Operation Manual

IS/Standard

Ultraviolet-visible Spectrophotometer

GENFINE BIOTECH (CHANGZHOU) CO., LTD

Foreword

Thank you for purchasing Ultraviolet-visible spectrophotometer. This Manual for users contains function and operation of the Instrument. In order to use the instrument properly, please read this manual carefully before using the Instrument.

Opening Check

Please check the instrument and appendix with the packing list when you first open the packing case. If you find there is something wrong with the instrument or the appendix, please contact GENFINE BIOTECH

GENFINE BIOTECH (CHANGZHOU) CO., LTD
ADD : Building E4, Changyang Road, West Taihu Technology Industrial Park, Changzhou City, Jiangsu Province
Tel: 18501955112
E-mail: marketing@genfine.com
Web: http://www.genfine.com/

Safety Warnings and Guidelines

1. Important operation information of the security

Before operation, please have a perfect conception of how to use the Instrument. Read this manual carefully before using it.

Operation before reading the Manual is forbidden. If the instructions are not followed, the instrument may cause accidental injury during operation, and an electric shock may occur. Please read the following safety tips and instructions carefully and implement all the precautions.

2. Security

The operation, maintenance and repair of the Instrument should comply with the basic guidelines and the remarked warning below. Otherwise, it will affect the scheduled using life of the Instrument and the protection provided.

This product is a normal and an indoor Instrument which conforms to Standard B style - I type - GB9706.1.

Before operation, read the manual carefully. These units are designed for using in the laboratory environments by who're knowledgeable in safe laboratory practices.

The operator should not open or repair the Instrument by himself, which will result in losing the qualification of repair guarantee or occur accident. If there is some wrong with the Instrument, the company will repair it.

Before power on, guarantee the voltage used should be accordant to the voltage needed, and the rated load of electrical outlet should not lower than the demand. If the electric line is damaged, you should replace it with the same type. You should assure there's nothing on the electric line and you should not put the electric line in the ambulatory place. Hold the jack when you pull out the electric line, and don't pull the electric line.

This instrument should be placed in a place with low humidity, little dust and far away from water source and avoid direct sunlight and strong light source. The room should be well ventilated and free from corrosive gas or strong magnetic field interference. It should be far away from heating, furnace and other heat sources.Do not place the instrument in damp or dusty places.

Power off when you finish your work. Pull off the connector plug when there's long time no use of the Instrument and cover it with a cloth or plastic paper to prevent from dust.

Pull the connector plug from the jack immediately in the following cases, and contact the vendor:
There is some liquid flowing into the Instrument.
The instrument is exposed to rain or water;
Abnormal operation such as abnormal sound or smell.
Instrument dropping or outer shell damaged.
The function has obviously changed.

3. The maintenance of Instrument

1. Temperature and humidity are important factors that affect the performance of the UV-visible spectrophotometer. They can cause the corrosion of mechanical parts, make the metal finish decrease, and lead to errors or performance degradation in the mechanical parts of uv-visible spectrophotometers.

2. The instrument should be placed in a dry room, the recommended temperature is 15 ℃ ~ 35 ℃, relative humidity does not exceed 70%.

3. The instrument should be placed on a solid and stable workbench, and avoid strong vibration or continuous vibration.

4. Indoor lighting should not be too strong, and should avoid direct sunlight.

5. When measuring, the electric fan should not blow directly to the instrument.

6. Try to stay away from high-intensity magnetic fields, electric fields and electrical equipment that generates high-frequency waves.

7. Avoid using in places with corrosive gas such as hydrogen sulfide etc.

4. After Sale Service Commitment

A) Content of warranty

The company will be responsible for replacement due to fault caused by the materials and manufacturing from the date of delivery within 1 month. The company will provide free warranty due to fault caused by the materials and manufacturing from the date of delivery within 12 months. In the warranty period, the company will provide free repair service or replacement for those machines which are proved as defective apparatus selectively.

B) Scope of Warranty

Improper use or use under unmoral condition, damage caused by repair or modify Without authority etc. do not belong to the scope of warranty. Out of Warranty period, charge the cost of fees appropriately.

Contents

Chapter 1 Introduction

Ultraviolet-visible spectrophotometer is a full-wavelength ultra-micro ultraviolet-visible spectrophotometer, which can be used to detect nucleic acids, micronucleic acid arrays, pure protein detection, labeled protein detection, protein quantitative detection, microbial cell culture detection and conventional full wavelength scanning, etc.

Characteristics:

1. By forming a liquid column, the sample required for one test is as low as 0.5ul, and the trace amount is detected, saving precious samples.
2. The detection concentration range is wide, and commonly used samples can be detected without dilution.
3. The machine does not need to be warmed up, it can be detected after starting up, and the single detection time is about 5 seconds, and the detection is fast.
4. Built-in software, easy and fast to operate, software running fast and stable, no delay, provide a stable user experience.
5. Small size, easy to carry, very suitable for field testing.
6. Can record all the data that the user tests, and has screenshot function, convenient for users to export precious data or delete data at any time.
7. It can be quickly upgraded by U disk, which is convenient for the instrument to update the software.
8. With user management system, multi - user independent detection, independent management of data.
9. High-definition 7-inch display screen, using capacitance touch screen, full touch operation, can sense the touch of laboratory gloves, longer life and better experience.
10. Has power-on self-test function, it can quickly and accurately judge whether there are impurities in the detection platform when the machine is started up.
11. The material of the sample detection platform is stainless steel and quartz optical fiber, high strength and anti-corrosion.

Chapter 2 Specifications

2.1 The normal operating condition

Ambient temperature: 4°C ~ 45°C
Recommended ambient temperature: 15°C ~ 35°C
The relative humidity: ≤70%
Power supply: DC12V 5A

