A Geno Technology, Inc. (USA) brand name

Microplate Reader

Cat. No. BT1123

1-800-628-7730 ♦ 1-314-991-6034 ♦ info@BTLabSystems.com

Thanks for choosing BT Lab Systems Microplate Reader. This operation manual describes the function and operation of the instrument. For proper use, please read this manual carefully before operating the instrument.

IMPORTANT SAFETY INFORMATION

The operation, maintenance and repair of the instrument should comply with the basic guidelines and warning below. Ignoring these instructions will affect the life of the instrument and safety precautions.

- This product is an indoor instrument which conforms to Standard B style- I type- GB9706.1
- Caution: Biological Contamination. Parts that meet any test samples, quality control products, calibration products, etc. should be considered contagious/infectious and must be handled with gloves.
- Attention: Avoid injury and damage to the product. When the microplate reader is running detection, it is prohibited to place hands or any parts of the body within 15 cm. in front of the instrument.
- The operator should never open or repair the instrument. Opening or repairing the instrument will void the guarantee and can cause accidents.
- Make sure the rated electrical outlet load is no lower than the demand. Power cord should be replaced with the same type if it is damaged. Make sure there is nothing else on the power line. Hold the power cord jack when unplugging and plugging. Do not pull the power line. Do not place the power line in a place where there is a tripping hazard.
- The instrument should be used in an area with low temperature, little dust, no water, no sunshine or hard light and with good air circulation. Do not use where there is corrosive gas or a strong magnetic field. Keep far away from central heating, camp stove and other hot sources. Do not put the instrument in a wet and dusty location.
- Power off when not in use. If the instrument will not be used for a long period, unplug, and cover to protect it from dust.
- In case of the following, unplug the instrument at once and contact BT Lab Systems.
    - The instrument encounters liquid inside
    - The instrument gets soaked.
    - The instrument emits an abnormal sound or smell.
    - The instrument is dropped, or the outer shell is damaged.
    - The instrument functions abnormally.

INTRODUCTION

BT Lab Systems Microplate Reader is an effective and reliable instrument for reading and analyzing the results of Enzyme-Linked Immunosorbent Assay (ELISA) applications. The enzyme-linked immunosorbent reaction is carried out by an enzyme-catalyzed chromogenic substrate coupled to an antigen or antibody. The concentration of the target antigen or antibody can then be quantified by measuring the absorbance of each well.

This product is widely used in the application of biology, agricultural science, food and environmental science, and can be found used in a wide range of academic and research industries.

KEY FEATURES

- Simple, easy to use, convenient, and practical device.
- 10-inch, high-resolution LCD touchscreen
- 13-channel high-precision optical fiber measurement system with automatic positioning function of the center of the enzyme-labeled well
- With a reference optical path system, the detection results are more stable and accurate.
- 8-position filter wheel that includes 4 standard filters that come with the unit. Additional filters are optional to purchase separately.
- Built-in software can realize the detection of kinetics, standard curve, qualitative, quality control, etc.
- The Software includes program generation and storage, detection data storage function, large storage capacity, powerful curve fitting, kinetic analysis and reporting function.
- The energy-saving design of the light source maximizes the life of the light source.
- Has self-inspection and diagnosis functions for optical path, mechanical movements, etc.
- Has a vibrating plate function with adjustable time and speed.
- Single-wavelength, dual-wavelength detection, fast detection speed
- Connect directly to a printer or export measurement data with a USB or U disk.
- Built-in incubation function

TECHNICAL SPECIFICATIONS

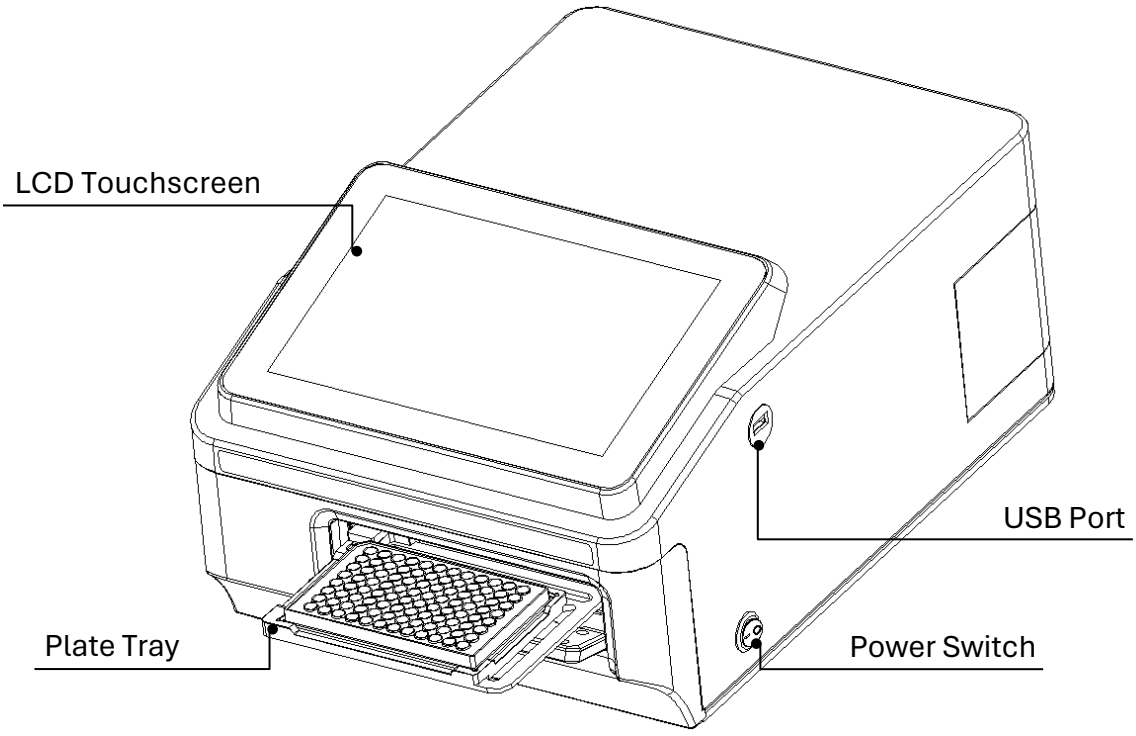
Normal Operating Conditions

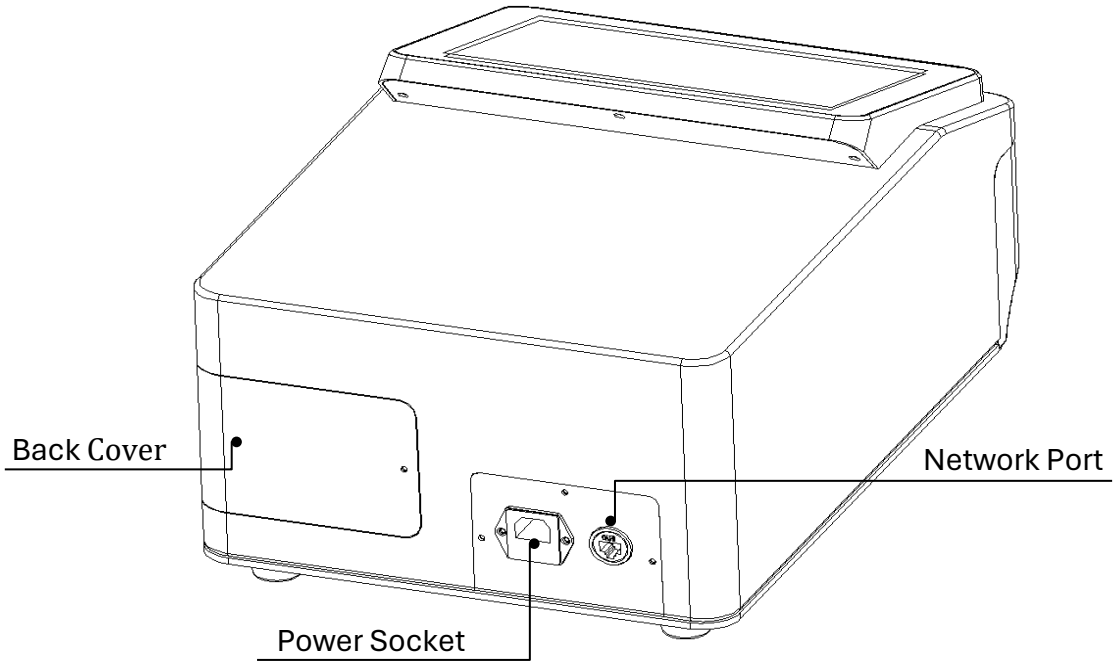
- Ambient Temperature: 4°C - 45°C
- Relative Humidity: ≤70%

Basic Parameters and Performance

Model	BT1123
Display	10-inch, high-resolution touchscreen
Light Source	6V, 10W Halogen Lamp
Wavelength Range	340-750nm
Filter Bandwidth	8-10nm
Filter	8-bit filter wheel includes standard filters: 405nm, 450nm, 492nm, 630nm *Additional filter options can be purchased separately.*
Absorbance Range	0-4.000Abs
Linear Range (450)	R^2 ≥0.995 [0.000-3.000Abs]
Incubation Temp. Range	RT +4°C-65°C
Resolution	0.001Abs
Wavelength Accuracy	≤±2nm
Absorbance repeatability (450nm)	[0-3Abs] CV≤0.3% [3-4Abs] CV≤1%
Absorbance Accuracy (450nm)	[0.000-2.000Abs] ≤±0.005Abs [2.000-3.000Abs] ≤±1% [3.000-4.000Abs] ≤±1.5%
Measuring Speed	Fast Measurement Mode: 5s, 96-well plate Accurate Mode: Single Wavelength <7s/96 holes Dual Wavelength <15s/96 holes
Sensitivity/Detector	≥0.01Abs/photodiode
Number of Program Storage	5000 pcs (supports mass storage on USB Drive)
Communication Interface	USB or U Disk
Temp. Accuracy @ 37°C	±0.5°C
Temp. Uniformity @ 37°C	±0.5°C
Voltage	AC100-240V, 2.3A, 50/60Hz
Power	200W
Fuse	250V, 2A Φ 5x20
Dimensions (mm)	300 x 430 x 232
Net Weight	10kg

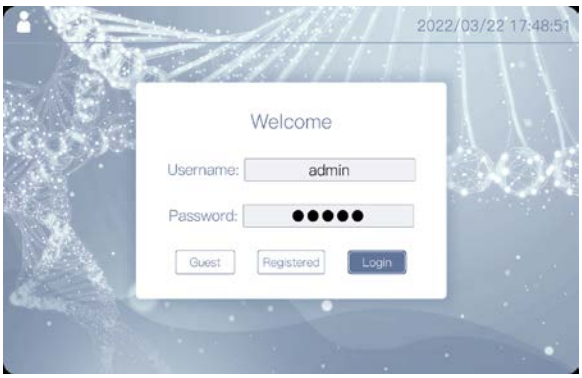
STRUCTURE


LCD Touchscreen
USB Port
Plate Tray
Power Switch


Back Cover
Network Port
Power Socket

START UP

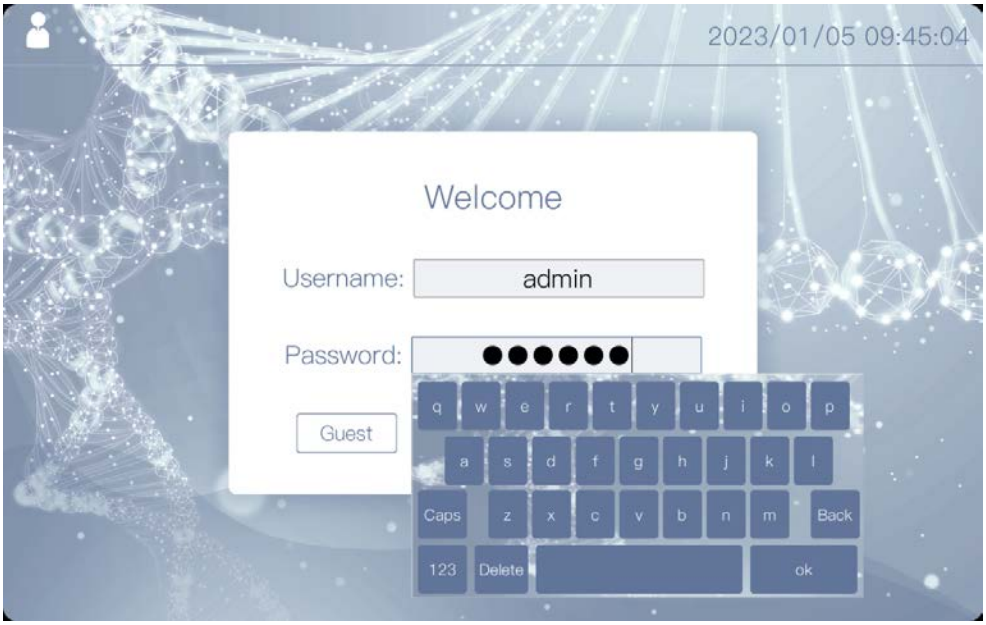
When powered on, the LCD screen will display the product name and perform a self-check to verify light source and filter operations. Once complete, the login screen will appear.



