StonyLab®

Electrospinning Machine

(Model: SB-PS-JDFSJ-4+)

Operation Manual

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

Contents

1. Introduction

Thank you for choosing our product. This product is independently designed, developed, and manufactured by our company, and its performance indicators meet all design requirements and standards.

To fully understand the features of this product and ensure your safety, please carefully read this manual before use and keep it for future reference. For any related internal instruments, please refer to the attached manuals.

2. Safety Precautions

2.1 User Notice

Only operators with a certain level of electrical knowledge may carry out wiring or other operations for this product. For any unclear usage, consult a professional technician.

When using this product in combination with others, confirm compliance with relevant regulations and principles.

During the warranty period, do not disassemble equipment parts or the control box without authorization to avoid damage to components.

When changing control parameters during operation, ensure thorough reading of the manual and confirm safety before proceeding.

2.2. Safety Declaration

Perform operations that pose safety risks only when the equipment is shut down and powered off.

For personnel and operational safety, especially during high-voltage or high-power operation, maintain a sufficient safety distance between the high-voltage output area, personnel, and nearby instruments to avoid injuries caused by direct or indirect contact with high voltage.

Ensure the equipment is properly grounded to guarantee safety.

After turning off the high-voltage power supply, wait approximately 5 minutes for the internal capacitors to fully discharge.

2.3 Safety Precautions

Read the Manual: Before using this product, carefully read this manual to fully understand its usage, safety, and precautions. Operate with utmost attention to safety.

Potential Hazards: Issues that may arise during product use are documented under safety precautions, marked at two levels: **Note and Danger**. Unforeseen situations should comply with basic electrical operation norms.

Note: Improper use may result in moderate or minor injuries or property damage.

Danger: Incorrect use may cause serious injury, death, or significant property damage.

2.4 Product Inspection Upon Receipt

Note

- After opening the packaging, visually inspect the exterior of the equipment. Open the cabinet door and inspect the interior to ensure no components are loose or damaged during transportation.
- Check for missing or damaged internal parts, wires, or plugs. If any issues are found, contact the manufacturer immediately.
- Inspect the control panel for mechanical damage, and ensure the screen and digital displays are intact.

2.5 Product Installation

Danger

- Disconnect all external power sources before installation to avoid the risk of electric shock.

Note

- Install and use the product under the environmental conditions specified in the manual.
- Do not use in damp, high-temperature, dusty, corrosive, flammable, or vibrating environments.
- Ensure the equipment is placed vertically and remains stable.
- Avoid direct contact with conductive parts.

2.6 Wiring the Product

Danger

- Disconnect all external power sources before installation.
- Correctly connect the AC power supply to the product's wiring socket. Do not connect the ground wire to the live or neutral wires, as this may damage the product.

2.7 Product Maintenance and Operation

Danger

- Do not touch any exposed live components, especially high-voltage power cables, after powering the equipment.
- Avoid connecting or disconnecting wires while the equipment is powered on.

Note

- Do not disassemble the product without authorization. Contact technical support if necessary.
- Insert or unplug cables only when the power is off to prevent damage or malfunctions.
- Turn off the power before disassembling this product or any peripheral equipment.
- During operation, avoid placing limbs near moving components of the device.

3. Specifications

- Product Dimensions: L700 mm × W600 mm × H800 mm
- Input Voltage: AC 220V ±10%, 50Hz (optional 110V transformer available)
- Rated Power: 1.7 kW

3.1 Dual High-Voltage Power Supply

- Output Voltage 1: DC 0 - Positive 30 kV, Current ≤1 mA, Input Voltage AC 220 ±10%.
- Optional negative voltage output (requires separate purchase).

3.2 Liquid Supply Pump System

- Injection pump system with independent control.
- Automatic liquid supply speed: 0.01 - 20 ml/h; Manual speed: 0.1 - 100 cm/min.
- Suitable syringe sizes: 1, 3, 5, 10, 20 ml.
- All syringe pumps are single-channel syringe pumps.

3.3 Nanofiber Collection System

- Collection Roller: Effective width 200 mm, diameter φ100 mm.
- Roller Speed: Adjustable from 200 to 4500 r/min.
- Flat Collection Plate: L-shaped, 200 × 200 mm.

3.4 Nozzle reciprocating motion system

- Automatic movement platform with a stroke of 200 mm and positioning accuracy ≤0.03 mm.

3.5 Environmental Control System

- Temperature Control: Room temperature to 60°C, adjustable, with an accuracy of ±1°C.
- Humidity Control: 30% to the ambient humidity value, with an accuracy of ±3% RH. Humidity control time: ≤15 minutes.
- Exhaust Ventilation: Exhaust time can be set, with a timed exhaust function.

3.6 Digital Control System

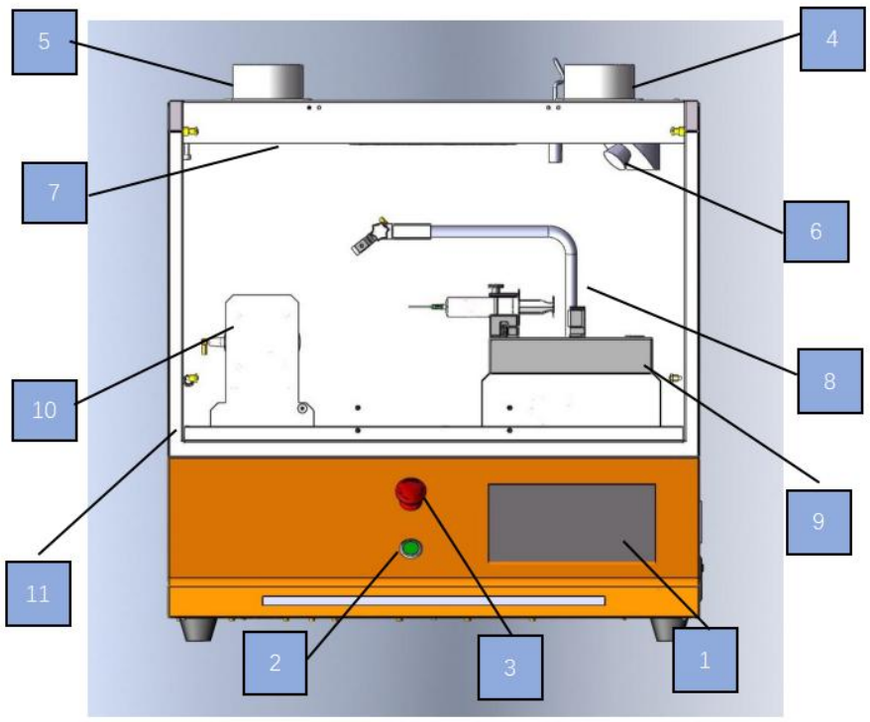
- 10-inch Human-Machine Interface CNC System Control: Controls the operation of components such as the nozzle movement device, liquid supply system, heating control, humidity control, exhaust gas control, experimental timing control, and lighting, while also monitoring the status of each part.
- Spinning Time Setting: Allows setting the spinning time, and the device automatically shuts down after the set time to ensure safety.
- Automatic Parameter Recording and Saving: Enables automatic recording and saving of parameters for easy comparison of experimental results.
- Customizable Exhaust Time: Allows setting exhaust time to ensure a stable spinning environment (non-flammable, non-explosive), and ensures that the exhaust is harmless (no gas leakage).

