StonyLab®

Full-Automatic Melting Point Meter

Operation Manual

(Please read the instruction carefully before you use the machine)

Contents

1. Safety Warnings

 Warning: The protection provided by the instrument may be impaired if it is not used in accordance with the manufacturer’s requirements.

 Warning: Handle all solutions used in the analysis with care, in compliance with laboratory safety regulations. Refer to the corresponding Material Safety Data Sheets (MSDS). Always wear a lab coat, safety goggles, and rubber gloves. Use caution when handling hot reagents to avoid burns.

 Warning: Risk of electric shock. Only qualified personnel are authorized to open the instrument cover and panels.

2. Features and Applications

The melting point is an important physical property of a substance. In the field of chemistry, melting point determination is one of the fundamental methods for identifying the nature of a substance, as well as an important technique for evaluating purity, content, and composition.

The fully automatic melting point apparatus integrates the Android operating system with advanced video technology. It provides intuitive and convenient display of temperature curves, optical signals, and real-time video images, while also supporting data storage, recording, watermarking, and playback functions directly on the device. Users can visually observe solid–liquid transitions, color changes, and subtle movements through video monitoring.

The unique layered thermal insulation design effectively resists environmental interference, ensuring stability and accuracy, while enabling faster heating and cooling rates to reduce waiting times. This instrument is widely applicable in chemistry, pharmaceuticals, industry, food, and cosmetics. It is an essential tool for the production of powdered fats, waxes, and for the determination of melting points of other non-crystalline substances.

Key Features:

- Large, high-definition capacitive touchscreen display
- 720P HD camera with 9× optical zoom for clear visualization of sample details and changes
- Linear heating rate continuously adjustable from 0.10 °C to 20.00 °C
- Storage of user-defined methods, historical measurement data, videos, and spectra
- Compatible with USB printers, thermal printers, and export of reports via USB flash drive
- Built-in Wi-Fi for wireless network connectivity and cloud service functionality
- Fully compliant with Pharmacopoeia GLP requirements
- Fully compliant with FDA 21 CFR Part 11, including audit trail, electronic signature, tamper-proof data output, user hierarchy management, and customizable access rights
- Certified according to the TART quality standards for laboratory analytical instruments

3. Structure Introduction

The structural composition of the instrument is shown in Figure A.

Figure A – Front View of the Instrument

1) Upper cover with sample testing holes (see Figure B)
2) Capacitive touchscreen
3) Ventilation inlet

Figure B – Upper Cover and Testing Holes

The user can load the sample into a capillary tube following the standard loading method (length ≥ 100 mm, inner diameter 1.0–1.3 mm, wall thickness 0.10–0.15 mm). The capillary tube should then be inserted into the sample testing hole.

4. Function Overview

4.1 Startup Animation

When the instrument is powered on, the interface appears as shown in Figure 1. The system will start automatically and display a startup animation.

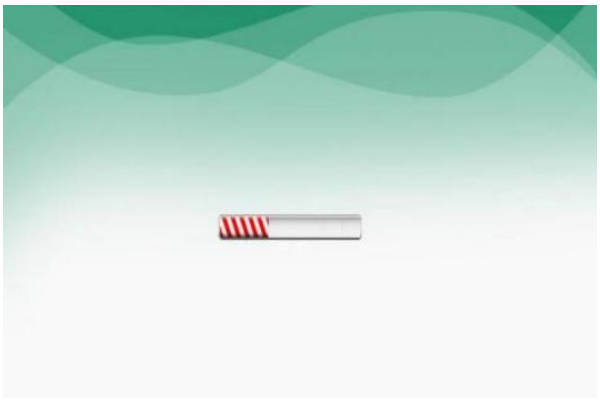


Figure 1

4.2 Login Interface

After the startup animation is completed, the login interface appears, as shown in Figure 2. Please select and enter the correct username and password in the corresponding input fields, then click “Login” (Default factory settings: highest-level username: admin; default password: 888888).

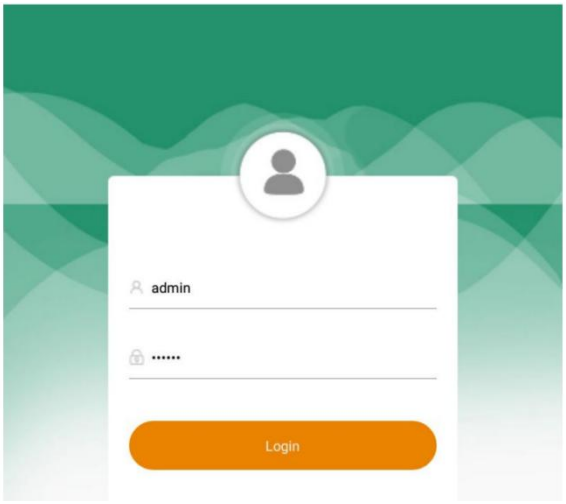


Figure 2

4.3 Test Interface

The test parameter interface is shown in Figure 3, including sample ID, sample name, method of use, starting temperature, ending temperature, heating rate, coordinate axis length, and auto/manual switch (as shown in Figure 3).

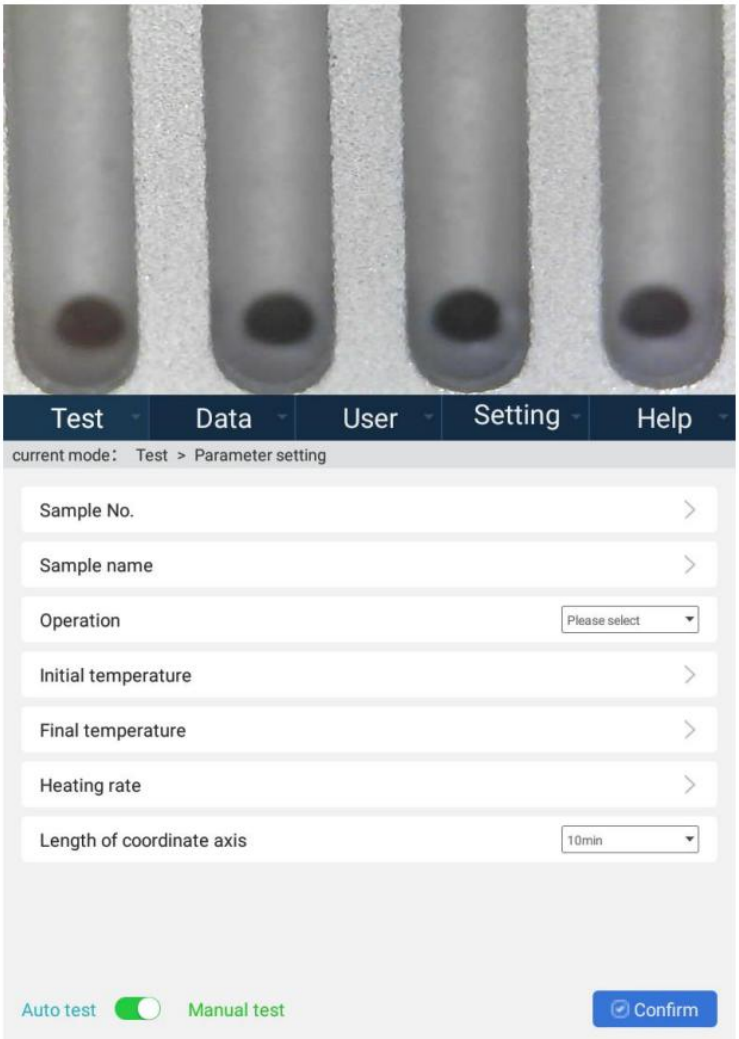


Figure 3

[Sample ID]: English, Chinese characters, numbers, or symbols can be entered.

