A Geno Technology, Inc. (USA) brand name

Ultra-micro UV-visible Spectrophotometer with Cuvette detection

Cat. No. BT3902

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Thanks for choosing BT Lab Systems' Ultra-micro UV-visible Spectrophotometer with Cuvette detection. This operation manual describes the function and operation of the instrument. For proper use and to avoid any serious injuries, please read this manual carefully before operating the instrument. Follow all safety instructions during operation, maintenance, and servicing. Failure to do so may damage the instrument, shorten its service life, or compromise its protective features.

IMPORTANT SAFETY INFORMATION

- This product is an indoor instrument which conforms to Standard B style- I type- GB9706.1
- These units are designed for laboratory use by people knowledgeable in safe laboratory practices.
- The operator should never open or repair the instrument. Opening or repairing the instrument will void the warranty and can cause accidents.
- Before powering the instrument, ensure the supply voltage matches the instrument's requirements, and the electrical outlet has sufficient capacity. Replace damaged power cords with the same type. Keep the power cord free of obstructions and away from walkways to prevent damage or tripping hazards. When disconnecting the power cord, grasp the plug rather than pulling on the cord.
- Turn off the instrument after use. If the instrument will not be used for an extended period, unplug the power cord and cover it with a cloth or plastic cover to prevent dust accumulation.
- In case of the following, unplug the instrument at once and contact BT Lab Systems.
    - The instrument encounters liquid.
    - The instrument gets soaked or burned.
    - The instrument emits an abnormal sound or smell.
    - The instrument is dropped or the outer shell damaged.
    - The instrument functions abnormally.

INSTRUMENT CARE AND MAINTENANCE

- Temperature and humidity can affect measurement accuracy and accelerate corrosion or deterioration of instrument components.
- Operate the instrument in a dry environment at a recommended temperature of 15–35 °C and relative humidity of 70% or less.
- Place the instrument on a stable, level workbench away from vibration.
- Avoid intense room lighting and direct sunlight.
- Do not direct fans or strong air currents toward the instrument during measurement.
- Keep the instrument away from strong magnetic or electric fields and high-frequency electrical equipment.
- Do not operate the instrument in areas containing corrosive gases, such as hydrogen sulfide.

INTRODUCTION

The Ultra-Micro UV-Visible Spectrophotometer is a full-spectrum analytical instrument designed for accurate and versatile sample analysis. In micro-volume measurement mode, the instrument supports nucleic acid quantification, microarray analysis, protein quantification, labeled protein analysis, protein assays, microbial cell culture density measurements, and full-spectrum UV-Visible absorbance scanning. In cuvette measurement mode, the instrument supports nucleic acid and protein analysis, microbial cell culture density measurements, and kinetic assays.

FEATURES

- Requires as little as 0.5 µL per measurement using liquid column technology, conserving valuable samples.
- Supports a broad concentration range, allowing most used samples to be measured without dilution.
- Requires no warm-up time and is ready for measurement immediately after startup. Each measurement takes approximately 5 seconds, enabling fast and efficient analysis.
- Features built-in software with an intuitive interface, fast processing, and stable performance for a smooth and reliable user experience.
- Its small footprint and lightweight design make the instrument easy to transport and suitable for laboratory and field applications.
- Stores more than 10,000 measurement records and includes a screenshot function. Users can conveniently review, export, or delete stored data as needed.
- Supports software upgrades via USB flash drive, allowing users to update the instrument software quickly and easily.
- Features an integrated user management system that supports independent measurements and data management for multiple users.
- Equipped with a 7-inch capacitive touchscreen that supports operation while wearing laboratory gloves. The durable display provides responsive touch control and enhanced user experience.
- Performs a self-diagnostic check during startup to help identify potential contamination on the measurement pedestal and ensure reliable instrument operation.
- Constructed from stainless steel and quartz optical fiber, providing excellent mechanical strength, corrosion resistance, and long-term durability.
- Supports cuvette-based measurements with integrated heating and stirring functions, expanding the instrument's analytical capabilities and application range.
- Supports kinetic analysis with real-time absorbance-versus-time curves. Users can select measurement wavelengths, monitor absorbance changes over time, and store up to 100 kinetic measurement programs.
- Supports microbial cell density measurements at 600 nm using either micro-volume or cuvette measurement modes, providing flexibility for different sample volumes and experimental requirements.
- Features a dust-resistant cuvette compartment designed to minimize dust accumulation and reduce potential measurement interference.
- Supports connection to a compatible printer via USB, allowing users to print measurement results for convenient documentation and recordkeeping.

TECHNICAL SPECIFICATIONS

Normal Operating Conditions

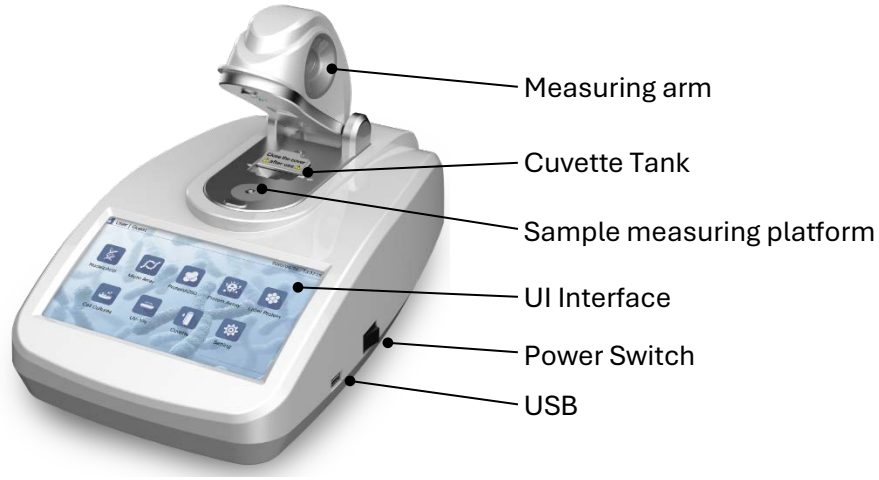
- Ambient temperature: 4 – 45 °C
- Recommended Ambient temperature: 15 – 35 °C
- Relative Humidity: ≤70%

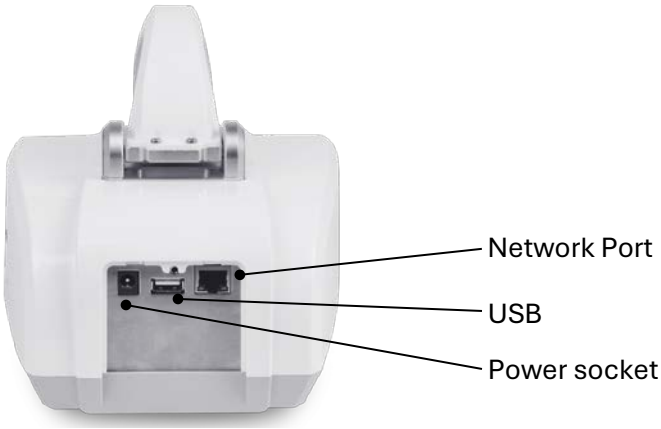
Basic Parameters

Model	**BT3902**
Sample Volume	0.5–2 μL
Light Source	Xenon lamp
Detector	2048-element linear CCD array
Optical Path Length	≤0.7 mm
Wavelength Range	200–850 nm
Wavelength Accuracy	1 nm
Wavelength Resolution	≤2 nm
Absorbance Range	0.04–300 Abs (10 mm equivalent)
Absorbance Precision	0.002 Abs (1 mm)
Absorbance Accuracy	1% (at 0.76 Abs, 256 nm)
Detection Concentration Range	2–15,000 ng/μL (dsDNA)
Cuvette Dimensions (L x W x H)	12.5 x 12.5 x 45 mm
Cuvette Optical Path Length	1, 2, 5, or 10 mm
Cuvette Optical Beam Height	8 mm
Cuvette Heating Temperature	37 ±0.5°C
Cuvette Stirring Speed	130–900 rpm
Cuvette Detection Concentration Range	0.2–75 ng/μL (dsDNA)
Sample Platform Material	304 stainless steel and quartz optical fiber
Measurement Time	Approximately 5 seconds
Power Consumption	20 W
Power Adapter	DC 12V, 5A
Dimensions (W × D × H)	197 x 327 x 181 mm
Net Weight	3.1 kg

STRUCTURE

This chapter identifies the instrument components and explains the basic steps required before measurement. Review these instructions before first use.





Micro-Volume Measurement Instructions

1. Lift the measurement arm and pipette 0.5–2 µL of sample onto the sample measuring platform. A sample volume of 2 µL is recommended.
2. Lower the measurement arm and follow the on-screen instructions to measure the sample.
3. After measurement, gently wipe the measurement surfaces with a clean, lint-free wipe to remove any sample residue.

Cuvette Measurement Instructions

1. Raise the measurement arm and insert the sample-filled cuvette into the cuvette compartment.
2. Lower the measurement arm and follow the on-screen instructions to perform the measurement.
3. After completing the measurement, remove the cuvette, close the cuvette compartment's dust cover, and lower the measurement arm.

Operation Guide

BLANK MEASUREMENT AND ABSORBANCE CALCULATION

The instrument automatically selects the appropriate optical path length based on the sample's light intensity. During blank measurement, the system records the transmitted light intensity at multiple optical path lengths to establish a reference.

