StonyLab®

# Electrospinning Machine

# Operation Manual

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

# Contents

# 1. Important Information

To fully understand the features of this product and ensure your safety, please read this user manual thoroughly before use and keep it in a safe place for future reference. For related instruments, please refer to the accompanying manuals.

## 1.1 User Notes

- Only operators with certain electrical knowledge should perform wiring and other operations on this product. If you encounter any unclear aspects during use, please prioritize contacting a professional technician for consultation.
- When using this product in combination with other products, please ensure that the combination complies with relevant regulations and principles.
- During the warranty period, please do not disassemble the device components or control box internally, as this may cause damage to the components.
- When making changes to operational parameters during the device's operation, please carefully read the manual and only proceed after confirming the operation is completely safe.

## 1.2 Safety Statement

- Operations that pose safety risks should only be performed when the equipment is powered off and shut down.
- To ensure personnel and operational safety, especially during high-pressure or high-power operations, the high-voltage output area should maintain a sufficient safety distance from personnel and surrounding equipment to avoid direct or indirect contact with high voltage, which could cause injury.
- To ensure the safety of both the equipment and personnel, **the equipment must be properly grounded**.
- After turning off the high-voltage power supply, wait for approximately 5 minutes to allow the internal capacitors to discharge completely. Do not switch on the high-voltage power supply prematurely.

## 1.3 Safety Precautions

The potential issues that may arise during product use have been covered in the safety precautions, and each has been marked with two levels of caution:

Important and Warning. For any other unforeseen situations, please adhere to basic electrical operation standards.

| | |
|---|---|
|  Note | ● Incorrect use may pose a danger, potentially resulting in moderate injury or minor harm, as well as possible property damage. |

| | |
|---|---|
|  Danger | ● Incorrect use may pose a danger, leading to personal injury or death, as well as serious harm and potentially severe property damage. |

**Confirmation Upon Receiving the Product**

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|---|---|
|  Note | ● After opening the packaging, visually inspect the exterior of the box. Open the door and check the interior of the box to ensure that no components are loose. Loose parts may indicate potential damage during transportation.<br>● Check if any components inside the box are damaged or missing. If there is any damage or missing parts, please contact the manufacturer for assistance.<br>● Inspect the wires and plugs inside the box for any damage.<br>● Check the control panel for any mechanical damage, and ensure the screen and digital display are not damaged. |

**Product Installation**

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|---|---|
|  Danger | ● Before installing the product, please ensure that all external power sources are disconnected.<br>● There is a risk of electric shock. |
|  Note | ● Please install and use the product under the environmental conditions specified in the general specifications of the manual.<br>● Do not use this product in humid, high-temperature, dusty, corrosive, flammable, explosive, or vibrating/shocking environments.<br>● The equipment should always be kept upright in a vertical position.<br>● Do not directly touch the conductive parts of the product. |

**Wiring of the Product**

| | |
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|  Note | ● Before installing the product, please ensure that all external power sources are disconnected.<br>● Connect the correct AC power to the product's power socket. Specifically, the ground wire must never be connected to the neutral or live wire! Otherwise, the product may be damaged. |

**Operation and Maintenance of the Product**

| | |
|---|---|
|  Danger | ● After powering on the equipment, do not touch any exposed live components, especially the high-voltage power cables.<br>● Do not connect or disconnect wires at the terminals while the equipment is powered on. |
|  Note | ● Do not disassemble this product casually. Please contact our technical support for assistance.<br>● When plugging or unplugging cables, ensure the power is off to avoid damage or malfunction.<br>● When disassembling this product and its peripheral devices, make sure to turn off the power first.<br>● During operation, do not insert any body parts into moving components of the equipment. |

# 2. Basic Product Specifications

## 2.1 Basic Specifications

- Product Dimensions: 1000 × 650 × 700 mm (L x W x H)
- Input Voltage: AC220±10%, 50Hz (Optional 110V voltage converter available)
- Rated Power: 1.8 KW

## 2.2 Component Configuration

(1) Dual High-Voltage Power Supply

- Output Voltage 1: DC 0-Positive 50KV, Current ≤ 1mA, Input Voltage AC220±10%.
- Output Voltage 2: DC 0-Negative 30KV, Current ≤ 1mA, Input Voltage AC220±10%.

(2) Liquid Pump System

- Injection Pump Liquid System (independently controlled); Automatic liquid

supply speed range: 0.001 - 20 ml/min; Manual liquid supply speed range: 0.1 - 3 mm/s
- Applicable syringe specifications: 1, 3, 5, 10, 20 ml
- All injection pumps are single-channel pumps.

(3) Nanofiber Collection System
- Collection drum: Effective width 200 mm, Diameter φ100 mm.
- Drum speed: 0-6000 r/min adjustable.
- Flat plate collection: Square 200x200 mm.

(4) Sprayer Reciprocating Movement System
Automatic movement platform: Reciprocating stroke 200 mm; Positioning accuracy ≤ 0.03 mm.

