Nano Spectrophotometer

LMNS-B100

Index

1. Safety Measures

1.1 Cautions and Warnings

This manual provides basic operating instructions for the Nano Spectrophotometer, including how to start, operate, and maintain the instrument. It should be specially pointed out that the attention and warning information in this manual are very important (emphasized in the manual and added with appropriate icons), which can effectively avoid inappropriate operations. The products described in this manual are developed, manufactured, and tested with the user's safety in mind. Therefore, if users follow the instructions in this manual for use and maintenance, they can avoid property damage and personal harm in routine use caused by improper operation. This manual contains relevant cautions and warnings. Such information is displayed with specific icons with corresponding explanatory text. The notes and warnings used in this manual are explained as follows:

Icon	Illustrate
	**Attention Marks and Information** - Indicates important information that requires attention during product use, or sections of this manual that require special attention.
	**Warning signs and information** - Indicates that failure to observe proper safety measures during use of the product will result in the instrument not working properly, and in particularly severe cases may result in serious personal injury or property damage.
	**Biohazard labeling and information** - Indicates that during the use of the product, if proper safety measures are not followed, there will be biological contamination to the instrument, the experimental environment, and personnel, and in particularly severe cases, it may cause serious personal injury or property damage.

1.2 Important safe handling information

Biohazard

All test samples should be considered as biological hazards and disposable latex gloves should be worn when contacting; the parts that have been in contact with the test samples should be considered infectious, and disposable latex gloves should be worn when touching.

Notice

- It is forbidden to replace the internal components with the power cord connected, otherwise it may cause personal injury.
- Only qualified inspectors trained in the installation and use of electrical equipment should operate this instrument. Except for the parts that can be opened by the user as stipulated in the operation manual, it is strictly forbidden for the user to disassemble the instrument.

- Before connecting the power supply, ensure that the voltage of the power supply is the same as that required by the instrument. Ensure that the rated load of the power socket is not less than the requirements of the instrument. If the power cord is damaged, it must be replaced. The replacement must be replaced by a power cord of the same type and size. Nothing should be covered by the power cord when the instrument is in use. Do not place the power cord where people move. When the instrument is not in use for a long time, unplug the power plug and cover the instrument with a soft cloth or plastic paper to prevent dust from entering.

Warning

In the following cases, the power plug of the instrument should be unplugged from the power outlet immediately, and a trained service person for handling it:

- Liquid spilled into the instrument.
- The instrument has been exposed to rain or water.
- The instrument is not working properly, especially if there is any abnormal sound or smell.
- The instrument has been dropped or the casing has been damaged.
- Instrument functionality has changed significantly.

2. Introduction

Nano Spectrophotometer LMNS-B100 offers extensive wavelength range from 190 to 900nm. Its microvolume measurement system guarantees rapid and efficient analysis with minimal sample requirements. Equipped with UV-enhanced CMOS linear array sensor ensuring high-resolution spectral data. Incorporates 7-inch capacitive touchscreen enabling intuitive navigation and convenience. Our spectrophotometer with automatic optical path switching optimizes maximum and low-concentration detection.

3. Features

- Long-lasting, stable light source
- Extended photometric range
- OD-600 bacterial culture measurements
- Standalone operation & user-friendly interface
- Portable & energy-efficient design

4. Specifications

Model No.	LMNS-B100
Loading Amount	0.3 to 2.5 µl
Optical Path	0.05mm, 2.2mm, 1.0mm
Wavelength Range	190nm to 900nm
Wavelength Accuracy	±1 nm
Wavelength Resolution	≤2nm
Absorbance Reproducibility	0.003 A
Absorbance Accuracy	±1% (7.332Abs at 260nm)
Photometric Range (10 Mm Equivalent	0.04 to 300A
Potassium Permanganate Solution Detection Range	0 to 106 µg/µl
Nucleic Acid Detection Range	0 to 15000ng/µl (dsDNA), 0 to 13200ng/µl (RNA)
Protein Detection Range	0 to 440 mg/ml (BSA), 0 to 210 mg/ml (Ig)
Light Source	Xenon lamp
Average Detection Time	< 5 seconds
Power Consumption	15W
Power Adapter	DC 24V
Product Dimension	310mm × 221mm × 176mm
Packaging Dimension	320 × 380 × 330
Net Weight	6 kg
Gross Weight	9 kg

5. Applications

Nano Spectrophotometer LMNS-B100 is ideal for quantifying ultra-low volume samples of DNA, RNA, protein, drug, microbial or cell culture.

6. Instrument Introduction

Composition of instruments:

Figure-1

Figure-2

7. Installation

7.1 Unpacking Inspection

Before unpacking, check carefully for the following damage:

1) The outer packaging is upside down or deformed.
2) The outer package contains obvious traces of water.
3) The outer package contains obvious signs of impact.
4) There are signs that the outer packaging has been opened.