When measuring a sample, the instrument selects the optimal optical path and records the transmitted light intensity. Absorbance at a specific wavelength is then calculated using the following equation:

$$A = -\log_{10}\left(\frac{I_{\text{sample}}}{I_{\text{blank}}}\right)$$

Where:

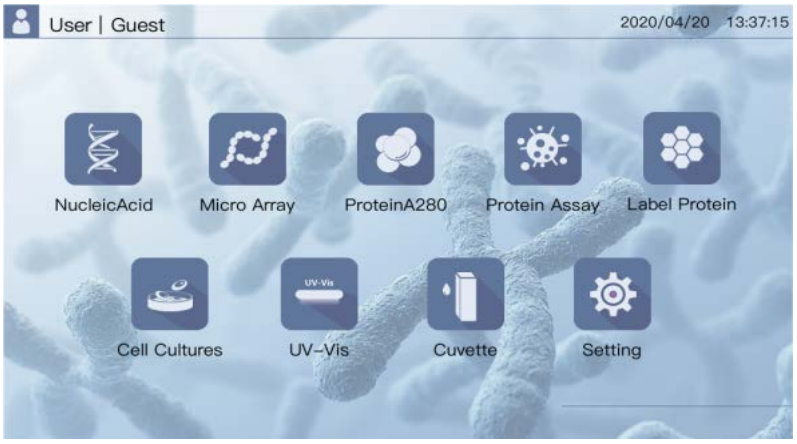
- A: Absorbance
- I_{sample}: Light intensity transmitted through the sample
- I_{blank}: Reference light intensity measured during blank calibration at the corresponding optical path length.

By comparing the transmitted light intensity of the sample with the blank reference, the instrument calculates the sample's absorbance at the selected wavelength.

SOFTWARE APPLICATIONS

The instrument features 9 software functions for sample analysis, instrument monitoring, and system configuration.

1. Nucleic Acid
2. Microarray
3. Protein A280
4. Protein Assay
5. Labeled Protein
6. Cell Cultures
7. UV-Visible
8. Cuvette measurement
9. System Settings

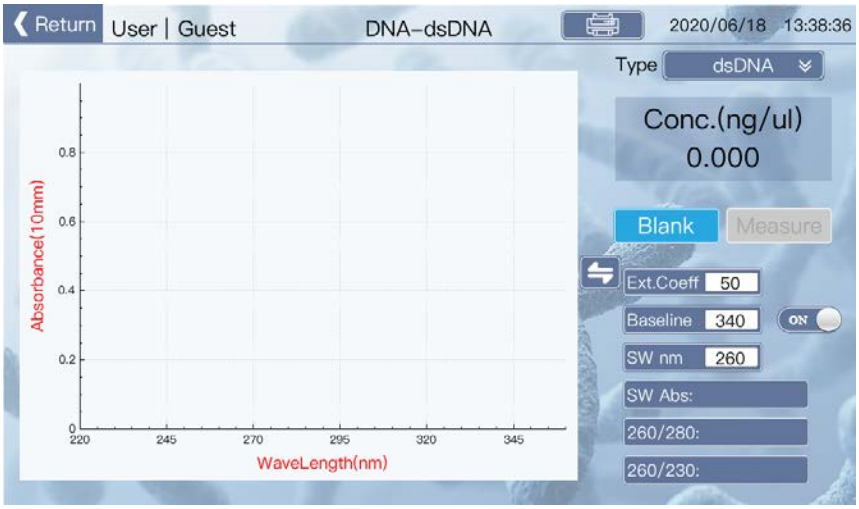


COMMON FUNCTIONS OF THE MEASUREMENT SOFTWARE

1. **Blank**: Measures and saves the light intensity of the blank solution to establish a reference for subsequent sample measurements.
2. **Measure**: Initiates sample measurement and calculates the sample concentration.
3. **Sample ID**: Allows users to customize the sample identification number or name. The default sample name is "Test."
4. **Save Screen**: Captures a screenshot of the current display, which can be saved to a USB flash drive.
5. **DATA (Graphic)**: Displays measurement results as a spectral curve or graph. Graphical data can be exported to a USB flash drive.
6. **DATA (Table)**: Displays measurement results in a table format. Tabulated data can be exported to a USB flash drive.
7. **Sidebar** : Tap the sidebar toggle icon on the left side of the screen to display detailed information about the current sample, including the extinction coefficient (Ext. Coeff), baseline, selected wavelength (SW nm), absorbance at the selected wavelength (SW Abs), A260/A280 ratio, A260/A230 ratio, and other relevant measurement parameters.

BLANK MEASUREMENT PROCEDURE

After powering on the instrument, navigate to the appropriate sample measurement interface.

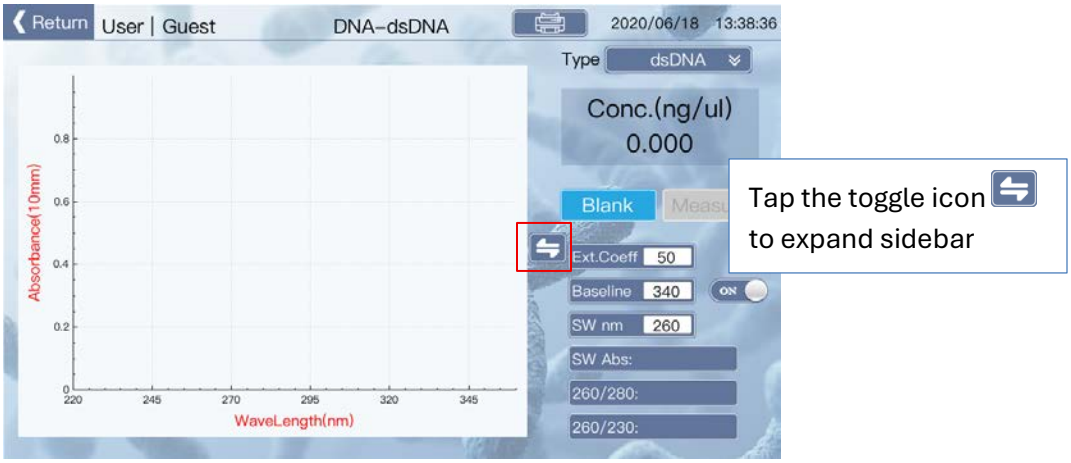


1. Lift the measurement arm and apply the blank solution to the sample measuring platform.
2. Lower the measurement arm and tap "Blank" to measure and record the blank reference light intensity.
3. Clean the measuring platform with a lint-free wipe, apply a fresh aliquot of the blank solution, and tap "Measure" to measure its absorbance.

   The resulting absorbance spectrum should appear as a nearly flat horizontal line, with absorbance variation not exceeding 0.04 A (10 mm equivalent path length).

NUCLEIC ACID MEASUREMENT

The NucleicAcid application measures nucleic acid concentration and evaluates sample purity using UV absorbance measurements.



Measurement Parameters

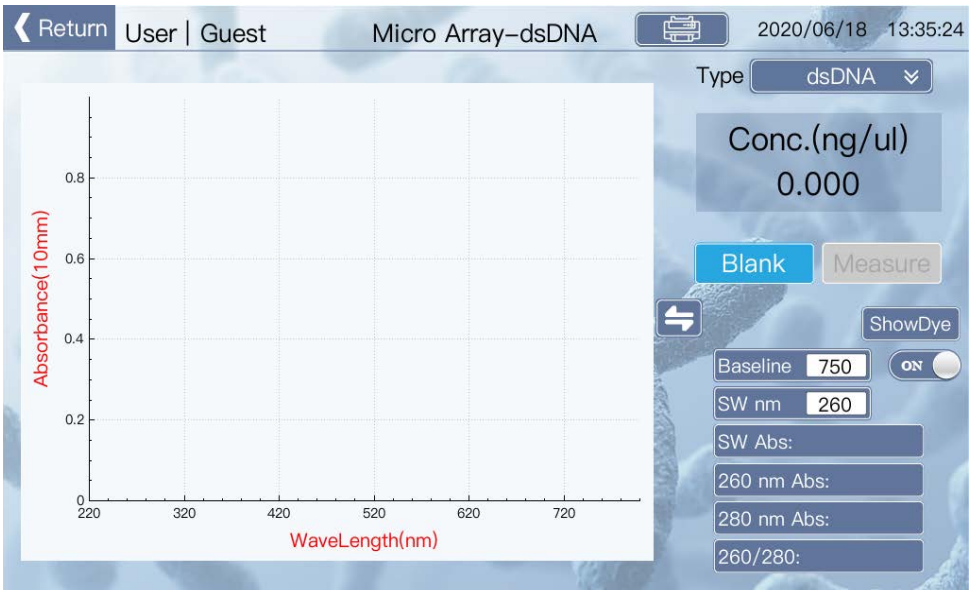
- **Type**: Select the nucleic acid type from dsDNA (double-stranded DNA), ssDNA (single-stranded DNA), RNA, or Other. The Other option allows users to define a custom nucleic acid type and extinction coefficient.
- **Ext. Coeff (Extinction Coefficient)**: Specifies the conversion factor used to calculate nucleic acid concentration from absorbance at 260 nm.

Nucleic Acid Type	Extinction Coefficient
dsDNA	50
ssDNA	33
RNA	40

- **Baseline:** Sets the wavelength used for baseline correction. The default wavelength is 340 nm, with baseline correction enabled. Users can customize the wavelength or enable and disable baseline correction as needed.
- **SW nm (Selected Wavelength)**: Specifies the wavelength used for measurement. The default wavelength for nucleic acid analysis is 260 nm, but users can select a different wavelength.
- **260/280**: The ratio of absorbance at 260 nm to absorbance at 280 nm (A260/A280) is used to assess nucleic acid purity.
    - Pure DNA typically has an A260/A280 ratio of approximately 1.8.
    - Pure RNA typically has an A260/A280 ratio of approximately 2.0.
    - Lower ratios may indicate contamination from proteins, phenol, or other substances that absorb light near 280 nm.
- **260/230**: The ratio of absorbance at 260 nm to absorbance at 230 nm (A260/A230) provides an additional indicator of nucleic acid purity.
    - Pure nucleic acid samples generally have an A260/A230 ratio between 1.8 and 2.2.
    - Lower ratios may indicate the presence of contaminants that absorb light near 230 nm.

MICROARRAY NUCLEIC ACID MEASUREMENT

The Micro Array application simultaneously measures nucleic acid concentration and fluorescent dye concentration at specified wavelengths.