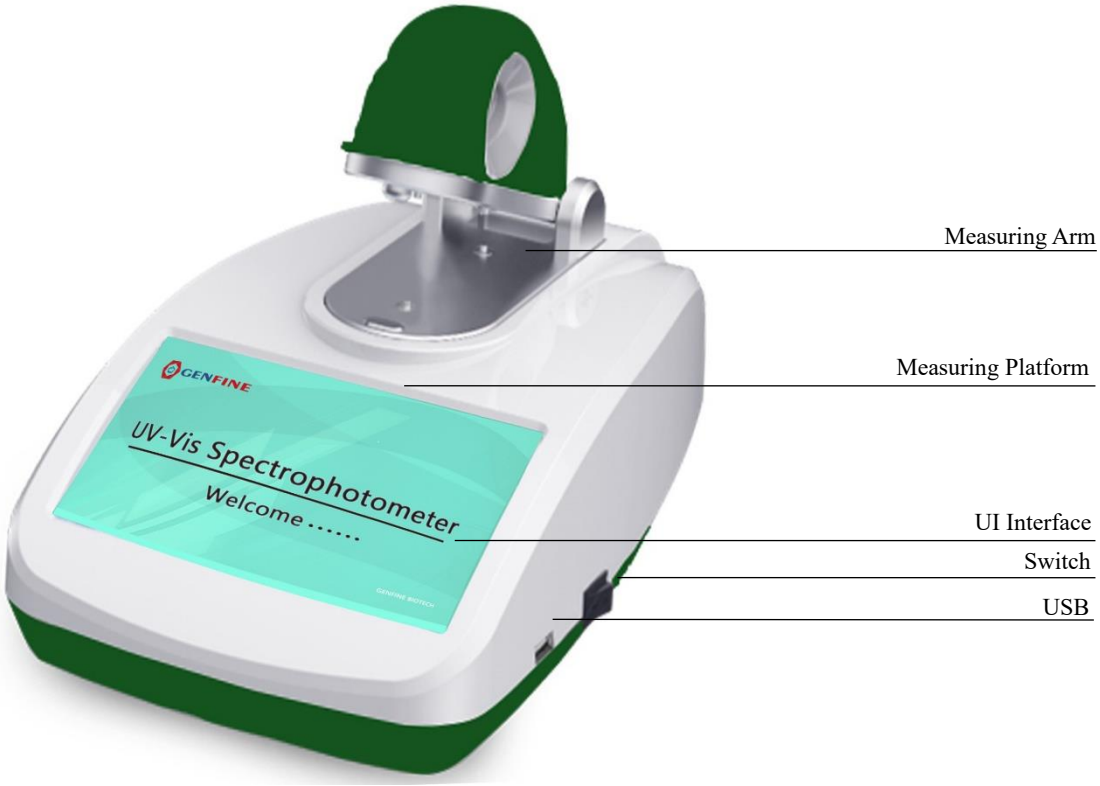
2.2 The parameters and function

Model	IS/Standard
Test sample capacity	0.5-2μl
Light source	Xenon lamp
Detector	2048 linear CCD array
Optical path	⩽0.7mm
Wavelength range	200~850nm
Wavelength accuracy	1nm
Wavelength resolution	⩽2nm
Light absorption range	0.04-300Abs (10mm)
Light absorption accuracy	0.002Abs (1mm)
Absorbance accuracy	1%(0.76Abs at 256nm)
Detection concentration range	2-15000ng/μl(dsDNA)
Sample base material	304 stainless steel and quartz optical fiber
Measure time	About 5s
Power	20W
Power Adapter	12V ， 5A
Dimensions	W.197×D.327×H.181mm
Net weight	3.1kgs

Chapter 3 Basic Operation

This chapter mainly introduces the structure of the instrument, the function of the operation panel, and the preparatory work before starting up. When using this instrument for the first time, you should be familiar with the contents of this chapter before starting it up.

3.1 Structure Description



3.2 Basic instructions for base inspection

1. Lift the sample arm and add the sample to the test base. (Theoretical value of sample volume is 0.5 ~ 2μl, 2μl is recommended)

2. Put down the sample arm and measure the sample according to the software interface.

3. After the test is completed, wipe the measuring platform clean with dust-free paper to avoid sample residue.

Chapter 4 Operation Guide

4.1 Blank control and light absorption calculations

The instrument adopts the automatic detection optical path mode, and the blank control will also take the blank light intensity of multiple optical paths. After the blank control, the instrument records the blank light intensity value under multiple optical paths. When performing sample detection, the instrument will According to the light intensity of the sample, the appropriate measurement light path is automatically selected, and the light intensity transmitted through the sample is also recorded. The light intensity through the sample and the blank light intensity are calculated according to the following formula:

Abs = -log10 (Intensity sample / Intensity blank)

In this way, the absorbance at a specific wavelength can be calculated from the transmitted light intensity of the sample and the blank control.

4.2 Software application

1. Pure nucleic acid concentration measurement (NucleicAcid)
2. Nucleic acid array measurement (Micro Array)
3. Pure protein measurement (ProteinA280)
4. Quantitative detection of protein(Protein Assay)
5. Label protein detection (Label Protein)
6. Microbial cell culture testing (Cell Cultures)
7. Ultraviolet and visible light measurement (UV-Vis)
8. Full wavelength light intensity detection and viewing (Check Intensity)
9. System Settings (Setting)

4.3 Introduction of the shared part in measurement software

1. "Blank" button, click this button to measure the light intensity value of the blank liquid and save it.

2. "Measure" button, click this button to measure the concentration of the sample.

3. Sample ID, measurement ID, name can be customized, the factory default Test.

4. Save Screen, save the screenshot of the current page, it can be saved to the U disk.

5. DATA (Grapic), data graphic display, display measurement data curve graph, can be exported to U disk.

6. DATA (Table), data chart display, table showing measurement data, can be exported to U disk.

7. Click "  " on the left to display the sidebar. The sidebar records the detailed data of the current measured sample, including Ext. Coeff, Baseline, SW nm, SW Abs, 260/280, 260/230 and other user-concerned data.

4.4 Starting up

After the instrument is powered on, press the power switch, the LCD screen lights, the instrument enters the welcome interface (see Figure 1), the LCD screen displays the product name in the welcome interface, and then enters the main menu interface (see Figure 2).

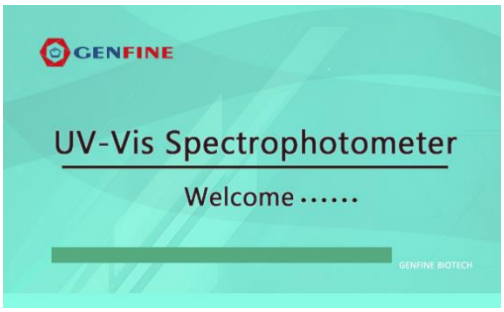
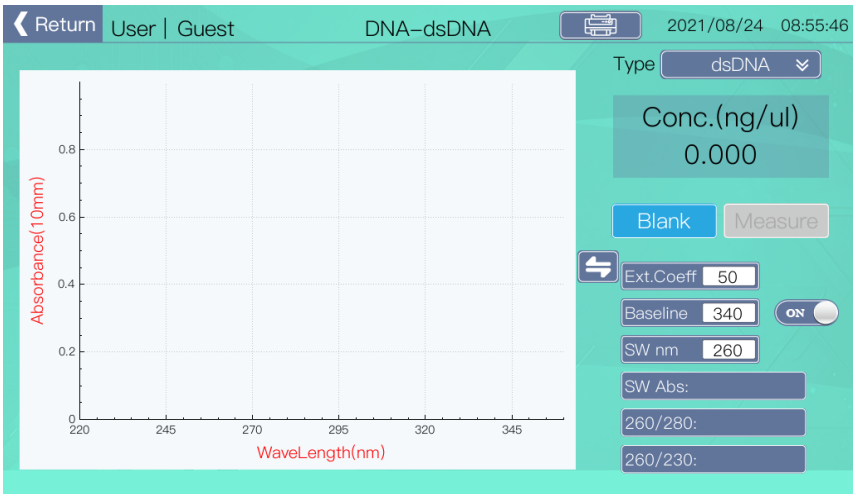


Figure 1

Figure 2

4.5 Blank cycle detection

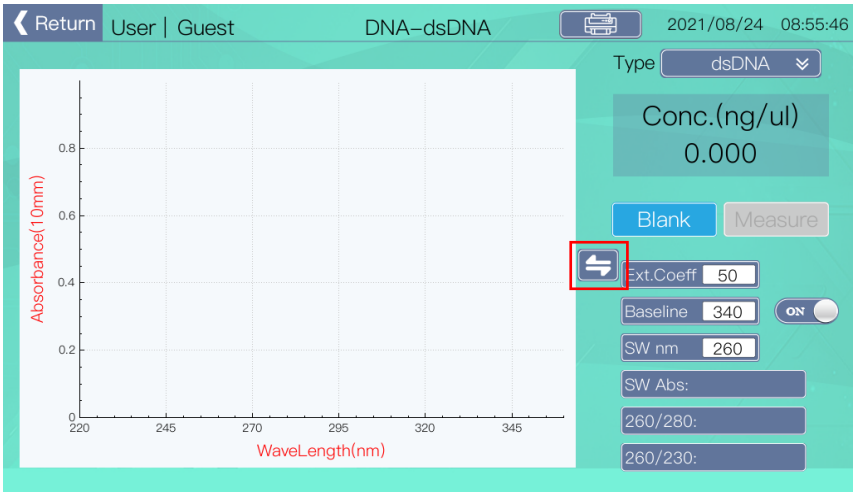
After the instrument is turned on, enter the sample measurement interface to be tested:



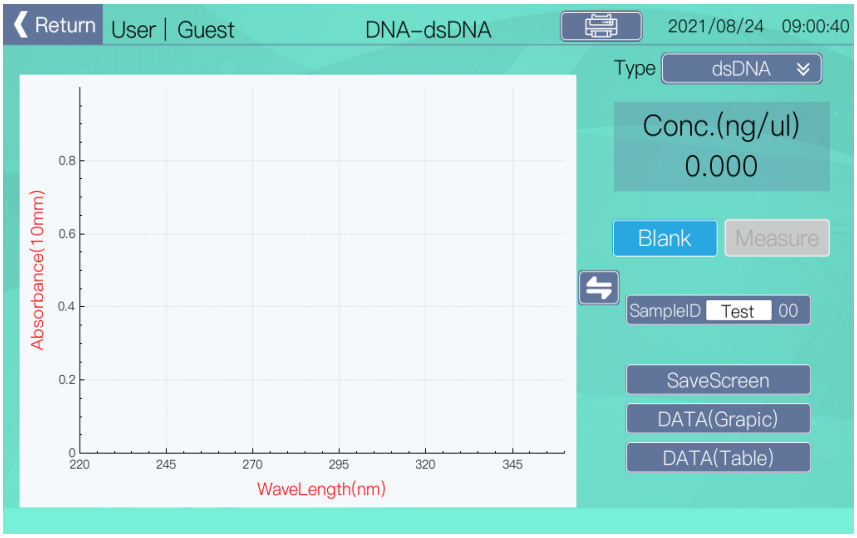
1. Add the blank solution to the sample base.
2. Click "Blank" button to measure the blank light intensity.
3. After wiping the sample base clean, add the blank solution to the sample base and click the "Measure" button to measure the absorbance value. The measurement result curve is basically at a horizontal line, and the change in absorbance value should not exceed 0.04A (10mm).

4.6. Nucleic acid testing

1) Pure nucleic acid detection



Click "⇆"to pop up the sidebar



Type： Measurement type, dsDNA, dsDNA, RNA, Other can be selected, where" Other" is user-defined nucleic acid

Ext.Coeff： Extinction coefficient.

Nucleic acid samples	Extinction coefficient
dsDNA	50
ssDNA	33
RNA	40

Baseline： Baseline calibration wavelength, default is 340nm, default is on; users can customize the wavelength, can be customized on and off;

SW nm： Measure wavelength, the default nucleic acid is 260nm, users can customize the measurement wavelength.

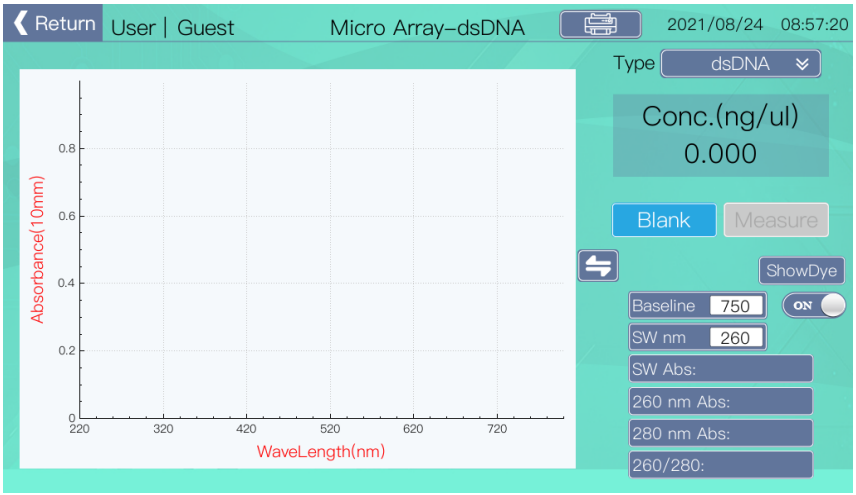
260/280：The ratio of 260nm absorbance to 280nm absorbance. This value is used to determine the purity of DNA and RNA. Generally, the ratio of pure DNA is about 1.8, and the ratio of pure

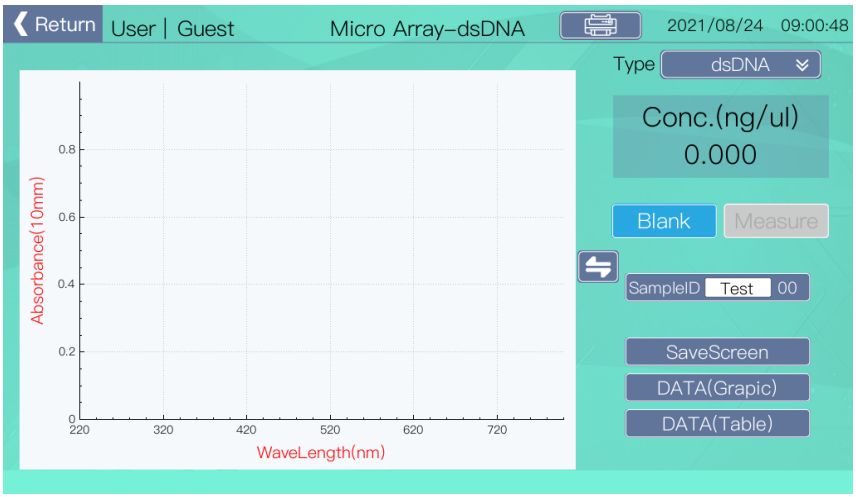
RNA is about 2.0. If the ratio is too small, it indicates the presence of protein, phenol or other contaminants, these substances have obvious light absorption at 280nm.

260/230： Ratio of 260nm absorbance and 230nm absorbance, this is the secondary nucleic acid concentration indicator, generally between 1.8 and 2.2. If the ratio is too low, it means that there are pollutants in the nucleic acid.

2) Micro nucleic acid array

The nucleic acid array module simultaneously measured the concentration of nucleic acid and dye at the set wavelength.





Type： Measurement type, dsDNA, dsDNA, RNA can be selected.

There is a ShowDye / HideDye button in the sidebar to open / hide the dye concentration interface. The user can set the dye type and check the dye concentration.

Baseline： Baseline calibration wavelength setting, default 750nm, user can modify according to actual needs, user can turn on and off line calibration.

SW nm： Nucleic acid measurement defaults to 260nm, and users can customize the measurement wavelength.

SW Abs： Select the wavelength absorption value.

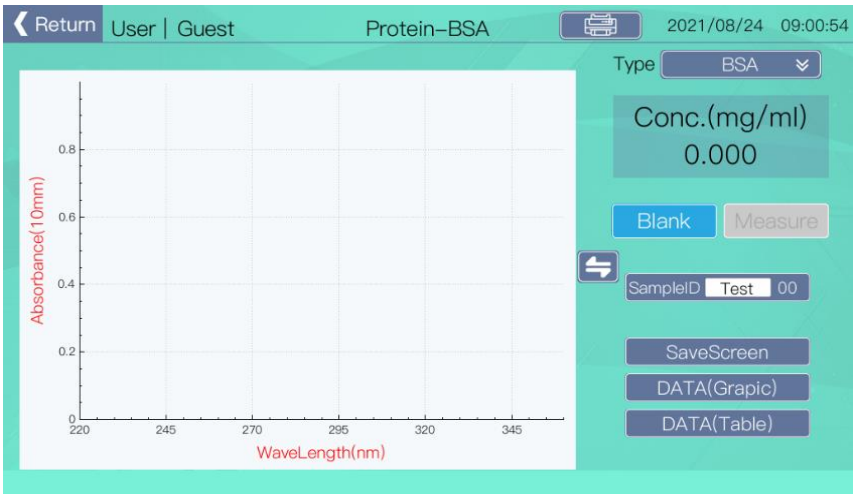
260nm Abs： 260nm light absorption value.

