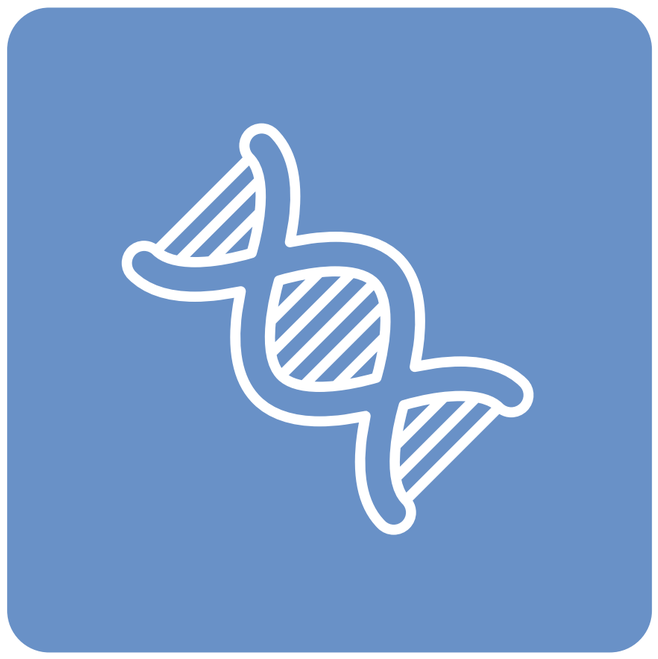
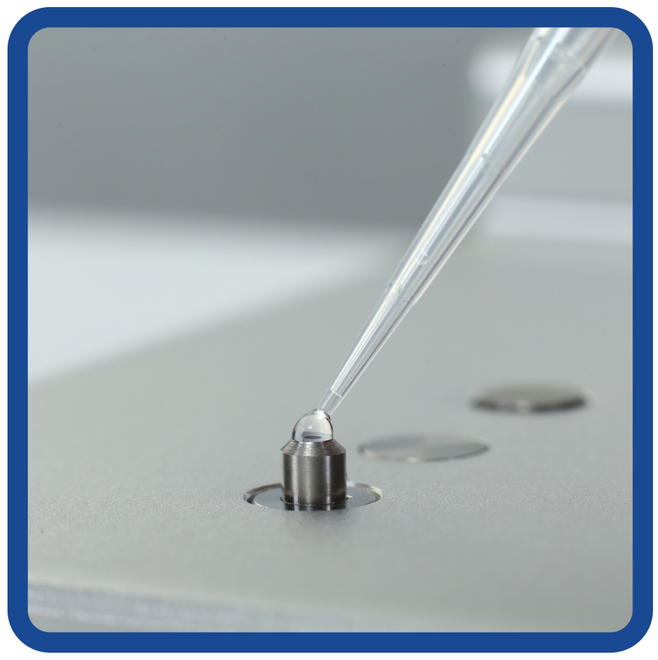




Apostle
NanoFlex 800

Apostle, Inc. All rights reserved

Micro-Spectrophotometer

User Manual

THANK YOU

Thank you for purchasing the Apostle NanoFlex 800 Micro-Spectrophotometer. This manual is provided as a guide to operating and troubleshooting the instrument. Read the instructions carefully and save this manual for future reference.

Please check the instrument and packing list to ensure all the listed components are present. If anything is missing or damaged, please contact the vendor.

Apostle, Inc.
3589 Nevada St., Pleasanton, California 94566
https://apostlebio.com
Email: support@apostlebio.com
Phone: 1.888.305.3218

Contact Us

Safety Warnings and Guidelines

- To ensure safe operation, please read this manual carefully before using the instrument.
- The operation, maintenance, and repair of this instrument should comply with the guidelines and warnings below. Failure to follow these instructions may affect the life of the instrument and warranty.
- This instrument is for indoor use only.
- Unauthorized repairs or opening of the instrument will void the warranty and could result in injury. Please contact Apostle for repairs.
- Immediately stop use and unplug the instrument in the following cases:
    - Liquid has spilled inside the instrument,
    - The instrument is sparking, smoking, or on fire,
    - Abnormal sounds or smells are coming from the instrument,
    - The instrument was dropped or the outer shell was damaged,
    - Basic functions are not working.

Table of Contents

Table of Contents

About Apostle NanoFlex 800

The NanoFlex 800 is a spectrophotometer that measures 0.5 to 2 µL samples with high accuracy and reproducibility. Sample pedestals hold the sample droplet in place with surface tension, forming a column. During measurement, light goes through the sample column.

The NanoFlex 800 can measure highly concentrated samples without dilution, up to 100 times more concentrated than samples measured in a standard cuvette.

Specifications

2.1 | Normal operating conditions

- Ambient temperature 5–35°C
- Relative humidity less than 70%
- Power supply: 24 V DC, 2A

2.2 | Maintenance

- Clean the pedestal of the spectrophotometer with a lint-free wipe and pure water.
- Clean the outside of the instrument with a lint-free wipe and alcohol.

2.3 | Parameters

Model	NanoFlex 800
Power supply	24 V DC, 2A
Power usage	25 W
Dimensions	208×320×186 mm
Weight	3.6 kg
Minium sample size	0.5 µL (2 µL is recommended)
Path length	0.05, 0.2, or 1 mm
Light source	Xenon flash lamp

Specifications

Light source life	> 10^9 flashes	
Detector type	2048-element linear silicon CCD array	
Wavelength range	200–800 nm	
Wavelength accuracy	± 1 nm	
Spectral resolution	≤ 3 nm (FWHM@Hg 253.7 nm)	
Absorbance precision	0.003 Abs (1 mm path length)	
Absorbance accuracy	± 1% (7.332 Abs, at 260 nm)	
Absorbance range	0.04-300 (10 mm equivalent at 260nm)	
Detection range	2–15,000 ng/μL (dsDNA)	
Detection time	< 6 s	
OD600 range	0–4.000 Abs	
OD600 stability	≤ 0.5% (0–3 Abs)	≤ 1% (3–4 Abs)
OD600 repeatability	≤ 0.5% (0–3 Abs)	≤ 1% (3–4 Abs)
OD600 precision	≤ 0.005 Abs (0–2 Abs)	≤ 1% (2–3 Abs) ≤ 2% (3–4 Abs)