[Sample Name]: English, Chinese characters, numbers, or symbols can be entered.

[Usage Method]: Pre-established methods can be directly called.

[Start Temperature]: Enter a value in the range of 20.00–400.00 °C.

[End Temperature]: Enter a value in the range of 20.00–400.00 °C. It must be greater than the start temperature and less than the maximum temperature of the coordinate axis. After reaching the end temperature, the instrument will automatically cool down to the start temperature, awaiting further user operation. If left blank, the end temperature will be automatically calculated as the maximum usable value.

[Heating Rate]: Enter a value in the range of 0.10–20.00 °C/min (inclusive).

[Coordinate Axis Length]: Specifies the maximum value of the horizontal axis of the graph. Only three options are available: 10 min, 15 min, and 20 min (applicable for automatic test parameters only).

[Automatic/Manual Test]: Switch between automatic sample testing and manual testing.

4.4 Automatic Test Interface

After setting parameters such as the start temperature and heating rate in the test interface, entering the automatic detection interface will display the screen as shown in Figure 4.

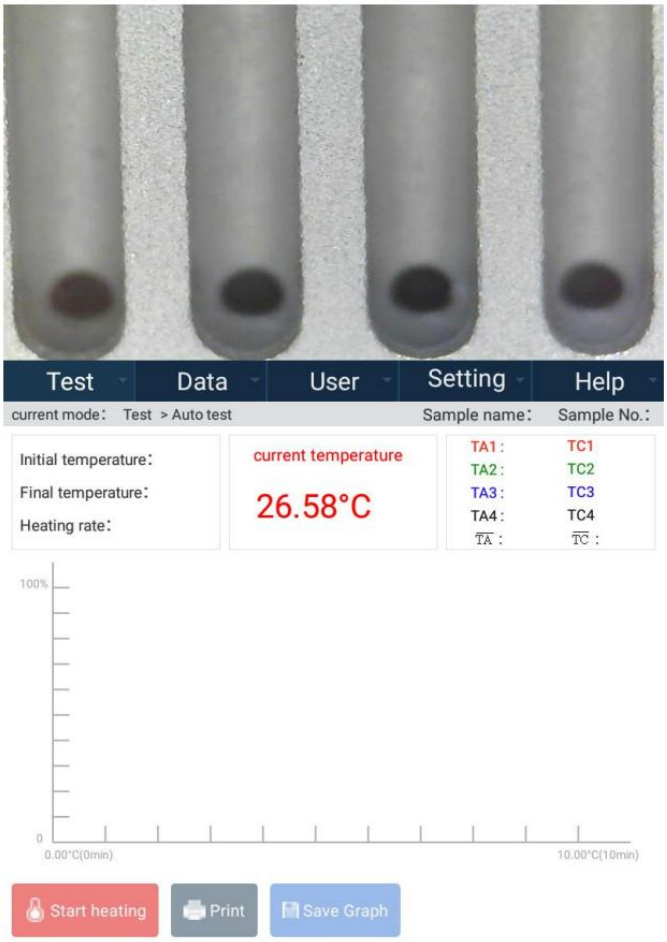


Figure 4

TA1 to TA4: Initial melting point values of the samples in the sample chamber from right to left.

TA: Average initial melting point value of TA1 to TA4.

TC1 to TC4: Melting point values of the samples in the sample chamber from right to left.

TC: Average final melting point value of TC1 to TC4.

[Start Heating]: This button can be clicked only when the current temperature has stabilized within ±0.1 °C of the set start temperature. The instrument will then heat according to the specified heating rate, marking the start of the test.

[Stop Heating]: Clicking this button will display options as shown in Figure 4-1 (this icon appears only after pressing the Stop Heating button).

Cancel: Cancels the stop heating command.

Abandon: Abandons the current experiment.

Save: Saves the results of the current experiment.

[Save Graph]: Clicking this button saves the current melting curve.

[Print]: Clicking this button prints the current test data.

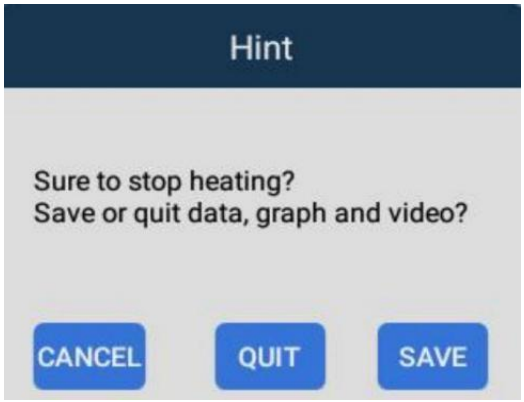


Figure 4-1

Notes:

- **The maximum duration for automatic sample testing is 20 minutes. If the set horizontal axis time or the maximum value exceeds 20 minutes, the curve will not be displayed. If a sample does not complete the entire melting process within 20 minutes, it is recommended to adjust the parameters accordingly. Before each test, ensure the capillary tubes are not inserted into the sample chamber. First, go to the parameter settings page to verify the settings, then click Confirm to enter the corresponding test interface. Wait until the actual temperature reaches the preset start temperature ±0.1 °C (a buzzer will sound), then insert the capillaries for testing. If capillaries are inserted before entering the automatic detection interface, detection errors may occur. Press Start Heating to begin the melting point test. During the test, the melting process of the sample can be observed via the video at the top of the interface, while the instrument automatically displays the melting curve and records the melting points.**
- **If the system is set to save graphs or videos (“Yes”), the curve or video will be automatically recorded at the end of the test.**

4.5 Manual Test Interface

After setting parameters such as the start temperature and heating rate in the test interface, entering the manual detection interface will display the screen as shown in Figure 5.