REGISTRATION

Register an account to create different user profiles. The admin level account will be the only user that can delete other user profiles. Users can also log in as a guest.

1. Press the **Register** button located on the Welcome Screen Panel.
2. Create a username and password.
3. Once registration is confirmed, the Welcome Screen Panel will reappear. Enter the new account details, then press the **Login** button to get to the Main Menu.
   Factory password for admin is 123456.



QUICK OPERATION GUIDE

This section is a quick rundown of the operation procedure.

1. Turn the instrument on. The unit will go through a self-check before entering the welcome log in interface.
2. Log in to the user profile to open the Main Menu interface.
3. Navigate to the Run interface, then select an existing program file from the file list or create a new program by pressing New.
4. Set/Verify the program parameters.
    - Measurement Settings – filters and read speed.
    - Layout Settings – Set plate layout by labeling each well plate.
        - BK – Blank Well
        - EP – Empty Well
        - SD – Standard. Select from up to 12 different standards. Enter concentration values and units in the MIC interface.
        - NC – Negative Control
        - QC – Quality Control. Select from up to 9 different QCs.
        - PC – Positive Control
        - UD – Unknown
5. Turn on or adjust the shaking function.
6. Set/Verify the kinetic measurements, pretreatment process, and standard curve from the Calculate module.
7. Press Plate to open the plate tray. Gently place the 96-well plate into place.
    - Align A1 well on the plate with the A1 on the plate tray to make the corresponding position of each well on the plate consistent with the displayed result.
8. Press Run to begin the operation.
9. After the operation is complete, click OK to view the report or no to remain on the current operation detection interface to view the corresponding absorbance value of each well.

Full Software Operation Guide

After user login, the main menu screen will display four main modules: **Run**, **Report**, **Setting,** and **Help.**

Run Module

Access saved file programs or create a new one.

Label each well content on a graphical representation of a 96-well plate.

Program the measurement parameters and activate/deactivate the instrument functions.

Report Module

View and export different types of reports such as raw data, analyzed results, standard curve, and quality control results.

Setting Module

General settings for the unit. Settings for: Time, Language, Filter, Users, Software Upgrade, Maintenance, and Print

Help Module

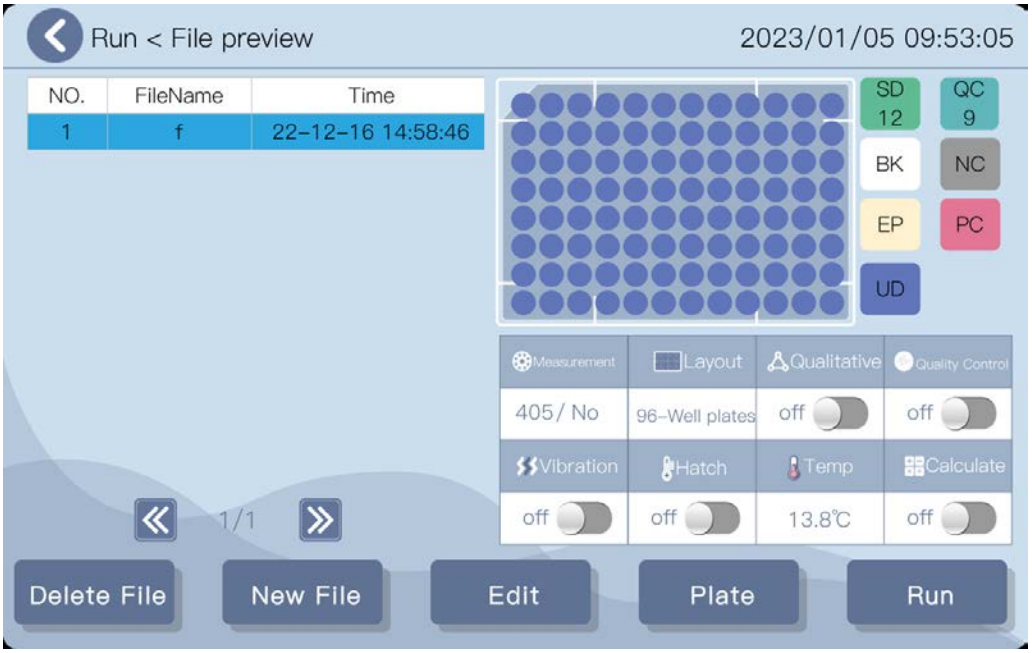
View software version information and basic software operation guide.

Run Menu Interface

In the run menu interface, users can access previously saved program files, modify the parameters of an existing file, or create a new file.

Files will appear on the left panel with corresponding parameters displayed on the right after the program file is selected.

Key Functions: **Delete File**, **New File**, **Edit**, **Plate**, and **Run** are located on the bottom of the screen.



Delete File

Select the file to be removed from the left panel. Press the **Delete** File key and a prompt will appear to confirm deletion.

New File

Create a new file by pressing **New File**. Enter the file name, then press OK.

Edit

Select the file containing parameters that need to be modified. Tap the **Edit** button to revise the selected file.

Plate

The **Plate** button controls the open and close function of the plate tray.

Run

Press the **Run** button to begin operation based on the selected program file or after parameters have been set.

Switch Button

Press to quickly toggle on/off corresponding functions using the saved settings of the current file program.

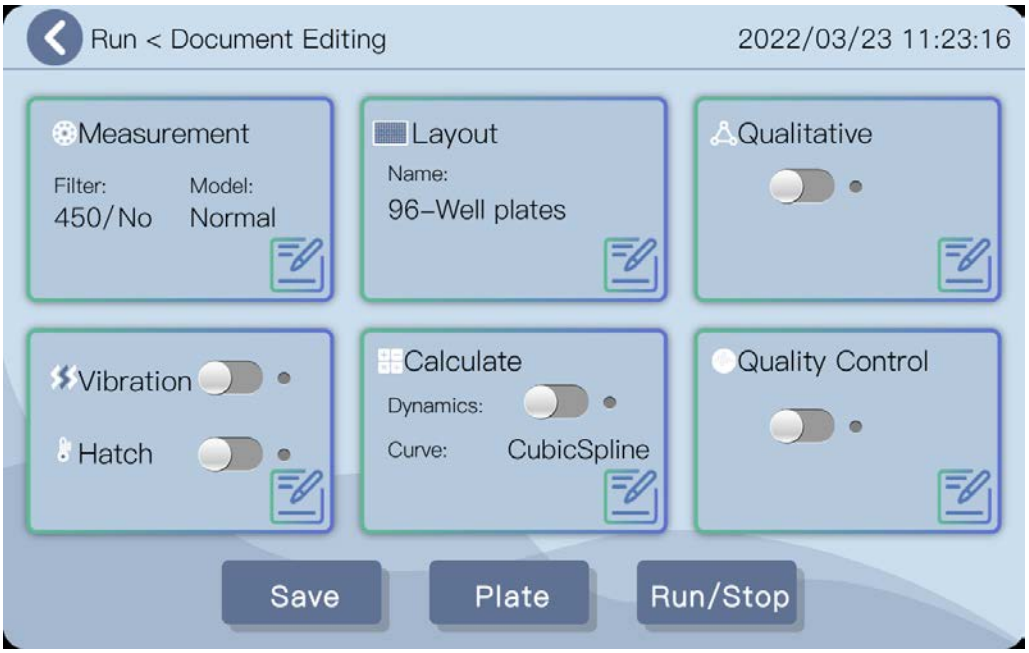
NOTE: The switch button for the Hatch operates the incubation temperature. Using the switch button will only affect the current program. Turn the function on to start the incubation and heat to the set temperature. Turn the switch off to automatically stop the incubation. Switching programs will also automatically stop incubation.

The temperature shown on the table reflects the current temperature of the instrument displayed in real time.

Document Editing Interface

1. Select the desired program file on the left side panel, then press the **Edit** button to enter the document editing interface.

   On the Document Editing Screen, the main parameter modules are displayed: **Measurement**, **Layout**, **Qualitative**, **Vibration/Hatch**, **Calculate**, and **Quality Control**.

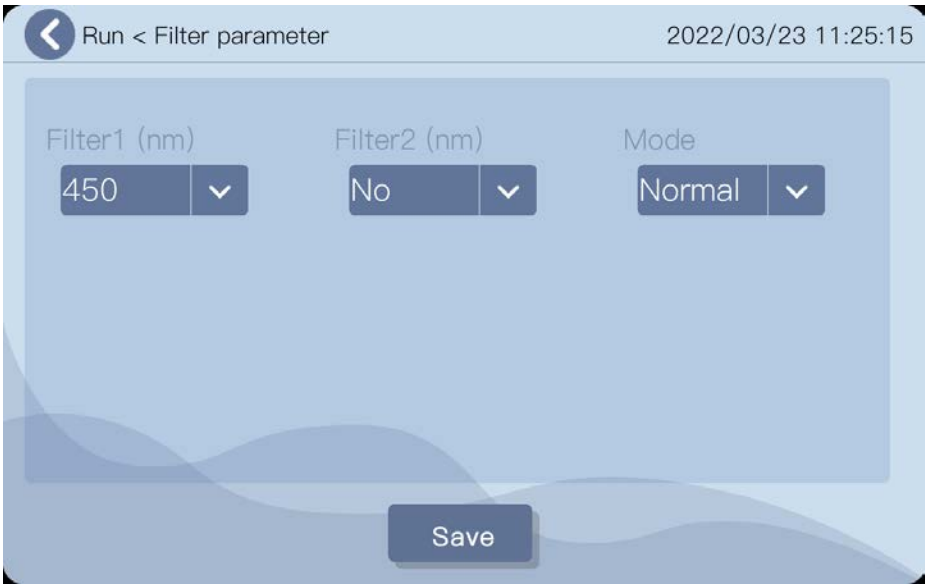


2. Press the “Edit Document” icon  found on the lower right corner of each module to enter the parameter setting interface.

Measurement Settings

This module is to set the wavelength and instrument detection speed.

1. On the Document Editing screen, press the “Edit Document” icon located on the bottom right corner of the Measurement Module.
2. To set the wavelength, tap the drop-down menu for “**Filter1**” and choose from the list.
   For single wavelengths, select “No” for “**Filter2**”.
   For dual wavelengths, select another measurement for “**Filter2**”.



3. To set the detection speed, tap the drop-down menu for **Mode** and select either Fast or Normal. It is recommended to use Normal Mode.

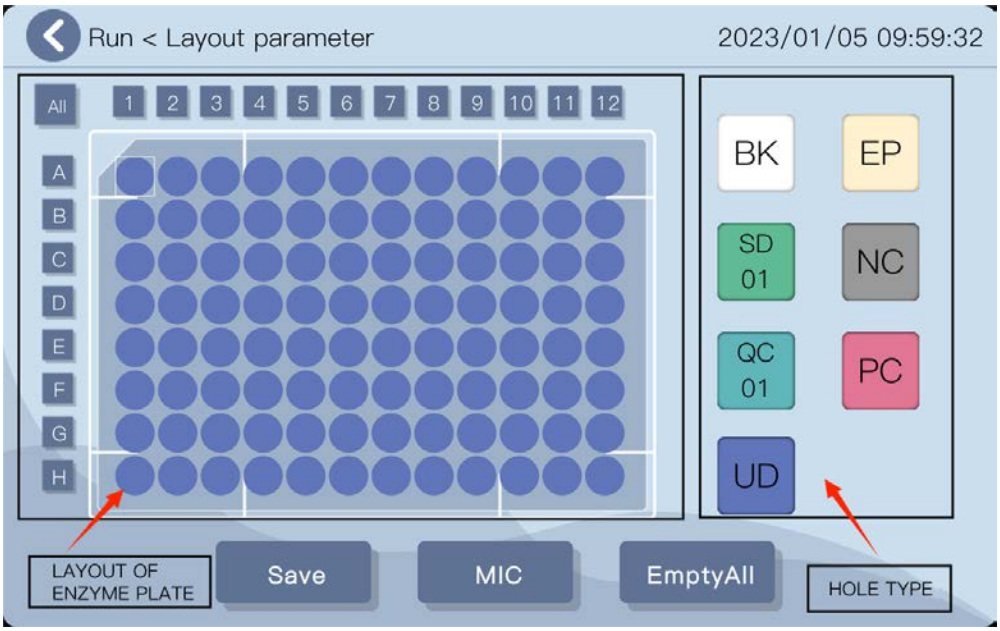
4. Press **Save** to complete the setting for measurement.