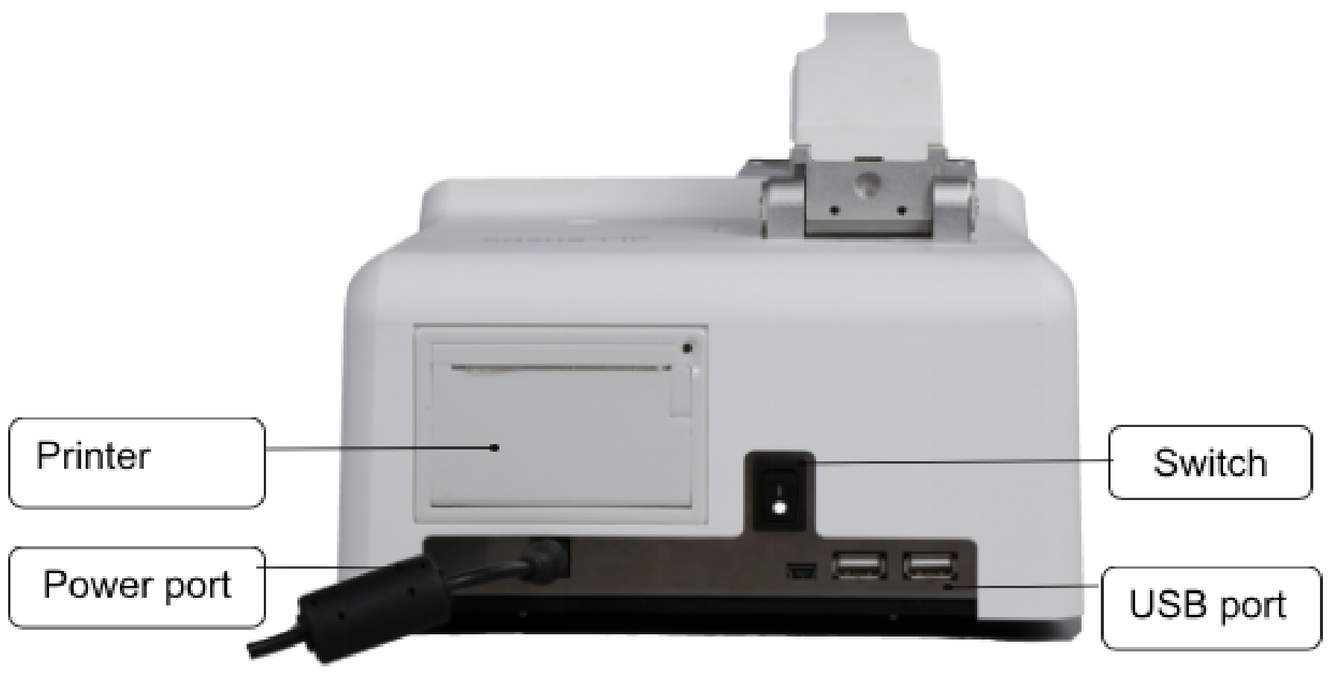
Specifications

Fluorometer linearity	$R^2 \geq 0.995$
Fluorometer repeatability	≤ 1.5%
Fluorometer stability	≤ 1.5%
Excitation wavelength	365 ± 20 nm
Emission wavelength	420 - 480 nm