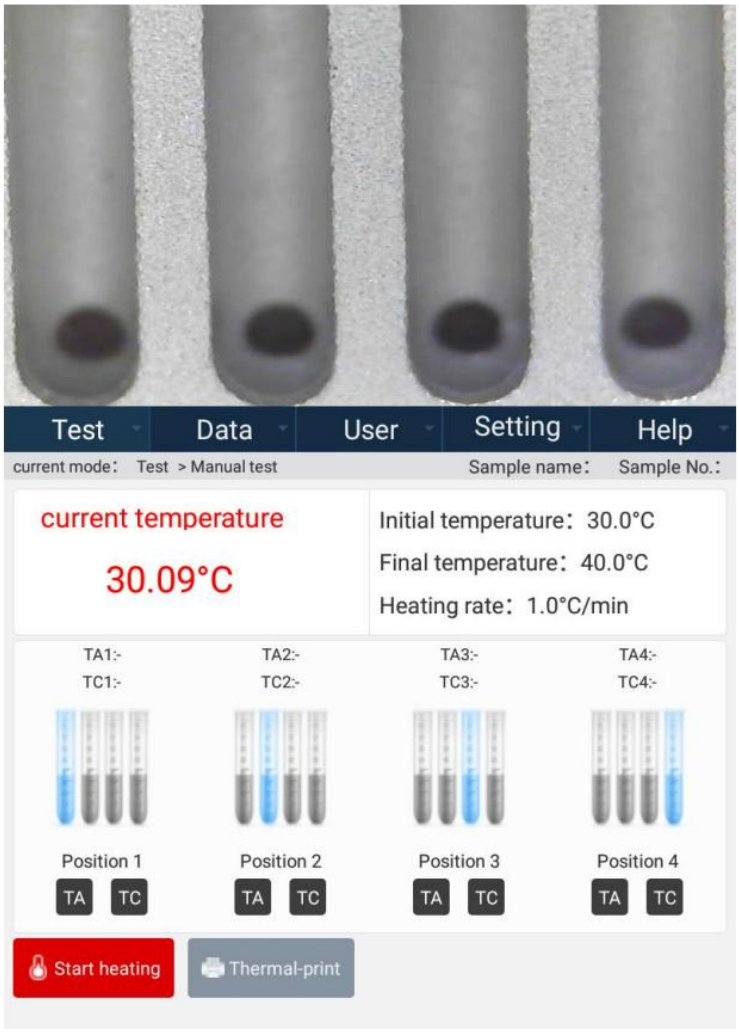


Figure 5

[Start Heating]: This button can be clicked only when the current temperature has stabilized within ±0.1 °C of the set start temperature. The instrument will then heat according to the specified heating rate, marking the start of the test.

[Stop Heating]: Clicking this button will display options as shown in Figure 4-1 (this icon appears only after pressing the Stop Heating button).

Cancel: Cancels the stop heating command.

Abandon: Abandons the current experiment.

Save: Saves the results of the current experiment.

[Thermal Printing]: Clicking this button prints the current test data. Both thermal and dot-matrix printers are supported.

TA: Manually click to record the initial melting point of the sample.

TC: Manually click to record the final melting point of the sample.

Notes:

- **If the end temperature is not set for manual testing, the instrument will automatically select the maximum achievable temperature according to the model. There is no time limit, and no curve will be displayed. Before each test, ensure the capillary tubes are not inserted into the sample chamber. First, go to the parameter settings page to verify the settings, then click Confirm to enter the corresponding test interface. Wait until the actual temperature reaches the preset start temperature ±0.1 °C (a buzzer will sound), then insert the capillaries for testing. If capillaries are inserted before entering the automatic detection interface, detection errors may occur. Press Start Heating to begin the melting point test. During the test, the melting process of the sample can be observed via the video at the top of the interface, and the TA and TC buttons must be manually clicked to record the melting points for each channel.**
- **If the system is set to save videos (“Yes”), the video of the experiment will be automatically recorded at the end of the test.**

4.6 Database Interface

Press the [Data] button on the right in sequence to enter the database interface, as shown in Figure 6. This interface is used to display and query user-saved data, and it can link each test record to the corresponding video file and graph file.

The most recently saved data appear at the top; that is, the higher the serial number, the newer the data. Clicking the Data button allows you to view a list of all test records.

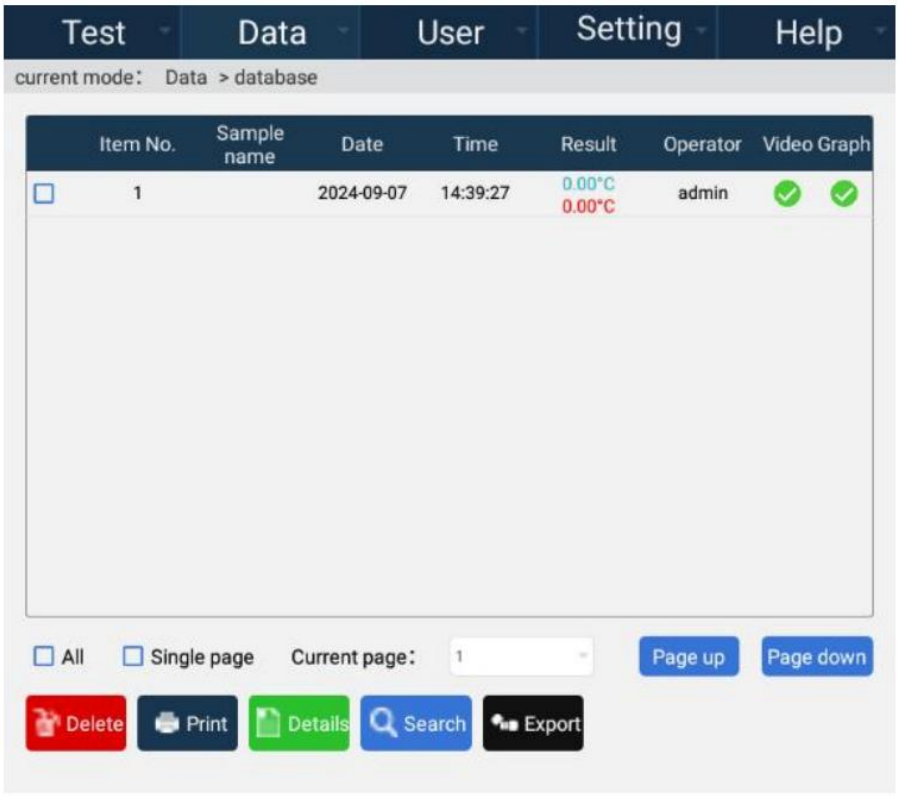


Figure 6

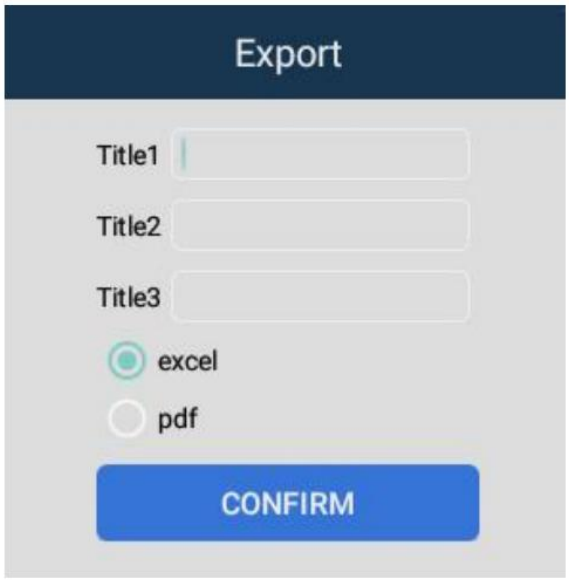


Figure 6-1

[Delete]: Users with deletion permissions can delete selected data.

[Print]: Select the desired data and click the Print button. This will open the title input screen as shown in Figure 6-1. Enter a title and press Confirm to print (laser

printer).

[Details]: Select a single record to view detailed parameters of that entry.

[Search]: Opens a filter window where users can specify criteria to find matching test data. (By default, all data are displayed at startup. To display all data again after a search, expand the search criteria.)

[Export]: When a USB drive is connected, the selected test data can be exported as a PDF or CSV report to the USB drive.

[Previous Page]: Navigate to the previous page.

[Next Page]: Navigate to the next page.

In the test list, the last columns labeled “Video” and “Graph” indicate the presence of linked files:

“√” means a video or graph is linked to this record.

“×” means no video or graph is linked.

This feature helps filter and identify records with associated videos or graphs for further operations.

Video Management and Graph Management allow users to query the corresponding files.

4.7 User Management Interface

Click [User] and then [User Settings] on the right to enter the User Settings interface, as shown in Figure 7. In this interface, you can change the password for the current account and enable password-free login.