3.7 Safety Assurance System

- Equipped with Discharge Short-Circuit Protection and Leakage Protection:
- Capable of Organic Waste Gas Emission:
- Prevents Accidents Such as Electric Shock, Fire, or Explosion Caused by Charge Accumulation, and Avoids Organic Waste Gas Leakage that Could Impact Health:
- Features Inert Gas Access and Control Functionality.

Note: The above content is subject to the actual product.

4. Configuration



1. **Touch Screen**: Used for normal manual/automatic operation and parameter settings of the device.
2. **Power Key Button**: Used to power on the entire device.
3. **Emergency Stop Button**: Used to stop the machine in case of an emergency or abnormal situation. It immediately halts all moving parts and stops the high-voltage power output.
4. **Dry Gas Inlet**: Used for the entry of dry air from an external dehumidifier into the internal chamber, with adjustable air intake volume. **Inert Gas Inlet**: Used for the introduction of inert gas in special cases, sharing the same air duct as the dry gas.
5. **Exhaust Outlet**
6. **Spotlight**: Used to observe the spinning process.
7. **Exhaust Fan**: Can expel solvents and high-voltage charges from the interior.
8. **Spinning Module**: Capable of automatic reciprocating motion and manual distance adjustment for the spinning process.

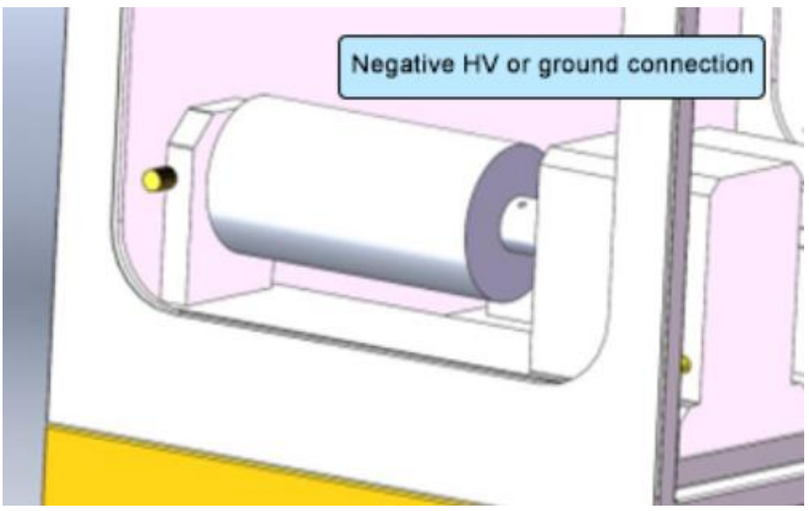
9. **Propeller**: Pushes the syringe forward and generates nanofibers through high-voltage stimulation.
10. **Collection Drum**: Collects the nanofibers.
11. **Outer Frame**

5. Operating Instruction

Note: Due to the high voltage generated during the operation of this product, in order to ensure the normal operation of the device and the personal safety of the operator, please carefully read the user manual before initial use!

5.1 Powering the Equipment

- Power Cable: Ensure that the power key switch on the operation panel is turned off before plugging the machine's power cable into the power strip or socket in the work area.
- Ground Connection: Ensure the equipment is properly grounded. It is recommended to connect an external grounding wire to the device's grounding feet.
- High Voltage Lead: The positive high voltage lead is a thicker red insulated wire. After fixing the syringe to the propeller, clip the high voltage lead to the needle. Attach the grounding box clamp to the reserved wiring terminal on the receiving drum.



Note: The positive high voltage and grounding must not be connected together, nor should they come into contact with other conductive materials!