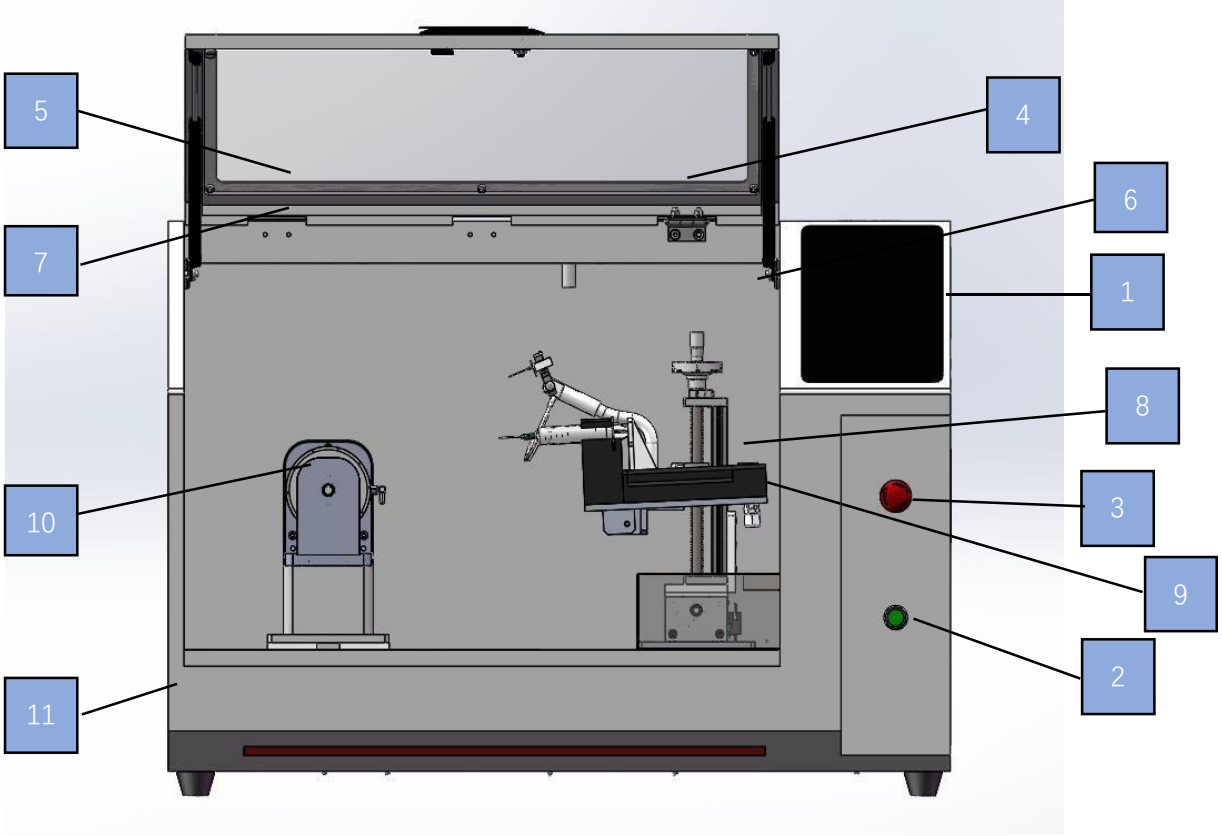
(5) Environmental Control System
- Temperature control: Room temperature to 60°C, adjustable temperature, accuracy ±1°C.
- Humidity control: 20% - ambient humidity, accuracy: humidity deviation ±3% RH, dehumidification time: ≤ 15 min.
- Exhaust: Waste gas discharge during operation to avoid charge accumulation.

(6) Numerical Control System
- 10-inch human-machine interface numerical control system for controlling (sprayer movement device, liquid supply system, heating control, humidity control, exhaust control, experiment timing control, lighting, etc.) and monitoring the status of each component.
- Adjustable spinning time, the system will automatically shut down after the set time to ensure safety.
- Automatic parameter recording and saving function, convenient for comparing experimental results.
- Customizable exhaust time to ensure a stable spinning environment (non-flammable, non-explosive), and harmless (waste gas does not leak).

(7) Safety Protection System
- Equipped with discharge short-circuit protection and leakage protection
- Can discharge organic waste gas.
- Prevent electrical shock, fire, explosion accidents caused by charge accumulation, and prevent leakage of organic waste gas that affects health.
- Inert gas access and control function.

The above content is subject to the actual product.

# 3. Appearance and Configuration




(1) **Touch Screen:** Used for normal manual/automatic operation of the device and parameter settings.
(2) **Power Key Button:** Used to power on the entire device.
(3) **Emergency Stop Button:** Used to stop the device in case of an emergency or abnormal safety condition. Immediately halts all moving parts and stops the high-voltage power supply output.
(4) **Dry Gas Inlet:** Used for dry air from an external dehumidifier to enter the internal chamber, with adjustable air intake volume.
**Inert Gas Inlet:** Used for the introduction of inert gas in special cases, sharing the same airflow path as the dry gas.
(5) **Exhaust Vent:** Contains an exhaust fan to expel internal air.
(6) **Spotlight:** Used to observe the spinning process.
(7) **Exhaust Fan:** Removes internal solvents and high-voltage charges.
(8) **Spinning Module:** Allows automatic reciprocating and manual distance adjustment during the spinning process.
(9) **Push Mechanism:** Pushes the syringe forward, triggering high voltage to generate nanofibers.
(10) **Collection Drum:** Collects the nanofibers.
(11) **Shell Frame:** The outer structure of the device.

# 4. Basic Operation

**Caution:** As this product generates high voltage during operation, to ensure the normal functioning of the device and the safety of the operator, please read the user manual carefully before first use!