280nm Abs： 280nm light absorption value.

260/280： The ratio of 260nm absorbance to 280nm absorbance.

4.7 Protein detection section

1) Pure protein detection(ProteinA280)



Type：Detection protein type, BSA、1Abs=1mg/ml、IgG、Lysozyme。

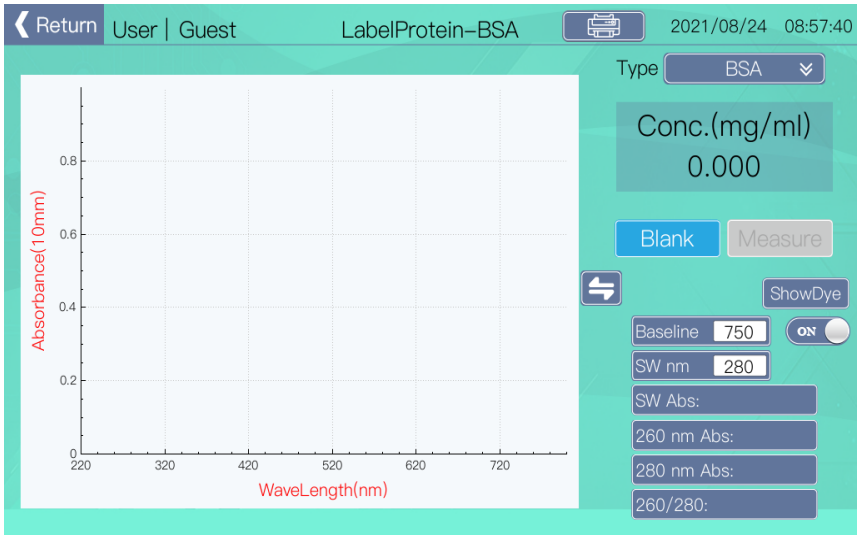
Sample type	Extinction coefficient
BSA	For calf serum protein reference, the mass extinction coefficient calculated for protein concentration is: the mass extinction coefficient of 10mg / ml protein at 280nm is 6.7.
1Abs=1mg/ml	The absorbance of 1mg / ml protein at 280nm is 1A
IgG	IgG reference, the mass extinction coefficient calculated by protein concentration is: The mass extinction coefficient of 10mg / ml protein at 280nm is 13.7.
Lysozyme	For lysozyme reference, the extinction coefficient calculated by protein concentration was: the mass extinction coefficient of 10mg/ml protein at 280nm was 26.4

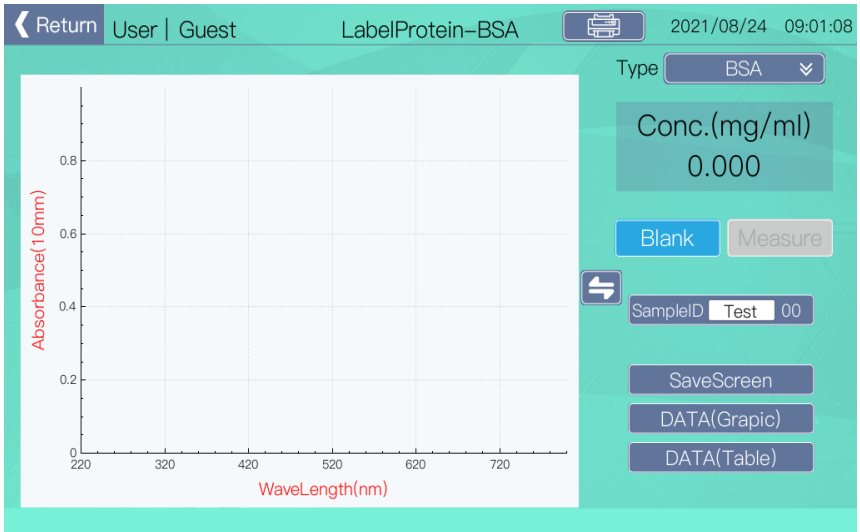
Baseline： Baseline calibration wavelength, default is 340nm, default is on; the user can customize the wavelength and can turn it on and off.

SW nm： Select the measurement wavelength, the default protein is 280nm, users can customize the measurement wavelength.

SW Abs： Select measurement wavelength absorption value.
260 nm Abs： 260nm light absorption value.
280 nm Abs： 280nm light absorption value.
260/280： The ratio of 260nm absorbance to 280nm absorbance.

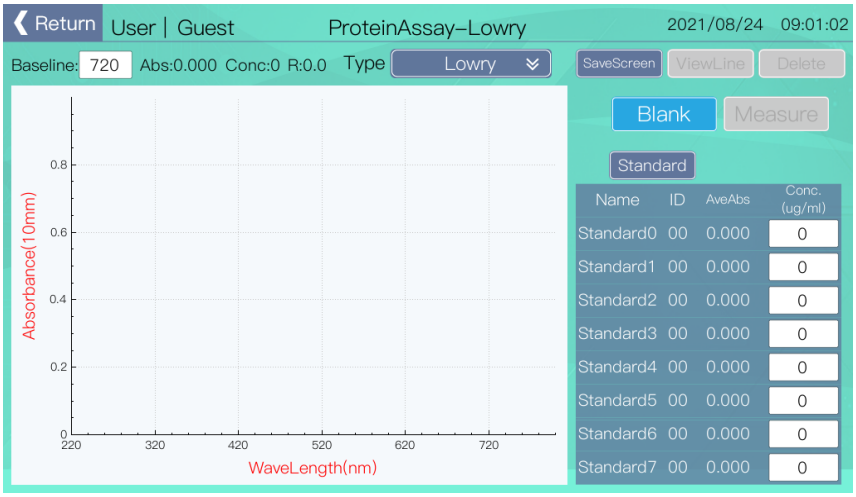
2) Labeled protein detection(Label Protein)





Type： Detection protein type, BSA、1Abs=1mg/ml、IgG、Lysozyme.
Baseline： The baseline calibration wavelength, default is 750nm, the baseline calibration is turned on by default. The user can customize the baseline wavelength, and can turn it off and on.
SW nm： Select the measurement wavelength, the default protein detection is 280nm, users can modify the measurement wavelength according to the actual situation;
SW Abs： Select the wavelength absorption value.
260 nm Abs： 260nm light absorption value.
280 nm Abs： 280nm light absorption value.
260/280： The ratio of 260nm absorbance to 280nm absorbance.
In the sidebar, there is a ShowDye/HideDye button to open/hide the dye concentration interface. Users can set the dye type and check the dye concentration.

3) Quantitative protein detection(ProteinAssay)



Type： BCA quantitative method, Lowry quantitative method, Bradford quantitative method.

a) The BCA quantitative method and the diquinolinecarboxylic acid (BCA) method are based on the principle that Cu^{2+} will be converted to Cu^{+} under alkaline conditions. The formed Cu^{2+} will react with BCA. This reaction will produce a strong violet absorption value at 562nm.

b) The Lowry quantitative method is based on the principle that Cu^{2+} will be converted to Cu^{+} under alkaline conditions. This reaction will produce a strong blue absorption value at 750nm.

c) The Bradford quantitative method is a common method of colorimetric determination of protein concentration in a sample solution. The protein determination Bradford method is based on the binding of a dye (Coomassie Brilliant Blue G) to the protein. The combination of the two makes the maximum absorption peak of the dye shift from red light to blue light. At a wavelength of 595nm, by comparing the standard curve, the absorbance of the measurement solution can be converted into protein concentration.