Layout Settings

This module is to setup up the plate layout parameters.

1. On the Document Editing screen, press the “Edit Document” icon located on the bottom right corner of the Layout Module.

   A diagram of a plate will appear on the left side of the screen with 7 icons to the right.

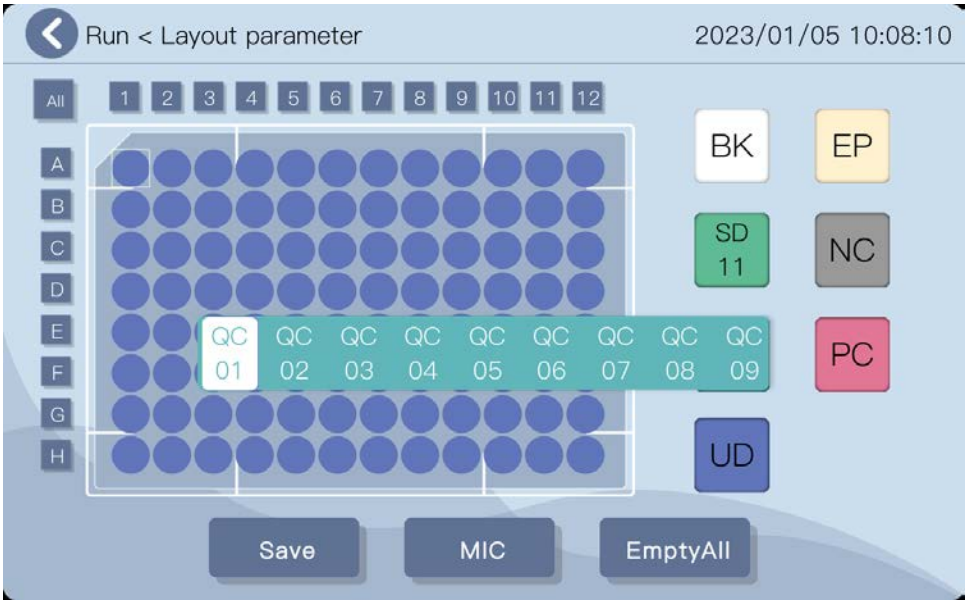


2. Using the icons on the right, label the type of contents in each well. The same type can be used to label multiple wells.

BK	BLANK	Blank well used for blank control
EP	EMPTY POSITION	Empty well. Test results will display EP instead of data
SD 01	STANDARD	Plate well used for standard sample for setting the standard curve
NC	NEGATIVE CONTROL	Plate well used for Negative Control
QC 01	QUALITY CONTROL	Plate well used for Quality Control samples
PC	POSITIVE CONTROL	Plate well used for Positive Control
UD	UNKNOWN SAMPLE	Plate well with unknown sample. This is the default setting for all the plate wells.

3. When setting a Standard sample, press the **SD** icon to choose the standard number, then select the corresponding well on the plate layout. Set up to 12 standard samples. The same standard number can be assigned to multiple wells.

4. When setting a Quality Control sample, press the **QC** icon to choose the QC number, then select the corresponding well on the plate layout. Set up to 9 QC samples. The same QC number can be assigned to multiple wells.



5. Once the setting of the plate layout is complete, press **Save** to return to the document editing menu.

Standard Concentration Settings

If there are standard samples set, return to the Layout screen to set the known concentration values for each standard.

1. On the Document Editing screen, press the “Edit Document” icon located on the bottom right corner of the Layout Module to return to the plate layout diagram.
2. Press the **Conc** button to navigate to the Concentration interface.

3. Enter or adjust the **Concentration** value for the standard numbers used on the plate layout. Standard numbers that were not used on the layout will not be measured.
   NOTE: The concentration data entered for each standard number corresponds with the standard number selected when labeling the plate wells in step 3.
   If not done correctly, this will affect the curve fitting and final measured results.
6. Choose from the **Unit** dropdown menu the concentration unit.
7. Press **Save** once finished to return to the plate layout.
8. Once the plate layout settings are complete, press **Save** to return to the document editing menu.

Vibration and Incubation Settings

The microplate reader comes with a shaking function that can be used for thorough mixing or to maintain sufficient aeration of the culture and to keep conditions uniform. Use the incubation function to maintain and control the temperature.

1. On the Document Editing screen, press the “Edit Document” icon located on the bottom right corner of the Vibration/Hatch Module.
2. Press to toggle on/off the Shaking and Hatch functions in this module.
3. After the settings for Shaking/Hatch are complete, press **Save** to return to the document editing menu.

Shaking Settings

Set the parameters for the vibration plate when function is activated.

1. Program the shaking to occur before or after a cycle by selecting from the **Mode** drop-down menu.
2. Double tap in the field box for **Time (h:m:s)**, then use the keyboard to set the duration.
3. Select **Speed** from the drop-down menu.
4. Double tap in the field box for **Pause (h:m:s)**, then use the keyboard to set the interval time after the shaking is complete.

Hatch Settings

Set the parameters for incubation when function is activated.

1. Double tap in the field box for **Temp (°C)**, then use the keyboard to set the temperature.
2. Choose the next incubation step once the desired temperature is reached.
    a. Turn off when the temperature is reached.
    b. Continue until the end of the test.
    c. Timing when temperature is reached.
    Set the timer by double tapping the **Time (h:m:s)** field box, then use the keyboard to enter the values.

Calculate Settings

The calculation module is for setting the data processing method of sample test results in detail. This includes the kinetic measurements, pretreatment process, and standard curve.

1. On the Document Editing screen, press the “Edit Document” icon located on the bottom right corner of the Calculate Module.

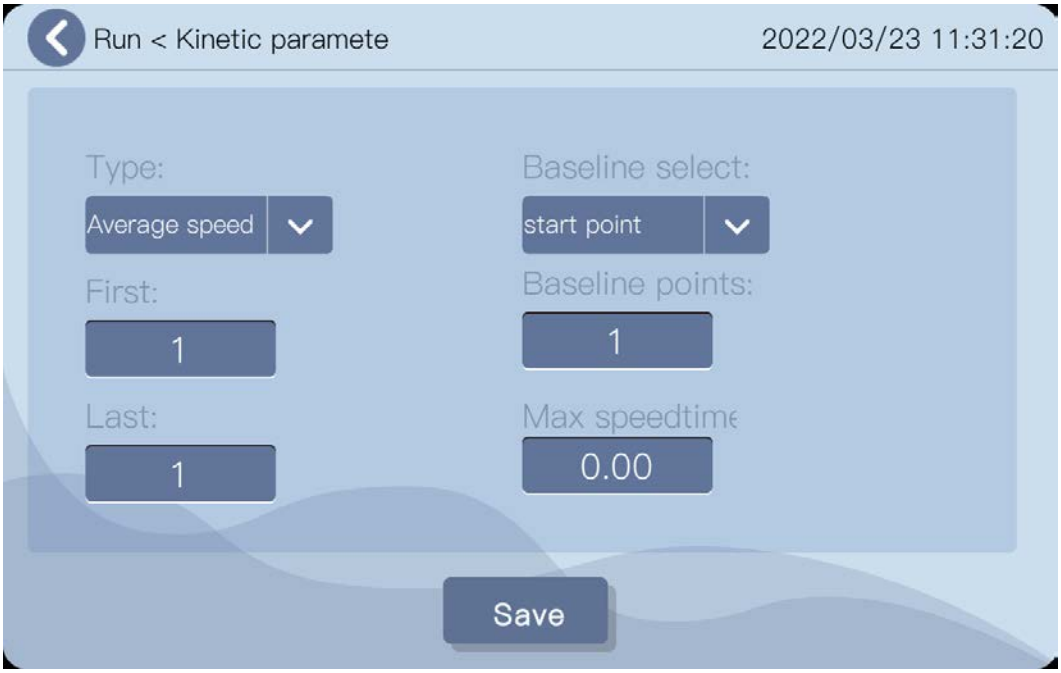
2. Press to toggle on **Dynamics** to set the parameters for kinetic readings. NOTE: Only by turning this feature on will the Parameters button appear on the bottom of the screen.

3. Double tap the **Readings:** field box, then use the keyboard to enter the number of measurements.

4. Double tap the **Interval:** field box, then use the keyboard to set the interval time between each reading. Time is entered in the format of HH:MM:SS.

5. Press the **Parameters** button on the bottom of the interface to navigate to the Kinetic Assay Parameters screen.

6. Set the Kinetic assay parameters.



   a. **Type** – Select the kinetic data processing method for desired results output. Setting options include **Average speed**, **Maximum speed**, **Maximum speed time**, **Change time**, **Maximum absorbance**, and **Maximum absorbance time**.
   For example, Average speed results will display on the report, the average rate of absorbance change over multiple consecutive measurements at each position on the plate.

   When the mode type is **Change time**, the three settings to the right will activate. Set the parameters for the **Baseline**, **Baseline points**, and **Maximum speed time** according to the experiment.

   Baseline select: Set the starting point or End point as the baseline.
   Baseline points: Set baseline points.
   Max speed time: Set the change value (if the value set is less than the set absorbance value, it will not be recorded).

   b. **First:** Start of reading and recording data points.

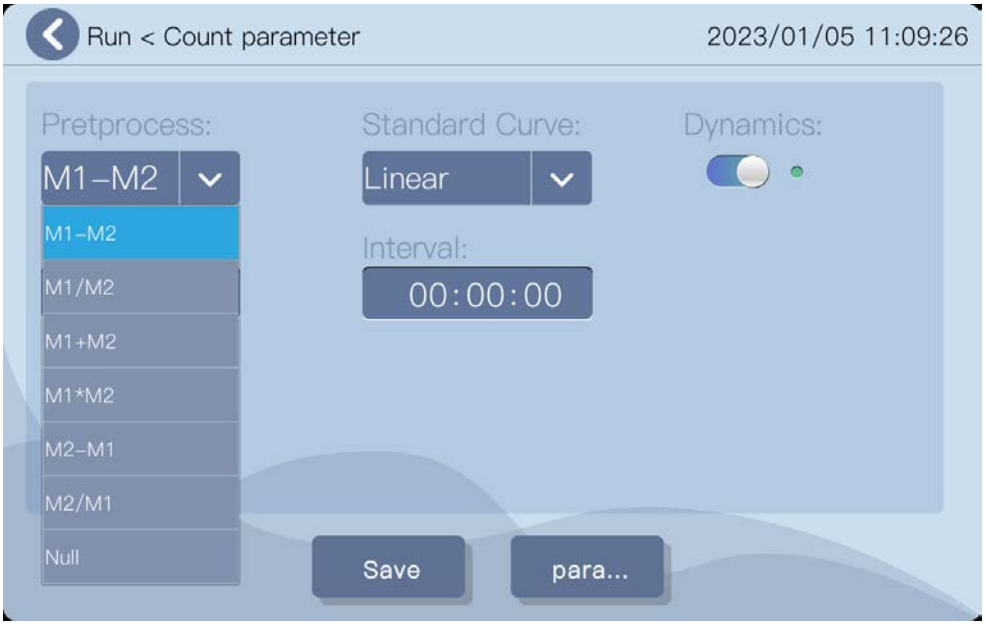
   c. **Last:** End of reading and recording data points.

7. Once parameters have been set, press **Save**.

Preprocessing Setting

On the Calculate Parameters interface, choose from the **Pretreatment Processing** drop-down menu the preprocess method when measuring double wavelengths.