3.1 | Instrument

3.1.1 Front

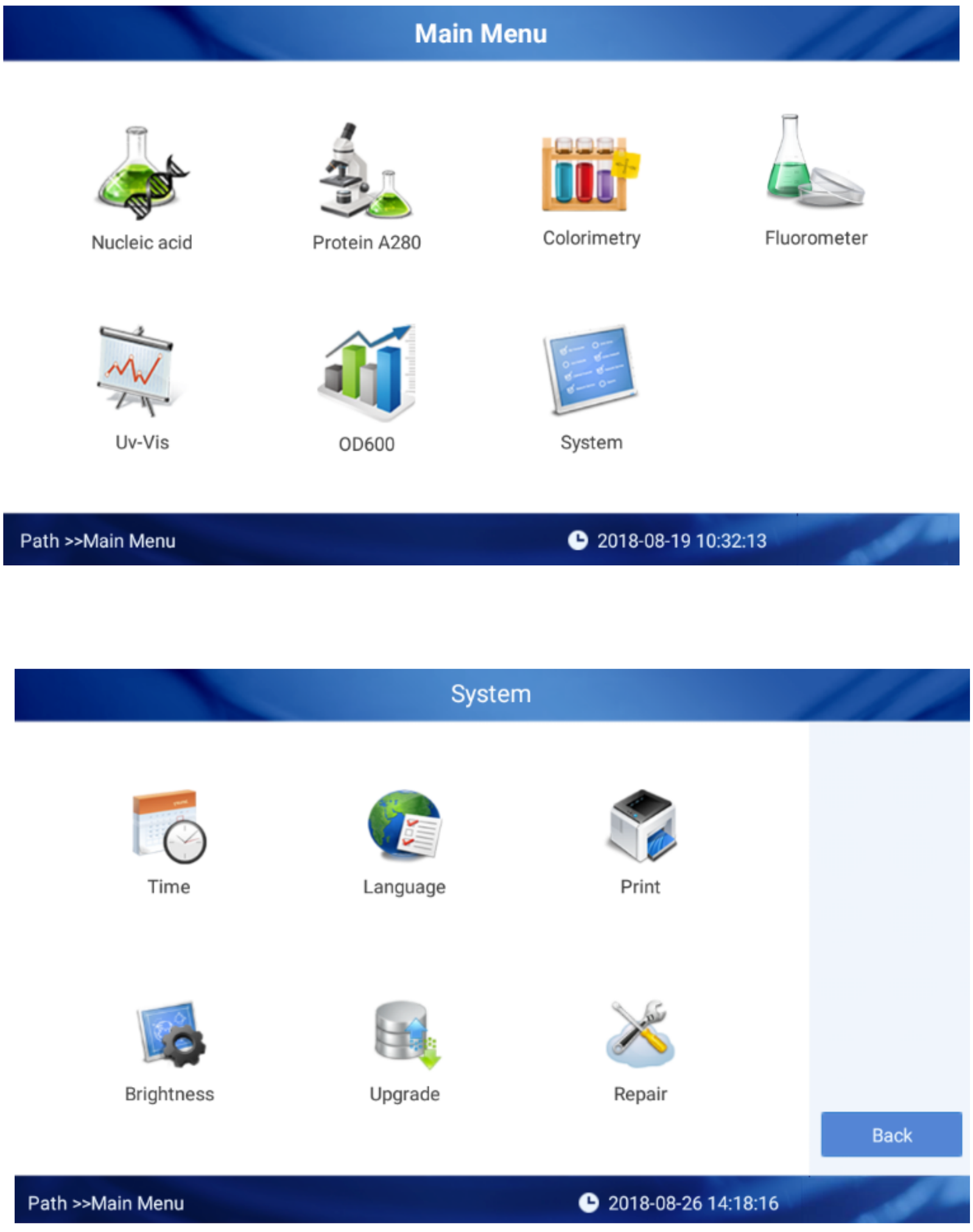
3.1.2 Back



Notes: Make sure the power supply with ground wire.

3.2 | Settings

Press “System” to access system settings, including language, brightness, time and date, 24-hour time format, automatic printing, and software updates.



4.1 | Sample

4.1.1 Sample Size

Although sample size is not critical, it is essential that a complete liquid column is formed between the upper measurement pedestal and lower measurement pedestal. It is best to use a 2-µL pipettor and maintain consistent volume between samples. A 2 µL sample is recommended for higher accuracy.

4.1.2 Sample ID

The sample batch ID defaults to the current date and time, e.g., 181212_143114. Users can edit the batch ID. Each ID can store 1000 measurements.

4.2 | Blanking

A blank measurement of the buffer solution is required before measuring samples. The system will automatically blank with the first measurement in each batch (“Auto Blank” can be turned off). Or, press “Blank” to measure a new blank. The accepted range of blank absorbance values is 0.004–0.03 Abs. If the blank is rejected, information will appear under the i icon. Blanks are valid for 30 minutes, after which the system will prompt the user to blank again.

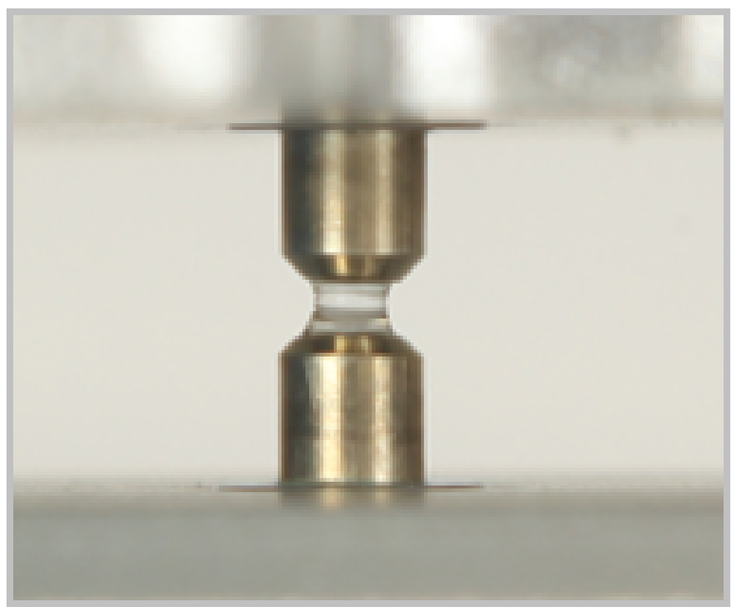
4.3 | Baseline Calibration

The baseline absorbance value is subtracted from all measurements. The default baseline (340 nm) can be changed, or turned off. A baseline is required for accurate results.

4.4 | Measuring a sample

1. Raise the upper arm of the spectrophotometer and make sure both pedestals are clean.
2. Pipette a 0.5 µL to 2 µL sample onto the center of the lower pedestal. Make sure there are no bubbles, and that the sample forms a tight droplet.

3. Gently lower the arm. The sample should form a bridge between the upper and lower pedestals, held by surface tension. The measurement will initiate automatically (Auto Sample can be turned off).



Liquid column

4. When the measurement is complete, open the upper pedestal and wipe the sample from both the upper and lower pedestals with a soft laboratory wipe. Simple wiping prevents sample carryover in the pedestals.
5. After each use, clean the pedestals with pure water

Wipe the sample

Spectrophotometer

- Press “Data” to see the data from the current batch, and press “Graph” to return to the full spectrum graph for the current sample.
- Press “Spectrum Data” to save the full spectrum absorbance data for a sample. Otherwise, only the select data points will be saved.
- Press the “Report” tab to view and manage all results.
- Press “Enlarge Curve” to choose a point on the spectrum and see its absorbance, or enter a wavelength in the box at the top of the window.

5.1 Introduction

Select Nucleic Acid to measure the concentration of DNA and RNA samples. The Beer–Lambert equation is used to calculate the nucleic acid concentration:

$$C = \frac{A \times \varepsilon}{b}$$

C=nucleic acid concentration, ng/µL
A=absorbance, AU
ε=extinction coefficient, ng · cm/µL
b=path length, cm

5.2 Measurement

The spectrophotometer can measure dsDNA concentrations up to 15,000 ng/µL by automatically adjusting the path length in the range of 0.05–1.0 mm. The absorbance value is equivalent to a path length of 1 cm.

Select the sample type and extinction coefficient from the drop-down menu:

- dsDNA – 50 ng · cm/µL
- ssDNA – 33 ng · cm/µL
- RNA – 40 ng · cm/µL
- Other – input a value for ε

5.3 Results and Interpretation

Nucleic acid is measured at 230, 260, and 280 nm.

A260/A280: This absorbance ratio can be used to judge the purity of DNA or RNA. Pure DNA will be around 1.8, while pure RNA will be around 2.0. If the ratio is lower, it means the sample contains protein, phenol, or other contaminants.

A260/A230: This absorbance ratio should be in the range of 1.8–2.2. If the ratio is lower, it means the sample is contaminated.

5.4 Report

Click “Report” to check results, choose one ID No. You can read all the results of this ID.