## 4.1 Powering the Device

### (1) Power Cord

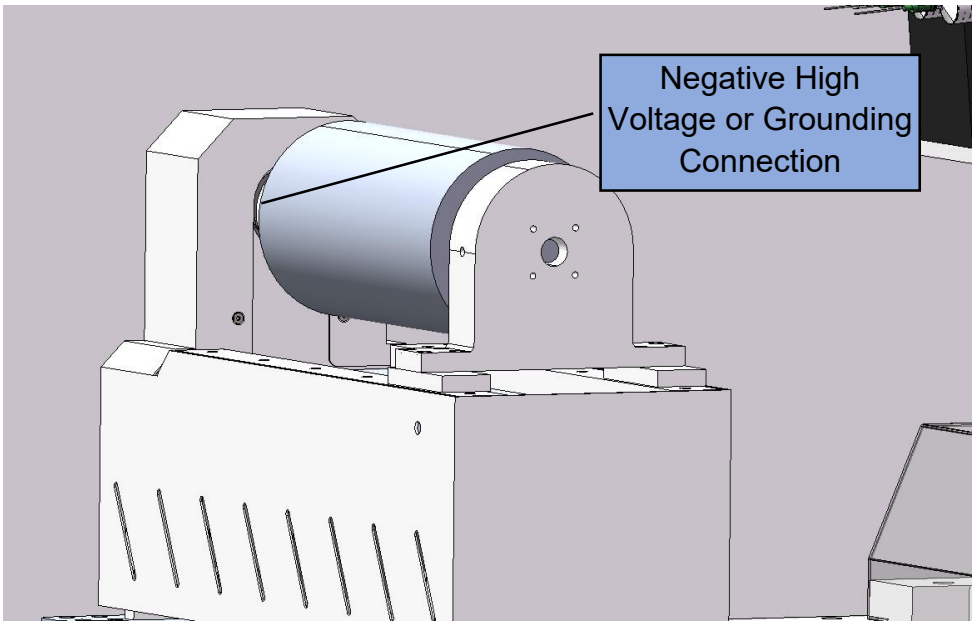
Ensure that the power key switch on the control panel is off. Then, plug the machine's power cord into the power strip or socket in the work area.

### (2) Grounding Connection

Ensure that the device is properly grounded. It is recommended to connect an external ground wire to the device's ground terminal.

### (3) High-Voltage Lead

The high-voltage lead is a thicker red, high-voltage-resistant wire. After securing the syringe to the pusher, attach the high-voltage lead to the needle. Connect the grounding clamp to the reserved terminal on the collection drum.




**Caution:** The high-voltage wire and grounding must not be connected together, nor should they come into contact with other conductive materials.

## 4.2 Startup Operation Process

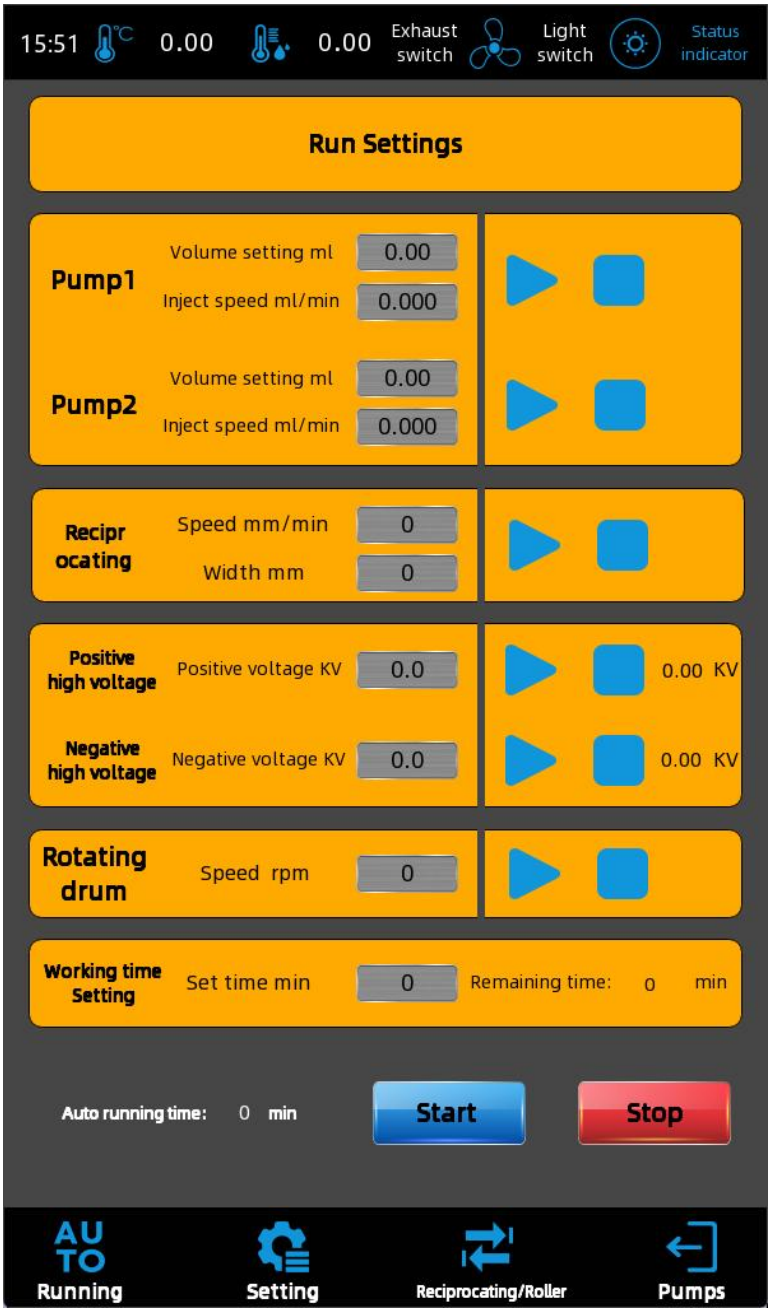
### ▶ Preparation for Operation

(1) Rotate the device’s power key button to the "on" position and ensure the emergency stop button has been released.

(2) Wait for the touch screen to initialize and enter the operation interface.

### ▶ Syringe Setting

**Caution:** The manual speed unit of the injection pump is mm/min. Since the syringe specifications vary, the automatic speed is in ml/min.