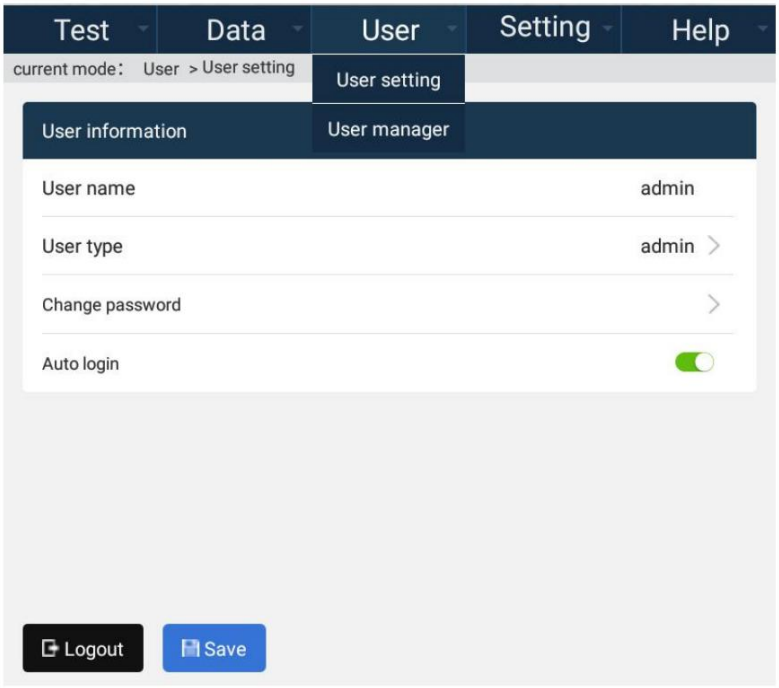


Figure 7

[User Management]

Accounts with permission to create new users can add new users on this page, as shown in Figure 7-1. Accounts without this permission can only view the information.

After entering the username and password, click Confirm. A pop-up window will appear to assign permissions to the new account, as shown in Figure 7-2. Once the permissions are assigned, click Save to complete the process.

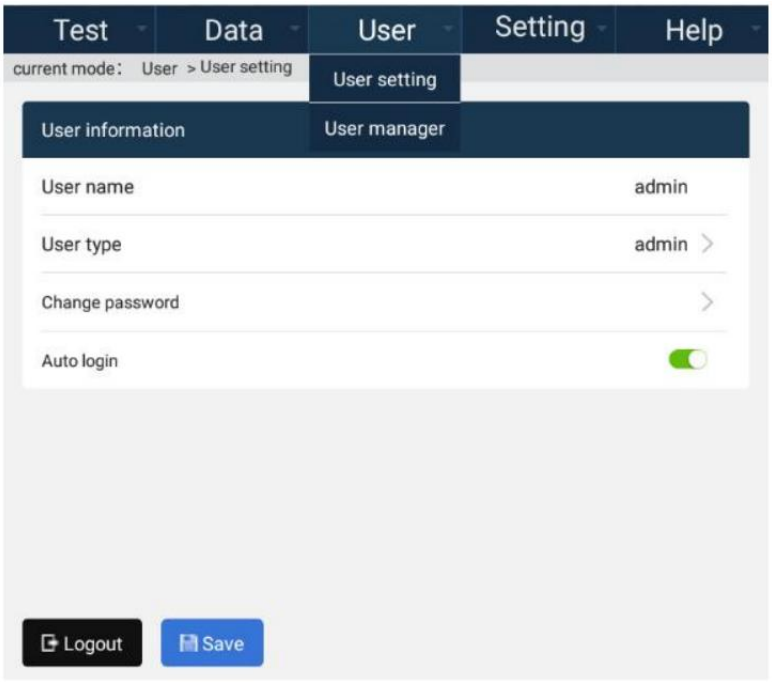


Figure 7-1

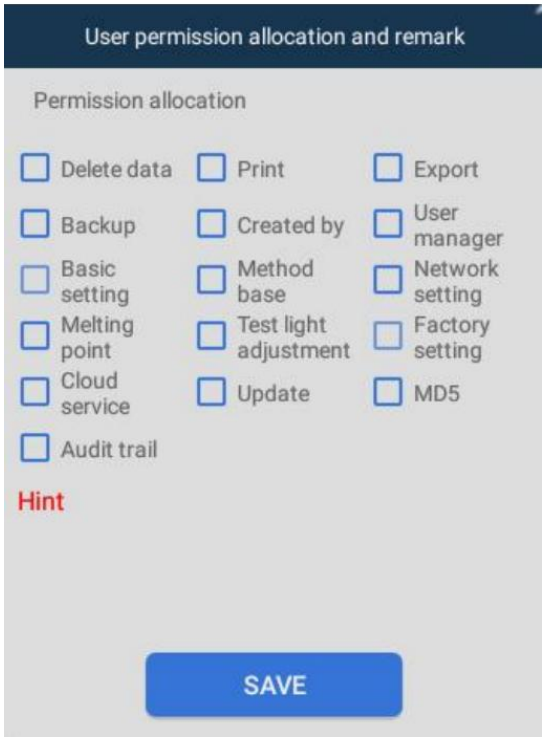


Figure 7-2

4.8 Settings Interface

[Basic Settings]: In the Settings interface, select [Basic Settings] to enter the screen shown in Figure 8.

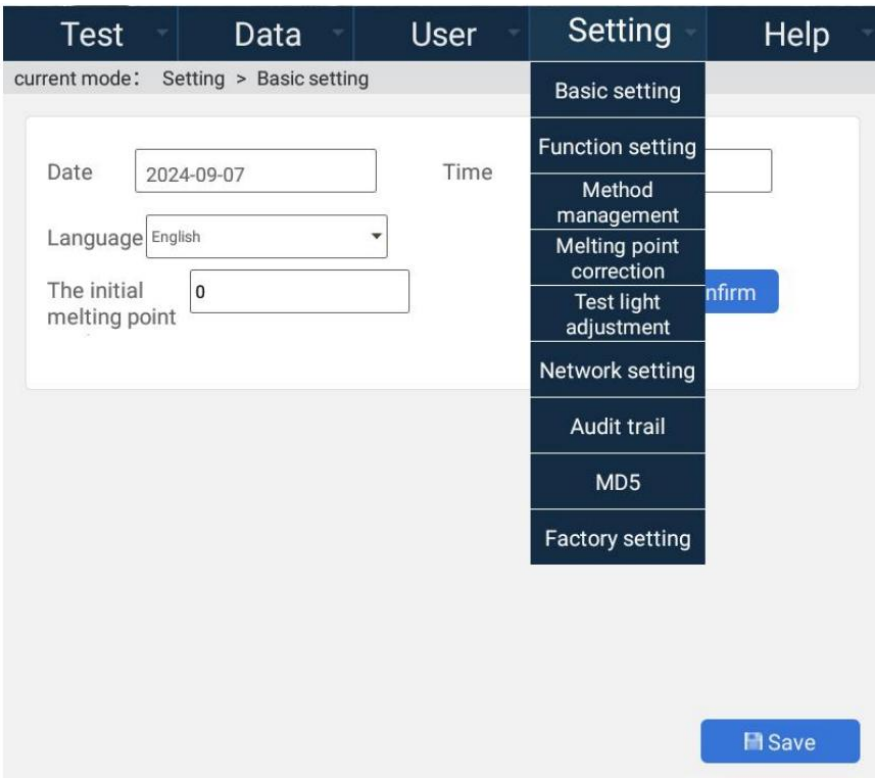


Figure 8

On this page, you can set the date, time, and language (Simplified Chinese or English).