6.1 Introduction

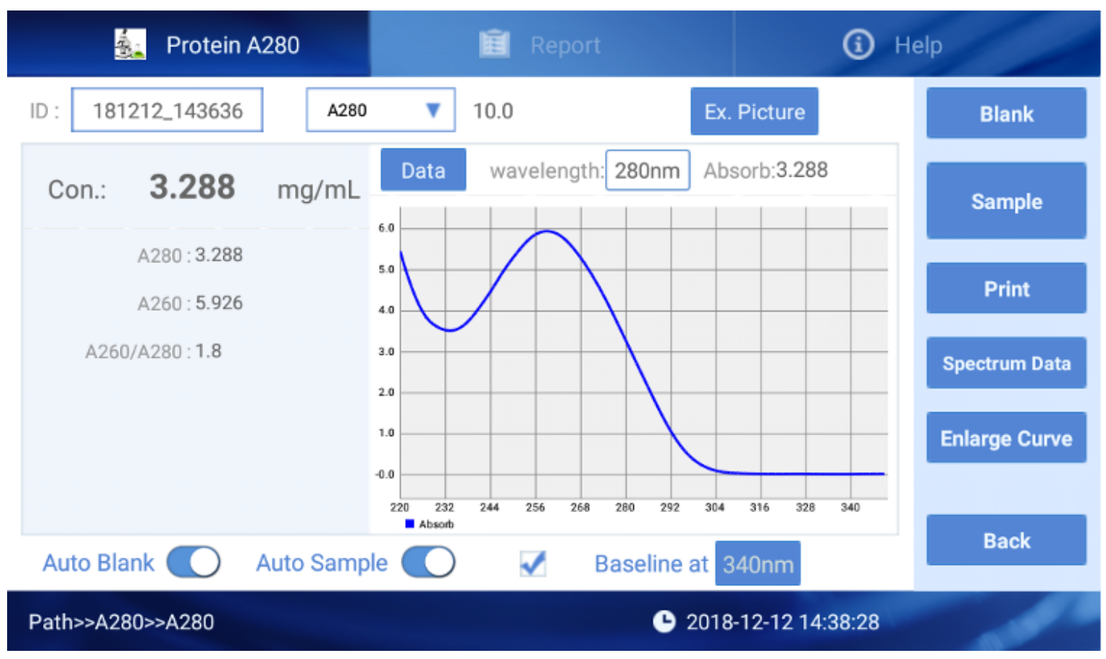
The protein A280 method is applicable to purified proteins containing Trp, Tyr, or Cys-Cys disulfide residues, which exhibit absorbance at 280 nm. It does not require generation of a standard curve. The software calculates the protein concentration in mg/mL directly after measuring the absorbance value. The full UV spectrum is measured at 10 mm equivalent path length.

The spectrophotometer will accurately measure protein samples up to 90 mg/mL (BSA) without dilution. If the sample is too concentrated, the software will inform the user to choose a shorter path length to ensure the precision of the measurement.

The user can input a different extinction coefficient in the drop-down menu under “other.”

6.2 I Result

A260/A280: The absorption ratio at 260 and 280 nm is a measure of nucleic acid contamination. A value below 0.60 is ideal.



UV–Vis full-spectrum scanning

For general spectrophotometry, the full ultraviolet–visible spectrum function measures from 200 to 800 nm. Choose up to five individual wavelengths to save in the data report. The instrument will automatically adjust the path length, allowing samples up to 300 Abs to be measured.

Press “Blank data” or “Sample data” to see the raw absorption intensity data for the blank or sample.

8.1 Introduction

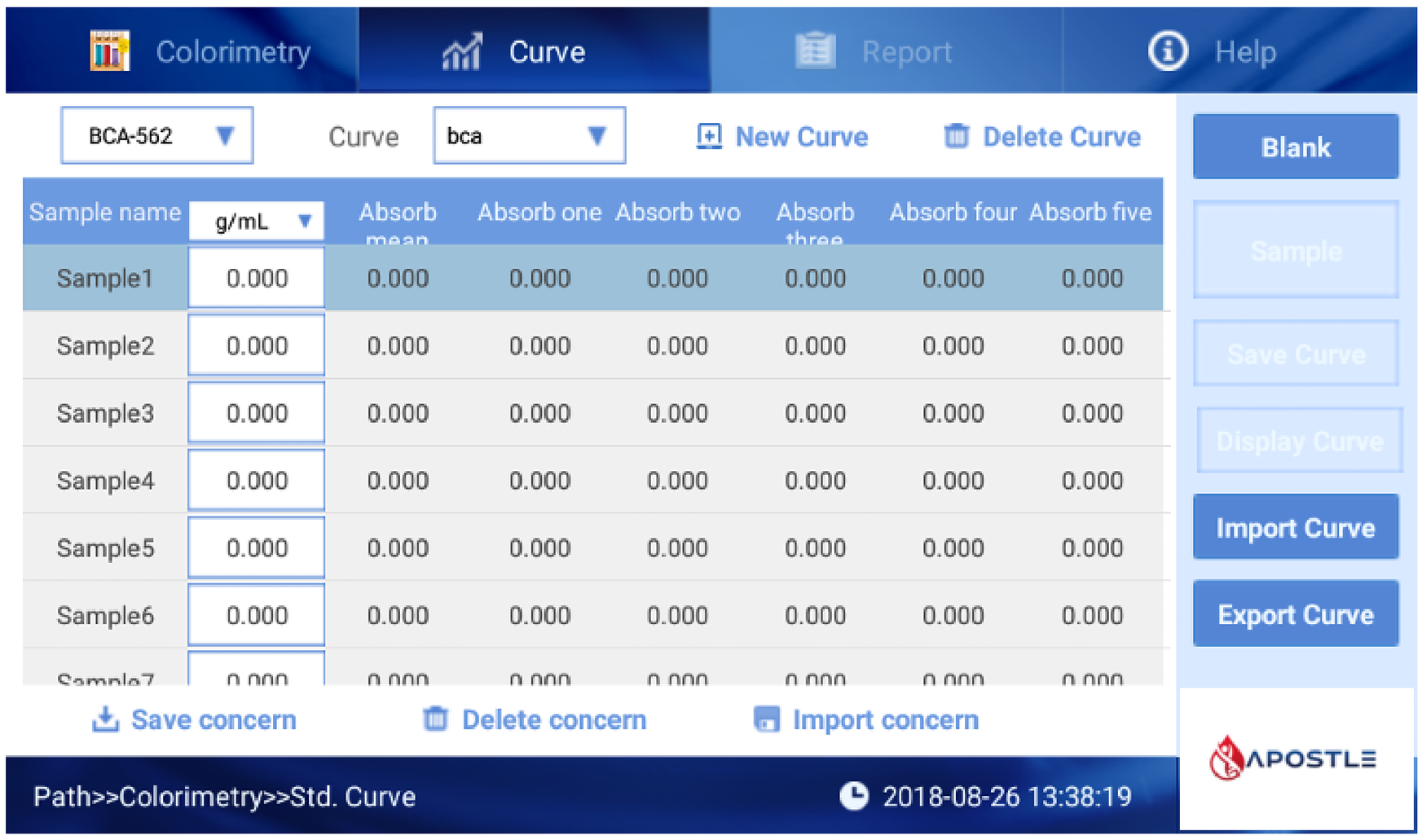
The colorimetry function supports three of the most common methods for measuring the concentration of impure protein solutions – the BCA, Lowry, and Bradford assays. Select an assay from the drop-down menu.