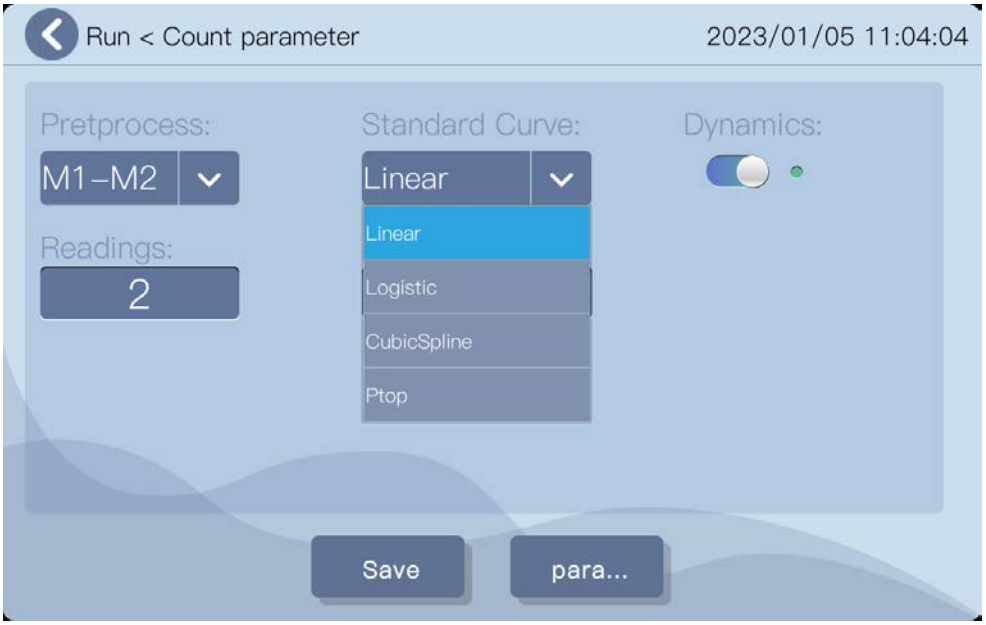
The options are: **M1-M2**, **M1/M2**, **M1+M2**, **M1*M2**, **M2-M1**, **M2/M1**, where M1 and M2 represent the absorbance values for wavelength 1 and wavelength 2.



Curve Fitting Settings

On the Calculate Parameters interface, select from the Standard Curve drop-down menu the curve fit needed.

The options are: **Linear**, **Logistic**, **CubicSpline**, and **Ptop**.



After the test is completed, the software will process the standard curve and analyze results using the measured absorbance values and input standard concentrations.

Qualitative Settings

The qualitative module is to set the interpretation of positive results.

1. On the Document Editing screen, press the “Edit Document” icon located on the bottom right corner of the Qualitative Module.
2. Press to toggle on **Interpret** to set the parameters for the qualitative analysis.

3. From the **Source** drop-down menu, select Absorbency or Concentration.
4. Enter the values for the formula to calculate the threshold value.
   Cutoff: a*NC + **b***PC + **c**, where a, b, and c represent the reagent control coefficients.
   Values can be set as needed, with NC as the average value of negative control, and PC as the average value of positive control.
   Double-tap in the field box referred to as “**a**”, use the keyboard to enter the coefficient value needed to multiply by NC, then press **OK**.
   Do the same for values “**b**” and “**c**”. If the cutoff does not require calculations with PC or NC, then values for “**b**” and “**c**” do not need to be set as the default is zero.
5. Enter a value for **Weak Positive: (+/-Cutoff%)** that indicates the measurement result is within the Cutoff% and the sample will be judged as a weak positive. The value comes from the calculation of a weak positive percentage according to the reagent user manual.
6. Tap field box to set the Positive sample interpretation as greater than **(>)** or lesser than **(<)** than the Cutoff value. Set according to the reagent user manual.
7. Press **Save** once complete.

Quality Control Settings

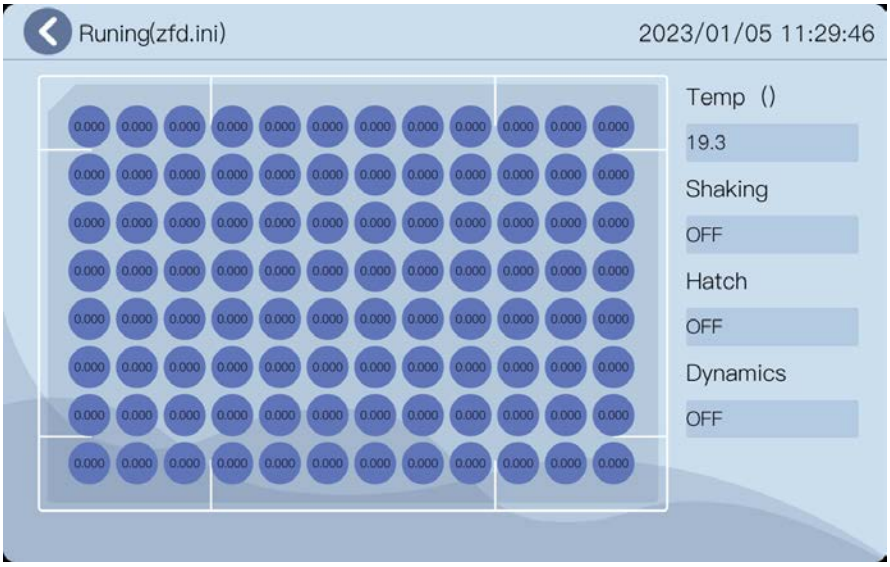
The Quality Control module is for setting the target/standard deviation values for the QC samples that are set on the plate layout interface.

1. On the Document Editing screen, press the “Edit Document” icon located on the bottom right corner of the Quality Control module.
2. Press to toggle on the **Quality Controls** function.

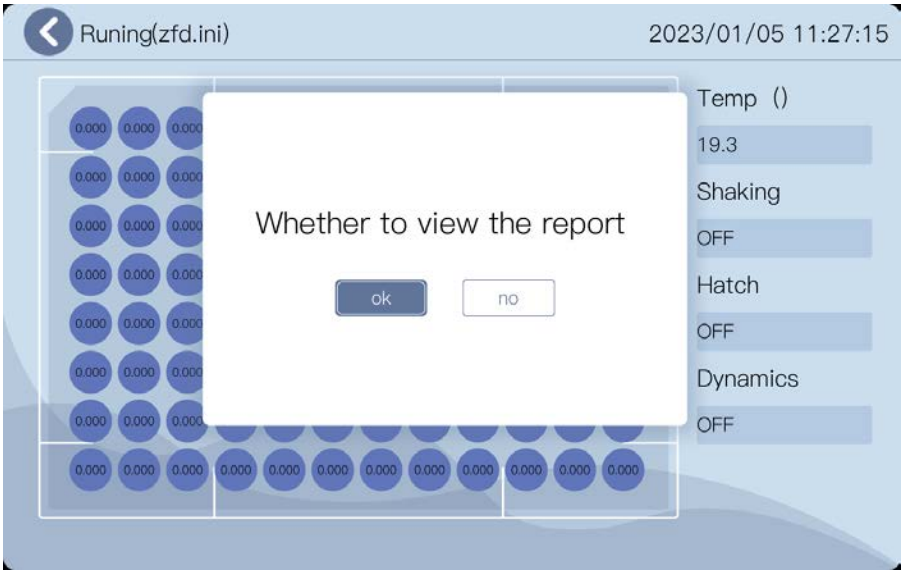
3. From the **ABS:** drop-down menu, select Absorbency or Concentration. The QC sample absorbency or concentration can be set as quality control variables.
4. Set the quality control concentration or absorbance value in the **Target** field box, then set the standard deviation **(SD)** value for QC concentration or ABS.
   Set values according to reagent user manual.
5. Once complete, press **Save**.

Run File Operation

1. After all parameters have been set or verified, press **Plate** to open the plate tray.
2. Gently place the 96-well plate into place. Align A1 well on the plate with the A1 on the plate tray to make the corresponding position of each well on the plate consistent with the displayed result.
3. Press Run to begin the operation. The detection interface will display the current operation status and steps.



4. After the reading is complete, the user has the option to view the report or remain on the detection interface.



   a. Press OK to navigate to the Report Menu Interface to view the current operation measurement results.
   b. Press No to remain on the current detection interface. The corresponding absorbance of each current well will be displayed in the 96 holes.

REPORT MENU INTERFACE

The report menu interface displays the measurement data results after a program is completed. Users can also access historical data saved in the last test of each program.

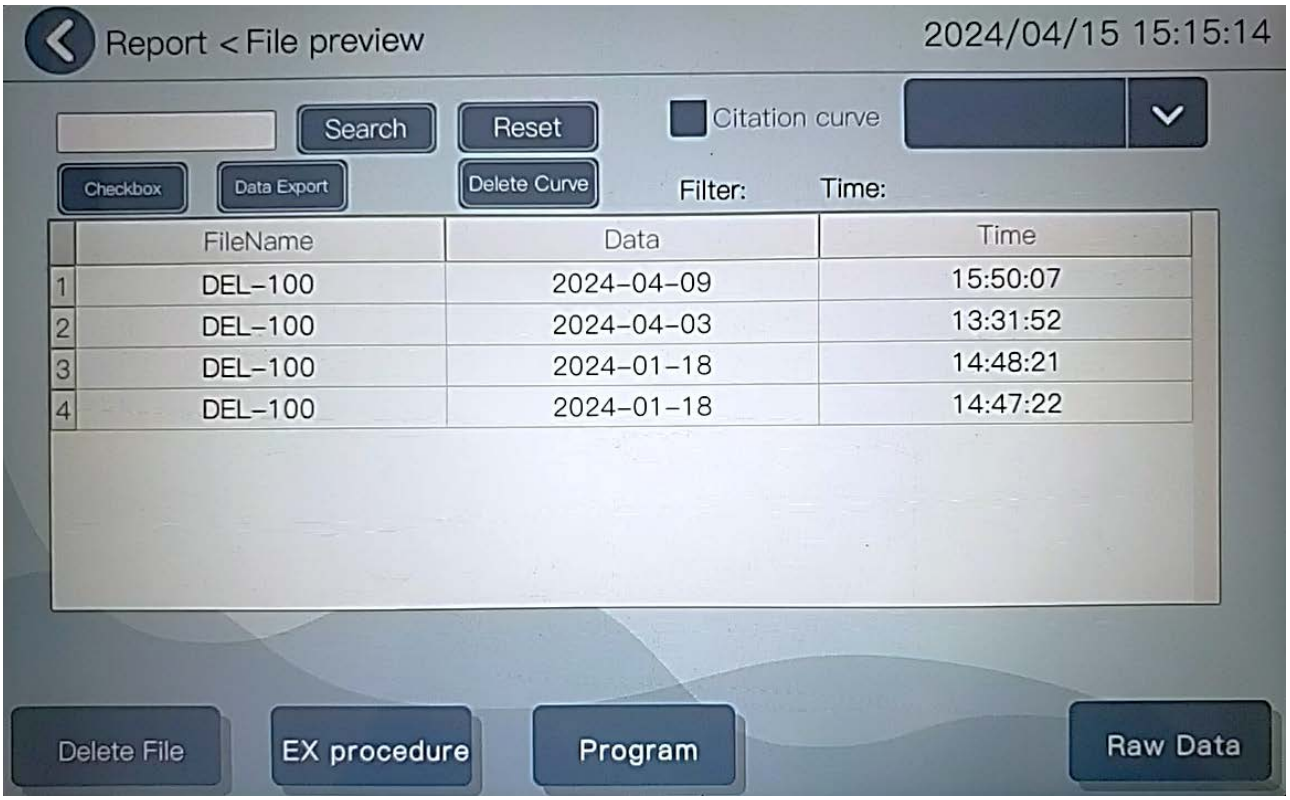
The are two display options for the report: General Detection and Kinetic Detection. When the report program has the dynamic function activated, the icon on the bottom will display “Dynamics”, otherwise the icon will display “raw data” to view report.

The General Detection Report displays the results during the qualitative and quantitative analysis of the sample. Data analysis options include raw data, QC analysis, quantitative analysis, qualitative analysis, and standard curve. Interpret, standard curve, and QC functions can be switched on or off in the program setting. If the function is not activated, no results are provided, and a prompt will display the reason.

The Kinetic Detection Report displays the data analysis results according to the program which includes raw data, analysis, and standard curve.

Report File Records

Report records are sorted by date and time.



Delete File

Select the report file to be removed. Press the **Delete** File key and a prompt will appear to confirm deletion.

EX procedure

Select the report file, then press **EX procedure** to export program to the “running” program file. If the file already exists, a prompt will appear.

Program

Select the report file, then press the **Program** key to enter the file’s document editing interface.

Raw Data or Dynamics

Select the report file, then press the **Raw Data** key to view the General Detection report or press the **Dynamics** to view the Kinetic Detection report.