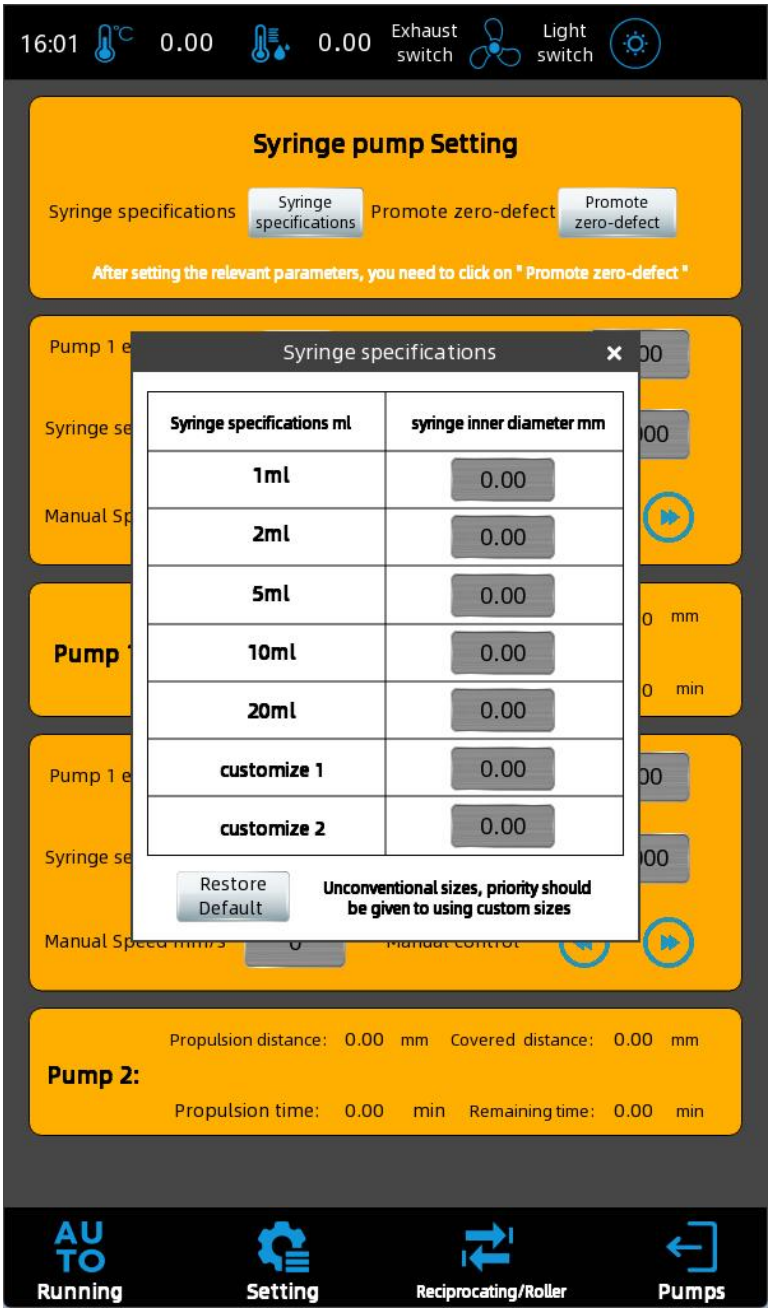


(1) Open the safety door, and after securing the syringe, tap the "Push" button on the touch screen to enter the push setup page. You can choose whether to activate a particular push pump. After activation, press the "Manual control" button under Push ① or Push ② to manually adjust the position of the push pump until a droplet forms at the syringe needle. Release the button once this is achieved.


(2) Attach the positive and negative high-voltage leads to the syringe holder, ensuring they are securely fastened.

(3) On the "Push" page, click the "Syringe Specifications" menu to select the corresponding pusher specifications. Click the "Syringe Specifications"

button to set the inner diameter of the pusher for different syringe specifications. (It is not recommended to change the formula data arbitrarily!)

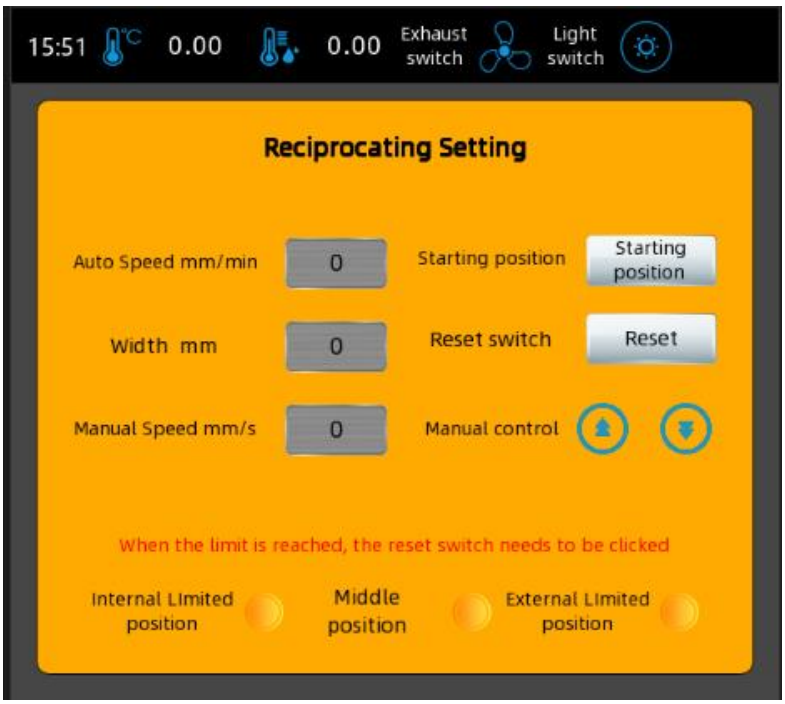



(4) In the "Push" interface, you can select "Enable" or "Disable" for Push ① and Push ② (both can be linked simultaneously, but before executing automatic operation, at least one push pump must be enabled, and both cannot be disabled).