ViewLine： Because the drawing of the standard curve requires data of at least two standard products, this button is not clickable by default; click this button to view the standard curve of the currently measured protein standard sample.

Delete： After opening the page, the button is gray and cannot be clicked by default, because when opening the page, the standard sample is not selected by default. When a standard sample is selected in the standard sample table, the button becomes available, and clicking the button clears the selected standard. After the measurement data of the sample is cleared, the standard sample does not participate in the calculation of the standard curve.

Standard： Click this button to view the standard measurement interface.

Sample： Click this button to enter the sample measurement interface. After measuring the sample concentration in the unknown sample concentration measurement interface, you cannot return to the Standard measurement interface. This is to prevent the user from modifying the standard measurement value by mistake.

① Standard measurement table

Support measurement of up to 8 standard samples, and at least two standard samples are needed to obtain the standard curve of the sample.

1) Name： The standard sample name defaults to Standard 0 ~ 7, and the name cannot be modified.

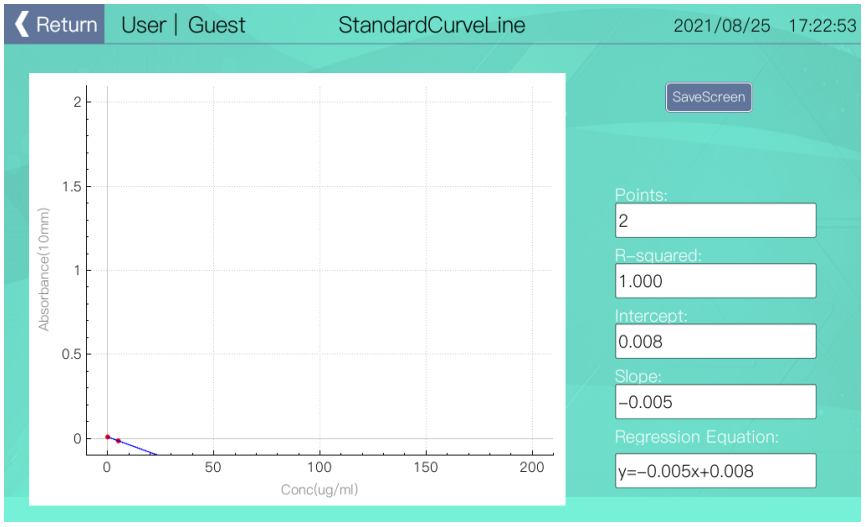
2） ID： Standard sample measurement serial number.

3） AveAbs： The average absorbance value of the standard sample can be measured multiple times for the same standard sample. Here, the average value of all measured absorbance values is displayed. The average value used for subsequent drawing of the standard curve also uses the

average value to improve the calculation accuracy.

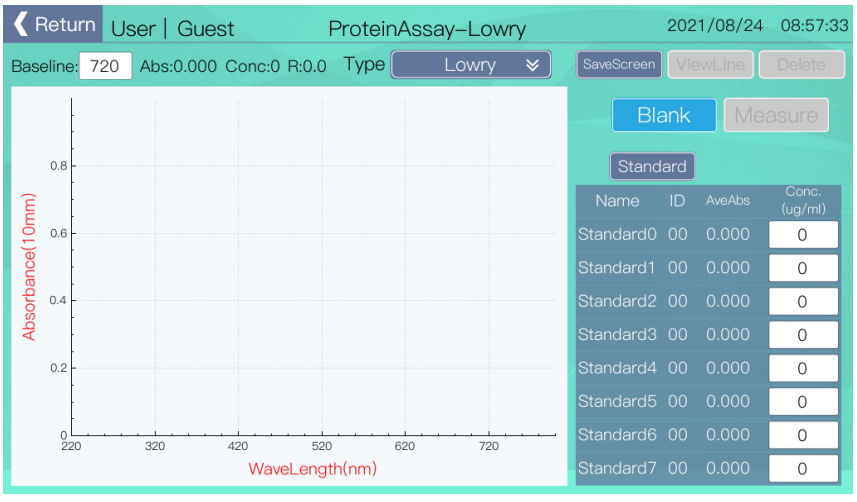
4） Conc： The concentration of the standard sample measured by the user needs to be set by the user; when setting the concentration, the user should note that only the concentration of StandArd0 can be set to 0, and the others can not be zero. If it's zero, it cannot be measured.

② Standard curve viewing



The instrument is based on the measured standard (at least two standards are measured), generate the standard curve corresponding to the standard product;

③ Unknown concentration sample measurement.

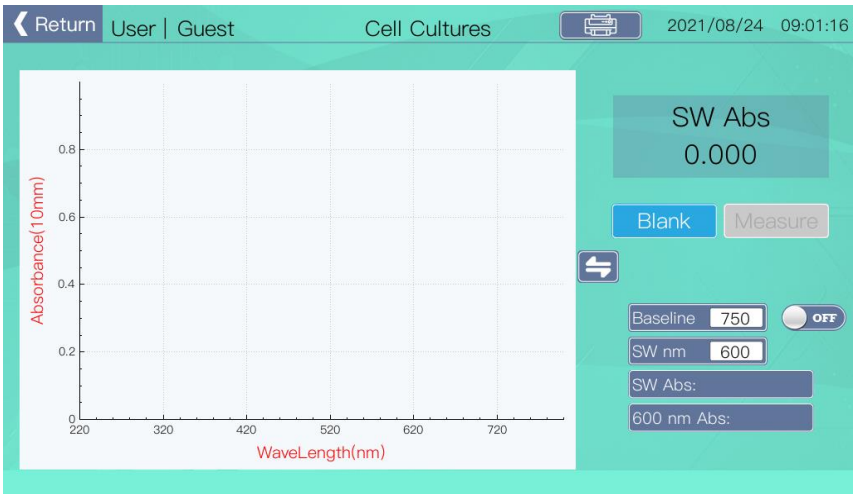


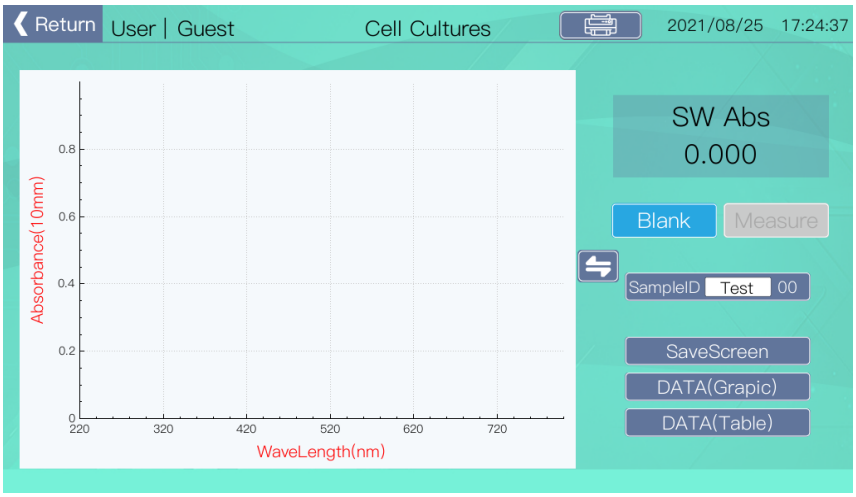
Abs（562nm）： The absorbance value at 562nm is displayed. The BCA method measures the absorbance value at 562nm; other quantitative methods are the same.