Search

Type in keywords in the search field box, then press **Search** to quickly locate a specific report file.

Reset

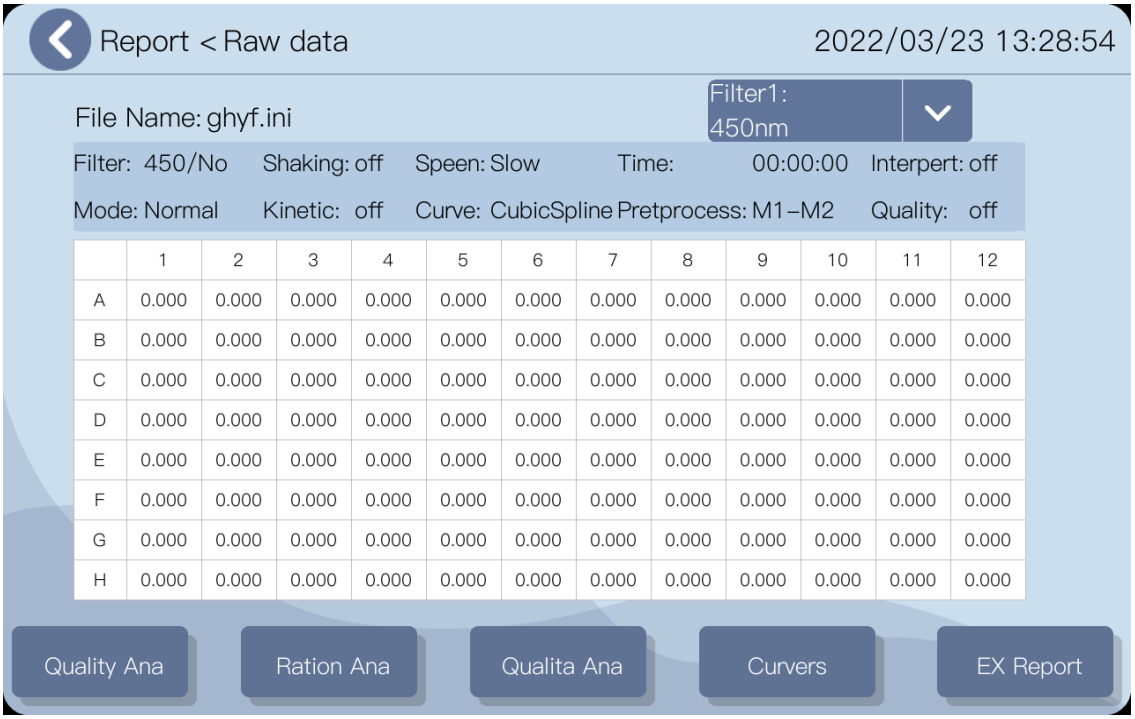
Press **Reset** key to display all current report files.

Data Export

Select one or more files, then press **Data Export** to export the reports to a USB Drive.

Raw Data Report Interface

When viewing the raw data of a file, the current interface will display the raw absorbance value. If dual wavelength detection was set, press on the **Filter1** drop-down to toggle between the two wavelengths.



	1	2	3	4	5	6	7	8	9	10	11	12
A	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
B	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
C	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
D	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
E	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
G	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
H	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Quality Control

When the Quality Control function is on during the program, the results will appear on the Quality Result interface.

NO.	ABC	SD	CV	Upper limit	Lower limit	Result
1	4.060	0.056	0.014	5.000	-3.000	Pass
2	3.070	0.026	0.008	11.000	-5.000	Pass

Quantitative

The quantitative analysis interface displays the sample concentrations calculated according to the standard curve through the curve-fit when set. Press the **Linear/Linear** drop down to toggle results between the axes of the curve fit and the curve fitting method.

	1	2	3	4	5	6	7	8	9	10	11	12
A	-0.084	-0.090	-0.092	-0.087	-0.088	-0.093	-0.091	-0.094	-0.096	-0.084	-0.092	-0.090
B	3.021	2.901	2.892	2.900	2.931	2.873	2.915	2.882	2.900	2.849	2.956	2.947
C	2.189	2.206	2.163	2.163	2.160	2.146	2.158	2.186	2.172	2.184	2.115	2.455
D	1.082	0.910	0.880	0.886	0.884	0.883	0.874	0.904	0.883	0.917	0.916	1.103
E	0.394	0.326	0.305	0.297	0.337	0.331	0.284	0.302	0.293	0.304	0.313	0.403
F	0.123	0.111	0.094	0.080	0.082	0.082	0.101	0.078	0.086	0.095	0.082	0.099
G	-0.090	-0.017	-0.013	-0.014	-0.007	-0.015	-0.014	-0.014	-0.011	-0.014	-0.010	-0.081
H	-0.091	-0.084	-0.089	-0.083	-0.087	-0.076	-0.084	-0.085	-0.084	-0.089	-0.090	-0.090

Qualitative

The qualitative interface displays the qualitative analysis of the test results.

The “+” symbol above each absorbance value means positive. A red “+” indicates full positive and a yellow “+” means weak positive.

The critical value is the threshold value “Cutoff” that was set in the Qualitative Settings of the document editing interface.

	1	2	3	4	5	6	7	8	9	10	11	12
A	+ 0.104	+ 0.102	+ 0.093	+ 0.112	+ 0.098	+ 0.099	+ 0.097	+ 0.089	+ 0.082	+ 0.101	+ 0.090	+ 0.091
B	3.735	2.715	2.844	2.821	2.801	2.746	2.834	2.819	2.812	2.793	3.642	3.882
C	+ 1.175	+ 1.436	+ 1.481	+ 1.496	+ 1.545	+ 1.561	+ 1.559	+ 1.548	+ 1.523	+ 1.549	+ 1.408	+ 1.420
D	+ 0.671	+ 0.809	+ 0.844	+ 0.926	+ 0.939	+ 0.939	+ 0.948	+ 0.945	+ 0.916	+ 0.896	+ 0.850	+ 0.713
E	+ 0.353	+ 0.429	+ 0.514	+ 0.599	+ 0.644	+ 0.644	+ 0.596	+ 0.620	+ 0.573	+ 0.525	+ 0.493	+ 0.378
F	+ 0.206	+ 0.256	+ 0.334	+ 0.316	+ 0.358	+ 0.373	+ 0.394	+ 0.353	+ 0.369	+ 0.352	+ 0.229	+ 0.195
G	+ 0.098	+ 0.142	+ 0.150	+ 0.148	+ 0.167	+ 0.153	+ 0.156	+ 0.151	+ 0.157	+ 0.149	+ 0.151	+ 0.100
H	+ 0.262	+ 0.217	+ 0.209	+ 0.217	+ 0.169	+ 0.172	+ 0.145	+ 0.133	+ 0.171	+ 0.111	+ 0.110	+ 0.078

Curves

The curve interface displays the standard curve fitting result. The curve fitting equation is displayed. Select different curve fit axes to be displayed.

Linear/Linear – Linear is absorbance value and corresponding concentration.

Linear/Log – Linear is absorbance value and corresponding log value of the concentration.

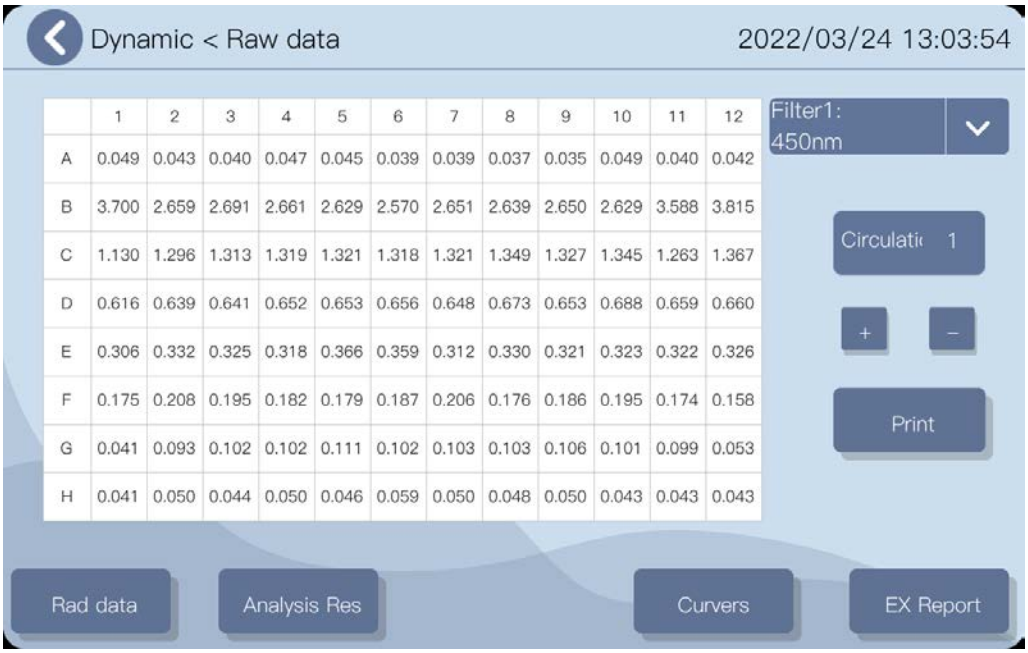
Log/Linear and **Log/Log**

EX Report

Select the data to be exported, then press the **EX Data** to begin exporting data to USB Disk.

Dynamic Report Interface

When selecting to view the kinetic measurements of a report file, the interface will display the raw data of the dynamic detection.



	1	2	3	4	5	6	7	8	9	10	11	12
A	0.049	0.043	0.040	0.047	0.045	0.039	0.039	0.037	0.035	0.049	0.040	0.042
B	3.700	2.659	2.691	2.661	2.629	2.570	2.651	2.639	2.650	2.629	3.588	3.815
C	1.130	1.296	1.313	1.319	1.321	1.318	1.321	1.349	1.327	1.345	1.263	1.367
D	0.616	0.639	0.641	0.652	0.653	0.656	0.648	0.673	0.653	0.688	0.659	0.660
E	0.306	0.332	0.325	0.318	0.366	0.359	0.312	0.330	0.321	0.323	0.322	0.326
F	0.175	0.208	0.195	0.182	0.179	0.187	0.206	0.176	0.186	0.195	0.174	0.158
G	0.041	0.093	0.102	0.102	0.111	0.102	0.103	0.103	0.106	0.101	0.099	0.053
H	0.041	0.050	0.044	0.050	0.046	0.059	0.050	0.048	0.050	0.043	0.043	0.043

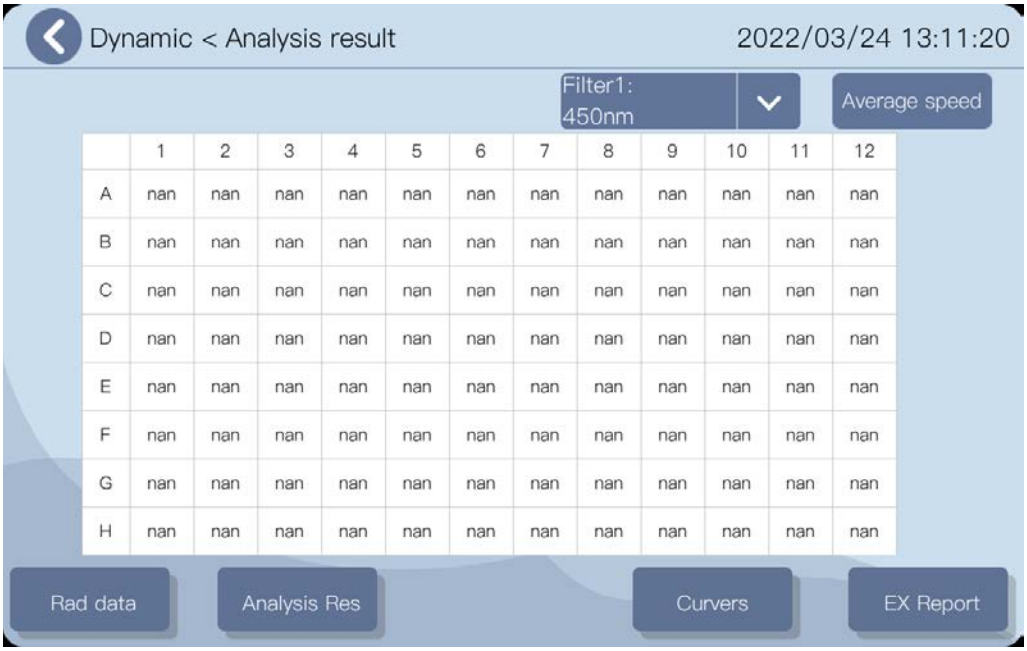
The absorbance value under the current measurement cycle is shown.