If the outer packaging is in good condition, open the box and check:

1) According to the packing list, check whether all components are complete.
2) Carefully inspect the appearance of all components for cracks, bumps, or deformation.

7.2 Installation Requirements

7.2.1 Space Requirements

The instrument should be placed on a dry, clean, and level workbench, with a space of more than 15 cm on both sides and back of the instrument. It is convenient for line connection and to meet the requirements for exhaust.

7.2.2 Environmental requirements

1) The ambient air is clean and free of corrosive steam and smoke.
2) The ambient temperature is 5°C – 40°C.
3) Humidity ≤ 80%.
4) The use environment requires testing in an environment without obvious air convection.

Note: Do not operate the instrument in a destructive gas-liquid environment.

7.3 Installation steps

1) Place the instrument and packaging lightly on the operating site, unpack, take out the package, and then place the instrument on the operating table.
   Note: Unless specifically specified in the instructions, do not loosen any other screws or parts, as this may cause damage to the instrument.
2) Put the "**ON/OFF**" switch on the back of the instrument to the "**OFF**" position. Take out the power cord, insert the plug of the power cord into the socket at the rear of the instrument, and then connect the other end to the AC100-220V power supply.
3) Turn on the power switch on the back of the instrument, the instrument runs self-test and can be used after completion.
   Warning: Do not operate the instrument connected to an ungrounded electrical outlet.

8. Software Operations

8.1 Self-test

Open the power switch on the back of the instrument to start the instrument.

Figure-3

8.2 Main interface

After the self-test is completed, the software enters the main interface. The interface is divided into 6 items: Nucleic acid detection, protein detection, colorimetry, UvVis, OD600, and system settings.

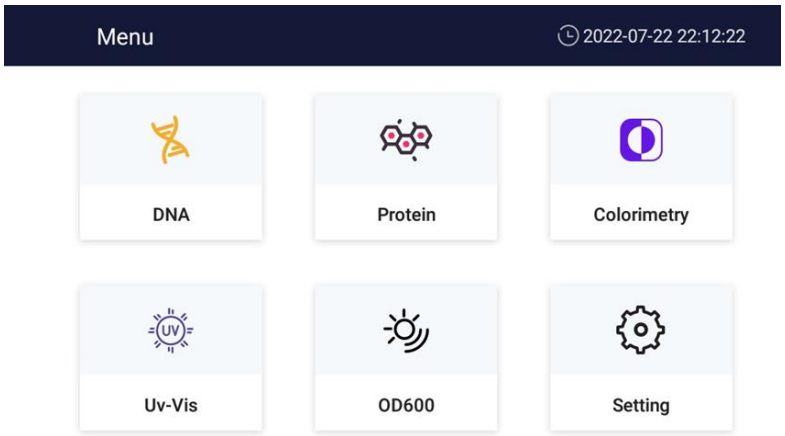

Figure-4

For **LMNS-B100:**
Click **"Nucleic acid A260"** and enter the nucleic acid detection interface.
Click **"Protein A280"** and enter the protein detection interface.
Click **"Protein Colorimetry"** and enter the colorimetry interface.
Click **"Full wavelength scan"** and enter the UvVIS full wavelength scan interface.
Click **"rowth Density"** and enter the OD600 detection interface.
Click **"System Settings"** and enter the system settings interface.

8.2.1 Nucleic acid detection

Click "**Nucleic Acid Detection**" on the main interface to enter the nucleic acid detection interface.