1. BCA (bicinchoninic acid) assay: measures the absorbance of the purple-red copper-BCA chelate at 562 nm, standardized to the baseline absorbance at 750 nm.
2. Lowry assay: measures the absorbance of the heteropolymolybdenum blue compound at 750 nm.
3. Bradford assay: measures the absorbance of the protein complex with Coomassie Bright Blue G-250 at 595 nm, standardized to the baseline absorbance at 750 nm.

8.2 I Constructing a standard curve

A standard curve covering the sample range must be constructed before measuring samples.

1. Select the “Curve” tab.
2. Press “New Curve” and enter a name.
3. Choose units of measure from the drop-down menu.
4. Input the concentrations of the standards to measure. The order does not matter.
5. Select one standard, make a blank measurement, and measure the standard up to five times.
6. To delete erroneous values, select a single value or press and hold a whole row.
7. After measuring all samples, press “Save Curve.” Curves can be viewed, but not edited after saving.



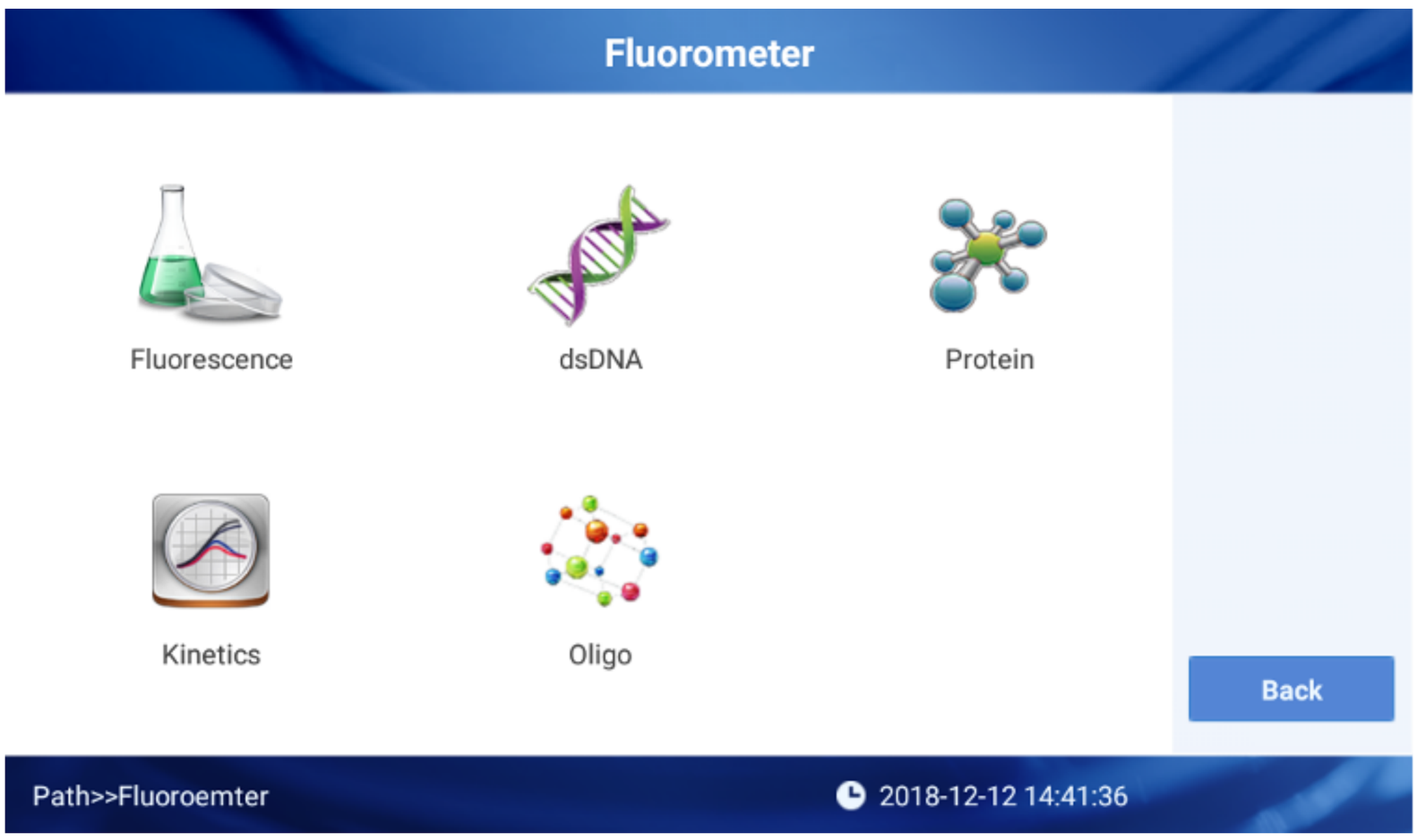
Once a curve is saved, you can select it from the drop-down menu when taking a measurement.