Press on the 

to switch cycles, with the cycle number indicated above.

Analysis

Average speed indicates the data processing method for dynamic detection.



	1	2	3	4	5	6	7	8	9	10	11	12
A	nan	nan	nan	nan	nan	nan	nan	nan	nan	nan	nan	nan
B	nan	nan	nan	nan	nan	nan	nan	nan	nan	nan	nan	nan
C	nan	nan	nan	nan	nan	nan	nan	nan	nan	nan	nan	nan
D	nan	nan	nan	nan	nan	nan	nan	nan	nan	nan	nan	nan
E	nan	nan	nan	nan	nan	nan	nan	nan	nan	nan	nan	nan
F	nan	nan	nan	nan	nan	nan	nan	nan	nan	nan	nan	nan
G	nan	nan	nan	nan	nan	nan	nan	nan	nan	nan	nan	nan
H	nan	nan	nan	nan	nan	nan	nan	nan	nan	nan	nan	nan

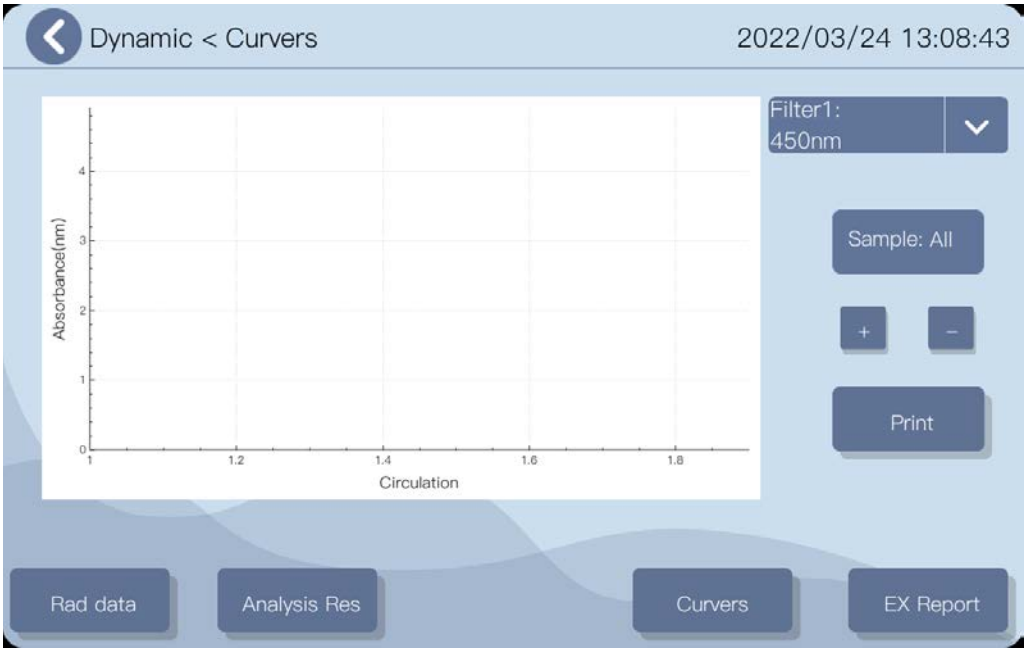
Curve

The kinetic curve interface displays the absorbance curve of each sample position according to different cycles.

Press the + − to switch between sample position.

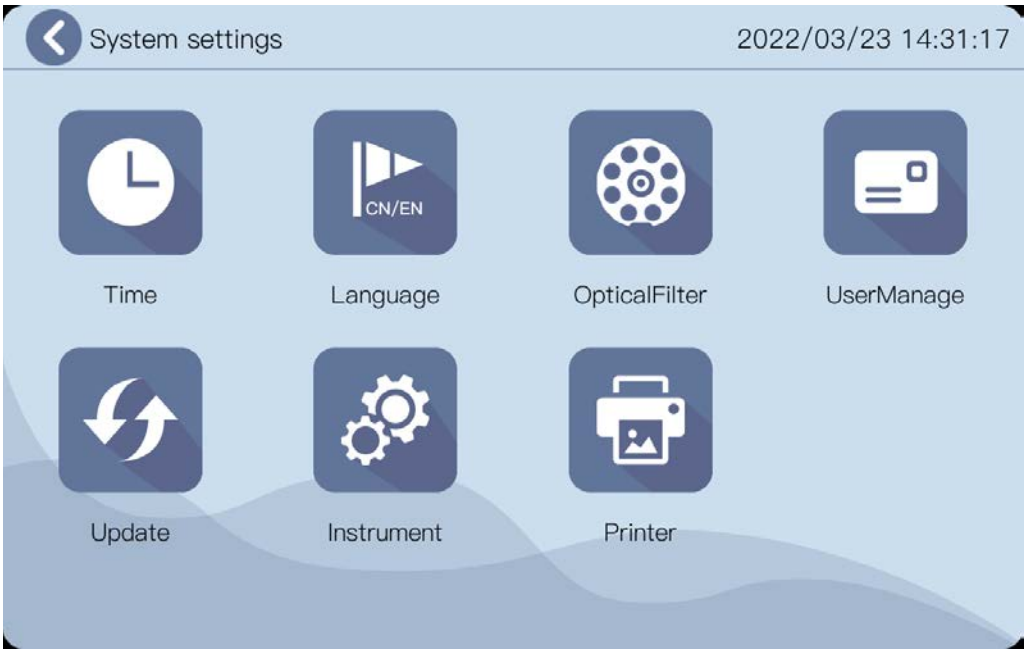
At the A1 position, press − to display the absorbance curve of all sample positions.

Sample: All Input the sample position number to view curve display



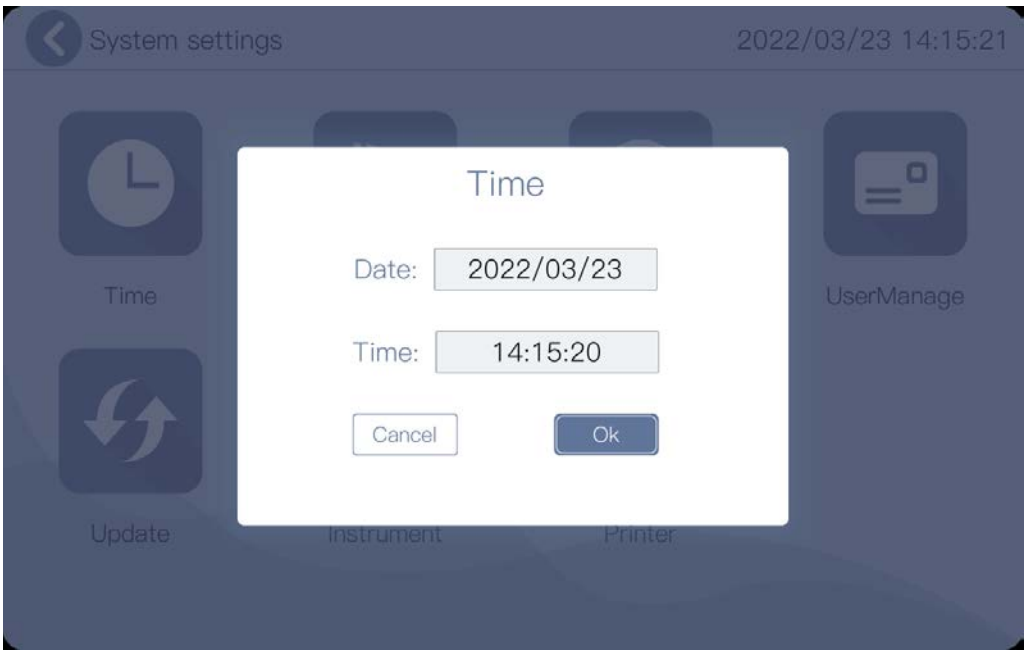
SETTING MENU INTERFACE

Time, language, filter, user management, system updates, maintenance, and printer can be modified or updated by going to the settings menu interface.



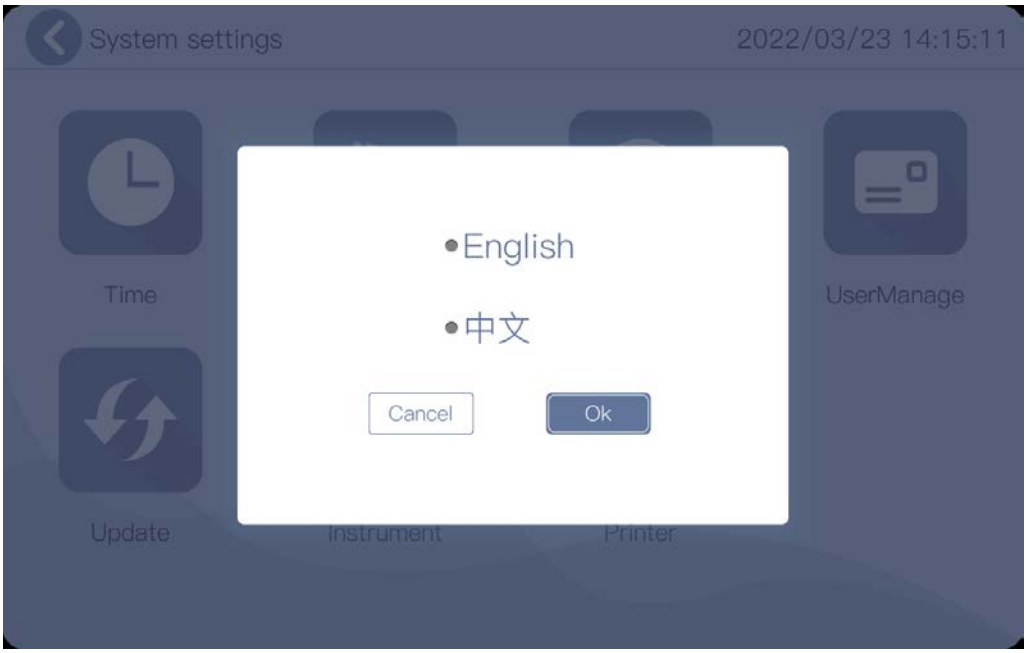
Time and Date Settings

Press on the **Time** icon, to modify the date and time on the instrument.



Language Settings

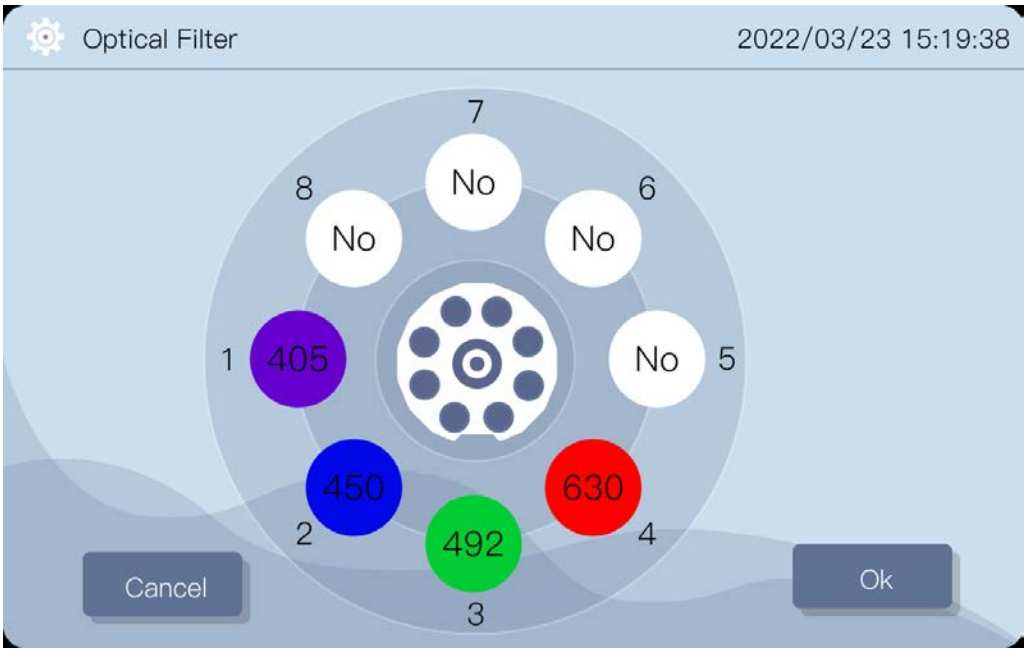
Press on the **Language** icon, to select the language. Currently, the supported languages are English and Chinese.