(5) In the "Push" page, you can set the actual liquid amount to be pushed and the pushing speed. After setting, you must click the "Reset Push" button until the "Pushed Distance" resets to zero. The syringe setting is now

complete

## ▶ Reciprocating Setting



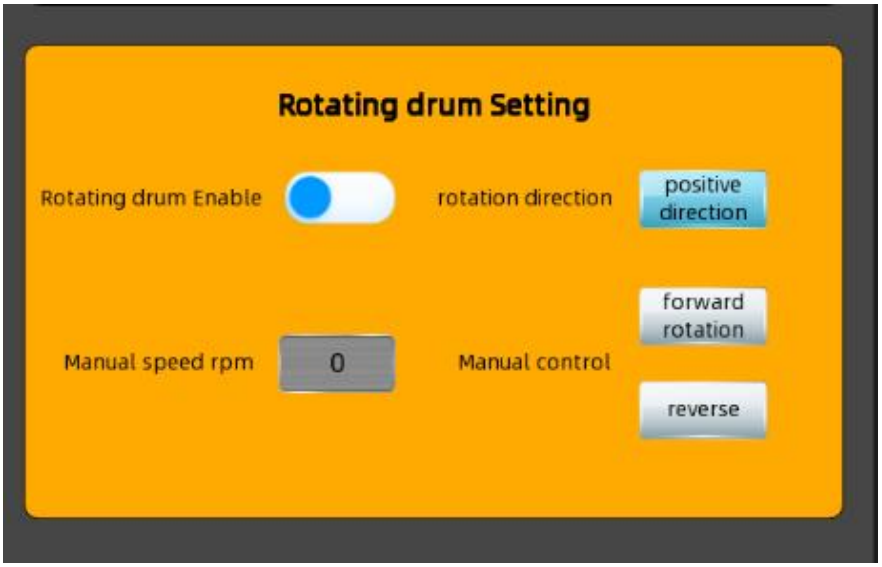

(1) In the "Reciprocating" page, you can set the automatic running speed of the reciprocating motor (range 0~2500 mm/min) and the stroke width of the reciprocating motor (range 0~200 mm).

(2) In the "Reciprocating" page, click the "Starting Position" button. At this point, the reciprocating module will automatically move to the middle position.

(3) In the "Reciprocating" page, press the two buttons to jog the reciprocating motor. Click the " 

" button to set the manual movement speed of the reciprocating motor (range 1~20).

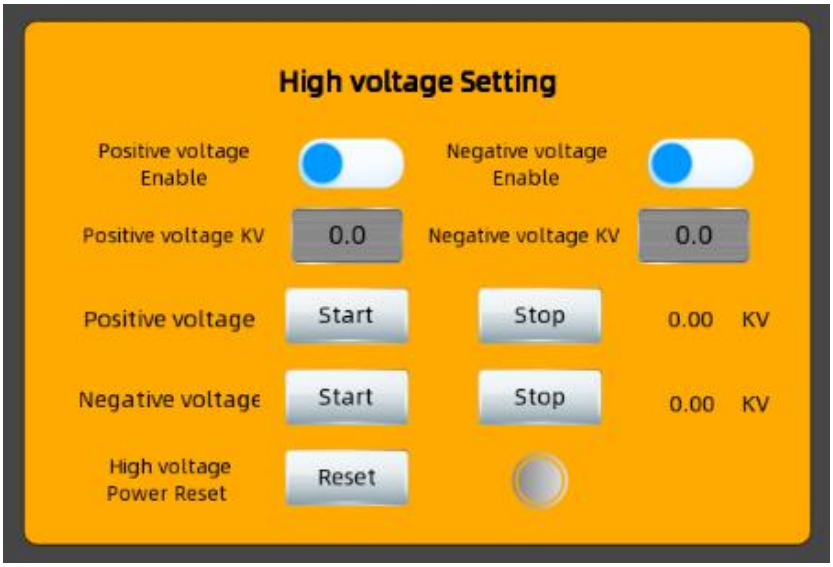
## ▶ Drum Setting




In the "Settings" page, click the "Rotation Direction" button to switch the rotation direction of the drum. Click the drum speed input box to set the drum speed (0~6000 rpm/min). Extension: The choice of forward or reverse rotation should be determined based on the actual winding method of the substrate, with the goal of preventing the substrate (shown in blue) from curling during rotation, which could affect the airflow and impact the spinning effect. The settings can be referenced in the diagram.

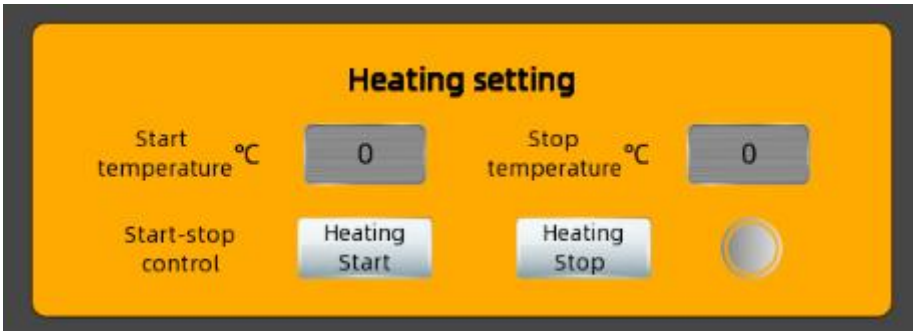
Rotation Direction Reference:

## ▶ High-Voltage Power Supply Settings




In the "Settings" page under "High Voltage Settings," you can choose to enable positive or negative high voltage and set the voltage value. (When the high-voltage power supply encounters communication failure or triggers arc protection, you can click the "High Voltage Power Reset" , and click “Reset” button to restart the high-voltage power supply and reset the fault).