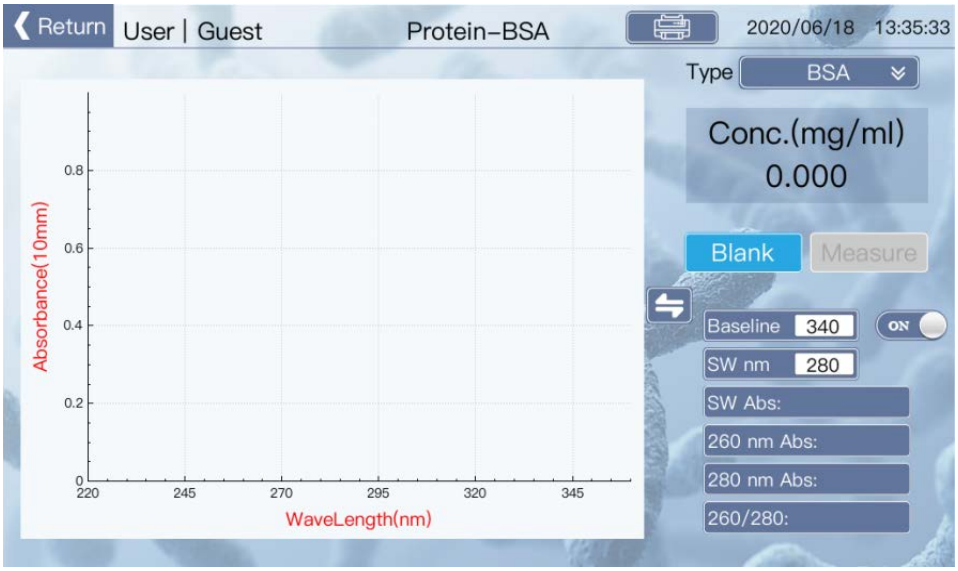


Measurement Parameters

- **Type:** Select the nucleic acid type from dsDNA (double-stranded DNA), ssDNA (single-stranded DNA), or RNA
- **ShowDye / HideDye**: Tap "ShowDye" in the sidebar to display the dye concentration settings and measurement results. Users can select the dye type and view its concentration. Tap "HideDye" to hide the dye concentration panel.
- **Baseline**: Sets the wavelength used for baseline correction. The default wavelength is 750 nm. Users can customize the wavelength or enable and disable baseline correction as needed.
- **SW nm (Selected Wavelength)**: Specifies the wavelength used for nucleic acid measurement. The default wavelength is 260 nm, but users can select a different wavelength.
- **SW Abs (Selected Wavelength Absorbance)**: Displays the absorbance value at the selected measurement wavelength.
- **260 nm Abs**: Displays the absorbance value at 260 nm.
- **280 nm Abs**: Displays the absorbance value at 280 nm.
- **260/280**: Displays the ratio of absorbance at 260 nm to absorbance at 280 nm (A260/A280), which is used to assess nucleic acid purity.

PURE PROTEIN MEASUREMENT (PROTEINA280)

The ProteinA280 application measures the concentration of purified protein samples based on their absorbance at 280 nm. Users can select from predefined protein types, each with a corresponding extinction coefficient for concentration calculations.



Measurement Parameters

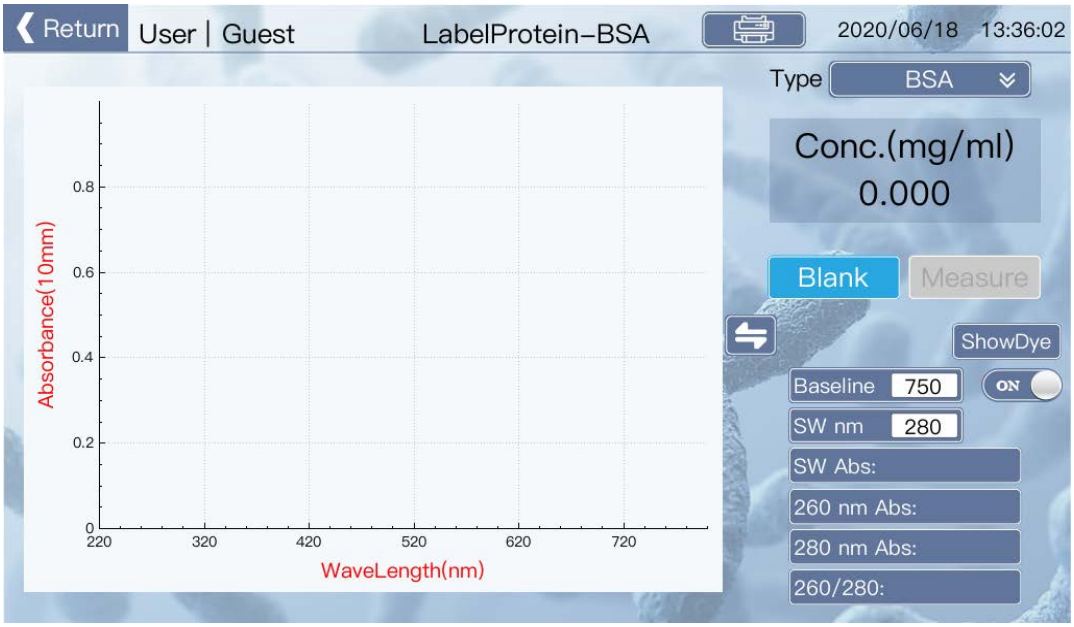
- **Type**: Select the protein type from BSA (Bovine Serum Albumin), 1 Abs = 1 mg/mL, IgG (Immunoglobulin G), or Lysozyme.

Protein Type	Extinction Coefficient/ Reference
BSA	Uses a reference absorbance of 6.7 A at 280 nm for a 10 mg/mL BSA solution (1 cm path length).
1 Abs = 1 mg/mL	Assumes a protein concentration of 1 mg/mL corresponds to an absorbance of 1.0 A at 280 nm (1 cm path length).
IgG	Uses a reference absorbance of 13.7 A at 280 nm for a 10 mg/mL IgG solution (1 cm path length).
Lysozyme	Uses a reference absorbance of 26.4 A at 280 nm for a 10 mg/mL lysozyme solution (1 cm path length).

- **Baseline**: Sets the wavelength used for baseline correction. The default wavelength is 340 nm, with baseline correction enabled. Users can customize the wavelength or enable and disable baseline correction as needed.
- **SW nm (Selected Wavelength)**: Specifies the wavelength used for protein measurement. The default wavelength is 280 nm, but users can select a different wavelength.
- **SW Abs (Selected Wavelength Absorbance)**: Displays the absorbance value at the selected measurement wavelength.
- **260 nm Abs**: Displays the absorbance value at 260 nm.
- **280 nm Abs**: Displays the absorbance value at 280 nm.
- **260/280**: Displays the ratio of absorbance at 260 nm to absorbance at 280 nm (A260/A280), which can help assess potential nucleic acid contamination in protein samples.

LABELED PROTEIN MEASUREMENT

The Label Protein application measures protein concentration and dye concentration in labeled protein samples. Users can select the appropriate protein type and dye to obtain measurement results.

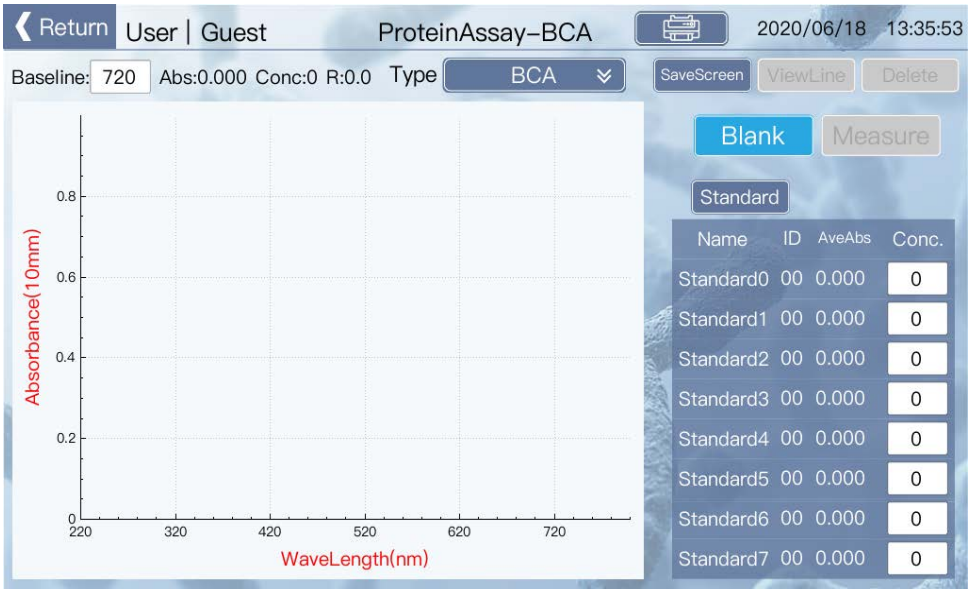


Measurement Parameters

- **Type**: Select the protein type from BSA (Bovine Serum Albumin), 1 Abs = 1 mg/mL, IgG (Immunoglobulin G), or Lysozyme.
- **Baseline**: Sets the wavelength used for baseline correction. The default wavelength is 750 nm, with baseline correction enabled. Users can customize the wavelength or enable and disable baseline correction as needed.
- **SW nm (Selected Wavelength)**: Specifies the wavelength used for protein measurement. The default wavelength is 280 nm, but users can select a different wavelength.
- **SW Abs (Selected Wavelength Absorbance)**: Displays the absorbance value at the selected measurement wavelength.
- **260 nm Abs**: Displays the absorbance value at 260 nm.
- **280 nm Abs**: Displays the absorbance value at 280 nm.
- **260/280**: Displays the ratio of absorbance at 260 nm to absorbance at 280 nm (A260/A280), which can help assess potential nucleic acid contamination in protein samples.
- **ShowDye / HideDye**: Tap "ShowDye" in the sidebar to display the dye concentration settings and measurement results. Users can select the dye type and view its concentration. Tap "HideDye" to hide the dye concentration panel.

QUANTITATIVE PROTEIN MEASUREMENT

The ProteinAssay application determines protein concentration using colorimetric assays. Protein concentrations are calculated by comparing sample absorbance values against a standard curve generated from known protein concentrations.



Measurement Methods

- **Type**: Select the appropriate protein quantification method from BCA, Lowry, or Bradford.