Conc.(ug/ml)： The measured concentration of the sample is displayed. The measured concentration is calculated based on the absorbance value at 562 nm substituted by the standard curve.

4.8 Other testing

1) Microbial cell culture testing(Cell-Cultures)





The instrument can measure the suspension density of cells or microorganisms by detecting the absorbance at a wavelength of 600 nm.

SW nm： The incident wavelength and absorbance value are displayed in SW Abs.

SW Abs： The absorbance value at the incident wavelength.

600 nm Abs： The absorbance value at 600nm is equivalent to the absorbance value at 10mm.

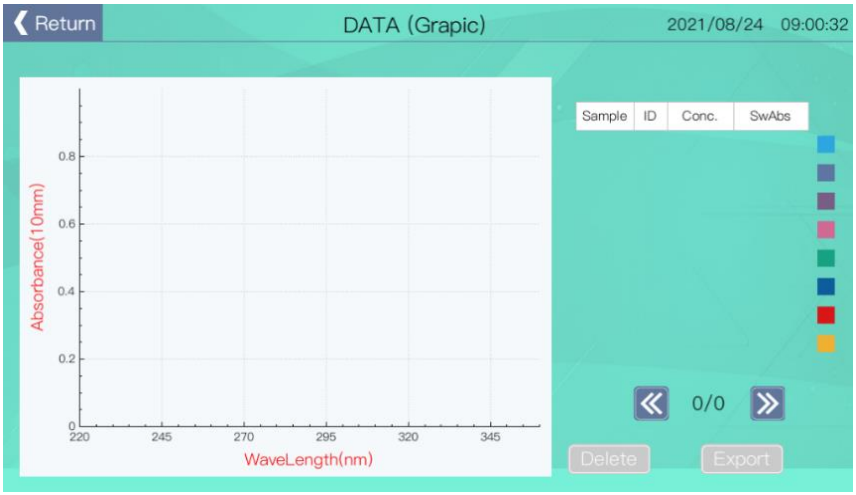
2) UV-visible light measurement(UV-Vis)

The instrument's ultraviolet visible light module provides absorbance measurement from 200nm to 900nm, the user can set the wavelength point to be measured and the corresponding baseline calibration wavelength.

4.9 Data export

1) Graphic data file export

Click the DATA (Grapic) button on the measurement page to enter the graphical data viewing page.

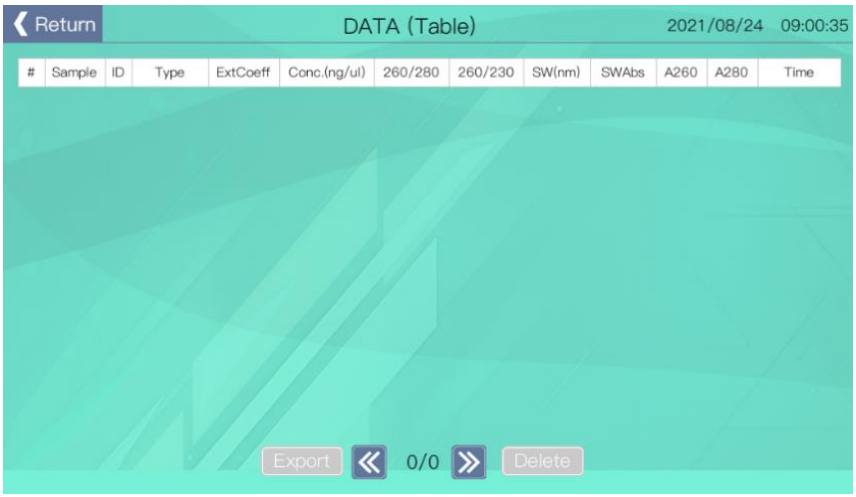


Export： Insert the U disk and click the button to enter the file export page.

Delete： Delete the selected graphic data.

2) Lable data file export

Click the DATA (Table) button on the measurement page to enter the graphical data viewing page.



Export： Insert the U disk and click the button to enter the file export page。

Delete： Delete the selected graphic data.

3）Screenshot file export

Click the SaveScreen button on the measurement page to enter the screenshot export page. To export screenshots, you need to insert the U disk first.

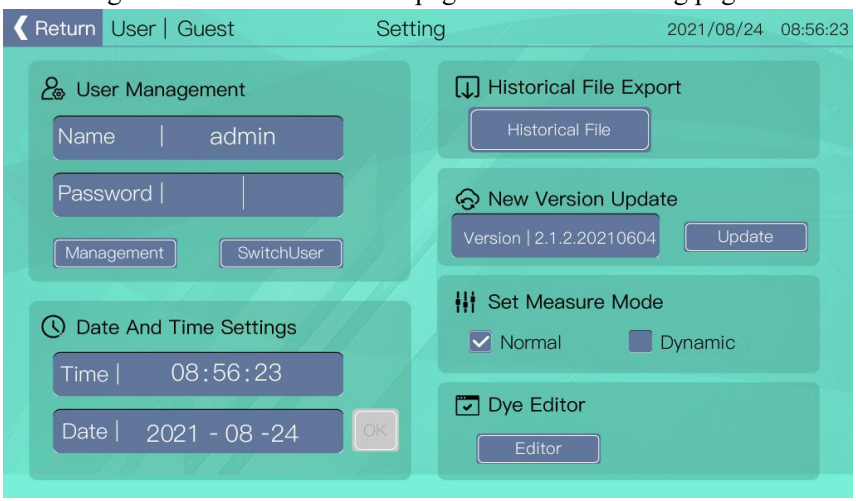
4.10 Dye

When performing Micro Array and Label Protein detection, Lambert-Beer law is used for dye calculation. The following table shows the dye parameters saved in the software:

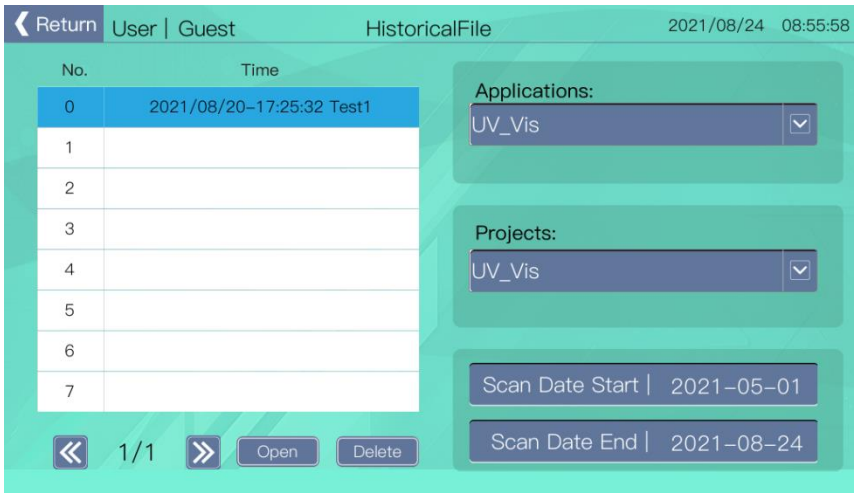
Dye	Unit	Coeff (1/mole-cm)	Analysis Wavelength(nm)	260nm Correction	280nm Correction
Cy3	uM	1.5E+5	550	0.04	0.05
Cy5	uM	2.5E+5	650	0.00	0.05
Alexa Fluor 488	uM	7.1E+4	495	0.30	0.11
Alexa Fluor 546	uM	1.04E+5	556	0.21	0.12
Alexa Fluor 555	uM	1.5E+5	555	0.04	0.08
Alexa Fluor 594	uM	7.3E+4	590	0.43	0.56
Alexa Fluor 647	uM	2.39E+5	650	0.00	0.03
Alexa Fluor 660	uM	1.32E+5	663	0.00	0.10
Cy3.5	uM	1.5E+5	581	0.08	0.24
Cy5.5	uM	2.5E+5	675	0.05	0.18

4.11 View and export historical data

Click the Setting button on the main menu page to enter the Setting page:



Click the Historical File button to enter the historical data viewing page:



Applications： Measurement applications, there are NucleicAcid, Micro Array, ProteinA280, Label Protein, ProteinAssay, Cell Cultures, UV-Vis; The unmeasured ones will not be displayed.