8.3 I Report

Results are displayed under the Report tab. Select an assay method from the drop-down menu to see all reports of that type.

9.1 I Function

- Fluorescence – direct fluorescence measurement, without a curve or concentration analysis.
- dsDNA, Protein, Oligo – measure samples according to a standard curve.
- Kinetics – measure concentration change over time.



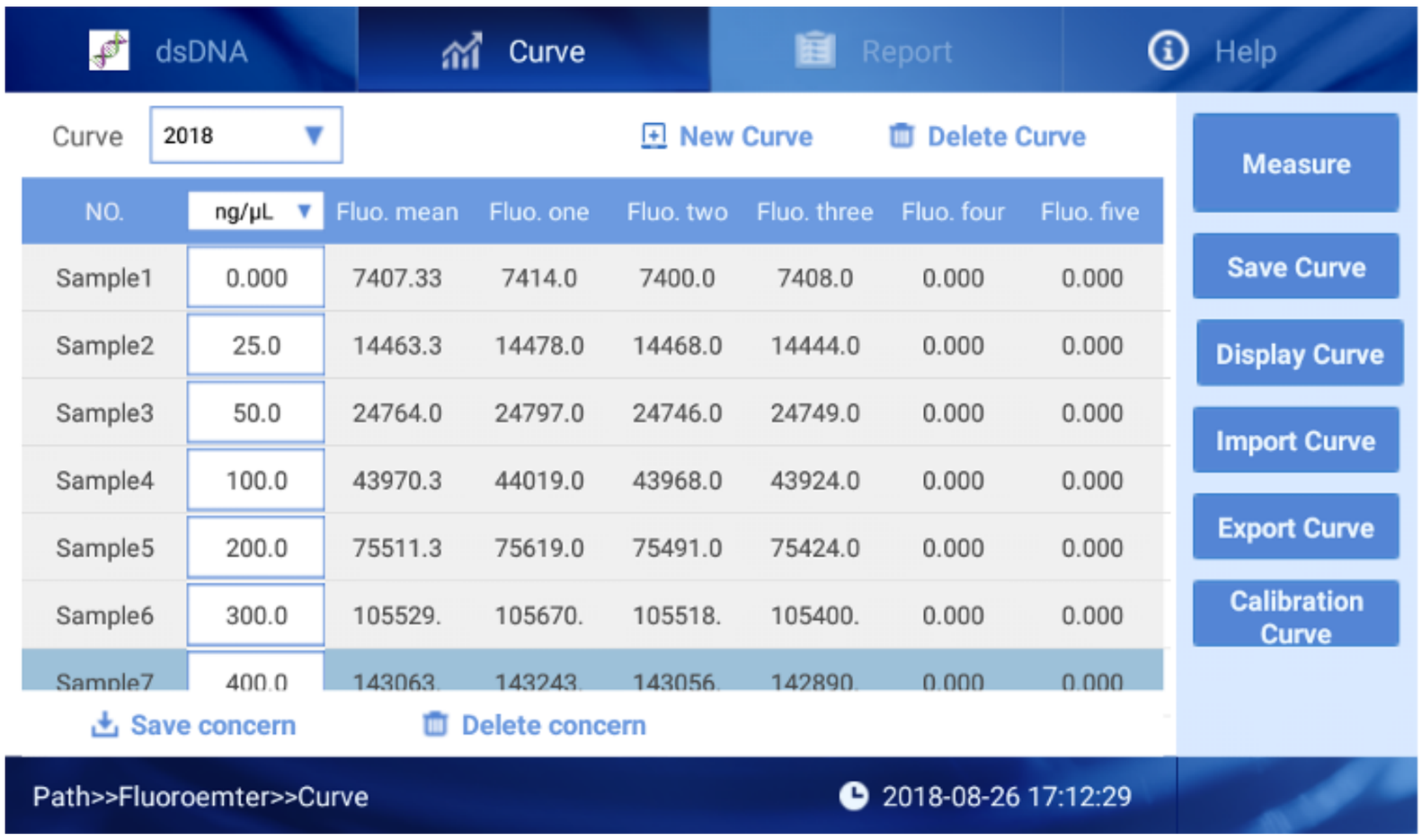
9.2 I Concentration Measurement

1. Add the sample into the 0.5 mL PCR tube and make the total volume 200 µL.
2. Put the tube in the fluorometer and close the lid.
3. Enter a batch ID, choose a standard curve from the drop-down menu, and input the original sample volume.
4. Measure the sample.

9.3 I Standard Curve

A standard curve needs to be established for the dsDNA, Protein, and Oligo measurement functions. The simplest standard curve can be composed of two points, but in order to ensure the accuracy of the detection, it is recommended to have at least 5 points. The curve should cover the possible range of the samples. Distribute standard points as evenly as possible.

Click "Standard Curve" to enter the standard curve interface, as shown in Figure below. The figure shows the curve that has been built.