BCA Method

The BCA assay is based on the reduction of copper ions (Cu^{2+}) to cuprous ions (Cu^{+}) by proteins under alkaline conditions. The resulting Cu^{+} ions react with bicinchoninic acid (BCA) to form a purple-colored complex with a strong absorbance at 562 nm. The absorbance intensity is proportional to protein concentration.

Lowry Method

The Lowry assay involves the reduction of copper ions (Cu^{2+}) to cuprous ions (Cu^{+}) under alkaline conditions, followed by a reaction with the Folin–Ciocalteu reagent. This produces a blue-colored complex with absorbance measured at approximately 750 nm. The absorbance intensity is used to determine protein concentration.

Bradford Method

The Bradford assay is based on the binding of Coomassie Brilliant Blue G-250 dye to proteins, causing a shift in the dye's absorbance maximum. The resulting, blue-colored complex is measured at 595 nm. Protein concentration is determined by comparing the sample absorbance against a standard curve.

Software Functions

- **ViewLine**: Displays the standard curve generated from measured protein standards. This button remains disabled until at least two standard measurements are available to generate the curve.
- **Delete**: Removes the selected protein standard from the standard curve calculation. The button is disabled by default and becomes available when a standard is selected in the standard measurement table. Once deleted, the selected standard is excluded from the standard curve calculation.
- **Standard**: Opens the standard measurement interface, where users can measure protein standards of known concentrations to generate a calibration curve.
- **Sample**: Opens the sample measurement interface for determining the concentration of unknown protein samples using the established standard curve.

  Important: Once the user enters the unknown sample measurement interface and begins measuring samples, the software does not allow a return to the Standard measurement interface. This restriction helps prevent accidental modification of the standard measurements used to calculate protein concentrations.

Standard Measurement Table

The Standard Measurement Table supports up to eight protein standards for generating a calibration curve. A minimum of two standards is required to establish the standard curve used for protein concentration calculations.

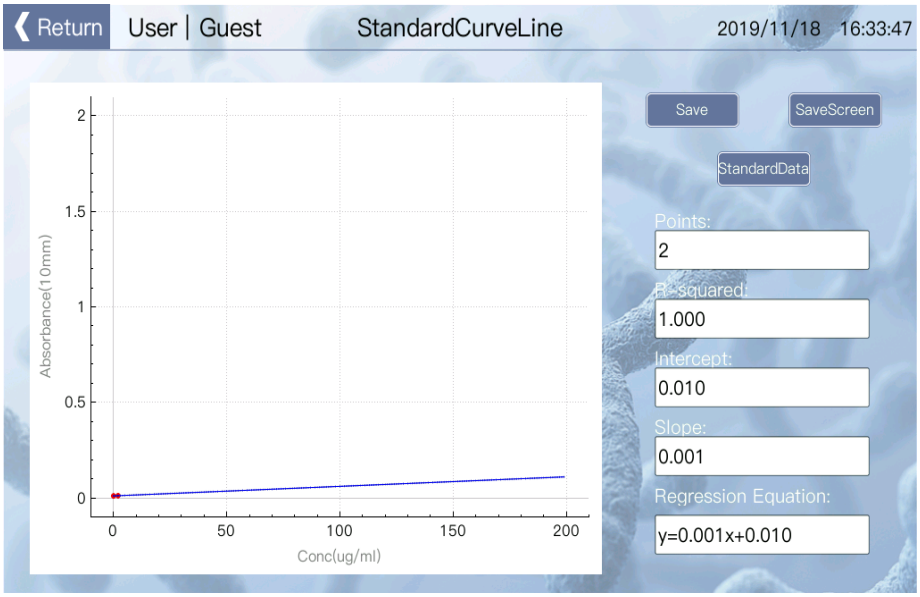
Measurement Parameters

- **Name**: Displays the standard sample name, automatically assigned from Standard 0 through Standard 7. These names are predefined and cannot be modified.
- **ID**: Displays the measurement identification number assigned to each standard sample.
- **AveAbs (Average Absorbance)**: Displays the average absorbance value obtained from multiple measurements of the same standard. The software automatically calculates the average and uses it to generate the standard curve, helping improve measurement accuracy and reliability.
- **Conc (Concentration)**: Specifies the known concentration of each protein standard. Users must manually enter the concentration before measurement. Only Standard 0 can have a concentration of zero. Standards 1–7 must have concentrations greater than zero; otherwise, the software will not allow measurement.

  Note*:* Ensure that the correct concentrations are entered for all standards before generating the calibration curve, as inaccurate values will affect the calculated concentrations of unknown protein samples.

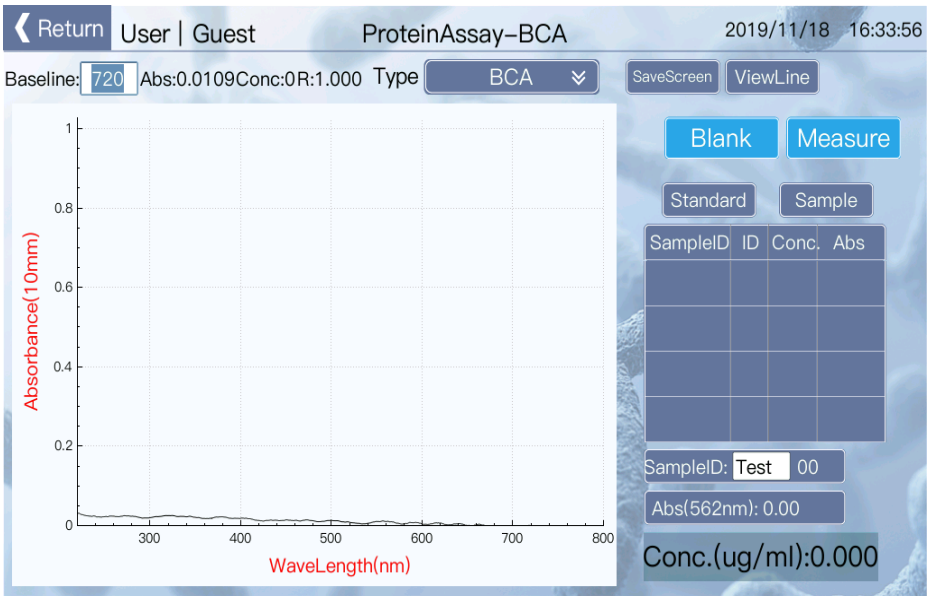
Standard Curve Viewing

The instrument automatically generates a standard calibration curve based on the measured absorbance values of the protein standards. At least two standards must be measured to generate the curve, which is then used to calculate the concentrations of unknown protein samples.



Unknown Protein Concentration Measurement

The Sample Measurement interface displays the absorbance and calculated concentration of unknown protein samples based on the established standard curve.



Measurement Parameters

- **Abs (562 nm)**: Displays the sample absorbance at 562 nm for the BCA method. Other protein quantification methods display absorbance at their respective measurement wavelengths.
- **Conc. (µg/mL)**: Displays the calculated protein concentration of the sample, determined by comparing its absorbance at 562 nm with the established standard curve.

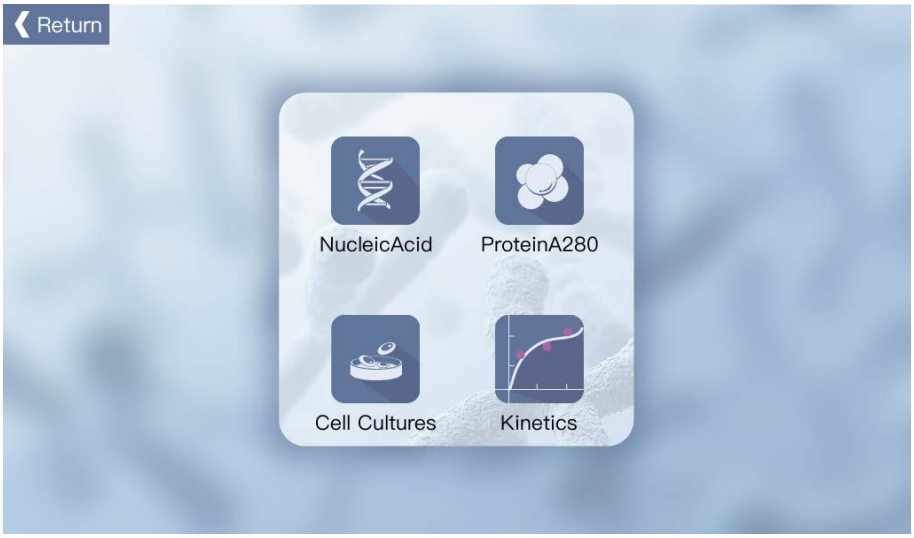
CUVETTE MODE MEASUREMENT

The Cuvette measurement mode allows users to perform nucleic acid quantification, protein analysis, microbial cell density measurements, and kinetic assays using standard cuvettes.

From the main menu, click Cuvette to access the cuvette measurement application selection interface.