## ▶ Other Selectable Function Settings




(1) Heating Settings: In the "Settings" page, you can set the "Temperature Lower Limit" and "Temperature Upper Limit" (the internal temperature will be maintained between the lower and upper limits. After heating starts, if the internal temperature exceeds the upper limit, heating will stop. It will restart automatically when the temperature drops below the lower limit. During this process, there is a built-in 3-minute cooling period to protect the heating lamps and avoid damage caused by frequent startups). After setting is complete, click the "Heating Start" button to begin heating.

(2) Exhaust Fan Operation: Click the "Exhaust" button above to turn on the exhaust fan.

(3) Spotlight On: Click the "Lighting" button to turn on the spotlight to observe the spinning process.

▶ **Automatic Operation**


(1) Automatic Start: After completing all operational parameters, click the "Start" button on the "Run" page. The spinning reciprocating motion and push pump will begin operating according to the set values for each section.
(2) The device will begin automatic operation until the spinning is complete or the preset time is reached. During 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 be disabled, and the automatic spinning will continue until the set liquid amount is pushed completely.

## 3.3 Shutdown Process

(1) Device Stop: After reaching the set time or when the solution is used up, the device will enter the shutdown process.
(2) Push Return: When the solution is exhausted, the pusher will return to the original full liquid state position.
(3) Reciprocating Stop: The reciprocating motion will stop at one side to allow the operator to replace materials or perform checks.
(4) High Voltage Stop: The high voltage will gradually decrease to 0 after a certain delay.
(5) Drum Stop: The drum will gradually slow down until it stops.

## 3.4 Power-Off Process

(1) Ensure that the device is in the stopped state, then cut off the power by turning off the key switch.
(2) For safety, please unplug the device's power plug.

# 5. Formula Settings

During the experiment, different syringe specifications are needed, and since they are commonly used consumables, the corresponding linear speeds for different syringes will vary to ensure the same push liquid volume. Therefore, this product has implemented precise conversions internally to automatically handle the ml/min value, avoiding errors that may occur when the operator performs manual calculations, which could lead to inaccurate experimental results.

For specific settings, please adjust in the "Settings" > "Syringe Settings" > "Syringe Specifications" pages. Once set, the parameters can be easily accessed for daily use.

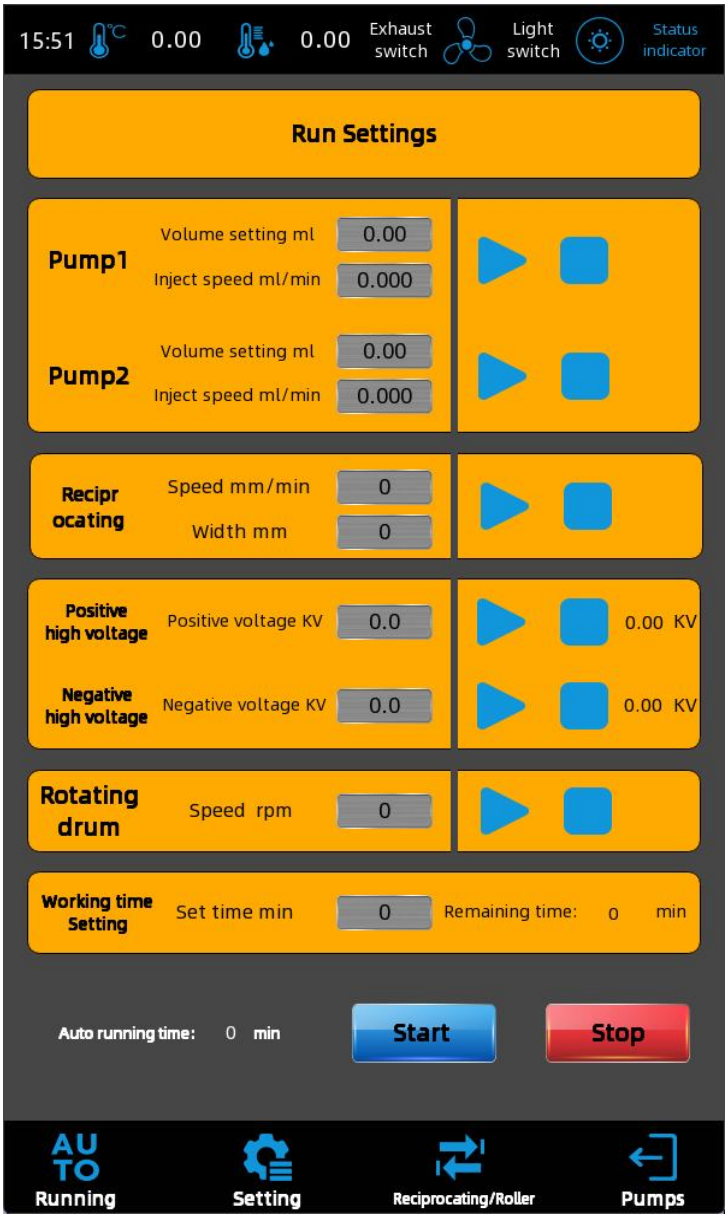
**Caution:** It is recommended to set the fixed milliliter parameters to match the commonly used syringe models. If a syringe from another manufacturer or a different specification is used temporarily, it is advisable to use custom parameters for temporary use, and please measure and confirm the parameters.