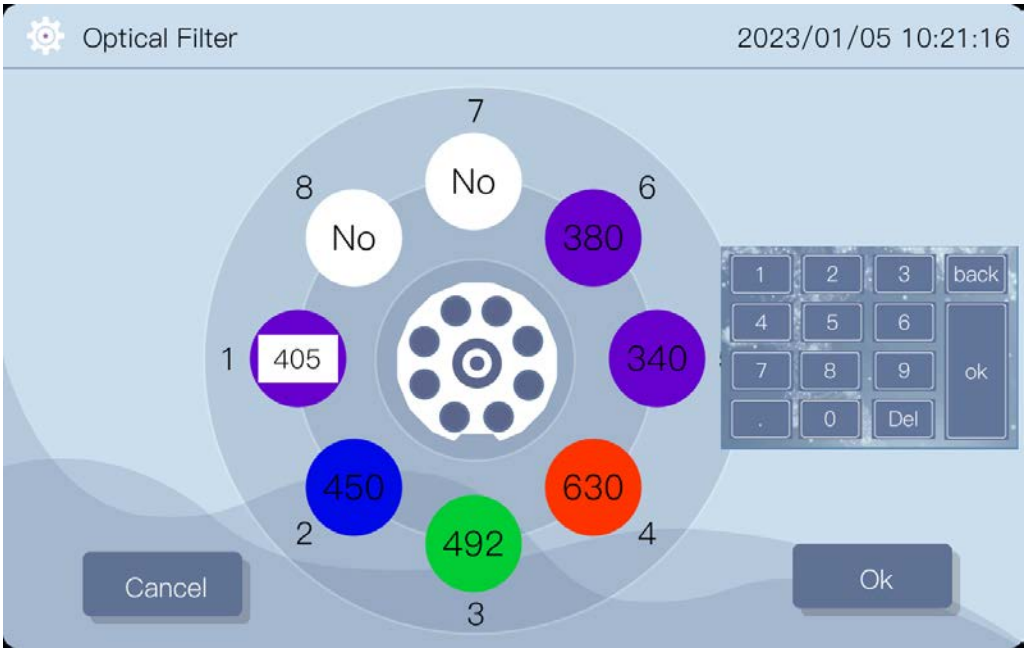
Optical Filter Settings

The instrument comes equipped with 4 standard filters that will display in positions 1-4. The filter wheel can hold up to 8 filter channels, and users can switch out or set up filters in positions 5-8 based on their requirements. Additional filters can be purchased separately.

1. Press on the **Filter** icon on the setting menu interface.



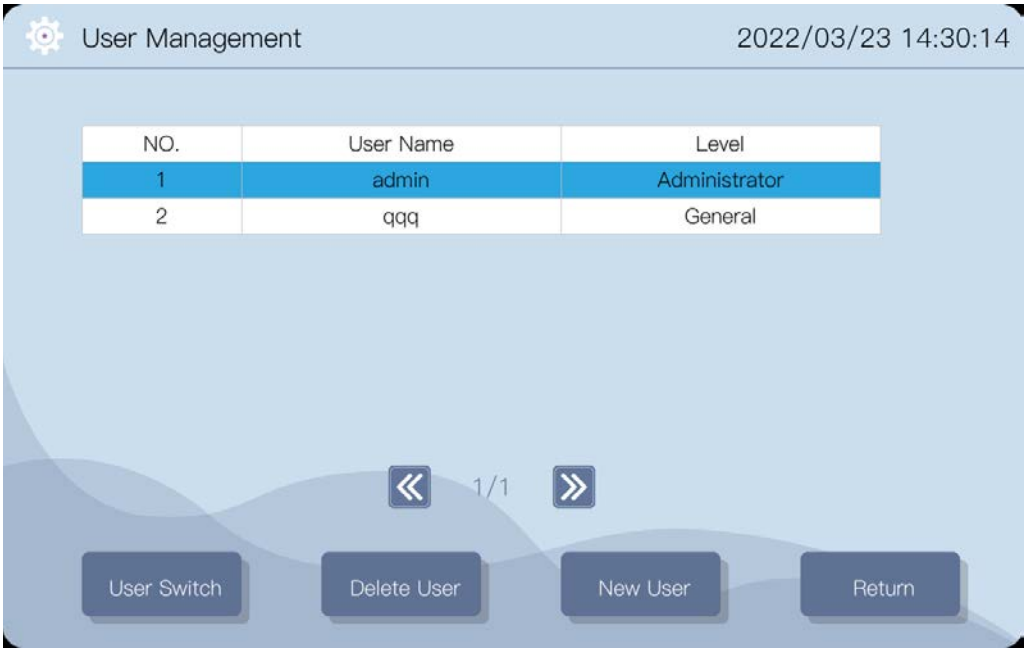
2. Tap on a blank slot, then enter the wavelength. The default unit is nm.



NOTE: The position numbers of the added wavelength shown on the display should match the filter wheel. If the position number does not correspond correctly with the filter wheel, this will result in incorrect detection data.

User Management Settings

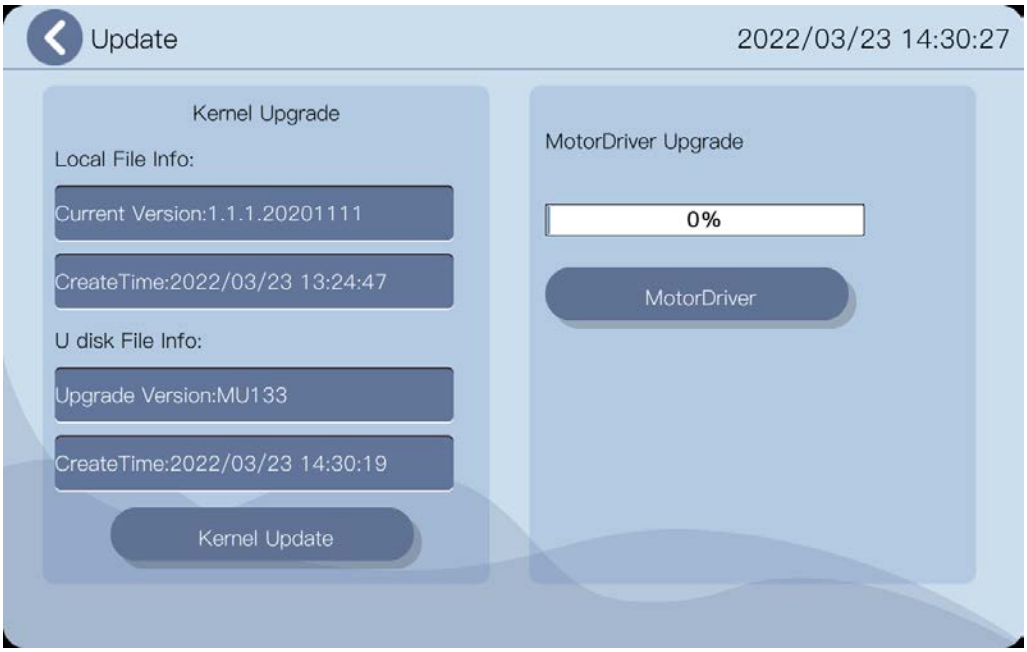
Press on the **UserManage** icon to switch user profiles, add a new profile, or delete a user profile. Only the admin user can delete other use profiles.



Software Update Settings

Upgrade the instrument software with any new updates.

1. Insert the USB disk containing the package updates into the unit.
2. Press the **Update** icon to enter the update interface.



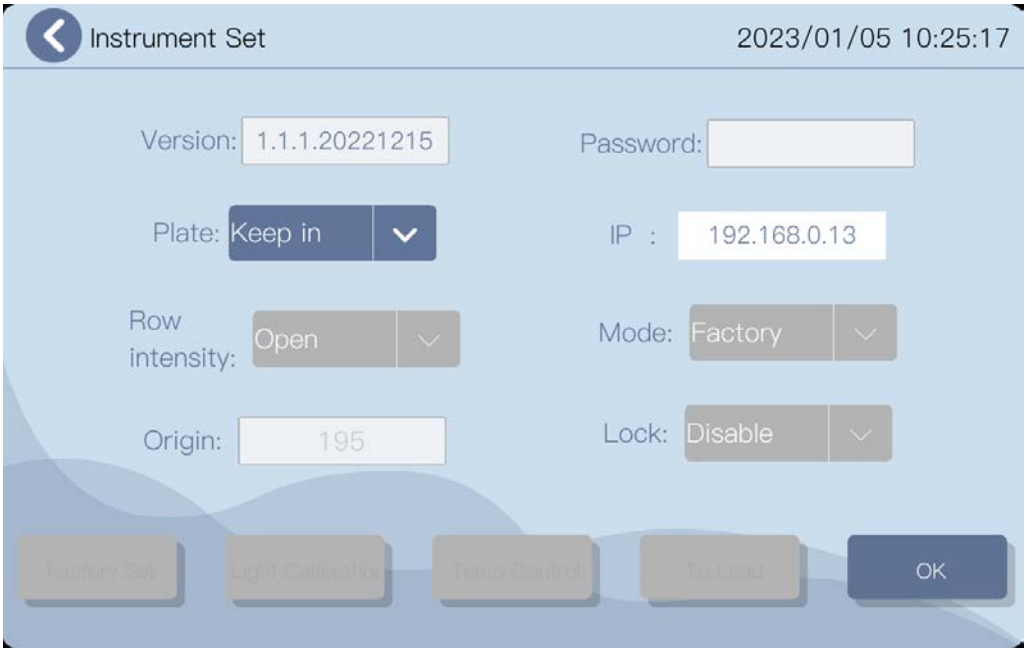
3. If the upgrade package exists, click the key buttons 

or 

to begin the upgrading process. Once complete, the instrument will restart.

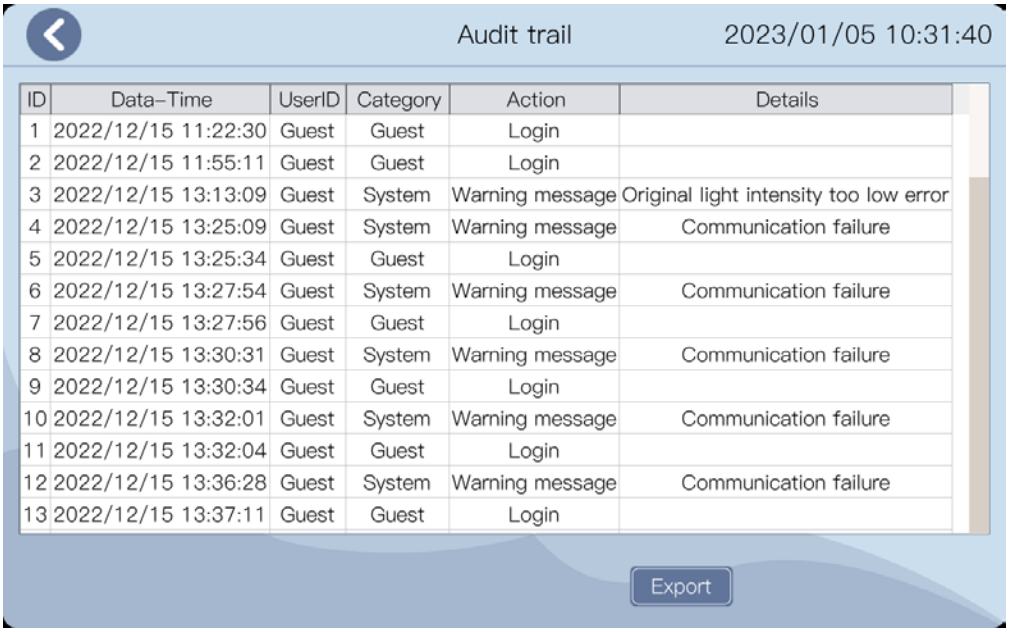
Maintenance Settings

On the maintenance settings, the admin user can set the position of the plate tray, manage the factory setting, and perform other maintenance functions. Press the **Instrument** icon to enter this interface.