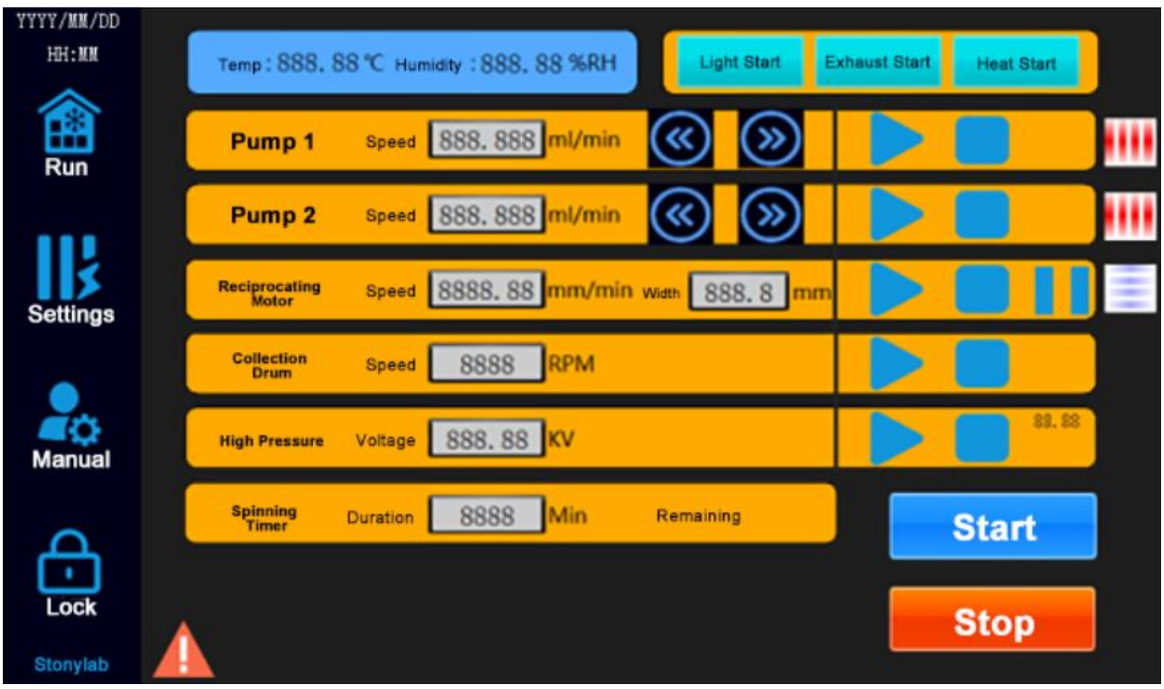
5.2 Startup Operation Process

—— Preparation for Operation ——

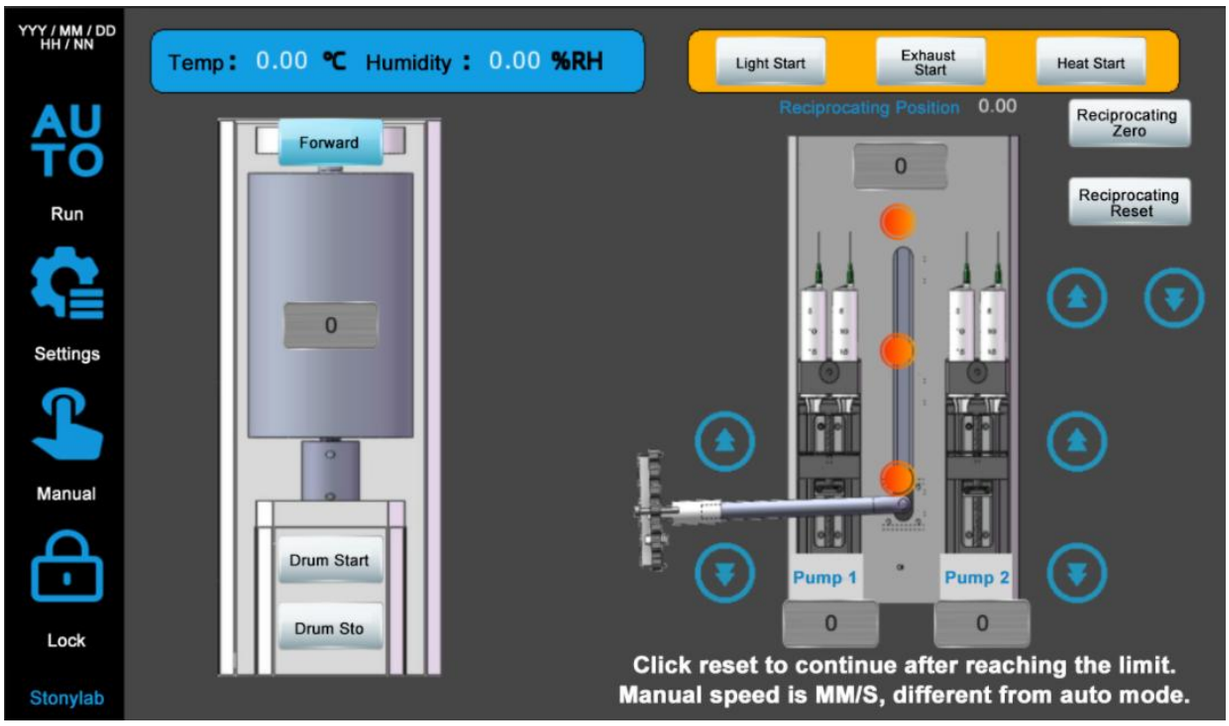
1) Rotate the equipment's key button to the power-on position and ensure the emergency stop button is released.
2) Tap the "HOME" button at the bottom right of the touchscreen to enter the operation screen.

—— Syringe Operation ——

Note: The manual speed unit for the advancing pump is mm/min. Due to different syringe specifications, the automatic speed is ml/min.