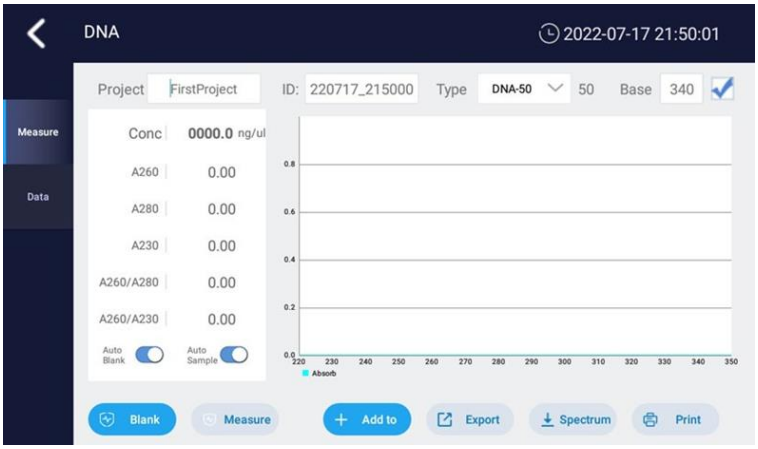

Figure-5

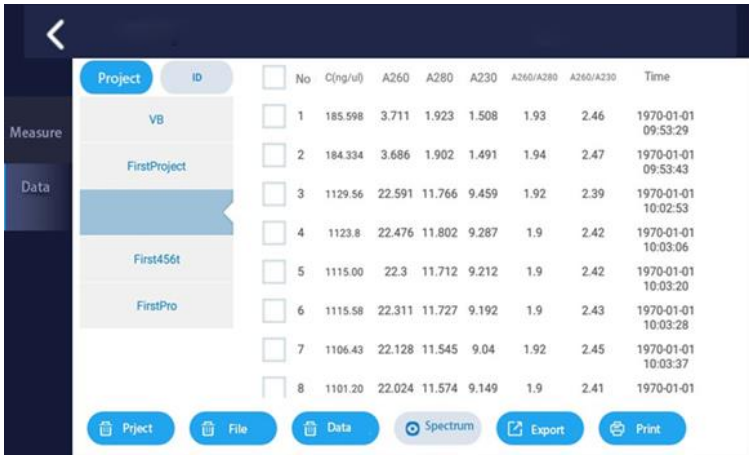

Figure-6

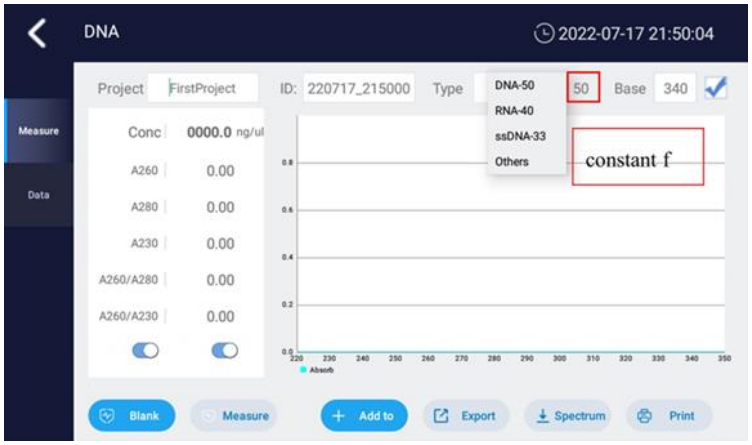

Figure-7

1) Wait for the sample to be shaken, centrifuged, mixed, or dissolved stored at low temperature refrigerated at room temperature.
2) Select "DNA-50", "RNA-40" or "ssDNA-33" in "Type", if other types of nucleic acids need to be detected, then select "Other" as detailed in steps "9" and "10".
3) Before using the instrument, wash the sample base and the light machine base with 3 to 5 μL of ultrapure water or sample buffer, and wipe the solution clean with dust-free paper; repeat at least 2 times.
4) Drop 0.3-2.5 μL (recommended 1 μL) sample buffer on the detection machine base, put down the detection arm, then the instrument automatically detects to obtain a blank baseline, or click "**blank**" to obtain a baseline, and wipe it clean with dust-free paper after completion (the instrument turns on "automatic blank" detection by default. when the detection arm is put down for the first time, blank detection can be carried out automatically without clicking the screen, or the automatic detection can be turned off manually.
5) Drop 0.3 - 2.5 μ L (recommended 1 μ L) sample solution on the testing machine base, lower the detection arm, perform sample detection automatically, or click "**sample**" for testing. Wipe it clean with clean paper after completion (the nth time (n ≥ 2). When the detection arm is put down, the sample detection can be carried out automatically without clicking the screen, or the automatic detection can be turned off manually.
6) After the test is completed, click "**Print**" to print the test results from the printer; click "**Save Spectrum"** to save the detailed detection data; Click "**Export Pictures**" to export the detection pictures to the USB flash drive; Click "**Add to**" add the current test result to other directories.
7) After all the samples are tested, click "**data"** to enter the data interface, select the test content according to the established items and ID, and export the test data to the U disk for further analysis.
8) After the test is completed, clean the sample base and the light machine base with 3-5 μL ultrapure water, and wipe the solution clean with dust-free paper; Repeat 2 times.
   Note: It is recommended to use the instrument in a clean environment. At this time, the light machine base does not need to be cleaned each time it is used, but only the sample base needs to be cleaned.
9) For nucleic acids with a known extinction coefficient, the constant f is calculated from the formula f=1/k, select "other" in the "Type" and input the constant f to detect; For nucleic acids with unknown extinction coefficients, it is necessary to provide a standard of this type of nucleic acid with a known concentration, first select "DNA-50" in "Type", and follow the above steps for A260 detection. The constant f is calculated from the formula f=c/A260, c is the standard concentration, the unit is ng/μL, then select "Other" in "Type" and input the constant f to detect.
10) For the calculation of extinction coefficients for known sequence oligonucleotides (e.g. primers): professional software is recommended.