Audit Trail Settings

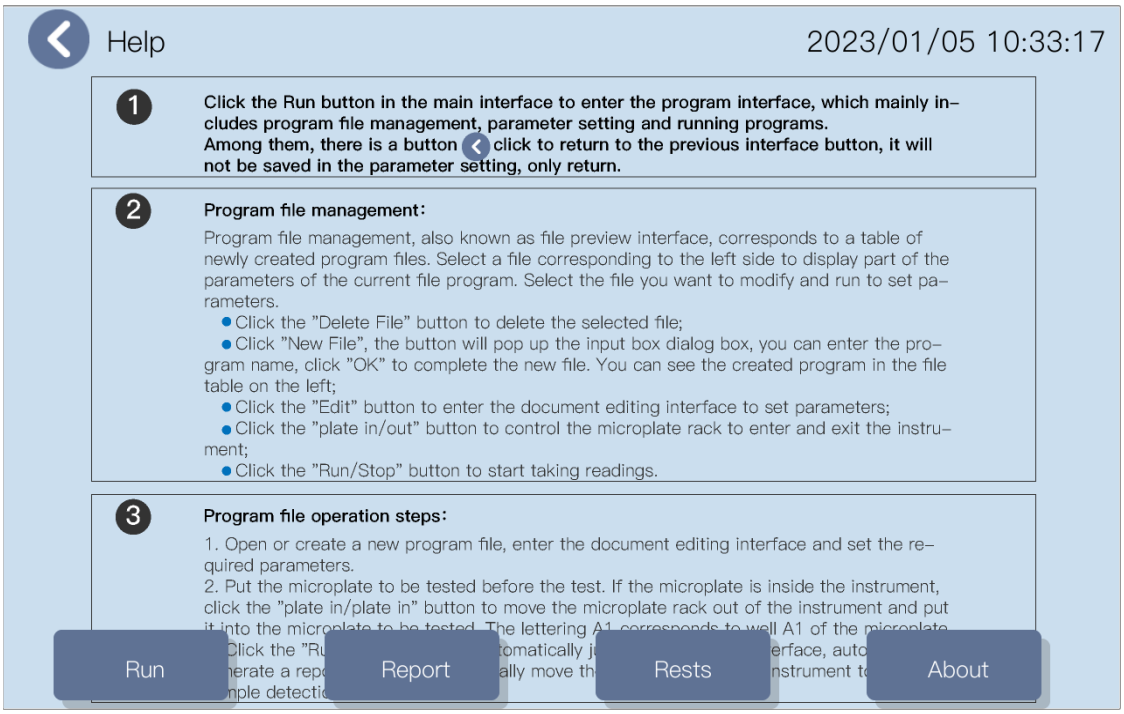
Press the **Audit Trail** icon to view the logbook detailing all operations and changes made.



ID	Data–Time	UserID	Category	Action	Details
1	2022/12/15 11:22:30	Guest	Guest	Login	
2	2022/12/15 11:55:11	Guest	Guest	Login	
3	2022/12/15 13:13:09	Guest	System	Warning message	Original light intensity too low error
4	2022/12/15 13:25:09	Guest	System	Warning message	Communication failure
5	2022/12/15 13:25:34	Guest	Guest	Login	
6	2022/12/15 13:27:54	Guest	System	Warning message	Communication failure
7	2022/12/15 13:27:56	Guest	Guest	Login	
8	2022/12/15 13:30:31	Guest	System	Warning message	Communication failure
9	2022/12/15 13:30:34	Guest	Guest	Login	
10	2022/12/15 13:32:01	Guest	System	Warning message	Communication failure
11	2022/12/15 13:32:04	Guest	Guest	Login	
12	2022/12/15 13:36:28	Guest	System	Warning message	Communication failure
13	2022/12/15 13:37:11	Guest	Guest	Login	

HELP MENU INTERFACE

On the help menu interface, users can find the software information and view basic operation guidelines.



MAINTENANCE, STORAGE, AND TRANSPORTATION

Instrument Maintenance

- The storage environment should be kept dry and clean, protected from moisture, corrosion, and strong electromagnetic interferences.
- Each instrument has been calibrated before leaving the facility.
- Users should not disassemble, adjust, or repair the instrument without first contacting BT Lab Systems. Doing so will void the warranty and may cause accidents or malfunctions.
- The rated electrical outlet load must not be lower than the demand. The power supply voltage must meet the specified range.

Component Part Replacement

The basic components of the instrument, as well as the structural and overall design, have been tested for quality, reliability, and effectiveness. The functional parts should not require replacement in normal use. Some parts may need to be replaced based on the usage situation.

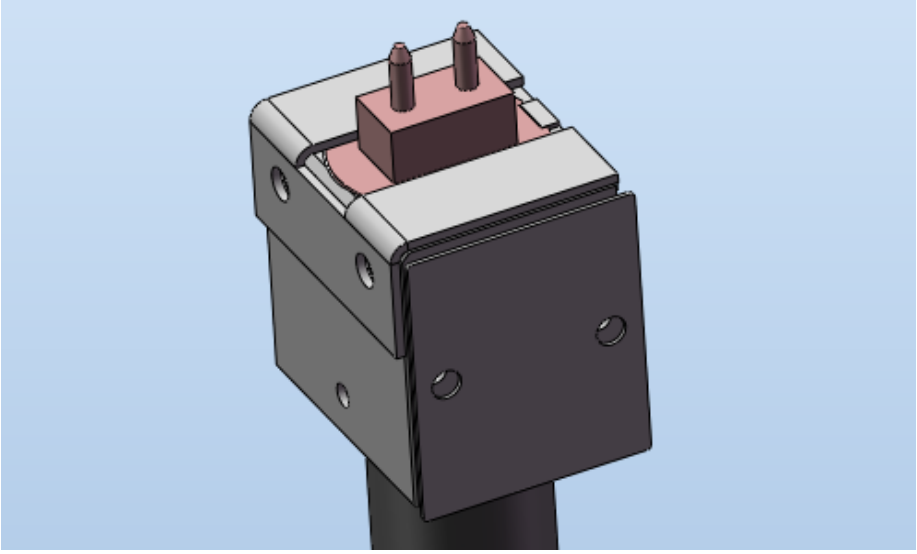
Light Source Replacement

Replacement light source can be purchased separately. Prior to replacing the light source, unplug the instrument from the power supply, then follow the next steps.

1. Using the 2.5mm hex wrench supplied with the unit, open the back door of the instrument.
2. Using a small screwdriver, loosen the screws on the light source connector, then pull the light source connector upwards to remove.

3. Loosen the screws on the light source pressure plate, then remove the plate.

4. Lift the light source upwards and remove from the unit.
   CAUTION: LIGHT SOURCE MAY BE HOT.
5. Load the new light source into the instrument using the reverse order of the steps above.
   Pay attention to the position of the light source. Affix the pressure plate after the instrument is flat and stable.



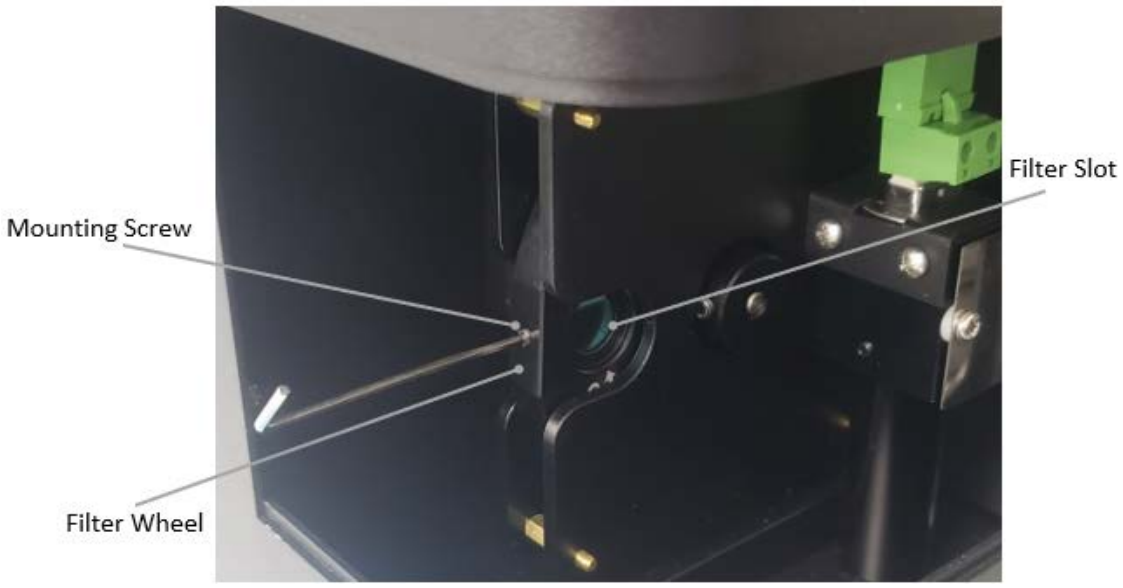
NOTE: Do not touch the bulb surface. Hold the base of the lamp when replacing and use even force to avoid damage.

Additional Filters

The instrument comes equipped with four standard filters. Different wavelength optical filters can be added or replaced on the filter wheel. Additional filters can be purchased separately. See section *Optional Accessories*.

1. Using the 2.5mm hex wrench supplied with the unit, open the back door of the instrument.
2. Manually rotate the wheel to the next empty position number or to the position number containing the filter to be switched out.
3. With the 1.5mm hex wrench provided with the unit, loosen the small mounting screw used to keep the filter in place, then remove the existing filter, if any. (It is not necessary to remove the screw completely, but just enough to be able to move the filter in and out of the slot)
4. Insert the optical filter into the slot. Arrows on the filter should be consistent with the direction of light incident and should be straight without tilting.

5. Tighten the screw to secure the filter in place.



Storage and Transportation

- Room Temperature: 10°C – 40°C
- Relative humidity: < 80%
- No corrosive gas and good ventilation

During transportation avoid heavy shock, vibration, and humidity.

TROUBLESHOOTING

Issue	Analysis	Troubleshooting
Instrument does not start	Defective Power Supply	Check power supply, replace fuse, or contact BT Lab Systems
Lamp not on	Defective lamp power supply or Defective lamp	Check power supply or Replace lamp
Weak Light	Defective lamp	Replace lamp
No reset signal on enzyme label plate	Damaged photoelectric switch	Replace photoelectric switch
Measurement results with large anomalies or no results. Filter wheel does not work or rotates too much before stopping.	Photoelectric switch of filter wheel is damaged	Replace filter wheel photoelectric switch
Plate tray does not move forward or backward	Obstruction	Check around the plate tray
Inaccurate measurement results	Microplate not placed flat	Check plate was placed properly on plate tray
Strong light	No optical filter in selected filter position	Delete wavelength in filter setting

OPTIONAL ACCESSORIES

The unit is supplied with four standard filters: 405nm, 450nm, 492nm, and 630nm. Additional filters and replacement parts are optional and must be purchased separately.

BT Lab Systems Cat. #	Description
BT1123-A	405nm filter
BT1123-B	450nm filter
BT1123-C	492nm filter
BT1123-D	630nm filter
BT1123-E	415nm filter
BT1123-F	470nm filter
BT1123-G	510nm filter
BT1123-H	520nm filter
BT1123-I	532nm filter
BT1123-J	540nm filter
BT1123-K	546nm filter
BT1123-L	570nm filter
BT1123-M	578nm filter
BT1123-N	595nm filter
BT1123-O	600nm filter
BT1123-P	620nm filter
BT1123-Q	650nm filter
BT1123-R	660nm filter
BT1123-S	690nm filter
BT1123-T	700nm filter
BT1123-U	750nm filter
BT1123-V	Halogen Lamp

WARRANTY

Our company guarantees that this unit is warranted against defective material and workmanship for a period of one year from the date of shipment. We will repair or replace the defective equipment returned during the warranty period free if the equipment has been used under normal laboratory conditions and in accordance with the instruction in this manual. The following defects are specifically excluded:

1. Damage caused by accident, misuse, or abuse.
2. Damage caused by disaster.
3. Repair or modification by anyone else without our authorization.
4. Corrosion due to the use of improper solvent or sample.
5. Defects caused by improper operation.
6. Use of fittings or other spare parts supplied by different manufacturers.

This warranty does not apply to platinum wire and all the accessories.

A return authorization must be obtained from us before returning any product for repair on a freight prepaid basis.

For any inquiry or request for repair service, please contact BT Lab Systems via the email below.

E-Mail: info@BTLabSystems.com

TECHNICAL SUPPORT

BT Lab Systems offers technical support for all its products. If you have any questions about the product's use or operation, please contact BT Lab Systems at the following info.

E-Mail: info@BTLabSystems.com