# 6. Introduction to the Human-Machine Interface

## ▶ Status Bar


The data displayed in the status bar, from left to right, includes the current time, internal temperature of the device, internal humidity of the device, exhaust button, lighting button, and the operating status of each section.

## ▶ Operation



**(1) Push Pump ① / Push Pump ②**
The injection liquid volume and speed settings for the corresponding push pumps (unit: ml/min). To avoid calculation errors during use, the mm/s value has been converted to ml/min. By clicking the start and stop buttons, you can run each push pump separately in manual mode.

**(2) Reciprocating Axis**
Set the speed and stroke width for the reciprocating motion (specific settings in Chapter 2). Click the start and stop buttons to control the operation.

**(3) Positive High Voltage / Negative High Voltage**
Set parameters for the high-voltage power supply. By clicking the start and stop buttons, you can operate the positive and negative high-voltage power supplies separately in manual mode and monitor the current output voltage.

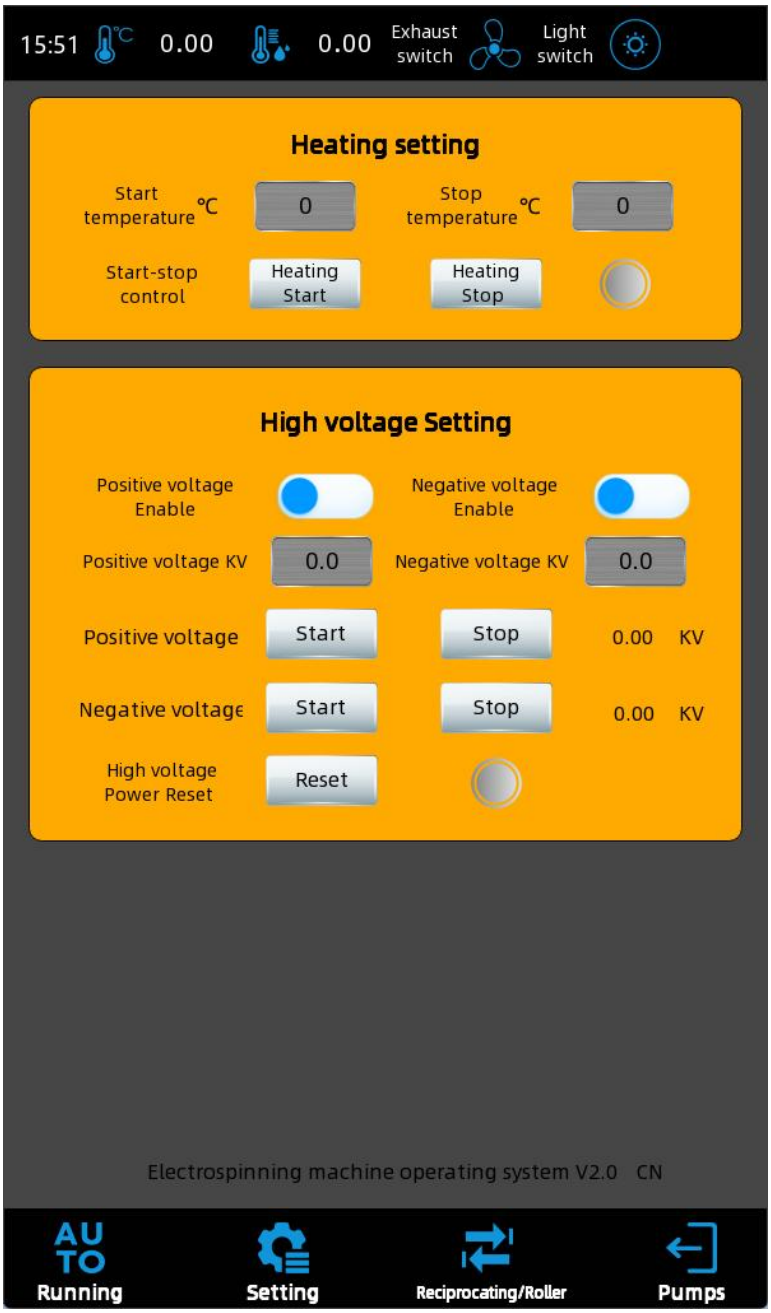
**(4) Collection Drum**
Set the operating speed of the drum. At very low speeds, the shaft may not rotate stably. It is recommended to set the minimum speed above 200 rpm. Click the start and stop buttons to run the drum motor separately in manual mode.

**(5) One-Click Start**
Once all parameters are set, click the one-click start button to enter automatic operation mode and start spinning according to the set parameters.

**(6) One-Click Stop**
After spinning is complete, the process will automatically end. If you wish to stop spinning during the process, press the one-click stop button. The drum, high voltage, reciprocating motion, and other modules will gradually stop until everything is fully halted, at which point spinning ends. (In case of an emergency, press the emergency stop button to immediately cut off power to the entire device).

**(7) Spinning Timer**
Set the spinning duration, and it will automatically stop when the time is up. If the timer is set to 0, the spinning timer function will be disabled.

