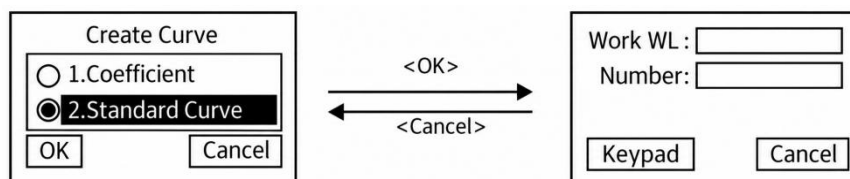
NOTE: Before taking measurements, perform the blank calibration using the reference sample. Otherwise, the measurement results may be inaccurate.

- **Standard Sample Method**



A. Select the Standard Sample Method

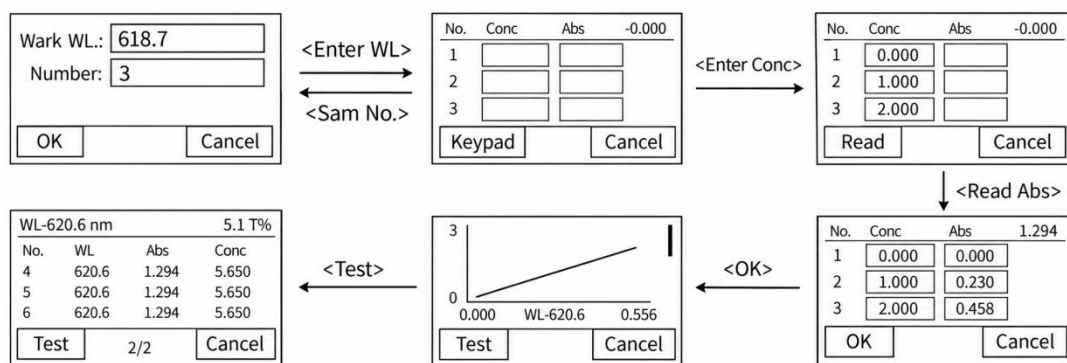
Press or to select "Create Curve". Then press or to select "Standard Curve", and press (left) to enter the standard sample method.



B. Build a New Standard Curve

Enter the wavelength and the number of standard samples (up to 9). Press (left) to confirm and proceed to the next interface.

Press or to enter the concentration of each standard sample using the keypad. Then press to perform the blank calibration. After blank calibration is completed, press (left) to measure the absorbance of each standard sample. The operation is shown below.



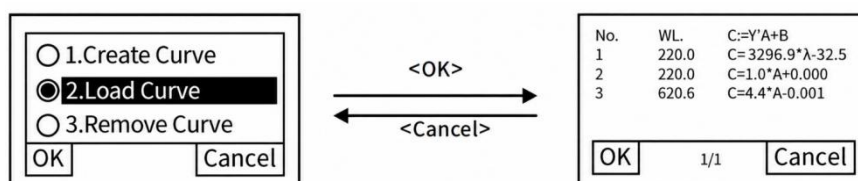
After all standard samples have been measured, the instrument automatically establishes the standard curve and saves it to the instrument's local memory.

NOTE: The number of standard samples must be between 1 and 9. If an invalid number is entered, the instrument will beep three times and return to the setting interface.

• Load a Stored Standard Curve

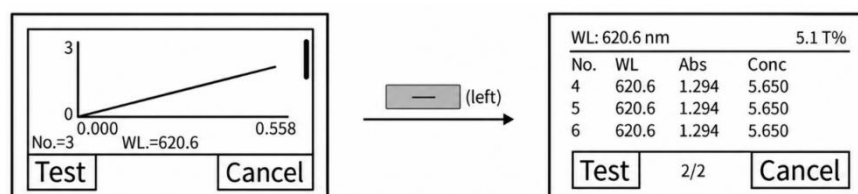
A. Load a Stored Standard Curve

Press or to select Load Curve. Press or to select the desired curve equation, then press (left) to confirm.



B. Enter the Sample Measurement Interface

After loading the curve, press (left) to enter the measurement interface.



C. Calibrate 100%T / 0Abs

Place the reference sample in the light path, then press to perform the 100%T / 0Abs calibration.

D. Measure the Sample Using the Standard Curve

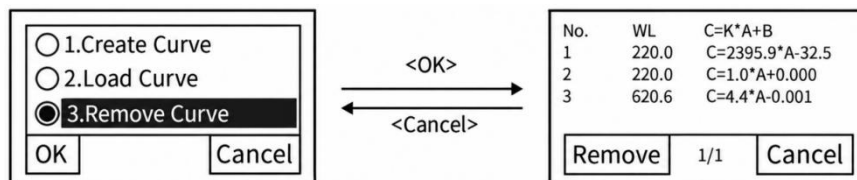
Place the sample in the light path and press (left) to perform the measurement. The measurement result will be displayed in the data list.