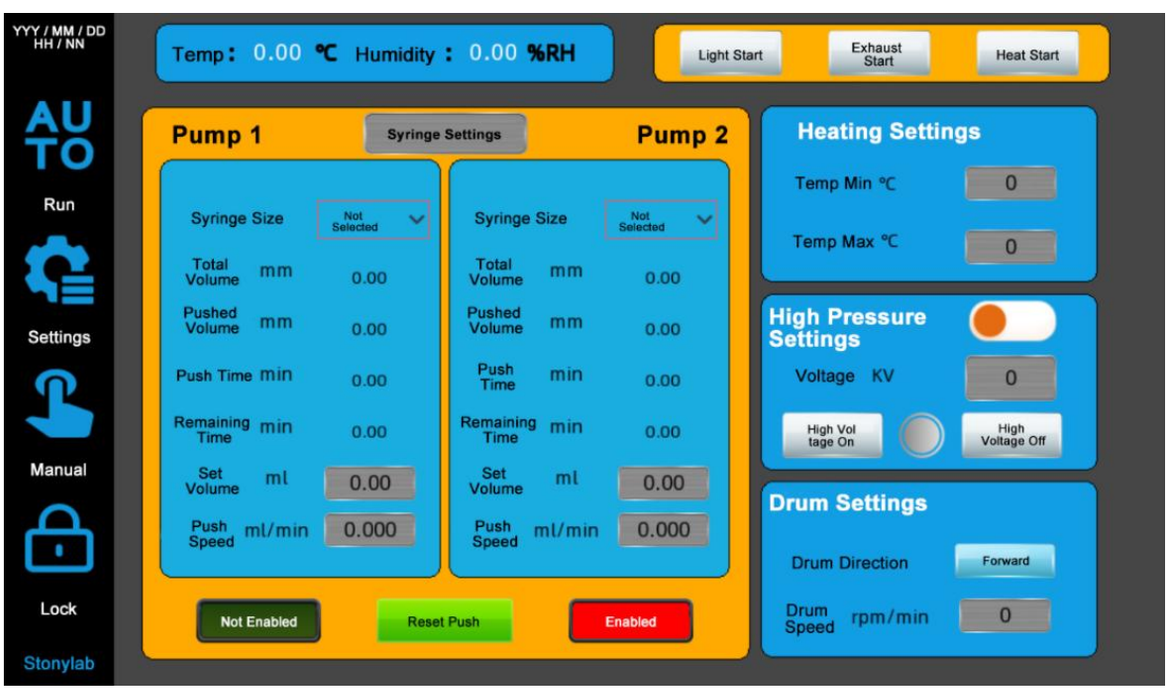


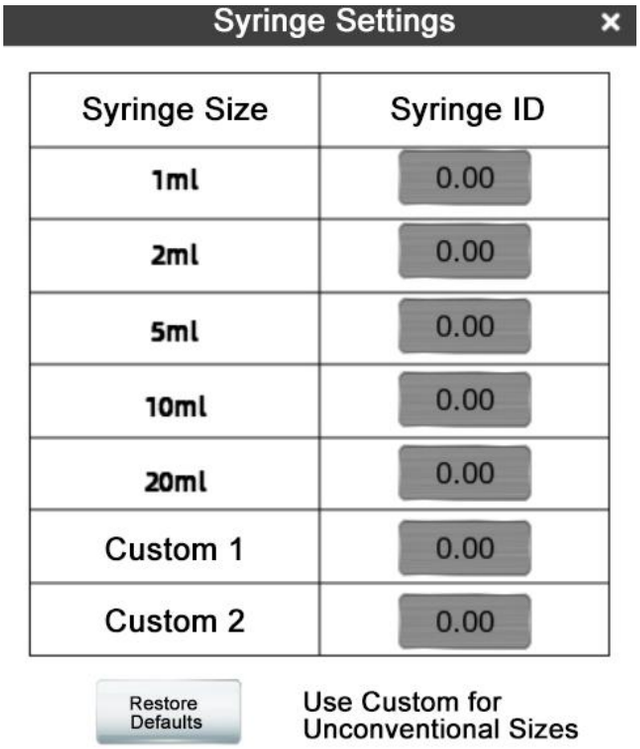
3) After securing the syringe, open the safety door and go to the "Home" screen on the touchscreen. Press the "  " button of the advancing pump 1 or 2 to manually adjust the position until a drop of liquid starts to fall from the syringe needle. Release the button. (The stepper movement of the advancing pump can be controlled on the "Manual" screen, and the speed of stepper movement can also be adjusted here.)



4) Insert the high-voltage lead into the side connection block of the syringe, ensuring it is secure and will not loosen.

5) In the "Settings" screen, click the "Syringe Specification" button to select the corresponding advancing pump specification. Click the "Syringe Settings" button to set the inner diameter of the advancing pump for different specifications. (Formula data should not be changed casually!)

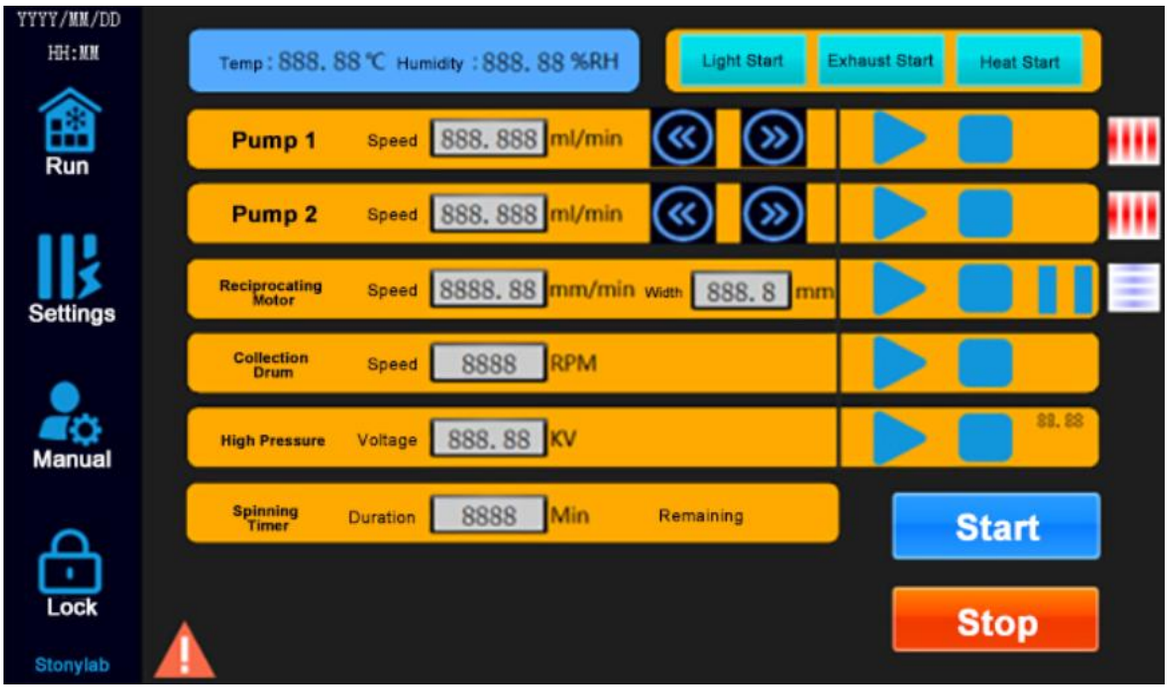




6) In the "Settings" screen, you can enable or disable advancing pump 1 or 2. (Both can work simultaneously, but before starting automatic operation, one pump must be enabled. Both pumps cannot be disabled at the same time.)