8.2.2 Protein detection

Click "**protein Detection**" in the main interface to enter the protein detection interface.

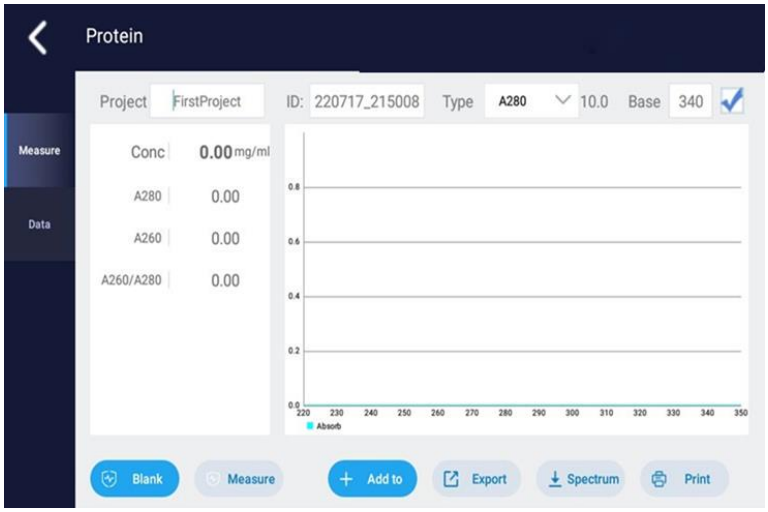

Figure-8

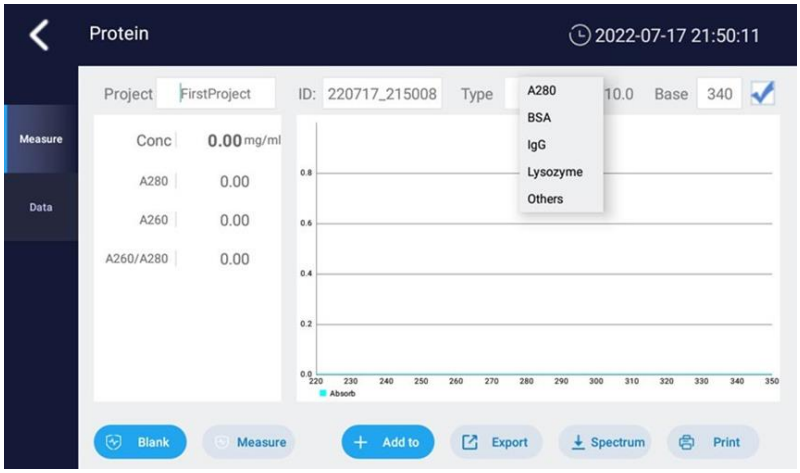

Figure-9

1) Wait for the sample to be shaken, centrifuged, mixed, or dissolved stored at low temperature and refrigerated at room temperature.
2) Select "A280" in “Type” to estimate the total protein concentration, and select "other" if you need to detect a specific purified protein with a mass extinction coefficient of the protein, or provide a protein standard with known concentration, refer to step "9" and step "10”.
3) Before using the instrument, clean the sample machine base and light machine base with 3 - 5 μL ultra-pure water or sample buffer, wipe the solution with clean paper; repeat at least 2 times.

4) Absorb 1 - 2.5 μL (recommended 1 μL) sample buffer on the testing machine base, put down the detection arm, click "**Blank**" to get the baseline, and wipe it with clean paper after completion.
5) Absorb 1 - 2.5 μL (recommended 1 μL) sample solution on the testing machine base, put down the detection arm, click "**sample**" to test, and wipe it clean with clean paper.
6) After the test is completed, click "**print**" to print the test results from the printer, click "**Save Spectrum**" to save the detailed test data, click "**Export Picture**" to export the test picture to the U disk, and click "**add to**" to add the current test results to other directories.
7) After all the samples are tested, click "**data**" to enter the data interface, select the test content according to the established items and ID, and export the test data to the U disk for further analysis.
8) After the test is completed, clean the sample machine base and light machine base with 3-5 μL ultra-pure water and wipe the solution with dust-free paper; repeat twice.
   Note: It is recommended to use this instrument in a clean environment. At this time, the light base does not need to be cleaned each time it is used, but only the sample base needs to be cleaned.
9) For the purified specific protein, it is necessary to provide a standard protein with a known concentration. Select "A280" in "Type", and test it according to the above steps, The constant d is calculated from the formula d = (10×A280). C is the standard concentration, unit is ng/μL, then select "Other" in "Type" and input the constant f to detect.
10) For the calculation of the protein extinction coefficient with known structure and molecular weight: professional software is recommended.