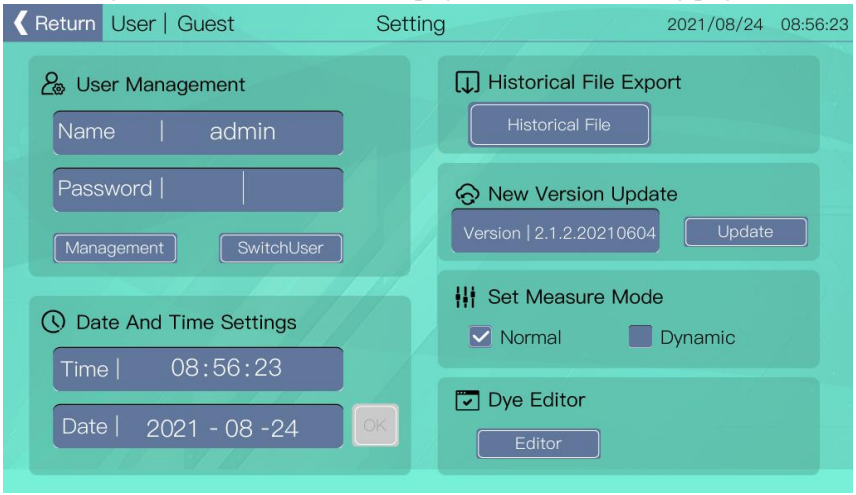
Projects： Corresponding to the measurement subdivision of Applications above, for example, if the measurement application is NucleicAcid, Projects has dsDNA, ssDNA, RNA, Other, and it will not be displayed if it has not been measured.

The file list on the left corresponds to each measurement made by the user. The file name is "time + SampleID + number of measurements". Click the Open button to open the selected measurement file. After opening, you can export historical data according to the process described in "Data Export" . Click Delete button deletes the selected file.

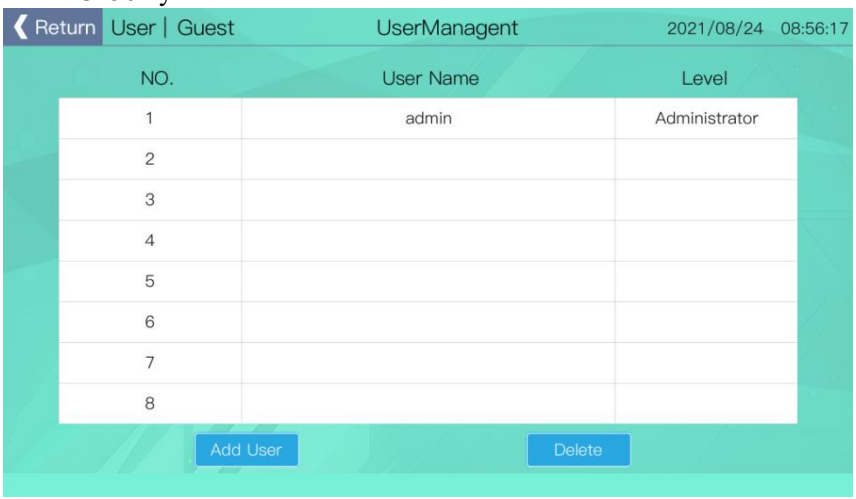
In the lower right corner, you can set the time period of the file to be browsed. By default, the measurement file within the first 3 months of the current time is displayed. If you want to browse earlier files, you can customize the time period.

4.12 User Management

Click the Setting button on the main menu page to enter the Setting page:



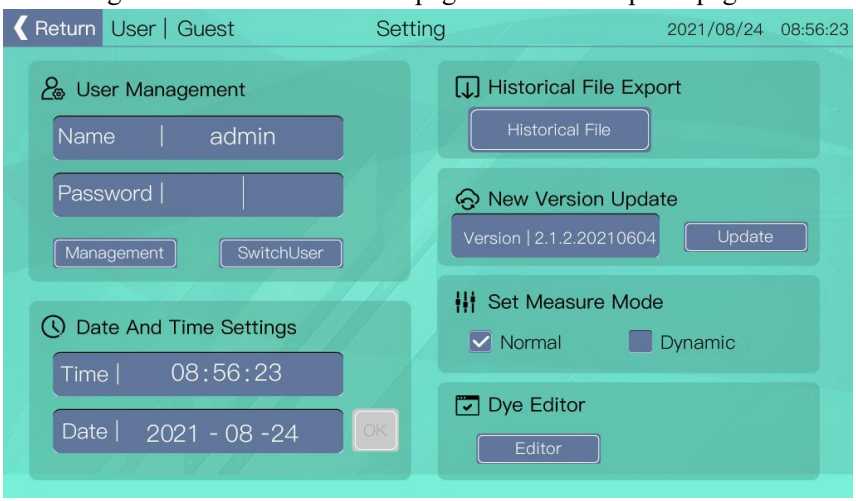
The user management provided on the settings page includes switching the current user (SwitchUser) and entering the user management interface (Managenment); users entering the user management interface need to enter the administrator (admin) password, the administrator password is 123456 by default.



On the user management page, users can add new users and delete users, but they cannot delete admin users. Users can add up to 7 users, total 8 users including the administrator user.

4.13 Software update

Click the Setting button on the main menu page to enter the Update page

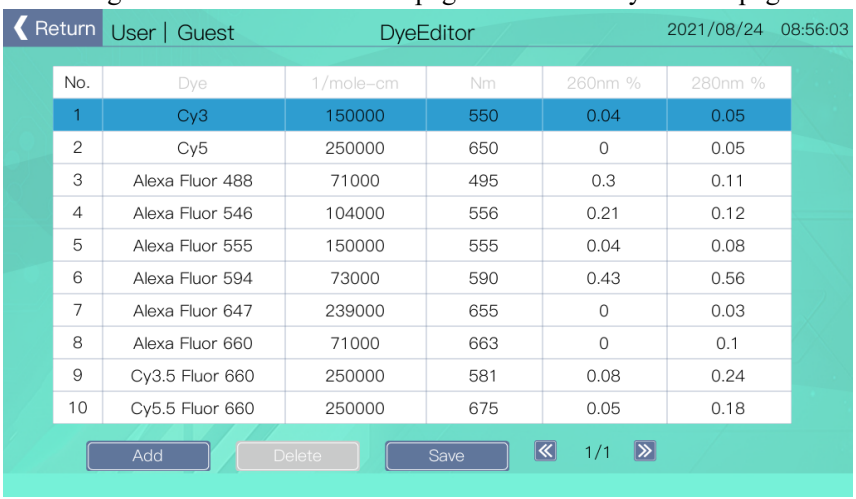


Click the "Update" button to enter the upgrade interface. If no USB disk is inserted, the user will be prompted "**No USB device found!**" The user is prompted to insert the usb flash drive. If there are no upgradable files in the usb flash drive, the prompt will be "**U disk no upgrade file available!**"If normal, insert the usb flash disk and enter the upgrade interface. The interface is as follows:

The current software information is displayed at the top of the interface, and the software information to be updated is displayed at the bottom. Click the "Update" button to update the software. After the update is completed, the system will automatically restart and enter the new software program.