[Function Settings]: In the Settings interface, select [Function Settings] to enter the screen shown in Figure 9.

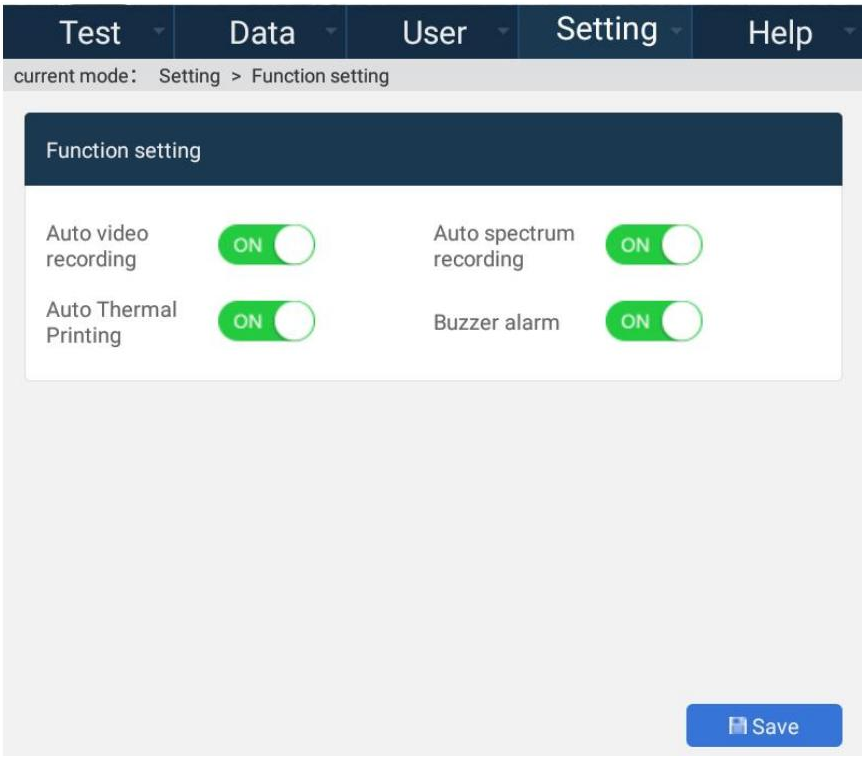


Figure 9

Here, you can configure parameters such as automatic video recording, automatic graph saving, automatic thermal printing (or dot-matrix printing), and buzzer alarms. In the figure, the buzzer is turned off.

[Method Management]: In the Settings interface, select [Method Management] to enter the screen shown in Figure 10.

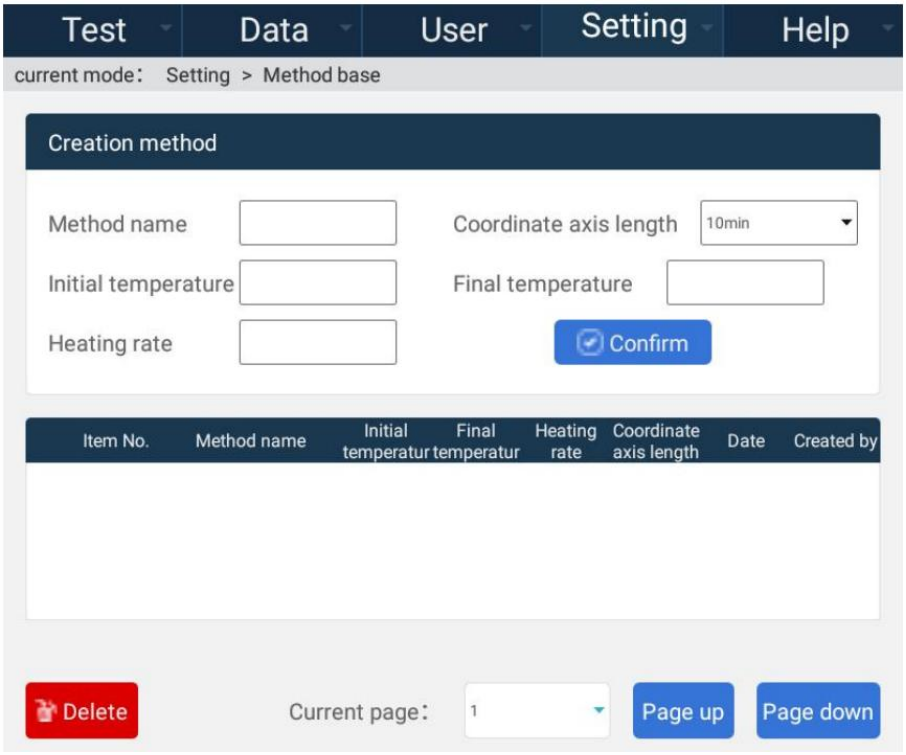


Figure 10

This interface allows users to create and manage test methods.

[Melting Point Calibration]: In the Settings interface, select [Melting Point Calibration] to enter the screen shown in Figure 11.

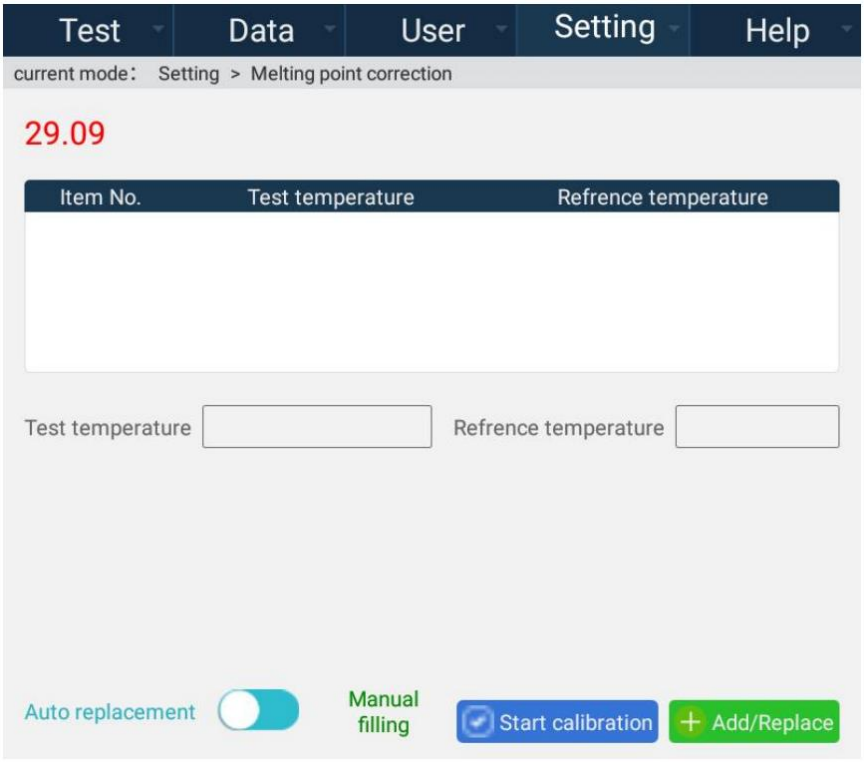


Figure 11

[Start Calibration]: Click this button to go to the parameter setting page of the test screen, same as ordinary sample measurement. After testing, click Confirm Calibration or Abandon Calibration to return. If Confirm Calibration is clicked, the system will automatically fill the measured average melting point value into the test temperature box in Figure 11.