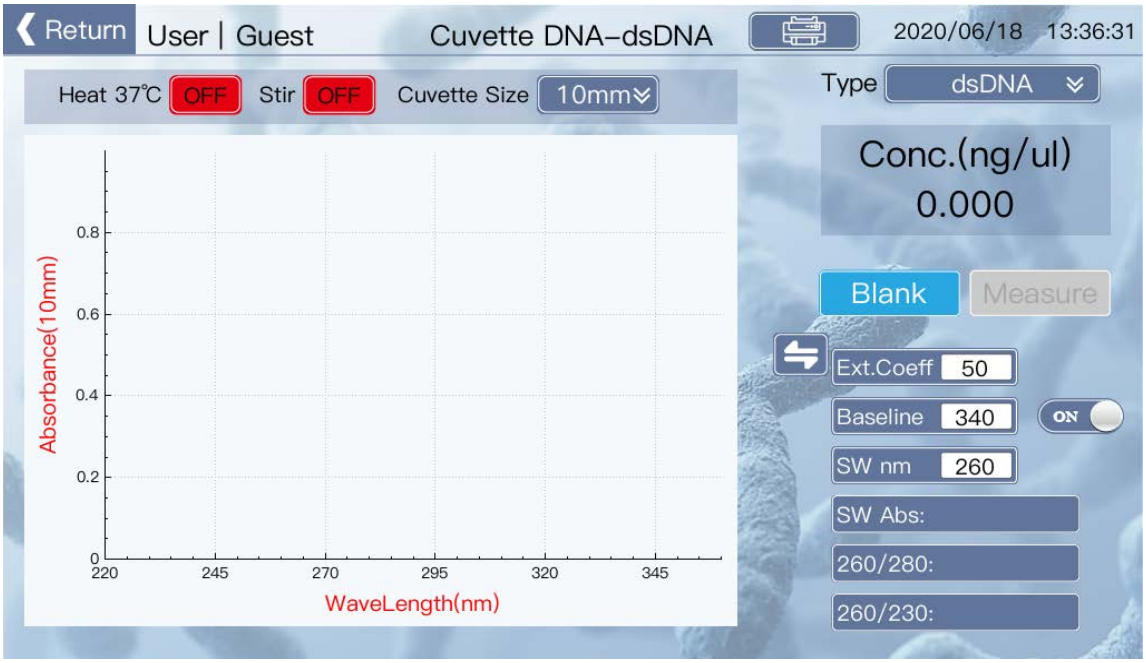
The following four measurement applications are available:

- **NucleicAcid**: Measures nucleic acid concentration and purity.
- **ProteinA280**: Determines protein concentration based on absorbance at 280 nm.
- **Cell Cultures**: Measures microbial cell density using optical density at 600 nm (OD600).
- **Kinetics**: Monitors changes in sample absorbance over time at selected wavelengths.



NucleicAcid, ProteinA280, and Cell Cultures Measurement Interface

The NucleicAcid, ProteinA280, and Cell Cultures applications provide the following cuvette-specific measurement settings.



Measurement Parameters

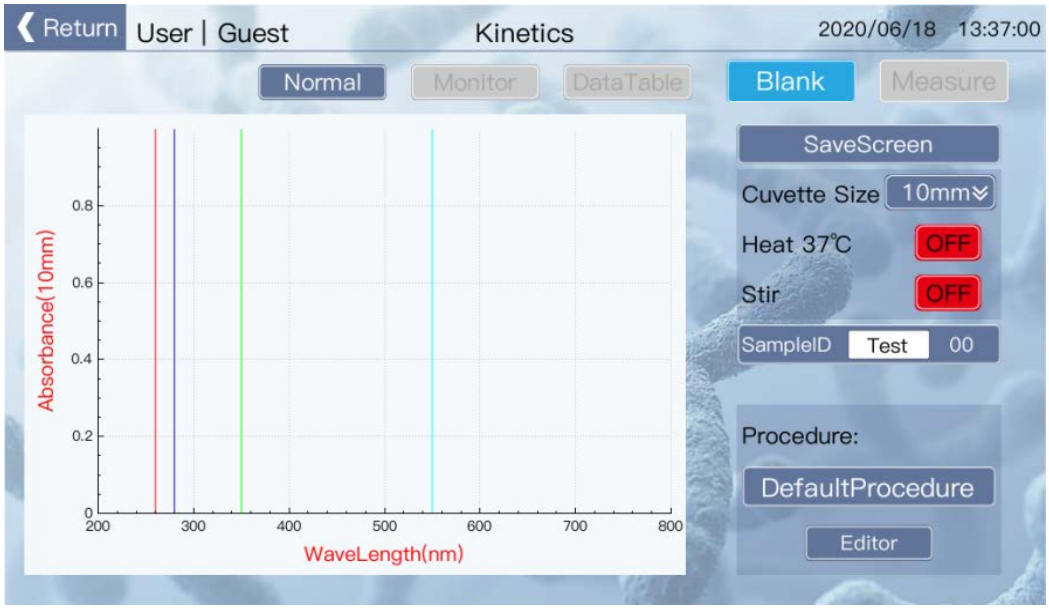
- **Heat 37°C**: Enables or disables the cuvette heating function. When activated, the instrument maintains the cuvette temperature at a constant 37°C.
- **Stir**: Controls the cuvette stirring function. A magnetic stir bar must be placed inside the cuvette before enabling stirring. Two stirring speeds are available: Low and High.
- **Cuvette Size**: Specifies the optical path length of the cuvette used for measurement. Supported optical path lengths are 1, 2, 5, and 10 mm.

Kinetics Measurement Interface

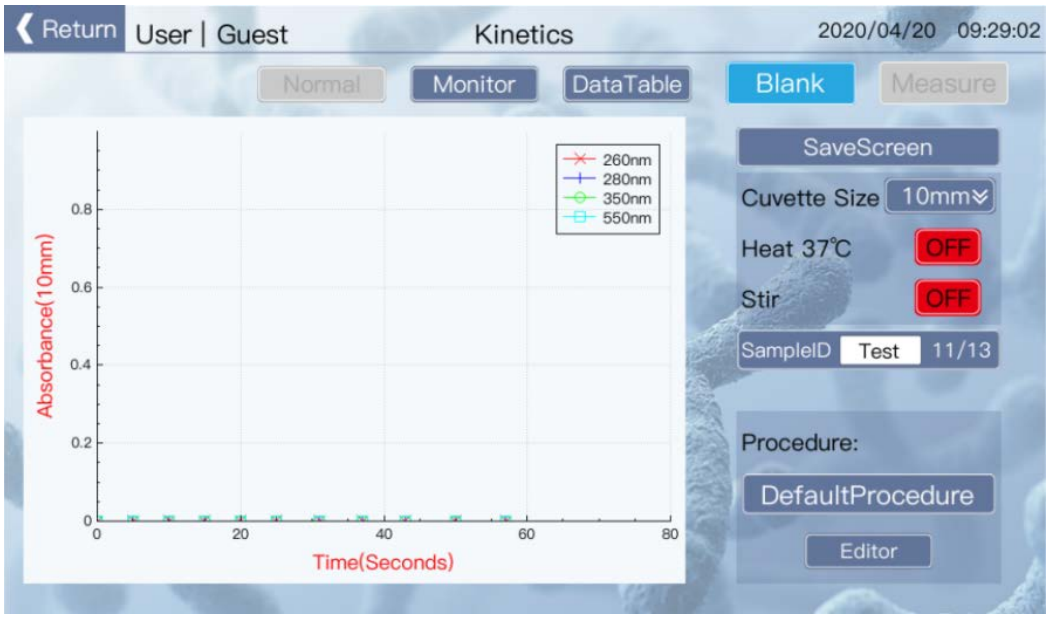
The Kinetics application monitors changes in sample absorbance over time, allowing users to analyze reaction kinetics and other time-dependent processes.

The interface provides the following functions:

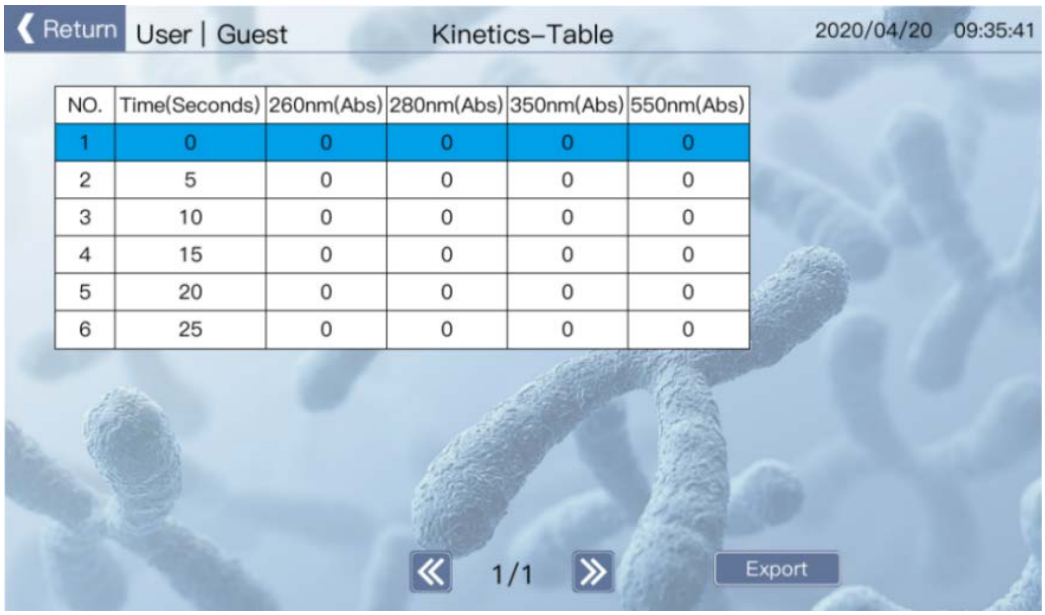
- **Normal**: Displays the absorbance spectrum as a function of wavelength. Cursors indicate the wavelengths selected for kinetic monitoring. Users can customize up to six monitoring wavelengths.
- **SaveScreen**: Captures a screenshot of the current measurement interface for documentation and export.