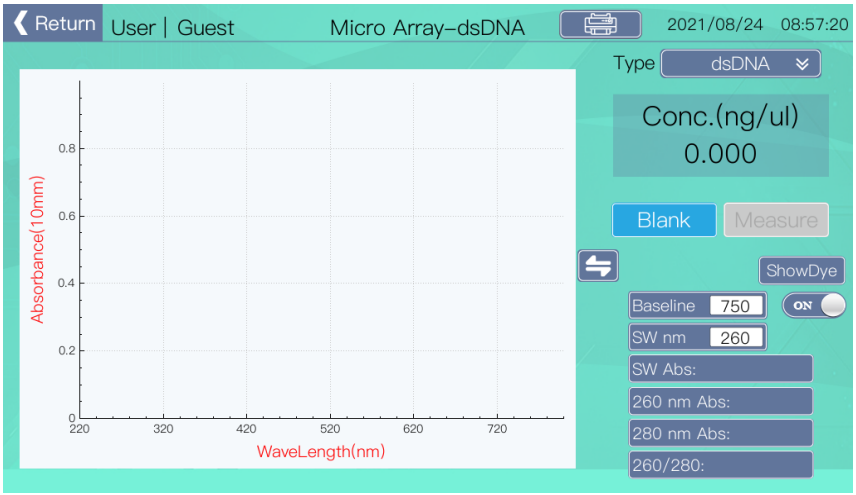
4.14 Dye editing

Click the Setting button on the main menu page to enter the Dye Editor page:



No.	Dye	1/mole-cm	Nm	260nm %	280nm %
1	Cy3	150000	550	0.04	0.05
2	Cy5	250000	650	0	0.05
3	Alexa Fluor 488	71000	495	0.3	0.11
4	Alexa Fluor 546	104000	556	0.21	0.12
5	Alexa Fluor 555	150000	555	0.04	0.08
6	Alexa Fluor 594	73000	590	0.43	0.56
7	Alexa Fluor 647	239000	655	0	0.03
8	Alexa Fluor 660	71000	663	0	0.1
9	Cy3.5 Fluor 660	250000	581	0.08	0.24
10	Cy5.5 Fluor 660	250000	675	0.05	0.18

Users can view related dye parameters, or they can add custom dyes and save them for use. The system's default dyes cannot be deleted, and users can delete custom dyes. Click "ShowDye" on the measurement interface to select a custom dye or select the default dye. Click the dye setting box to pop up the dye selection interface, as shown below:

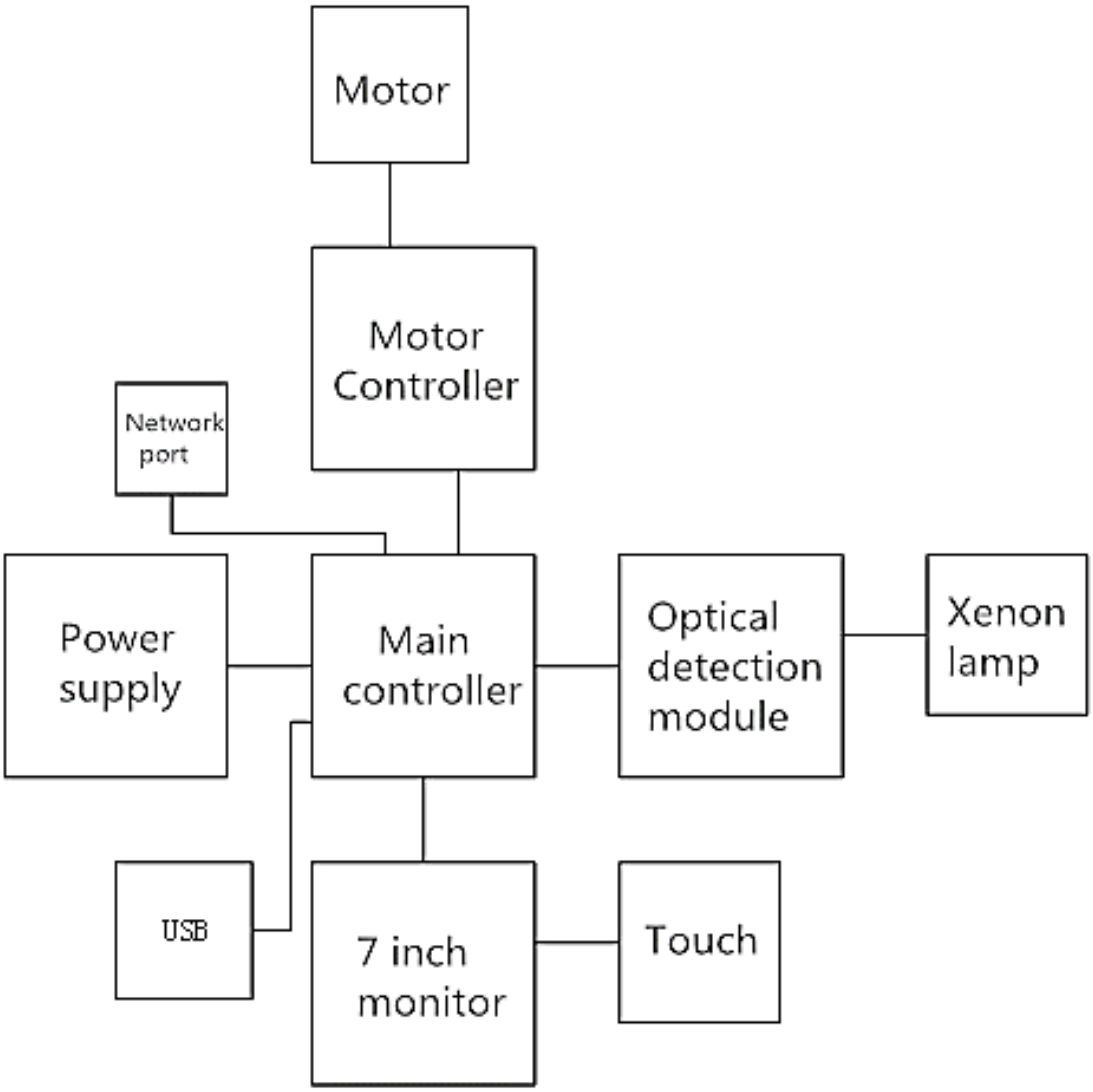


Chapter 5 Failure Analysis and Handling

Failure analysis and processing procedures
Possible causes and corresponding countermeasures

No.	Error message	Possible causes and corresponding countermeasures
1	Low light intensity alarm at startup	The measuring arm is not lowered or there are pollutants on the measuring platform; lower the measuring arm and wipe the measuring platform clean.
2	The motor is noisy	The motor wiring is partially broken or the photoelectric switch is damaged. The motor reaches the limit.
3	The power-on screen is not bright	The internal circuit is damaged and needs to be returned to the factory for repair.
4	Touch is not available	The internal circuit is damaged and needs to be returned to the factory for repair.
5	Unrecognized U disk	The internal circuit is damaged and needs to be returned to the factory for repair.
6	Xenon lamp does not flicker during measurement	The internal USB cable is loose or the internal circuit is damaged, you need to return to the factory for repair.

Annex A Wiring Diagram for Photometer



NOTE