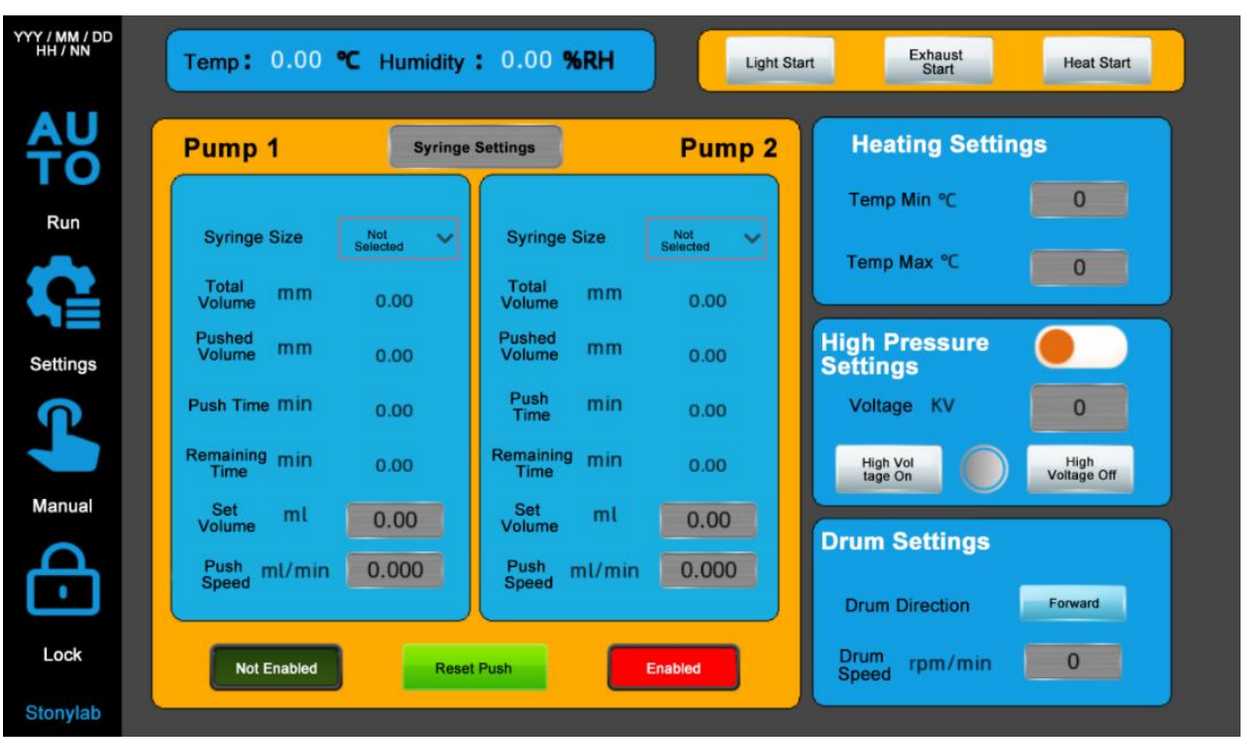
7) In the "Settings" screen, you can set the actual amount of liquid to be advanced and the advancing speed. After the settings are complete, click the "Reset Advancement" button until the "Amount Advanced" value reaches zero, indicating the syringe is set.

—— Reciprocating and Drum Settings ——

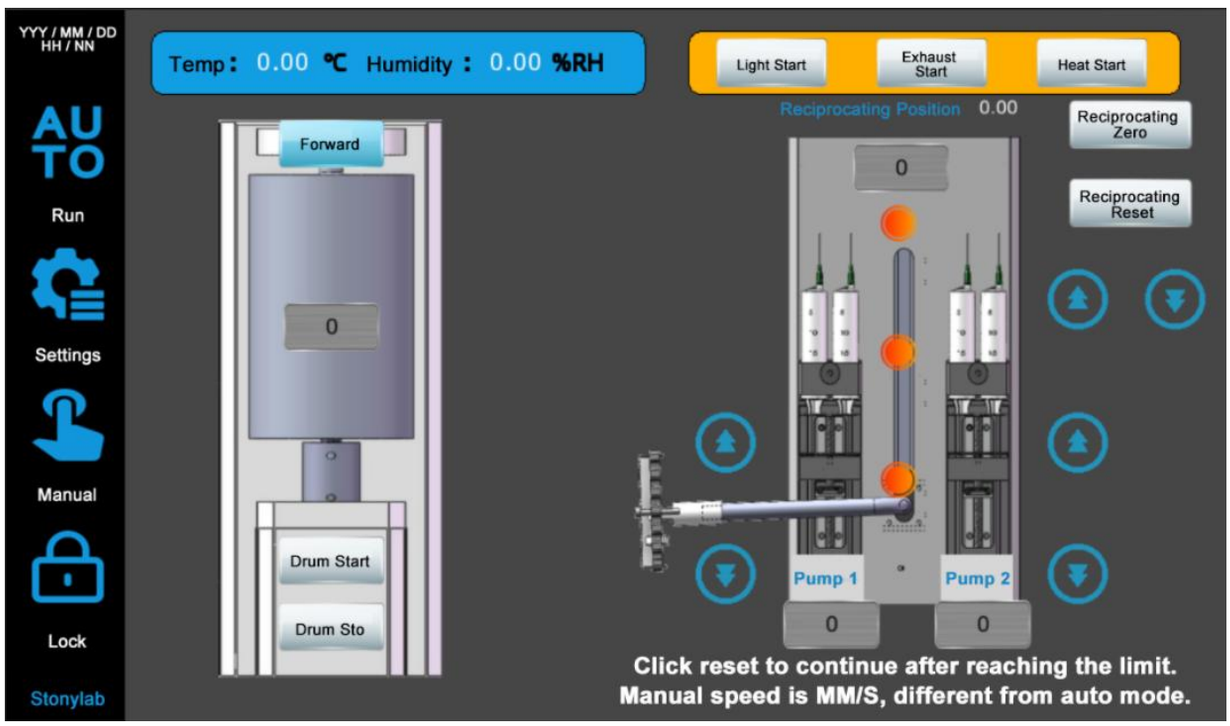


8) In the "Home" screen, you can set the speed of the reciprocating motor (range: 0-2500 mm/min), the stroke width of the reciprocating motor (range: 0-200 mm), and the rotation speed of the drum motor (range: 200-3000).

9) Automatic Spinning Execution: When performing automatic spinning, the timing function can be set on the "Home" page, with the unit in minutes. When the custom spinning duration is set to 0, the timing function will not be activated, and the automatic spinning will continue until the set liquid volume is pushed through.



10) On the "Settings" page, you can select the "Reciprocating Centering" button. When selected, the reciprocating module will automatically stop at the center position of the drum. If deselected, the reciprocating motion will resume.