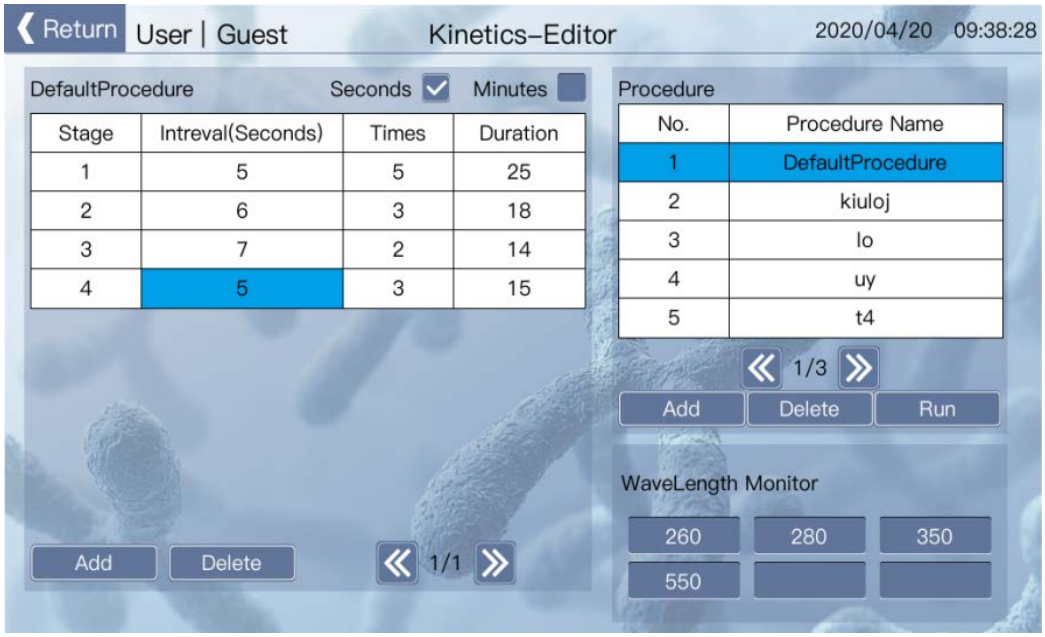
- **Monitor**: Displays absorbance-versus-time curves for the selected monitoring wavelengths. Each curve represents the absorbance changes recorded at a specific wavelength during the kinetic measurement.



- **DataTable**: Opens the kinetic measurement data table, allowing users to review and export recorded measurement results.

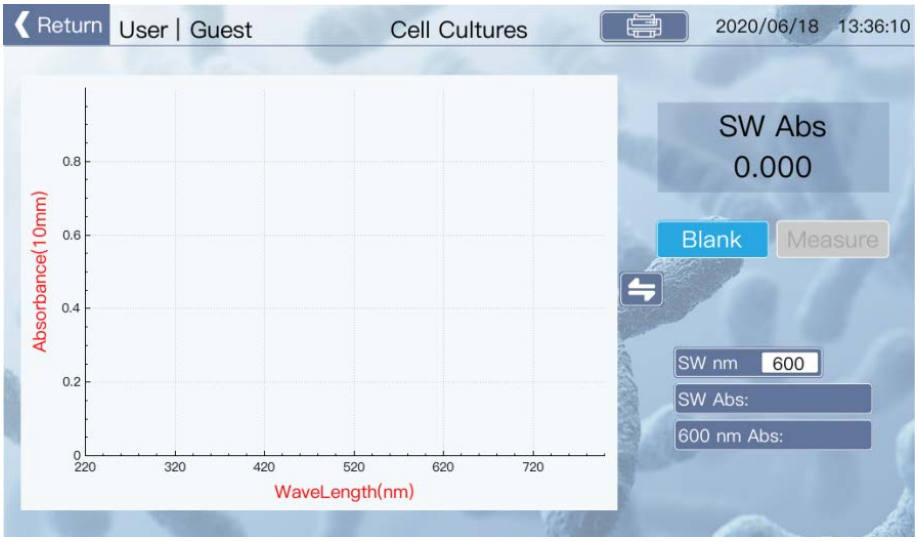


- **Editor**: Opens the kinetic program editing interface, where users can create new programs, modify existing programs, and execute kinetic measurements.



MICROBIAL CELL CULTURE MEASUREMENT

The Cell-Cultures application measures the optical density of cell or microbial suspensions by detecting absorbance at 600 nm (OD600). This measurement provides an indication of cell density in the sample.

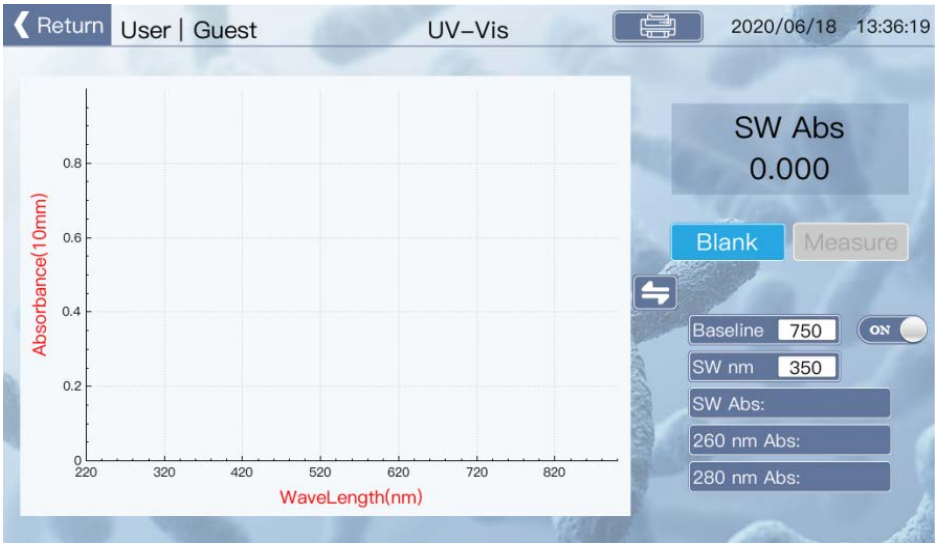


Measurement Parameters

- **SW nm (Selected Wavelength)**: Displays the wavelength selected for measurement. The corresponding absorbance value is displayed under SW Abs.
- **SW Abs (Selected Wavelength Absorbance)**: Displays the absorbance value at the selected measurement wavelength.
- **600 nm Abs**: Displays the absorbance value at 600 nm (OD600), normalized to an equivalent optical path length of 10 mm (1 cm).

UV-VISIBLE ABSORBANCE MEASUREMENT

The UV-Vis application measures sample absorbance across the ultraviolet and visible wavelength spectrum. Users can select specific measurement wavelengths and configure the corresponding baseline correction wavelength to obtain accurate absorbance readings.

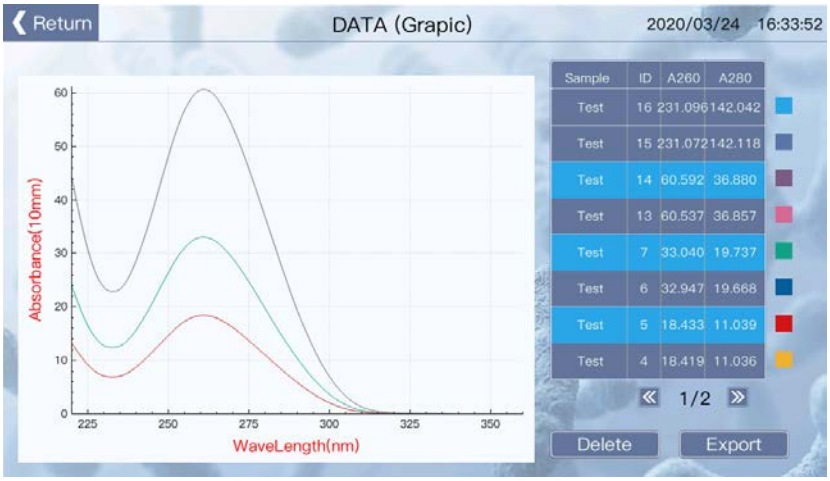


DATA EXPORT

The instrument supports exporting measurement graphs, data tables, and screenshots to a USB flash drive for data storage and analysis.

Graphical Data Export

Click DATA (Graphic) on the measurement screen to open the graphical data viewing interface.



- **Export**: Insert a USB flash drive and click Export to open the file export interface and save the selected graphical data.
- **Delete**: Deletes the selected graphical data.

Tabular Data Export

Click DATA (Table) on the measurement screen to open the tabular data viewing interface.



#	Sample	ID	Type	ExtCoeff	Conc(ng/ul)	260/280	260/230	SW(nm)	SWAbs	A260(10mm)	A280(10mm)	Time
0	Test	9	dsDNA	50	74.635	1.716	2.331	260	1.493	1.493	0.870	14:49:15
1	Test	8	dsDNA	50	74.585	1.703	2.333	260	1.492	1.492	0.876	14:49:06
2	Test	7	dsDNA	50	74.685	1.703	2.349	260	1.494	1.494	0.877	14:48:56
3	Test	6	dsDNA	50	74.655	1.694	2.346	260	1.493	1.493	0.881	14:48:51
4	Test	5	dsDNA	50	74.790	1.688	2.357	260	1.496	1.496	0.886	14:48:46
5	Test	4	dsDNA	50	74.750	1.683	2.344	260	1.495	1.495	0.888	14:48:40
6	Test	3	dsDNA	50	74.865	1.668	2.330	260	1.497	1.497	0.898	14:48:34
7	Test	2	dsDNA	50	74.910	1.662	2.199	260	1.498	1.498	0.901	14:48:08
8	Test	1	dsDNA	50	841.055	1.629	2.396	260	16.821	16.821	10.327	14:47:41

- **Export**: Insert a USB flash drive and click Export to open the file export interface and save the selected graphical data.
- **Delete**: Deletes the selected measurement data.

Screenshot Export

Click SaveScreen on the measurement screen to open the screenshot export interface.

Insert a USB flash drive before exporting screenshots.

DYE PARAMETERS

The Micro Array and Label Protein applications use the Beer–Lambert law to calculate fluorescent dye concentrations based on their absorbance values and molar extinction coefficients.

The following table lists the fluorescent dye parameters stored in the instrument software for use in the Micro Array and Label Protein applications.

Dye	**Unit**	**Extinction Coefficient ($M^{-1}\cdot cm^{-1}$)**	**Analysis Wavelength (nm)**	**260 nm Correction**	**280 nm Correction**
Cy3	μM	1.5E+5	550	0.04	0.05
Cy5	μM	2.5E+5	650	0.00	0.05
Alexa Fluor 488	μM	7.1E+4	495	0.30	0.11
Alexa Fluor 546	μM	1.04E+5	556	0.21	0.12
Alexa Fluor 555	μM	1.5E+5	555	0.04	0.08
Alexa Fluor 594	μM	7.3E+4	590	0.43	0.56
Alexa Fluor 647	μM	2.39E+5	650	0.00	0.03
Alexa Fluor 660	μM	1.32E+5	663	0.00	0.10
Cy3.5	μM	1.5E+5	581	0.08	0.24
Cy5.5	μM	2.5E+5	675	0.05	0.18

VIEWING AND EXPORTING HISTORICAL DATA

The instrument automatically stores measurement records, allowing users to review, manage, and export previously collected data.