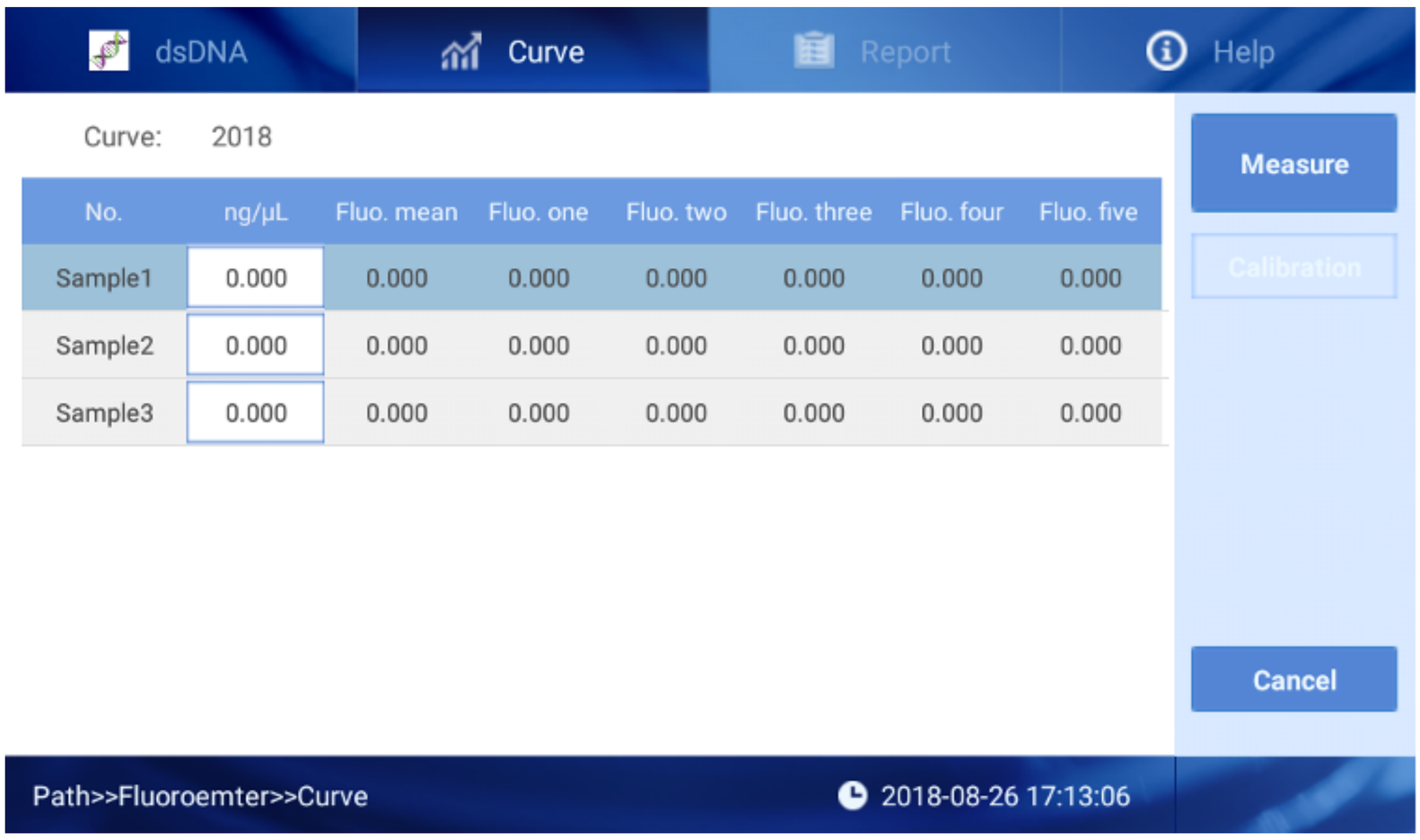
- Select the “Curve” tab.
- Press “New Curve.” Choose the type of equation used to model the curve, and enter a name.
- Choose units of measure from the drop-down menu.

- Input the concentrations of the standards to measure. The order does not matter.
- Select one standard, and measure the standard up to five times. There is no blanking.
- To delete erroneous values, select a single value or press and hold a whole row.
- After measuring all samples, press “Save Curve.” Curves can be viewed, but not edited after saving.

9.4 I Curve Calibration

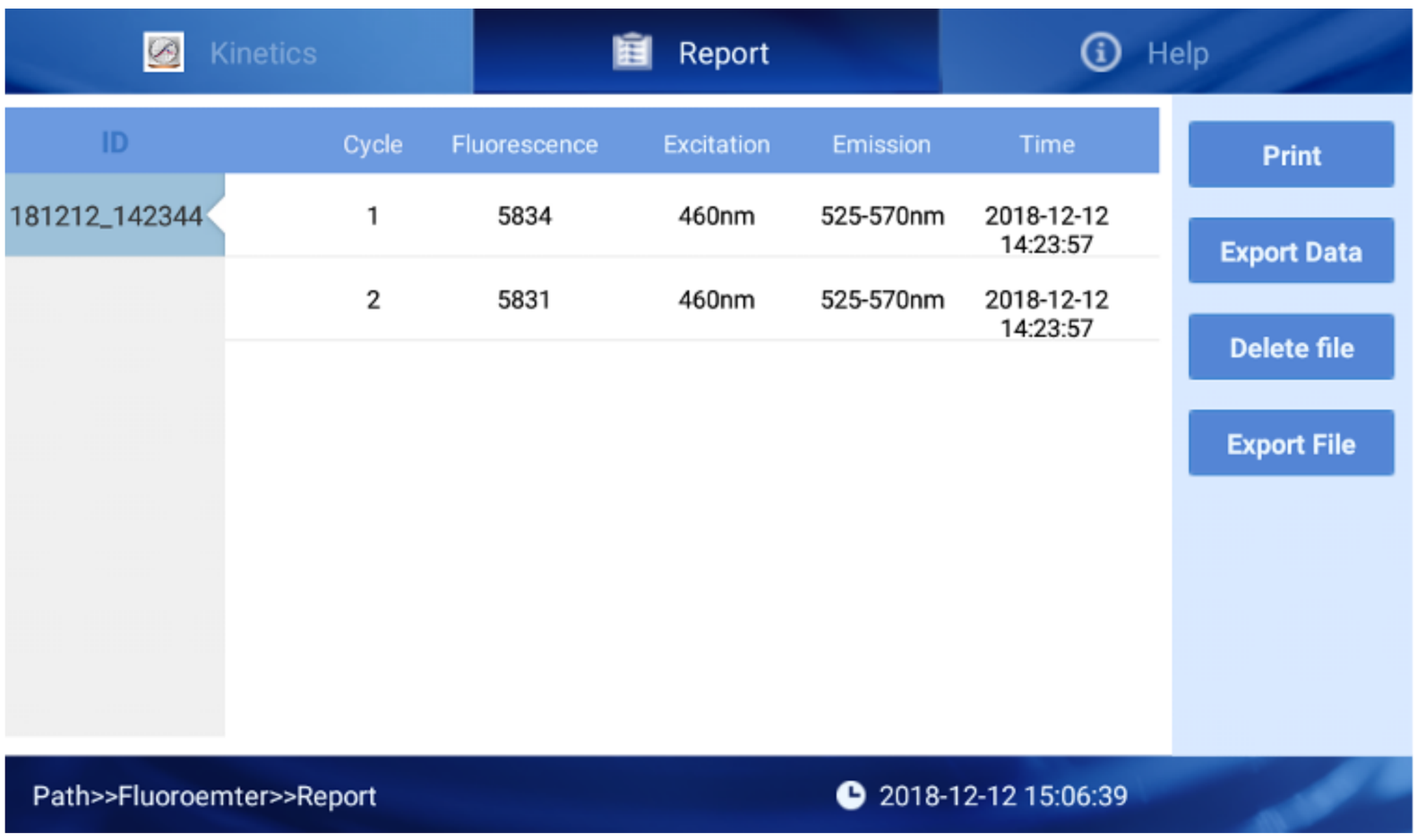
An existing standard curve can be calibrated to eliminate error caused by drift in the instrument.