Repeat this operation to complete the measurement of all samples.

E. Print the Data

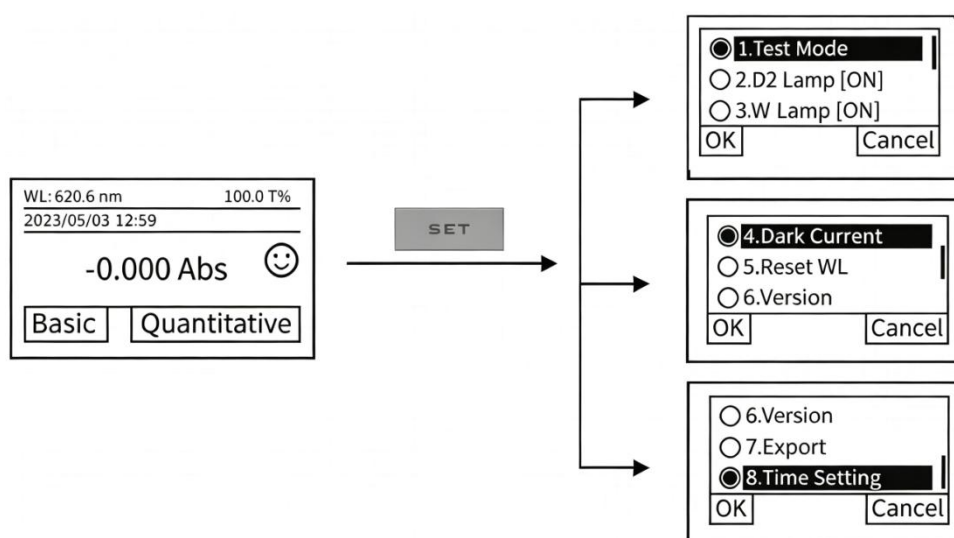
In the measurement interface, short-press **PRINT** to enter the print settings.

Enter the data number to be printed, then press **—** (left) to print the corresponding measurement result.



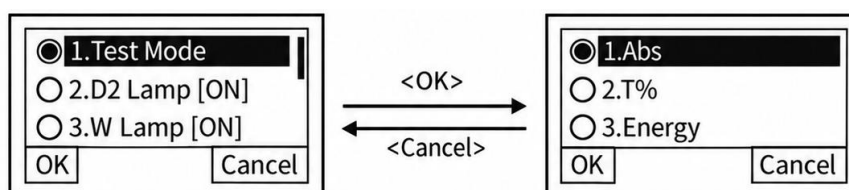
5.5 System Settings

Users can configure the instrument settings according to actual use. On the Main Interface, press **SET** to enter the System Settings interface.



5.5.1 Measurement Mode

Press **▲** or **▼** to select Test Mode, then press **—** (left) to enter. Press **▲** or **▼** to select Absorbance, Transmittance, or Energy, then press **—** (left) to confirm.

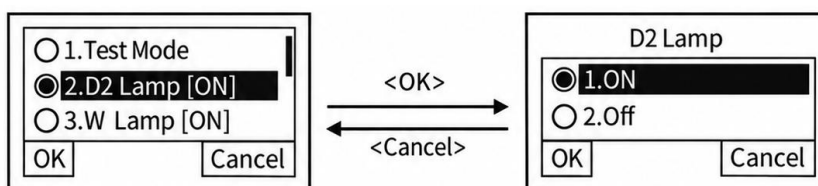


5.5.2 Turn ON and OFF the Deuterium Lamp

When measuring at wavelengths within the range of 340-1000 nm, the deuterium lamp can be turned OFF to extend its service life.

Press  or  to select D2 Lamp, then press  (left) to enter. Press

 or  to select ON or OFF, then press  (left) to confirm.

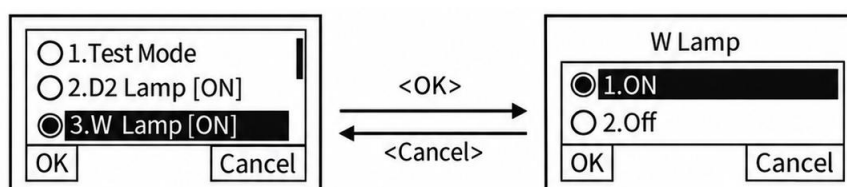


5.5.3 Turn ON and OFF the Tungsten Lamp

When measuring at wavelengths within the range of 200-339 nm, the tungsten lamp can be turned OFF to extend its service life.