[Add/Replace]: After entering valid test and standard temperatures, click this button.

If Automatic Replace is selected, the system compares the new value with existing calibration records and chooses the optimal replacement, prompting for confirmation before replacing.

If Manual Replace is selected, a specific row in the existing calibration list must be designated for replacement, and confirmation is required before replacing.

[Automatic Replace / Manual Replace]: Automatic replace lets the system select the optimal replacement. Manual replace requires the user to designate the row to be replaced.

[Network Settings]: In the Settings interface, select [Network Settings] to enter the screen shown in Figure 12.

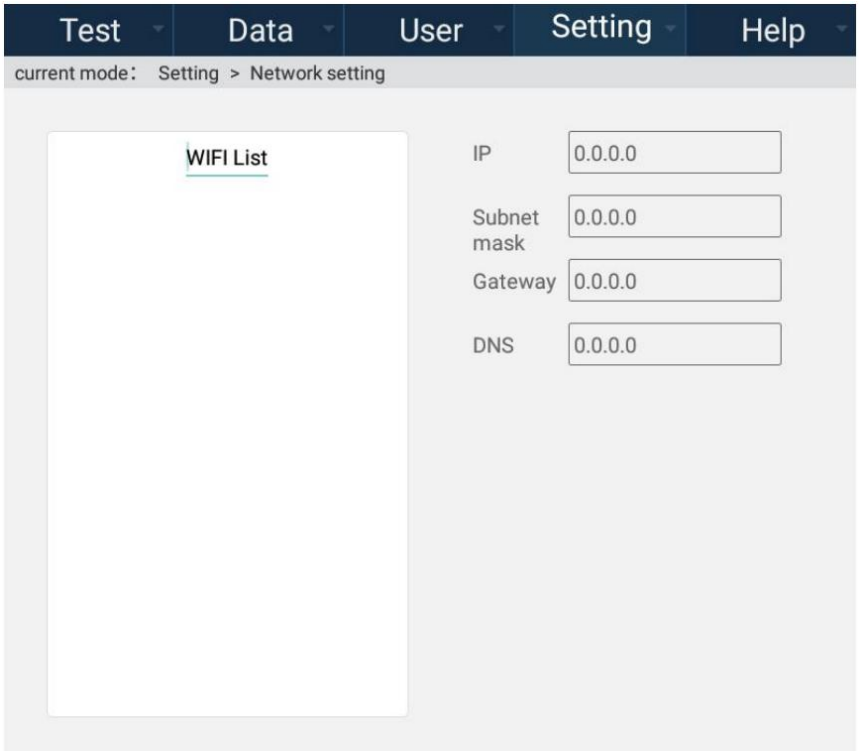


Figure 12

The left side displays the detected Wi-Fi networks. Click the desired network, enter the correct password, and a black dot will appear next to connected networks. Connecting to the Internet enables cloud service functions. When connected to the wireless AP named “DIRECT-95-HP LaserJet M104W”, a designated model laser printer can print A4 experiment reports.

On the right side, enabling DHCP allows automatic IP address allocation; otherwise, IP addresses must be entered manually.

When connected via the rear RJ45 wired port, the wireless network is disabled.

[Audit Trail]: In the Settings interface, select [Audit Trail] to enter the screen shown in Figure 13.

This table records all critical user operations, similar to a system log. It can be exported to an external USB drive as an Excel file encrypted with MD5.

Audit trail records include: date and time changes, deletion of test database content, system upgrades, boot time (accurate to the minute), device self-check faults and errors, adjustment of light intensity, sensor calibration, permission configuration, video file deletion, cloud backup upload/download/deletion, user addition/deletion, user password modification, user permission changes, login username, addition/deletion/modification of test methods, and modification of auto-login names.

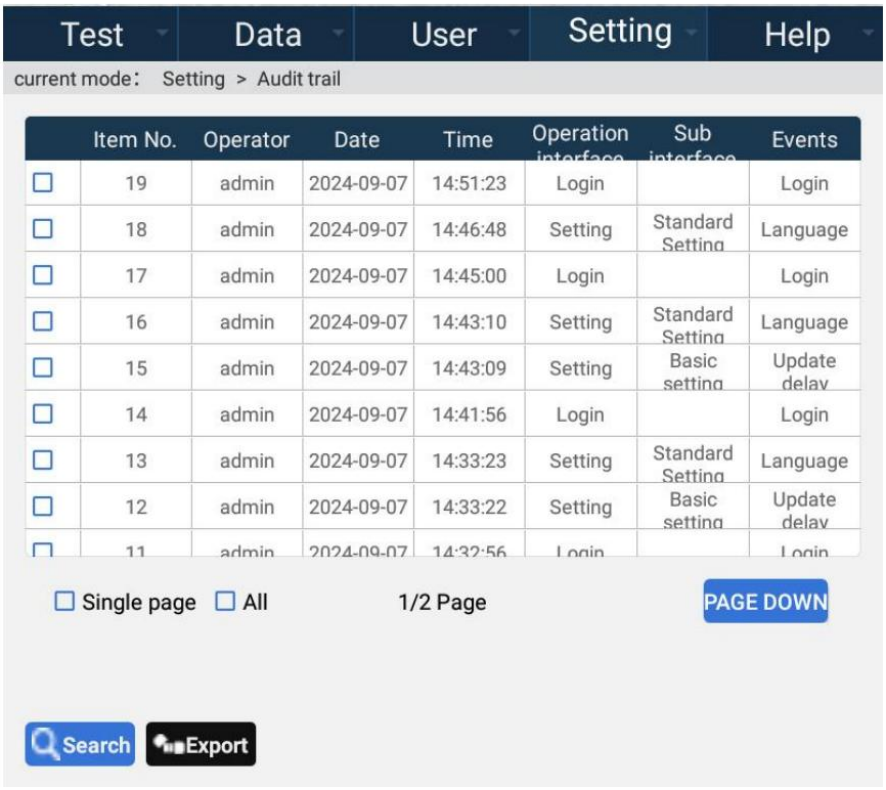


Figure 13

[Export]: Click this button to export the audit trail as an MD5-encrypted Excel file to the external USB drive at the back of the instrument (export fails without a USB drive).

[MD5]: Exported data and audit trail Excel files generate an MD5 code for verifying the authenticity of the exported data.

4.9 Help Interface

[Troubleshooting]: In the Help interface, select [Troubleshooting] to enter the troubleshooting screen, as shown in Figure 14. This section provides a list of common faults, explanations for each fault, and recommended solutions.