8.2.3 Colorimetric method

Click "**colorimetry**" in the main interface to enter the colorimetric detection interface.

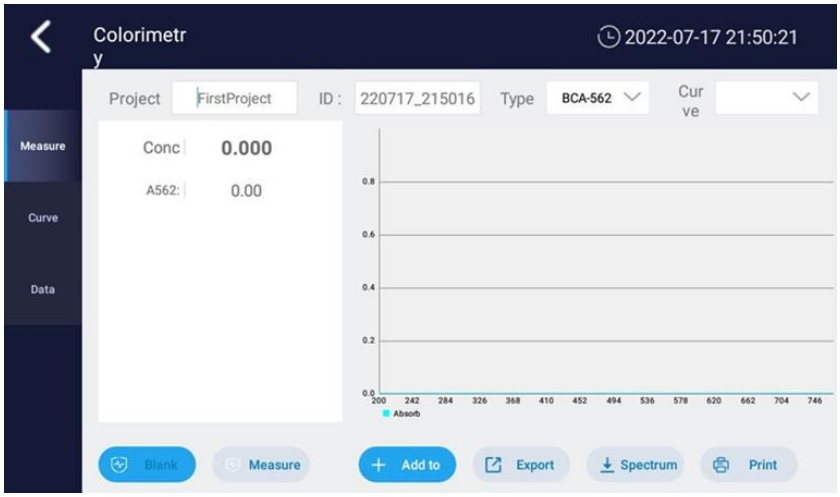

Figure-10

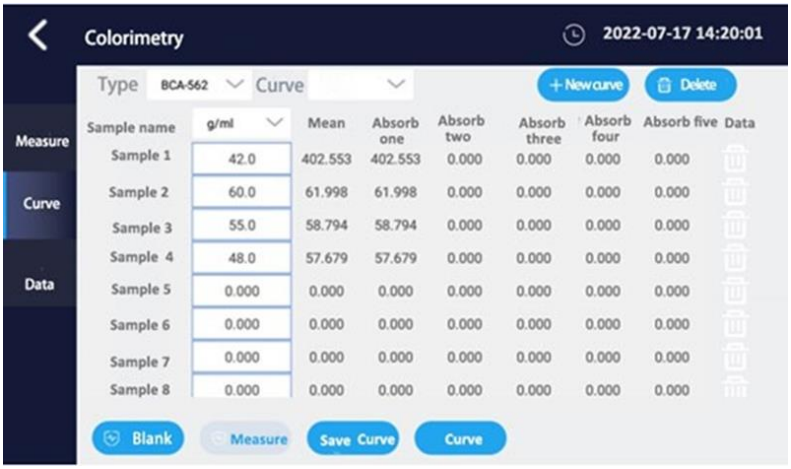

Figure-11

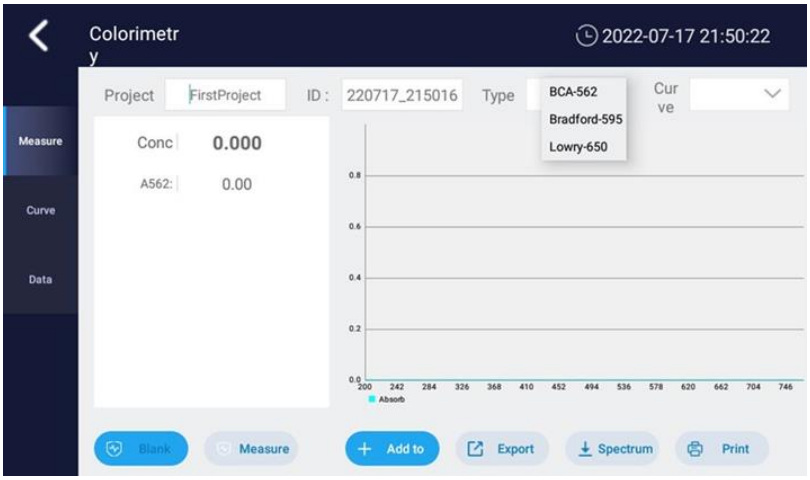

Figure-12

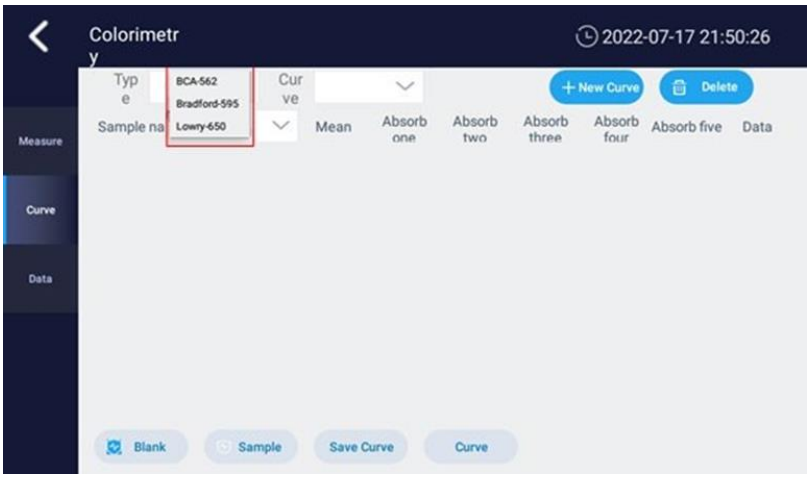

Figure-13

Figure-14

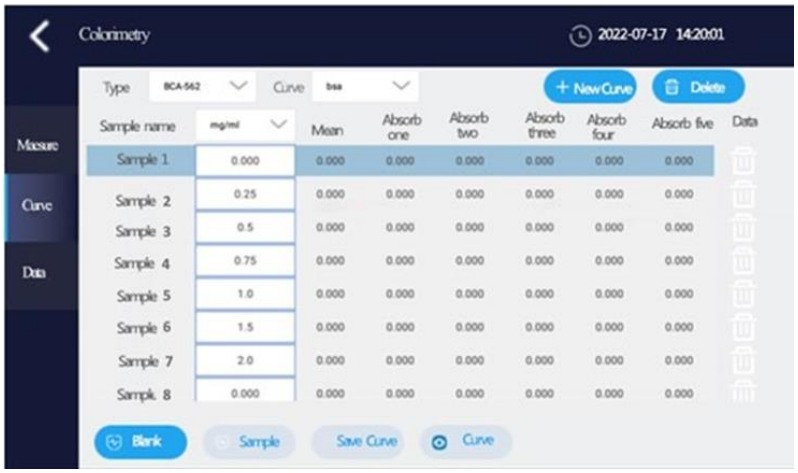

Figure-15

1) Wait for the sample to be shaken, centrifuged, mixed, or dissolved stored at low temperature refrigerated at room temperature.
2) Before using the instrument, clean the sample machine base and light machine base with 3 - 5 μL ultra-pure water or sample buffer, wipe the solution clean with dust-free paper; repeat at least 2 times.
3) Select the desired curve, if you need to create a new curve, refer to step "9" for details.
   Note: Curves must be established and selected before blank testing and sample testing can be carried out.
4) Drop 0.3-2.5 μL (recommended 1 μL) sample buffer on the testing machine base, put down the detection arm, click "**Blank**" to get the baseline, and wipe it with clean paper after completion.
5) Absorb 0.3-2.5 μL (recommended 1 μL) sample solution on the testing machine base, put down the detection arm, click "**sample**" to test, and wipe it clean with clean paper.

6) After the test is completed, click "**print**" to print the test results from the printer, click "**Save Spectrum"** to save the detailed test data, click "**Export Picture**" to export the test picture to the U disk, and click "**add to**" to add the current test results to other directories.