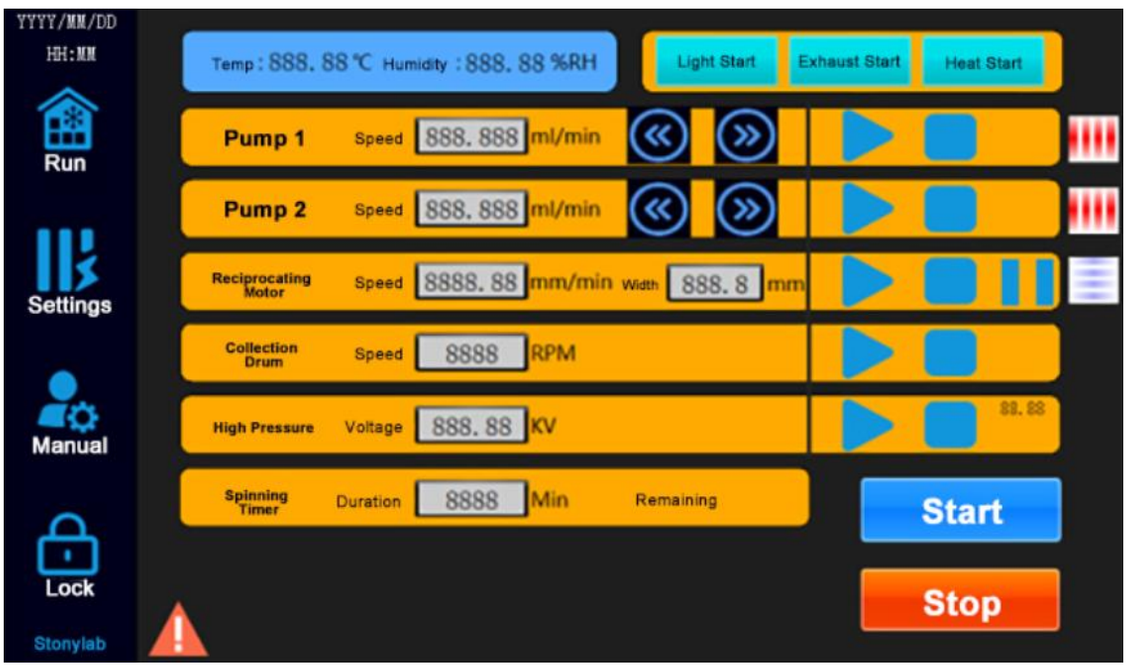
11) In the "Manual" page, pressing the two buttons shown in figure ① will control the reciprocating motor's movement in small increments. Clicking the input box ② allows you to set the manual movement speed of the reciprocating motor (range: 1~3000).

12) In the "Manual" screen, press and hold the "Forward" button for 1 second to switch the rotation direction of the drum.

Extension: The choice of forward or reverse rotation should be determined according to the actual winding material method to avoid the end of the material (blue in the figure) from curling and affecting airflow, which would impact the spinning results. Refer to the following diagram for settings.

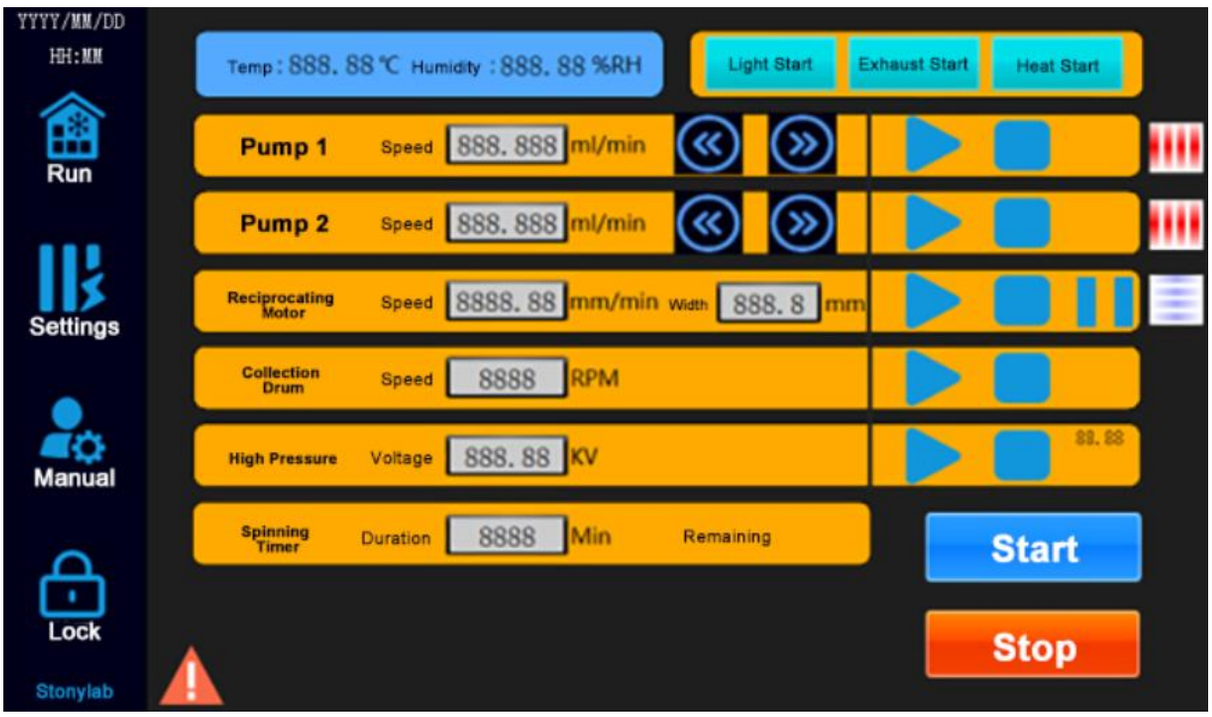
13) In the event of a sudden power failure or other unexpected fault, if the zero position of the reciprocating motor is lost, manually move the motor to the center zero position and press and hold the "Reciprocation Reset" button ③ to re-establish the zero position. This button should not be pressed unless there is an emergency.

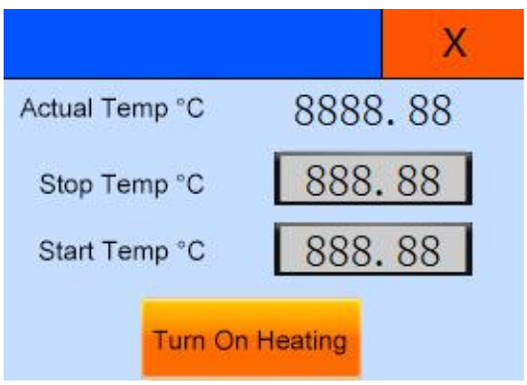
—— High Voltage Power Supply Settings ——



14) In the "Home" screen, you can set the high voltage power supply value for the positive high voltage.