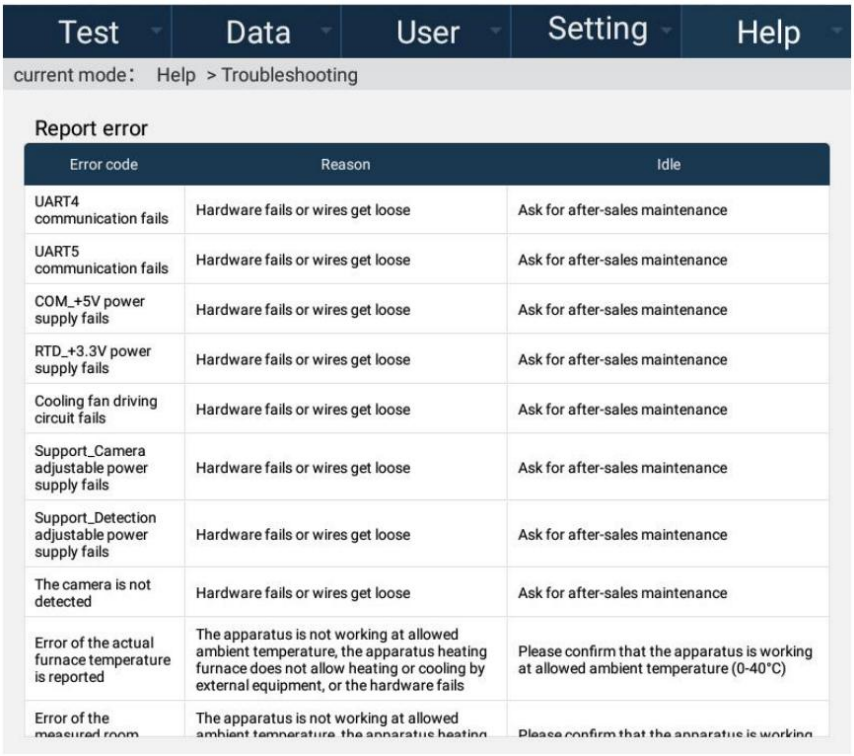


Figure 14

[Usage Instructions]: In the Help interface, select [Usage Instructions] to enter the usage instructions screen, as shown in Figure 15.

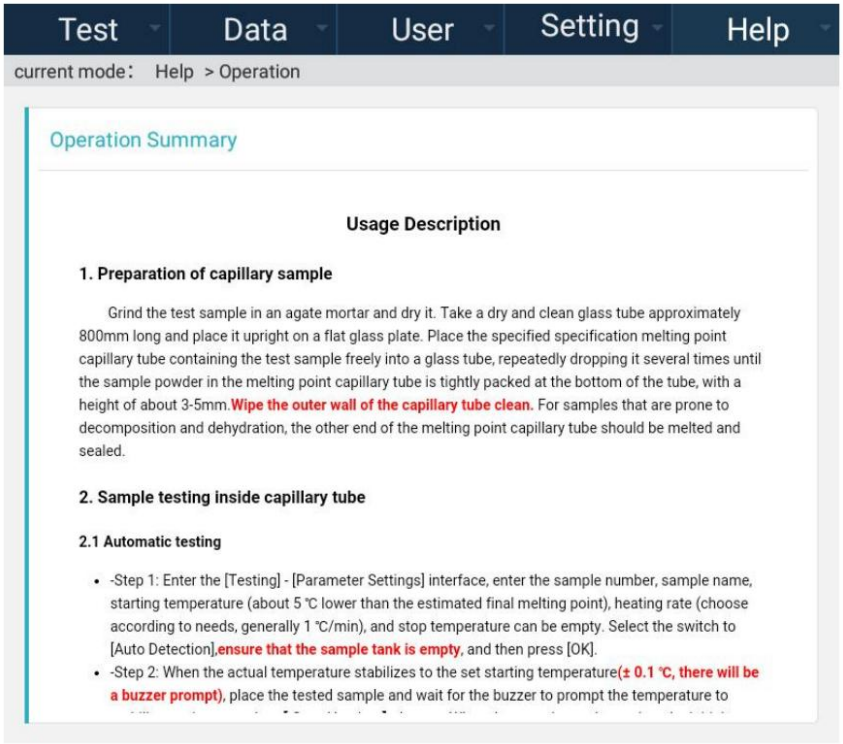


Figure 15

[Update]: In the Help interface, select [Update] to enter the update screen, as shown in Figure 16. Copy the software upgrade package into a USB drive, insert it into the rear USB port of the instrument, and click the Update button to complete the upgrade.

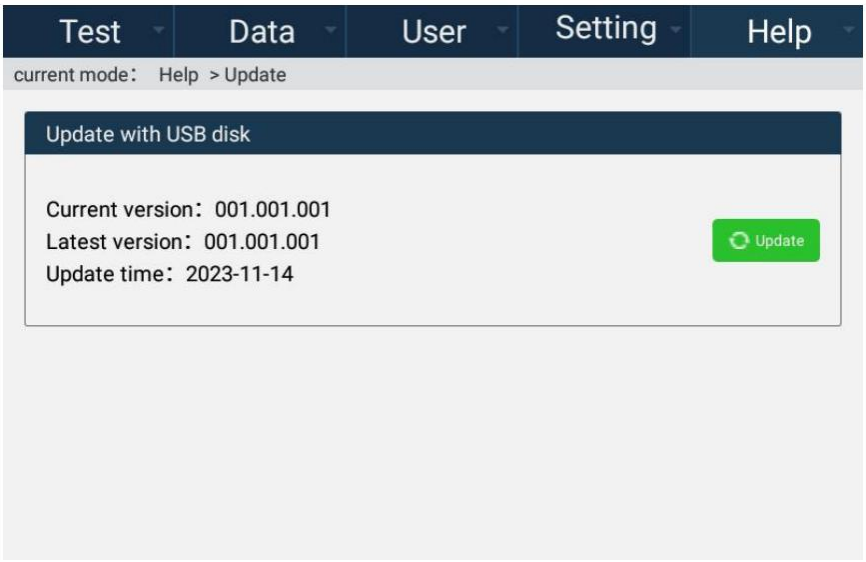


Figure 16

5. Operating and Usage Methods

5.1 Capillary Sample Preparation

Grind and dry the sample in a mortar. Take a clean, dry glass capillary tube approximately 100 mm long and place it upright on a magnetic or glass plate. Insert the tube containing the sample from the top, allowing it to fall freely. Repeat the dropping process 8 times so that the sample powder consolidates at the bottom of the tube to a height of approximately 3–5 mm.

5.2 Melting Point Testing

5.2.1 Automatic Test Example – Adipic Acid: Final Melting Point 153 °C

Step 1: Turn on the power switch and preheat the instrument for 20 minutes.

Step 2: Enter the main interface, select Test, and enter the sample name Adipic

Acid, start temperature 148 °C, heating rate 1 °C/min, stop temperature 155 °C, and use the default method. Then click Automatic Test to enter the corresponding interface. **(Note: Ensure no capillaries are inside the furnace before entering Automatic Test.)**

Step 3: When the actual temperature stabilizes at 148 °C (indicated by four or more buzzer sounds), insert the capillary containing the sample. Wait until the temperature is stable at 148 °C. (Note: Inserting the sample may slightly lower the furnace temperature; it is recommended to wait for the buzzer to sound four times before pressing the Start Heating button.) Press Start Heating. The instrument will automatically display the initial melting point when the sample begins to melt, and the final melting point when melting is complete.

Step 4: After all results appear, press Save to store the data or Print to print. To retest the same sample, repeat step 2. To test a different sample, press Back, adjust parameters, and proceed.

5.2.2 Manual Test Example – Adipic Acid: Final Melting Point 153 °C

Step 1: Turn on the power switch and preheat the instrument for 20 minutes.

Step 2: Enter the main interface, select Test, enter the sample name Adipic Acid, start temperature 148 °C, heating rate 1 °C/min, stop temperature 155 °C, and click Manual Test.