7) After all the samples are tested, click "**data**" to enter the data interface, select the test content according to the established items and ID, and export the test data to the U disk for further analysis.
8) After the test is completed, clean the sample machine base and light machine base with 3-5 μL ultra-pure water and wipe the solution with dust-free paper; repeat twice.
9) Create a new curve; click "**Curve**" to enter the curve interface, select the new curve type in "Type", click "**New Curve**", enter the name of the curve, "BCA" method suggests choosing " polynomial of the first order", "Bradford" method suggests choosing "Quadratic polynomial", "Lowry" method recommends choosing " Quadratic polynomial".
10) Absorb 0.3 - 2.5 μL (recommended 1 μL) ultra-pure water droplets on the testing machine base, put down the detection arm, click "**Blank**" to get the baseline, and wipe it clean with clean paper after completion. A sample without a target analyte is used as a reference, that is, a standard with a concentration of 0.
11) Enter the sample concentration, click to select the sample, and click "**sample Test"** to test the absorbance of the sample.
12) When the test is completed, click "**Save Curve**", when the curve can be fitted, click "**Show Curve**" to display the saved curve. If the curve cannot be fitted, it indicates that the curve fitting fails.
Note: Each batch of colorimetric testing requires the establishment of a new standard curve. when using the "**Bradford**" method, each sample needs to be re-mixed and tested immediately.

8.2.4 UvVis full-wavelength scanning

Click **"UvVis"** in the main interface to enter the full-wavelength scanning interface.