—— Other Optional Function Settings ——





15) Heating Settings: In the "Home" screen, click "Temperature" to pop up the "Temperature Settings" page. This will display the "Real-Time Temperature" inside the chamber, and you can set the "Start Temperature" and "Stop Temperature" (heating will stop once the chamber temperature exceeds the stop temperature). After the settings, click the "Start Heating" button to begin heating.

16) Exhaust Fan Operation: In the "Home" screen, click "Fan On" to turn on the exhaust fan.

17) Spotlight Operation: In the "Home" screen, click "Spotlight On" to turn on the spotlight and observe the spinning process.

—— Automatic Operation ——

18) Automatic Start: In the "Home" screen, click "One-Button Start" to start the spinning reciprocation and advancing pump based on the preset values.

19) The equipment will automatically operate until the spinning is complete or the preset time is reached.

5.3 Shutdown Process

1) **Equipment Stop:** After the solution is used up or the preset requirements are met, the equipment will enter the shutdown process.
2) **Advancing Pump Reset:** When the solution runs out, the advancing pump will return to the initial full-liquid position.
3) **Reciprocating Motor Stop:** The reciprocating motor will stop at one side for easy material change or inspection by the operator.
4) **High Voltage Stop:** After a delay, the high voltage will drop to zero.
5) **Drum Stop:** The drum will gradually slow down until it stops.

5.4 Power Off Process

1) Ensure the equipment is in the stopped state, then turn off the power using the key switch.
2) For safety reasons, unplug the power supply from the device.

6. Syringe Settings and Volume Calibration

Due to the need for different syringe specifications during the experiment, and since syringes are commonly used consumables, the corresponding linear speeds for different syringes will vary if the same advancing liquid volume is to be maintained. To address this, this product includes an accurate conversion mechanism that automatically processes the liquid flow in ml/min, eliminating the potential errors that may arise if the experimenter had to calculate the values manually, ensuring reliable experimental results.

The specific setting page can be found under "Settings" → "Syringe Settings" → "Syringe Specification" and other related pages for configuration.

Once set, this parameter can be called up for daily use.

Note: It is recommended to set the fixed milliliter parameter for commonly used syringe models. If using syringes from other manufacturers or different specifications temporarily, it is suggested to use the custom parameter for temporary use. Please measure and confirm the parameters.

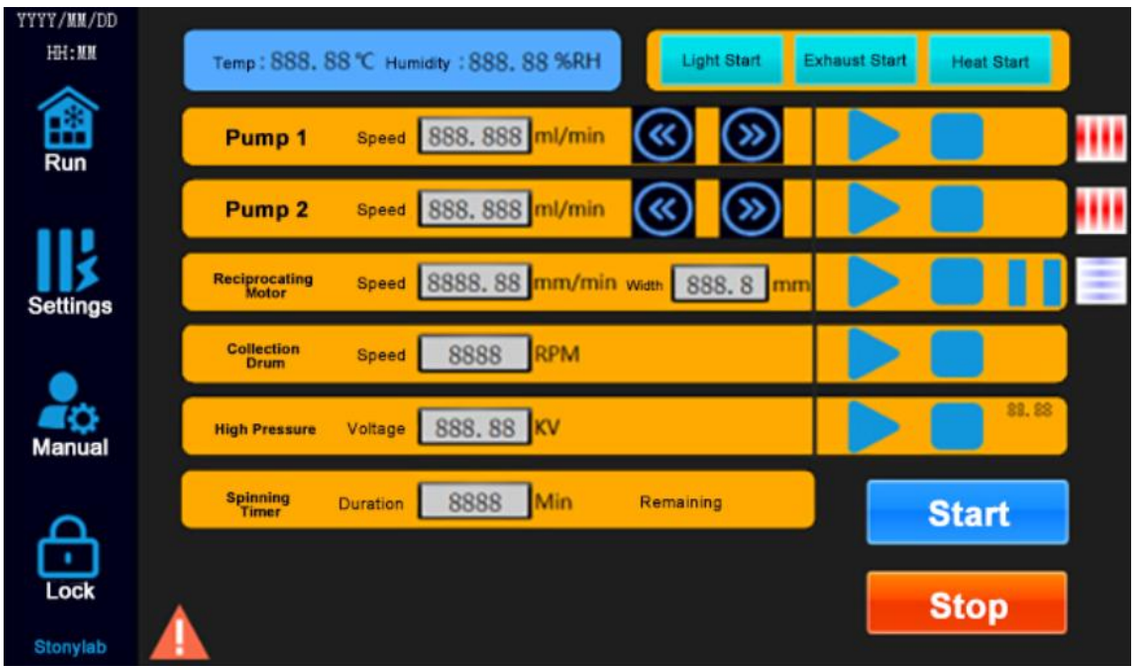
7. Human-Machine Interface Introduction

7.1 Menu Bar

Click to switch between different screens.

- **Run:** Common spinning parameters and operational parameters are displayed here. For detailed operation methods, refer to Chapter 5, Section 5.2
- **Settings:** Detailed parameter settings for syringes, advancing pumps, reciprocating motors, and drum motors.
- **Manual:** Manual operation and speed settings for the drum, reciprocating motor, and two advancing pumps. Further details are provided below.

7.2 Run



- **Temperature/Humidity:** Real-time monitoring of the internal temperature and humidity of the chamber. Click on the temperature to open the temperature settings window.
- **Fan On/Light On:** Turn on the exhaust fan and light inside the chamber.
- **Advancing Pump 1/Advancing Pump 2:** Set the speed of the corresponding advancing pumps (unit: ml/min, to prevent calculation errors, mm/s is converted to ml/min). You can also manually move the advancing pumps by clicking the "start" or "stop" buttons in manual mode to run the pumps independently.
- **Reciprocating Motor:** Set the speed and stroke width (refer to Chapter 2 for specific settings). Click "start" or "stop" to manually run the reciprocating motor.
- **Drum Motor:** Set the rotational speed of the drum motor. It is recommended to set the minimum speed above 200 rpm for stable rotation. Click "start" or "stop" to manually run the drum motor.
- **High Voltage Power Supply:** Set the high voltage parameters. Click "start" or "stop" to manually control the high voltage power supply and monitor the voltage value.
- **One-Key Start:** After setting all parameters, click the one-key start button to enter

automatic mode, and spinning will begin according to the set parameters.