1. From the Curve tab, press “Calibration Curve” to enter the calibration curve interface.
2. Measure two or three standards, in any order.
3. Press “Calibrate” to complete the calibration.



9.5 I Kinetics

The Kinetics function measures the same sample multiple times over a time period. Under “Total,” input the duration of the test. Under “Interval,” input the interval between measurements. The format is Hours:Minutes:Seconds. A maximum of 99 measurements can be made for each test. Press “Stop” to end the test after the next measurement. The report shows the time each measurement was made.

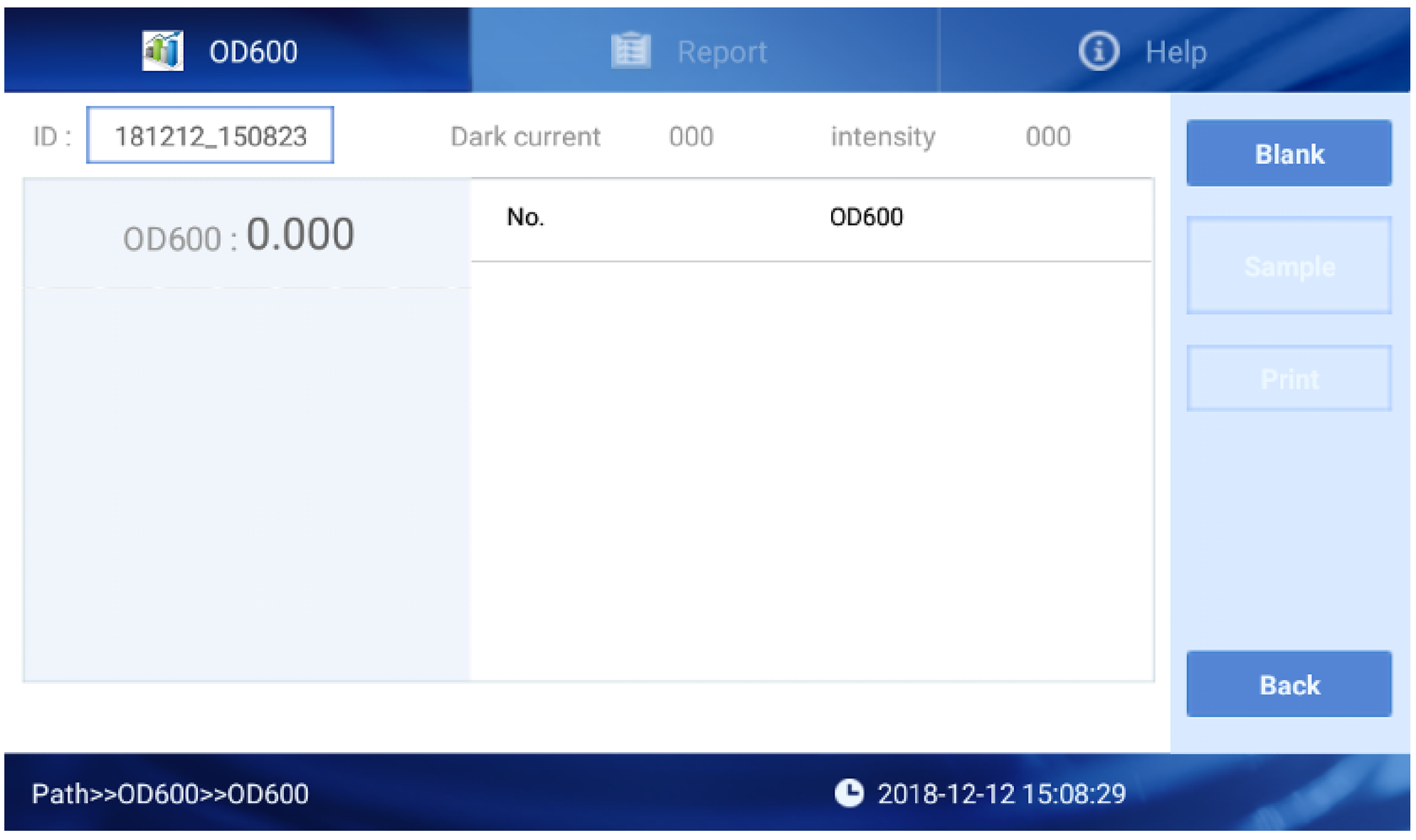


10.1 I Introduction

OD600 refers to the optical density (absorbance) of a solution at the 600 nm wavelength. An important application of OD600 is measuring the concentration of bacteria or other cells in a culture solution.

10.2 I Measuring a sample

1. Enter the sample batch number.
2. Blank before taking a measurement. The blank can be performed with the cuvette filled with buffer, an empty cuvette, or nothing at all in the cuvette holder.
3. Add 2 to 3 mL of sample into the cuvette.
4. Measure the sample.
5. View data and other batches under the Report tab.



TroubleShooting

Problem	Possible Cause	Solution
Instrument cannot turn on	Power supply, adaptor, or switch is defective	Check the power supply and switch. Contact the vendor
Spectrophotometer measurements are not precise,	Liquid column is not forming correctly, or the pedestal is contaminated	Make sure to pipette a full 2 µL of sample. Check that the liquid column is connecting both pedestals. Clean the pedestals. Contact the vendor
OD600 module failure	Poor connection between cable and board	Contact the vendor
Insufficient light intensity error	Analysis module is defective, or the optical fiber is broken	Contact the vendor
Touch screen problems	Power supply is not ground	Make sure the power supply is grounded correctly
Communication timeout	Analysis module communication failure	Restart instrument. Contact the vendor