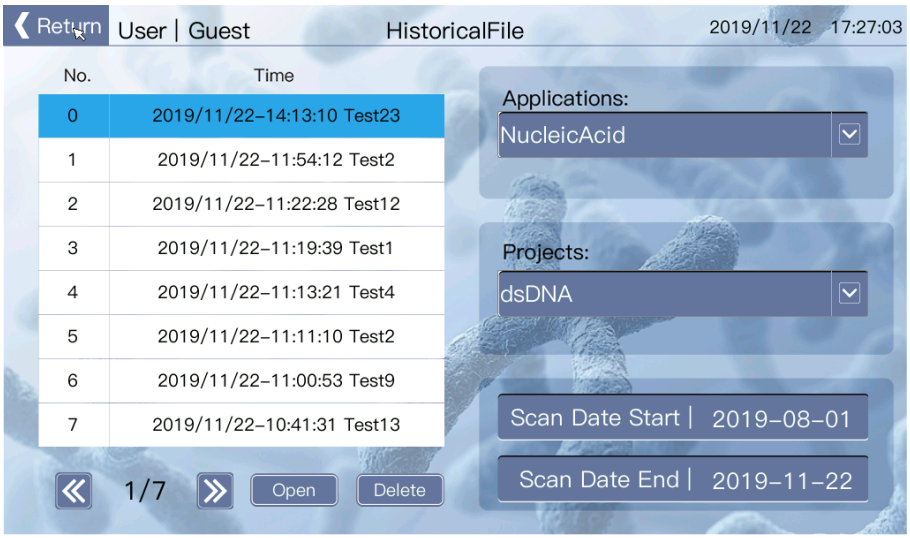
Accessing Historical Data

1. From the main menu, click Setting to open the settings interface.
2. Click Historical File to access the historical data viewing interface.
3. Select the desired measurement application and project to locate previously saved measurement records.



Historical Data Parameters

- **Applications**: Displays the available measurement applications, including NucleicAcid, Micro Array, ProteinA280, Label Protein, ProteinAssay, Cell Cultures, and UV-Vis. Applications without recorded measurements will not appear in the list.
- **Projects**: Displays the measurement categories associated with the selected application. For example, selecting NucleicAcid displays the available categories: dsDNA, ssDNA, RNA, and Other. Categories without recorded measurements will not appear.
- **File List**: Displays the saved measurement records for the selected application and project. Each file is named using the measurement time, Sample ID, and measurement count.



Viewing and Managing Historical Files

- **Open**: Select a measurement record and click Open to view its data. Historical data can be exported using the procedure described in Data Export section.
- **Delete**: Select a measurement record and click Delete to remove the selected file.

Setting the Historical Data Date Range

The date range control is in the lower-right corner of the historical data interface.

By default, the instrument displays measurement records from the previous three months.

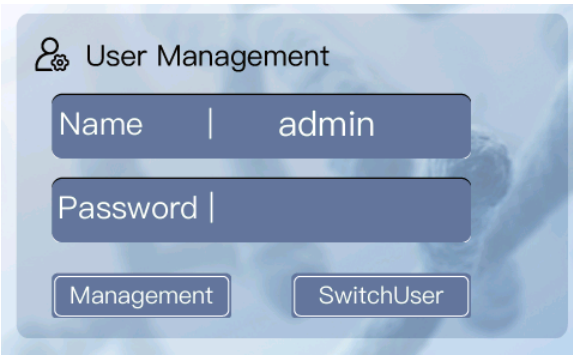
To view older records, adjust the date range to the desired period. The file list will display measurement records corresponding to the selected date range.

USER MANAGEMENT

The User Management function allows administrators to manage user accounts and switch between registered users.

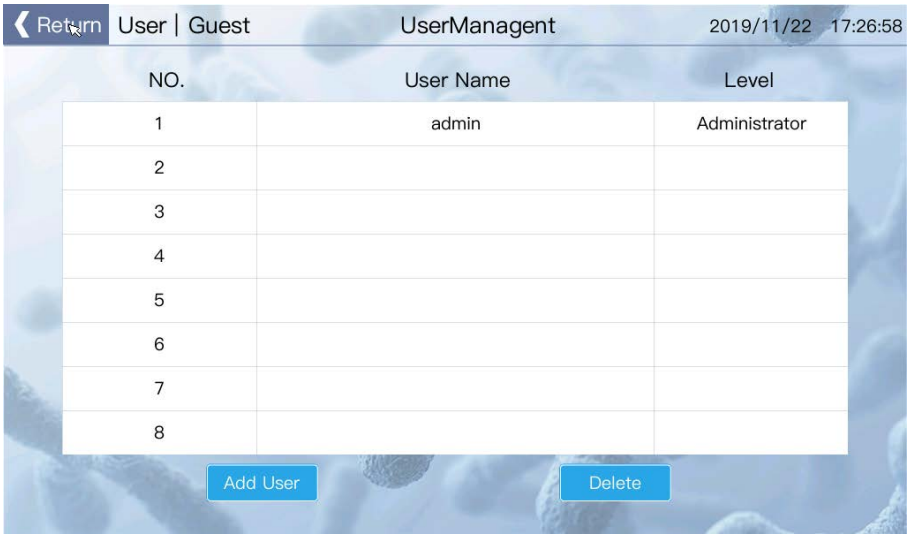
Accessing User Management

1. From the main menu, click Setting to open the settings interface.
2. The following user management options are available:
    - SwitchUser: Switches between existing user accounts.
    - Management: Opens the user management interface.
3. To access Management, enter the admin password.
    - Default Administrator Password: 123456



Managing User Accounts

The user management interface allows administrators to add and delete user accounts.



- **Add User**: Creates a new user account.
- **Delete**: Removes an existing user account. The default administrator (admin) account cannot be deleted.

User Account Limitations

The instrument supports a maximum of 8 user accounts, including:

- 1 administrator account (admin)
- Up to 7 additional user accounts

SOFTWARE UPDATE

The Software Update function allows users to upgrade the instrument software using a USB flash drive containing the appropriate update files.

1. From the main menu, click Setting to open the settings interface.
2. Insert a USB flash drive containing the software update files into the instrument's USB port.
3. Click Update to access the software update interface.



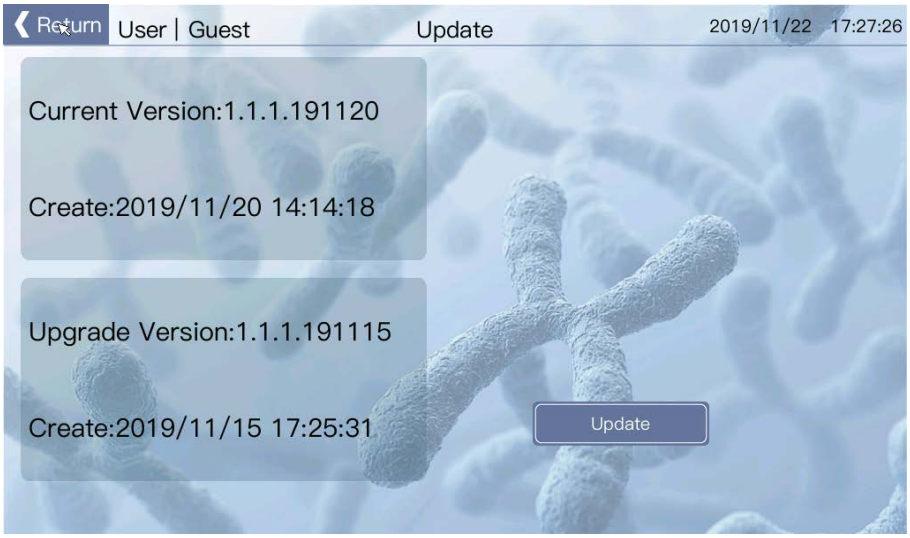
The instrument automatically checks for a connected USB flash drive and valid software update files.

The following messages may appear:

- "No USB device found!" — No USB flash drive has been detected. Insert a USB flash drive and try again.
- "U disk no upgrade file available!" — No compatible software update files were found on the USB flash drive. Verify that the correct update files are present.

If a valid update file is detected, the software update interface will open.

4. Review the current and available software version information.
5. Click Update to begin the installation.



6. Once the update is complete, the instrument will automatically restart and launch the updated software.

DYE EDITING

The Dye Editor function allows users to view predefined fluorescent dye parameters, create custom dye profiles, and manage saved dyes for use in measurements.

1. From the main menu, click Setting to open the settings interface.
2. Select Editor to access the dye management interface.