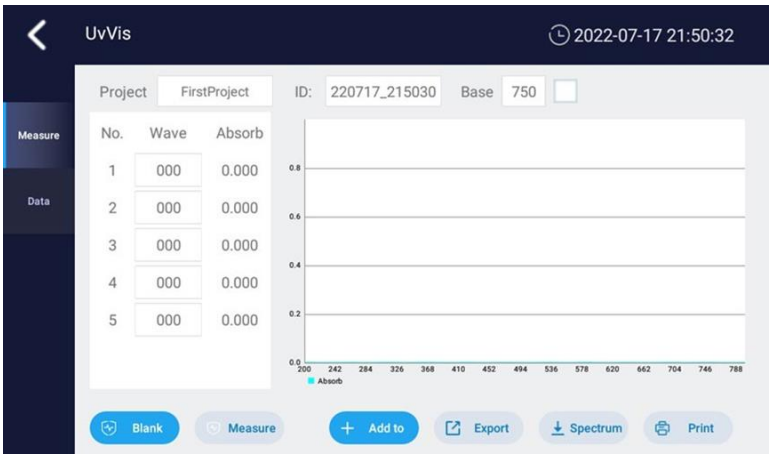

Figure-16

1) Wait for the sample to be shaken, centrifuged, mixed, or dissolved stored at low temperature refrigerated at room temperature.
2) Before using the instrument, clean the sample machine base and light machine base with 3-5 μL ultra-pure water or sample buffer, wipe the solution with clean paper; repeat at least 2 times.
3) Absorb 0.3 to 2.5 μL (recommended 1 μL) of sample buffer on the testing machine base, lower the detection arm, click "**Blank**" to obtain the baseline, and wipe it clean with dust-free paper when finished.
4) Enter the wavelength to be detected in the wavelength frame (whether the wavelength is entered or not, the instrument will scan a full wavelength and give the UV-VIS absorption spectrum). Absorb 0.3 to 2.5 μL (1 μL) of sample solution on the testing machine base, lower the detection arm, click "**Sample**" for testing, and wipe it clean with dust-free paper after completion.
5) After the test is completed, click "**Print**" to print the test results from the printer, and click "**Save Spectrum**" to save the detailed detection data; Click "**Export Pictures**" to export the detection pictures to the U disk. Click "**Add to**" to add the current test result to other directories.
6) After all the samples are tested, click "**data**" to enter the data interface, select the test content according to the established items and ID, and export the test data to the U disk for further analysis.
7) After the test is completed, clean the sample machine base and light machine base with 3-5 μL ultra-pure water, wipe the solution clean with dust-free paper, and repeat twice.

8.2.5 OD600 rowth density detection

Click "**OD600**" in the main interface to enter the OD600 growth density detection interface.

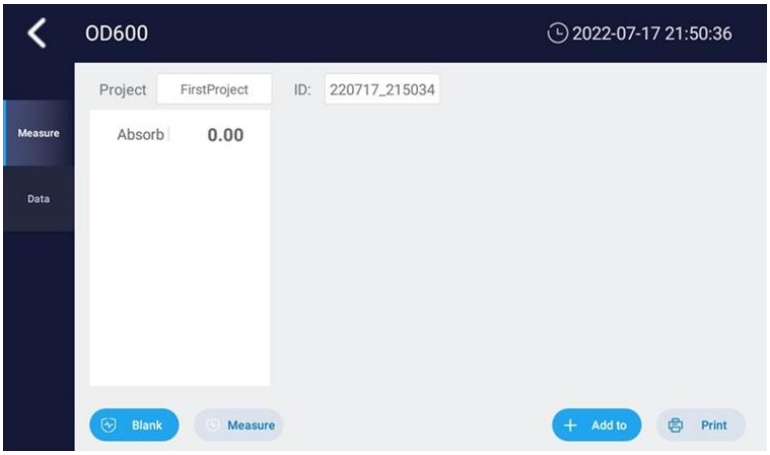

Figure-17

1) Insert the colorimetric tank filled with aseptic medium solution into the slot, and click "**Blank**" to obtain the original blank absorbance.
2) Insert colorimetric tank filled with the bacterial solution into the slot and click "**sample**" to test the absorbance of the sample.
3) After the test is completed, click "**print**" to print the test results from the printer, and click "**add to**" to add the current test results to other directories.

4) After all the samples are tested, click "**data**" to enter the data interface, select the test content according to the established items and ID, and export the test data to the U disk for further analysis.