- **One-Key Stop:** After spinning is complete, the process will automatically stop. If you want to stop spinning during the process, press the one-key stop button. The drum, high voltage, reciprocating motor, and other modules will gradually stop until they are fully off. In case of emergency, press the emergency stop button to cut the power off immediately.
- **Timed Spinning:** Set a spinning time, and the system will automatically stop when the time is up. If the set time is 0, the timed spinning feature will not be enabled.

7.3 Settings

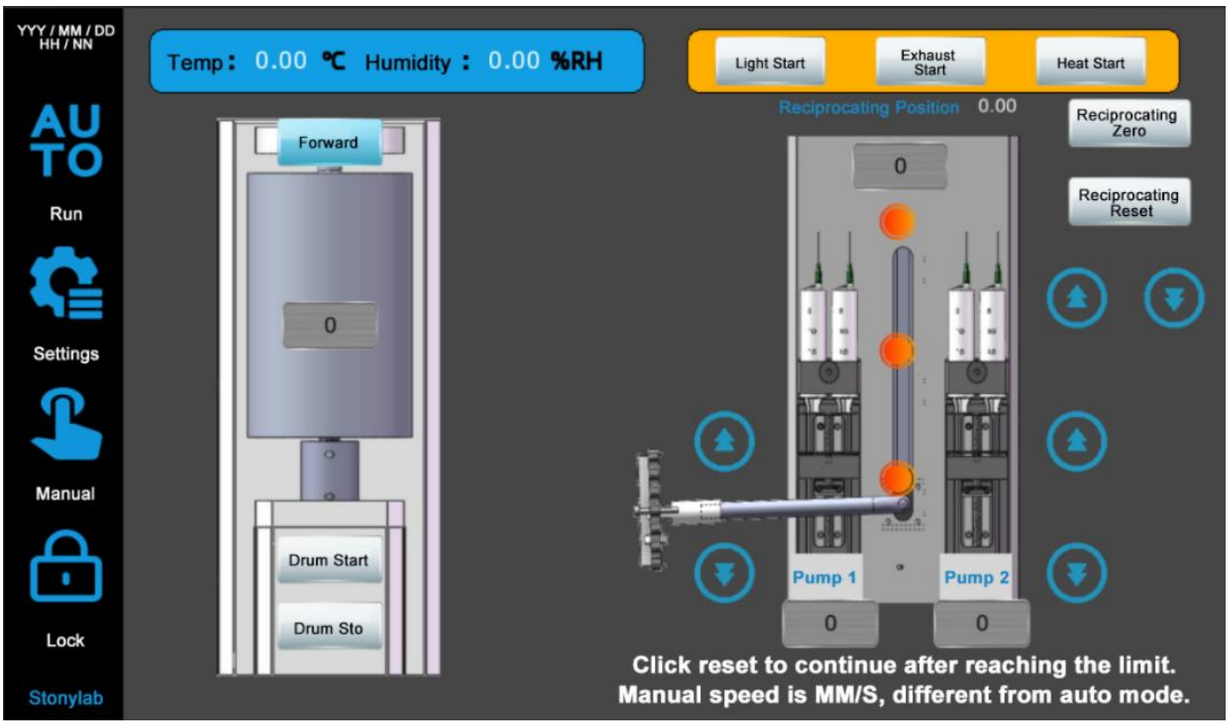
- **Actual Liquid Volume:** Set the exact liquid volume of the fixed syringe. The set value may be smaller than the actual value to prevent the advancing pump from over-traveling and causing machine collision.
- **Advancing Speed:** Set the advancing speed for the syringe, in ml/min, from 0.01 to 30.

- **Syringe Specification:** Choose the syringe specification. The corresponding inner diameter size has already been preset in the syringe settings.
- **Syringe Settings:** Pre-set the inner diameter for different syringe specifications. It is not recommended to change these settings.
- Using the above parameters, the total advancing volume will be automatically calculated.
- **Advancing Reset:** After confirming the data is correct, click "Advancing Reset" to reset the advancing volume to 0 and display the correct advancing time/remaining time.

  Users can set alarms based on the remaining time.

  Note: After the solution is fully advanced, the advancing pump will automatically return to its initial position, and the reciprocating motor will stop, with the high voltage shutting off after a delay.
- **Reciprocating Auto:** Specific operations are explained in Chapter 5.
- **Drum Motor Auto:** Forward/Reverse switching: Please perform this operation before the device is running. Changing the direction during operation is not supported. For details on the usage of forward and reverse, please refer to Chapter 5, Section 5.2, Point 12.

7.4 Manual



- **This page allows for manual movement of the two advancing pumps and the reciprocating motor, as well as manual speed settings, which differ from the automatic settings. Specific settings should be made when using.**

  Note: If an unexpected power outage causes the reciprocating motor's zero point to be lost, the motor must be manually moved to the center position. Press and hold the "Reset Reciprocating" button to recalibrate the zero point. This should only be done in the event of an accident, and the button should not be pressed under normal circumstances.
- **Alarm Record:** Click the exclamation mark alarm record button at the bottom of the homepage to view alarm records and fault information.

8. Exception Codes and Handling Methods

Content	Handling Method
Positive High Voltage Not Turned On	The positive high voltage needs to be turned on via the HMI (Human-Machine Interface).
Positive High Voltage Communication Fault	Power off and restart the system.
Reciprocating Axis 1 Pulse Error A013, Reciprocating Axis 2 Pulse Error A011, Advancing Pump Axis 1 Pulse Error A012, Advancing Pump Axis 2 Pulse Error	Power off and restart the system.
Emergency Stop Activated	Rotate clockwise to release the emergency stop, then turn on the high voltage power supply again. The system can continue in automatic operation mode.

9. Warranty

Thank you for choosing StonyLab! Our warranty is effective from the date of purchase and is non-transferable.

For more details, please visit:
stonylab.com/pages/warranty

Keep your order number for warranty service. If you need assistance, contact us at:

- Company: StonyLab Inc.
- Email: support@stonylab.com
- Phone: 631-406-6080
- Website: stonylab.com

This manual may be updated without notice.