Step 3: When the actual temperature stabilizes at 148 °C (indicated by four or more buzzer sounds), insert the sample. Press Start Heating and observe the melting process through the video on the interface. Click the TA (Initial Melting) button when the sample reaches initial melting, and TC (Final Melting) when melting is complete.

Step 4: After all results appear, press Save or Print. To retest, repeat step 3. To test a different sample, press Back and adjust parameters.

5.3 Melting Point Calibration

5.3.1 Calibration Example – Calibration using Adipic Acid: Final Melting Point 153 °C

Step 1: Enter the Calibration interface in Settings. Set the standard sample Adipic Acid parameters: melting point 153 °C, start temperature 146 °C, heating rate 1 °C/min, stop temperature 156 °C. Click Automatic Test or Manual Test to enter the corresponding interface. (For automatic calibration, use three standard samples with default parameters.)

Step 2: Follow the same steps as in Section 2, step 3 (sample testing).

Step 3: If results are normal, click Calibrate to save the calibration. Otherwise, repeat step 2. Press Back to exit the Calibration interface.

Notes:

- **If the measured final melting point is less than 5 °C above the start temperature, recalibrate and set the start temperature at least 5 °C below the final melting point. (Example: Standard sample 153 °C measured as 151.5 °C, set start temperature below 144.5 °C for recalibration.)**
- **Calibration can be single-point or multi-point (up to three points). For multi-point calibration, select one point in each range: 0–100 °C, 100–200 °C, 200–400 °C. If multiple calibrations are performed in the same range, the last calibration value is valid.**

5.3.2 Recommended Standard Sample Settings

Naphthalene: Melting point 80.6 °C (per certificate), start 76 °C, heating rate 1 °C/min, stop 85 °C.

Adipic Acid: Melting point 153 °C (per certificate), start 146 °C, heating rate 1 °C/min, stop 156 °C.

Anthraquinone: Melting point 217.1 °C (per certificate), start 212.1 °C, heating rate 1 °C/min, stop 222 °C.

Notes:

- **The instrument is calibrated before leaving the factory; short-term recalibration is generally unnecessary.**
- **If abnormal readings occur during calibration, press Restore Factory Settings to reset the original instrument data.**
- **Calibration can be performed with 1–3 standard samples.**

6. Routine Maintenance

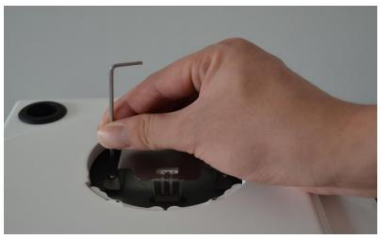
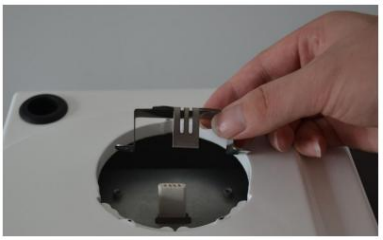
1) The instrument should be used indoors in a dry and well-ventilated environment. Avoid exposure to water or moisture. The instrument uses a three-prong power plug; the ground prong must be connected to earth. The neutral wire cannot replace the grounding.

2) Only glass sleeves and capillaries provided by the manufacturer should be used. Do not use third-party glass sleeves or capillaries, as incorrect dimensions may cause breakage or inaccurate test results. Fine capillaries should be carefully selected.

3) If the instrument will not be used for an extended period, it is recommended to turn off the power switch at the rear of the instrument and unplug the power cord.

7. Handling Broken Glass Sleeves

If a capillary breaks inside the furnace during testing, follow the steps illustrated below to safely remove it:

1. Hold the furnace cover firmly.	
2. Rotate counterclockwise 90°.	
3. Open the furnace cover.	
4. Loosen the screws on the furnace core support.	
5. Remove the furnace core support.	

8. Troubleshooting and Solutions

Fault Phenomenon	Possible Cause	Solution
Screen does not respond after power on	1. Power plug not connected properly 2. Internal display cable is loose 3. Fuse blown	1. Plug in the power cord or turn on the main switch 2. Return the instrument to the factory for repair 3. Return the instrument to the factory for repair
Self-check reports a fault at startup	Possible hardware failure	Try restarting and observe. If the error persists, return the instrument for repair
Graph or video saving fails	1. Automatic graph/video saving option set to "No" 2. Insufficient internal storage	1. Set automatic graph/video saving to "Yes" 2. Delete unnecessary files to free up space
[Start Heating] button not working	1. Start temperature has not reached constant temperature control 2. Current temperature not within ±0.1 °C of set start temperature	1. Set appropriate start temperature and heating rate in parameter settings, then click Confirm 2. Wait until the current temperature stabilizes
Automatic test results abnormal	1. Foreign matter in the heating furnace sample slot or contaminated glass sleeve 2. Capillary inserted or glass sleeve missing before clicking Confirm in parameter settings 3. Incorrect light source brightness or prolonged usage causing changes	1. Clean the sample slot and refill water if necessary 2. Remove the capillary, insert the glass sleeve, and retest 3. Return the instrument to the factory for repair
Melting point results inaccurate	1. Platinum resistance aging 2. Foreign matter in the heating furnace sample slot	1. Return the instrument to the factory for repair 2. Clean the sample slot 3. Perform melting point calibration

	3. Temperature deviation	
Only Help page available after login	At least one fault detected during startup self-check	Try restarting and observe. If the error persists, return the instrument for repair
Poor repeatability	1. Inconsistent sample loading method or batch 2. Capillary dimensions inconsistent 3. Glass sleeve dimensions non-compliant 4. Improper water level in glass sleeve	1. Follow standard procedures strictly 2. Carefully select compliant capillaries 3. Use only manufacturer-provided glass sleeves 4. Ensure water level in the glass sleeve (without inserted capillary) is 22 mm ± 1.5 mm before testing

9. Precautions

1) Samples should be taken according to the specified method and melted in a clean container. The sample filling height must be maintained between 3 mm and 5 mm. For a single measurement, use samples from the same batch, with the same sampling method and consistent sample height to ensure uniform test results.

2) If the sample's melting point is higher and the instrument automatically cools to the start temperature before detecting the melting value, increase the horizontal axis time and raise the stop temperature in the parameter settings, then retest.

3) For certain samples, the start temperature may affect the melting point measurement results. Follow the standard operating procedures strictly.

4) Different linear heating rates can produce different measurement results. Set appropriate standard rates. Generally, higher heating rates may result in higher recorded values. Melting point readings at various rates can be corrected experimentally. For samples with unknown melting points, it is recommended to first use a high heating rate or manual measurement with an empty stop temperature setting to roughly determine the range, and then perform automatic testing.

5) Handle the instrument gently during use, keep it away from acidic or alkaline solutions, and avoid using it under strong light.

6) If the glass sleeve breaks or is damaged in the sample slot, allow it to cool and power off before removing it. (Refer to the previous sections of the manual for detailed procedures.)

7) When exporting data, insert a USB drive and wait a moment for the system to recognize it before proceeding.

10. Warranty

Warranty is effective from the date of purchase and is non-transferable.
For more details about the warranty, please refer to the link below:
stonylab.com/pages/warranty

For any inquiries or assistance, feel free to contact us:
Company: StonyLab Inc.
Email: support@stonylab.com
Phone: 631-406-6080
Website: stonylab.com

This instruction manual is subject to change without prior notice.