8.2.6 System Setting

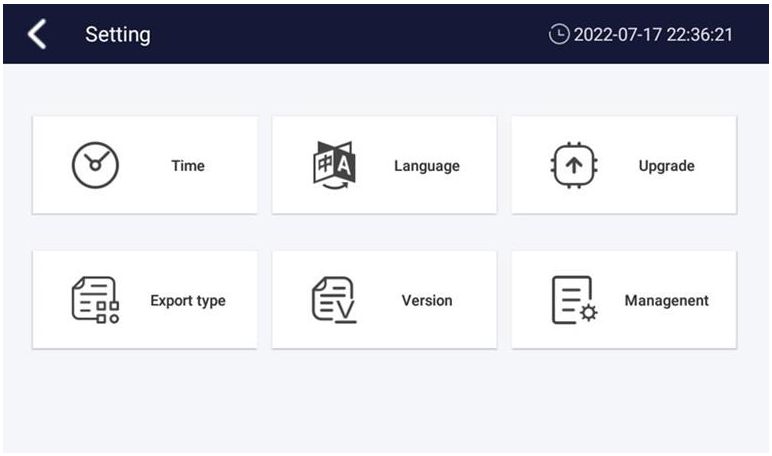

Figure-18

1) Click "**time**" to use Android's time setting system to set the instrument time.
2) Click the "**Language**" system pop-up dialog box, and select the language as English.
3) Insert the USB disk with upgrade software, click the "**upgrade**" button, and then click "**upgrade main program**" to upgrade the instrument system.
4) Click the" **format"** system pop-up dialog box, select the format as "CSV" or "TXT", and the corresponding export file data format is "CSV" or "TXT".
5) Click **"version**" to display the version information of the current system.
6) Click the "**maintenance**" pop-up maintenance password box, and enter the password to enter the maintenance interface.

9. Maintenance

9.1 Cleaning of the sample holder and light holder

Figure-19

After wiping the perimeter with alcohol, add ultrapure water 2 ul. Close the detection arm, so that the upper and lower light guide columns can be in full contact with ultrapure water, dissolve them statically for 5 to 10s, open the detection arm, and dry the upper and lower light guide columns with dust-free paper.

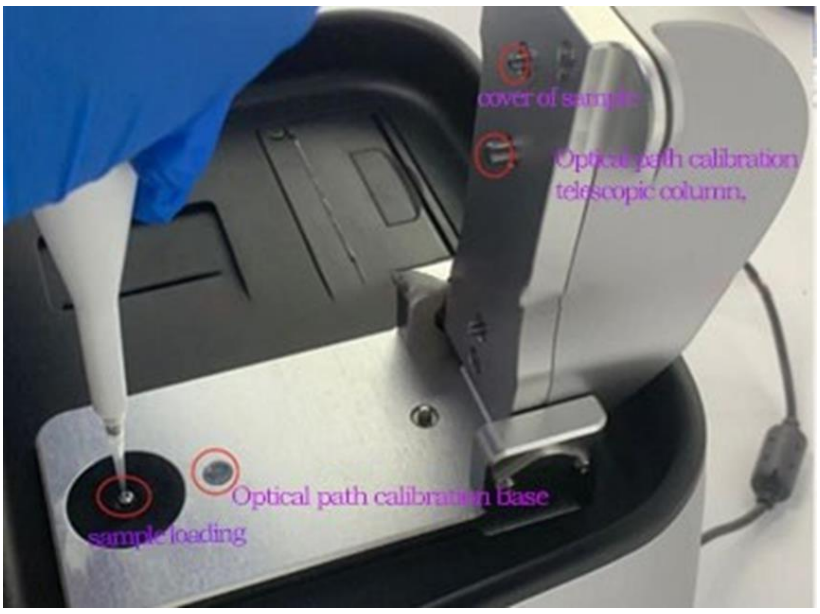

Figure-20

Take the water to the sample table, cover the upper arm, let it sit for 5 seconds, and use dust-free paper to suck off the water at the upper and lower joints.

9.2 Instrument maintenance

9.2.1 Daily use

1) Keep the instrument clean and dry to avoid liquid dripping. If a large amount of reagents overturns the instrument, cut off the power immediately and use a dry cloth or paper towel to clean up the liquid. After the inside of the instrument is completely dry, turn on the UV lamp for sterilization for more than 30 minutes for disinfection.
2) After the detection is completed, use 3-5 μL of ultrapure water to clean the sample holder and the light holder, and wipe the solution with dust-free paper; repeat twice.

Warning: Do not use ethanol to clean the sample detection frame, otherwise it may seriously damage the instrument.

9.2.2 Idle maintenance

1) Kindly refer to 7.2.2 Environmental requirements of the instrument.
2) If the instrument will not be used for a long time, close the observation window, turn off the power supply unplug the plug, and cover the instrument with a soft cloth or plastic bag to prevent dust from falling into it.
3) It is recommended to start up and run dry every 30 days to ensure the stability of the instrument.