Press  or  to select W Lamp, then press  (left) to enter. Press

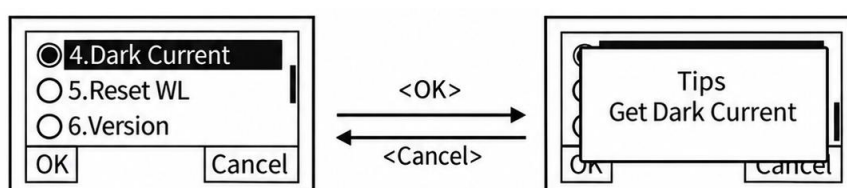
 or  to select ON or OFF, then press  (left) to confirm.



5.5.4 Dark Current Calibration

When the instrument's working environment changes, the dark current can be recalibrated after the instrument has completed preheating and before sample measurement.

Press  or  to select Dark Current, then press  (left) to perform the calibration. The sample chamber cover must remain closed throughout the calibration process. Press the return key after completion.

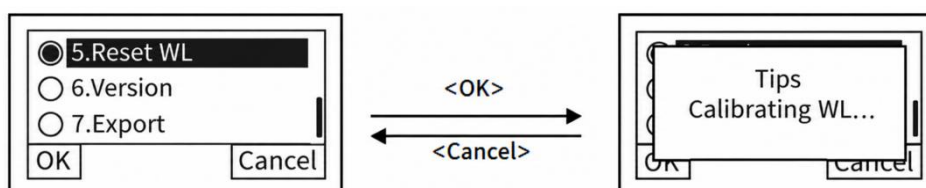


5.5.5 Wavelength Calibration

Sudden power failures while the instrument is in use, abnormal power-off, and attenuation of light source energy may result in wavelength deviation and measurement errors, in which case wavelength recalibration is required.

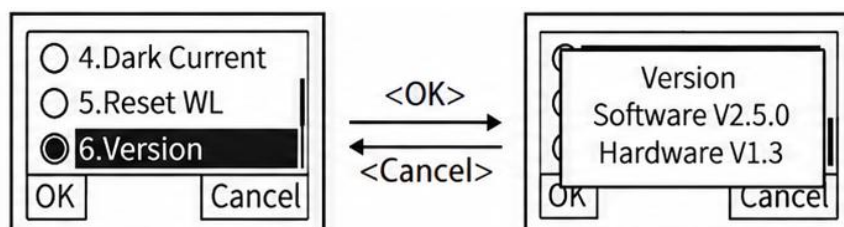
Make sure that the light path is clear and the sample chamber cover is closed. Press

 or  to select Reset WL, then press  (left) to perform the calibration. The sample chamber cover must remain closed throughout the calibration process. Press the return key after completion.



5.5.6 Version Information

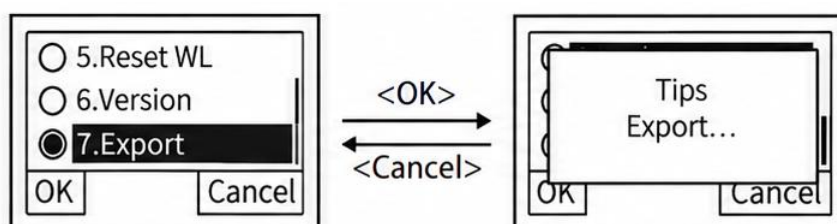
Press  or  to select Version, then press  (left) to view the version information interface. Press any key to return.



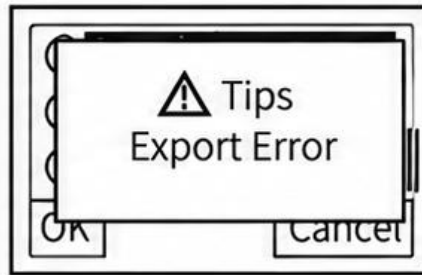
5.5.7 Export Data to USB

Saved data from the spectrophotometer can be transferred to a USB drive. Press

 or  to select Export, then press  (left) to transfer the data.

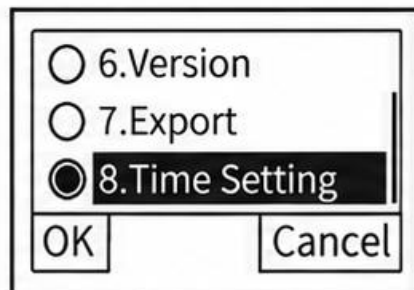


Before exporting data, insert the USB drive into the USB port on the back of the instrument. Otherwise, an error message will be displayed.



5.5.8 Date and Time Setting

Press  or  to select Time Setting, then press  (left) to enter the menu and set the correct date and time.



6. Quality Assurance

Warranty is effective from the date of purchase and is non-transferable.

For more details about the warranty, please refer to the link below:
stonylab.com/pages/warranty

For any inquiries or assistance, feel free to contact us:

Company: StonyLab Inc.

Email: support@stonylab.com

Phone: 631-406-6080

Website: stonylab.com

This instruction manual is subject to change without prior notice.