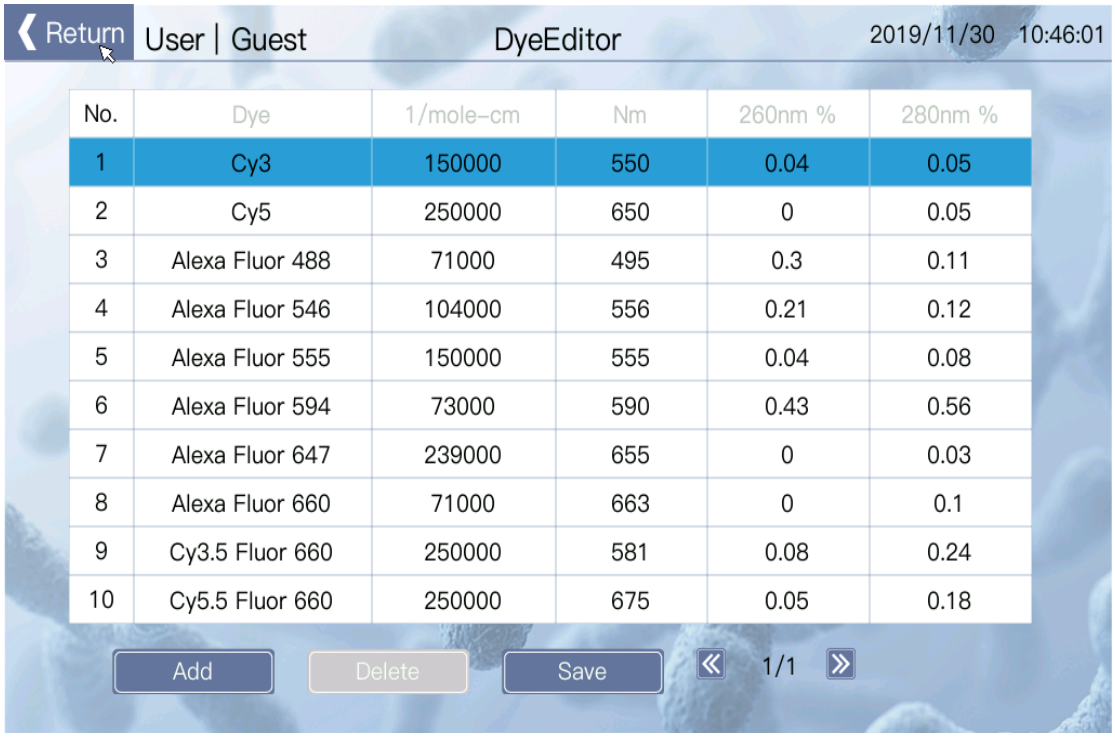


3. View the parameters of existing dyes or add custom dyes as needed.

Managing Dye Profiles

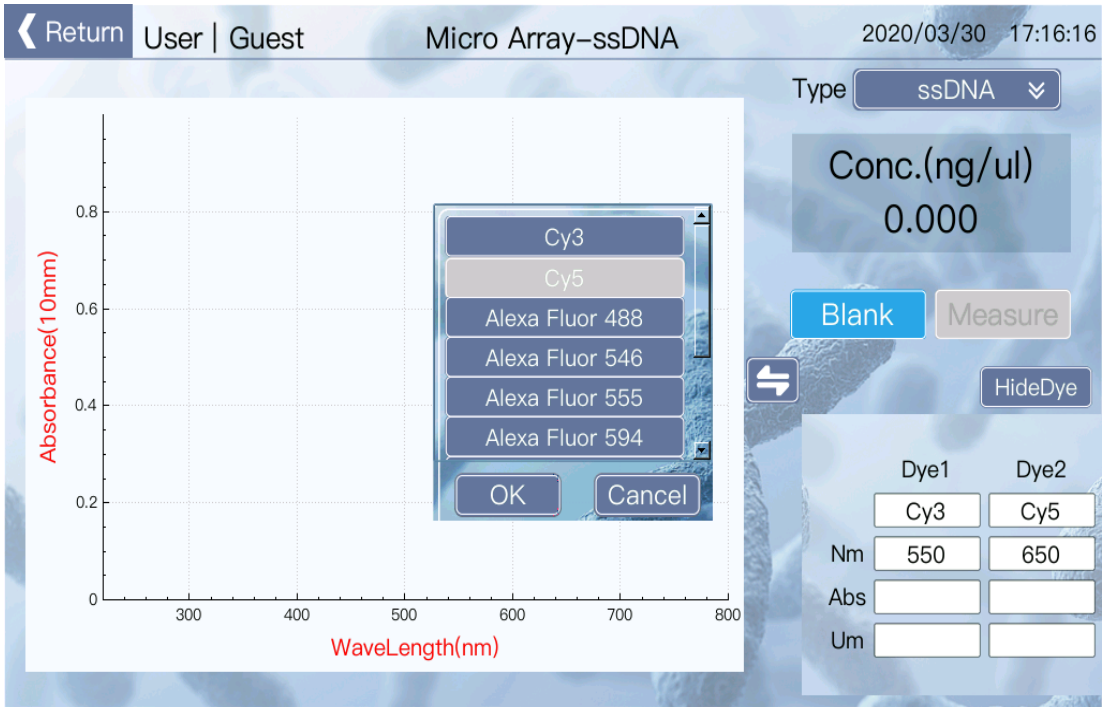
The Dye Editor provides the following functions:

- **View Dye Parameters**: Displays the measurement parameters associated with predefined and custom fluorescent dyes.
- **Add Custom Dye**: Allows users to enter and save parameters for additional fluorescent dyes.
- **Delete Custom Dye**: Removes previously saved custom dye profiles. The system's predefined dyes cannot be deleted.



Selecting Dyes for Measurement

1. Open the Micro Array or Label Protein measurement application.
2. Click ShowDye to enable fluorescent dye measurement.
3. Click the dye selection field to open the dye selection interface.
4. Select a predefined dye or a previously saved custom dye.

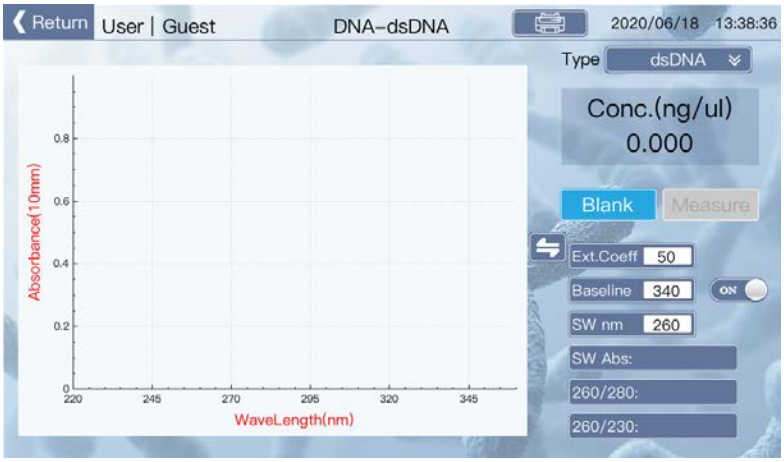


PRINTER OPERATION

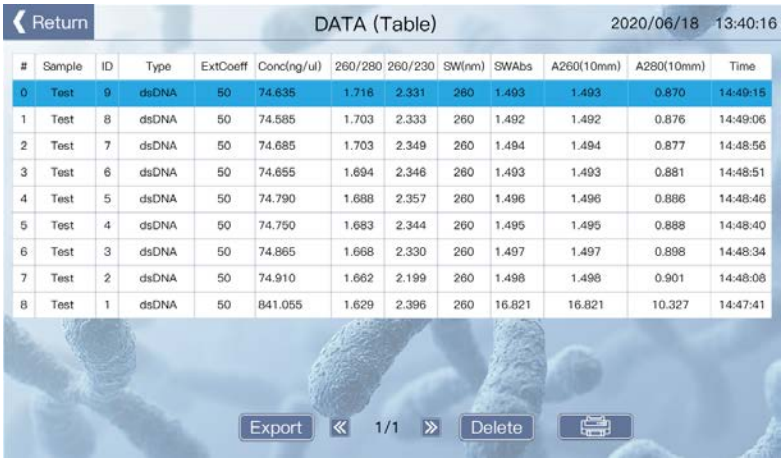
The instrument supports an optional USB thermal printer for printing measurement results directly from the software interface.

The software provides two printing functions, click the Printer button  to print results.

- **Current Measurement**: Print the current measurement results.



- **Selected Measurement**: Print selected data from measurement record.



#	Sample	ID	Type	ExtCoeff	Conc(ng/ul)	260/280	260/230	SW(nm)	SWAbs	A260(10mm)	A280(10mm)	Time
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6	Test	3	dsDNA	50	74.865	1.668	2.330	260	1.497	1.497	0.898	14:48:34
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8	Test	1	dsDNA	50	841.055	1.629	2.396	260	16.821	16.821	10.327	14:47:41

Note: The printer is an optional accessory and is not included. Users may purchase the printer separately.

Printer Specifications

Parameter	Specification
Printer Model	BT3901-A
Printing Method	Direct thermal line printing
Print Width	48 mm
Print Resolution	384 dots per line
Printing Speed	90 mm/s
Interface	USB
Paper Width	57.5 ±0.5 mm
Max. Paper Roll Diameter	ϕ83 mm
Power Adapter Input	AC 110/220V, 50-60 Hz
Power Adapter Output	DC 12V, 3A
Printhead Service Life	50 km of printing

TROUBLESHOOTING

The following table outlines common operating issues, their possible causes, and recommended corrective actions.

Fault/Problem	Possible Causes	Recommended Action
Low Light Intensity Alarm at Startup	The measuring arm may not be fully lowered, or the measurement sample platform may be contaminated.	Lower the measuring arm completely and clean the measurement sample platform with a lint-free wipe.
Abnormal Motor Noise	The motor wiring may be partially damaged, or the photoelectric sensor may be malfunctioning, causing the motor to reach its mechanical limit.	Contact BT Lab Systems
Display Does Not Turn On	The internal circuitry may be damaged	Contact BT Lab Systems
Touchscreen Is Unresponsive	The internal circuitry may be damaged	Contact BT Lab Systems
USB Flash Drive Not Recognized	The internal circuitry may be damaged	Contact BT Lab Systems
Xenon Lamp Does Not Flash During Measurement	The internal USB cable may be loose, or the internal circuitry may be damaged	Contact BT Lab Systems

WARRANTY

Our company warrants this product against defects in materials and workmanship for a period of one year from the date of shipment. During the warranty period, we will repair or replace defective equipment at no charge, provided that the equipment has been operated under normal laboratory conditions and in accordance with the instructions provided in this manual.

The warranty does **not** cover damage or defects resulting from:

- Accident, misuse, or abuse.
- Natural disasters or other events beyond reasonable control.
- Unauthorized repair, modification, or alteration of the equipment.
- Corrosion or damage caused by using incompatible solvents, samples, or chemicals.
- Improper installation, operation, or maintenance.
- Use of fittings, replacement parts, or accessories supplied by other manufacturers.

Platinum wire, accessories, and consumable components are excluded from this warranty.

RETURNS AND SERVICE

A Return Authorization must be obtained from our company before returning any product for repair. For technical support, warranty assistance, or repair service, please contact:

Email: info@BTLabSystems.com

WIRING DIAGRAM

The wiring diagram is for reference only. Product specifications and design are subject to change without prior notice.