## ▶ Settings


15:51
0.00
0.00
Exhaust switch
Light switch
Heating setting
Start temperature ℃
0
Stop temperature ℃
0
Start-stop control
Heating Start
Heating Stop
High voltage Setting
Positive voltage Enable
Negative voltage Enable
Positive voltage KV
0.0
Negative voltage KV
0.0
Positive voltage
Start
Stop
0.00 KV
Negative voltage
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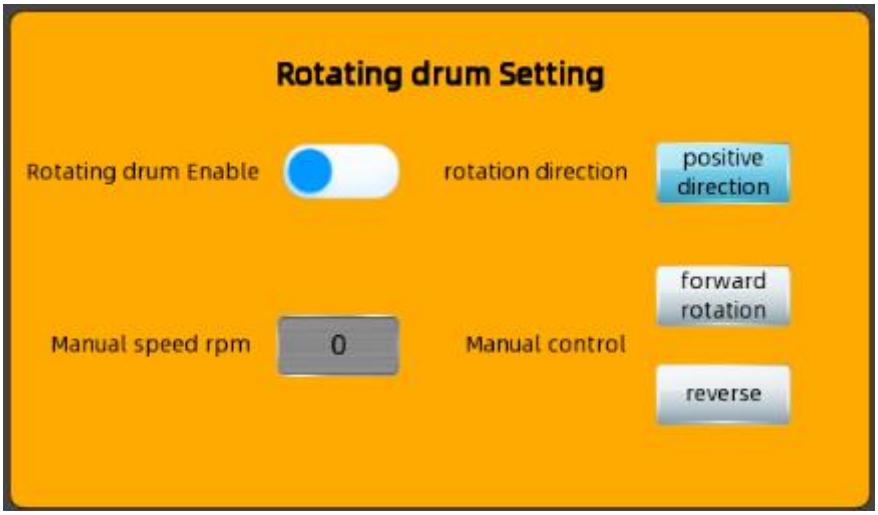
Stop
0.00 KV
High voltage Power Reset
Reset
Electrospinning machine operating system V2.0 CN
AU TO
Running
Setting
Reciprocating/Roller
Pumps




**(1) Heating Settings**

Set the upper and lower temperature limits for heating. Click the "Heating Start" or "Heating Stop" button to manually control the heating lamp in manual mode.

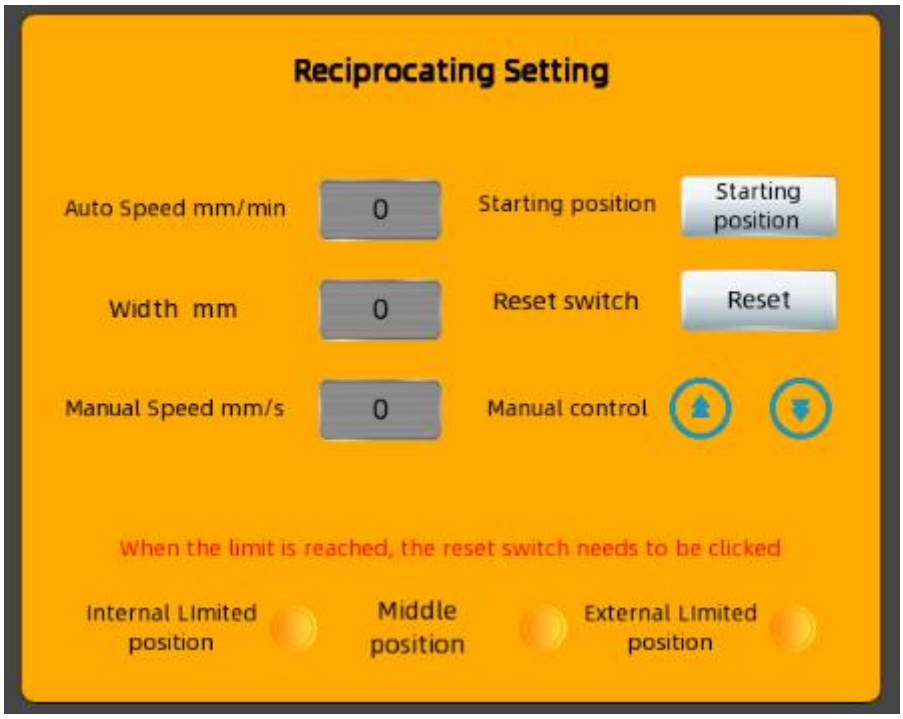
**(2) High Voltage Settings**

Select whether to enable the positive and negative high-voltage power supplies. After enabling, set the voltage (0~30KV). Click the "Start" or "Stop" button to manually control the positive and negative high-voltage power supplies in manual mode. (If the high-voltage power supply experiences a communication failure or triggers arc protection, click the "High Voltage Power Supply Control" power-off and power-on buttons to restart the high-voltage power supply and reset the fault.)

**(3) Drum Settings**

Set the rotation speed and direction of the collection drum. Click the "Drum Start" or "Drum Stop" button to manually control the drum in manual mode.

## ▶ Reciprocating




## ▶ Reciprocating Settings

You can set the automatic running speed, stroke width, and manual running speed for the two reciprocating axes. Click the "Manual Control" button to move the reciprocating axis in manual mode. When the reciprocating axis triggers the limit sensors on both sides, click the "Reset" button to continue manual control. (If the position of the reciprocating axis is incorrect, click the "Starting Position" button to automatically find the zero point again.)

## ▶ Push


### (1) Syringe Specifications Settings

Click the "Syringe Specifications" button to set the inner diameter for different syringe specifications. If you make an error, you can click the "Restore Default Values" button in the specifications settings pop-up window to reset to the default settings.

### (2) Push Reset

After spinning is complete and before starting the next spinning cycle, click the "Push Reset" button to reset the push amount of the pusher to zero, preventing errors.

### (3) Push Settings

You can choose whether to enable a specific push pump. After enabling, you can set the liquid amount, automatic push speed, manual jog speed, and syringe specifications for this push pump. Click the "Manual Control" button to control the movement of the push pump in manual mode.

### (4) Alarm Information and Handling Methods

| Content | Handling Method |
|---|---|
| Emergency stop button pressed, device in stopped state | Rotate the emergency stop button clockwise and release it to reset. |
| Master-slave communication failure | Check the network cable on the switch in the electrical control box and ensure it is properly connected to the PLC. |
| Positive high voltage output not enabled | Check the high voltage parameter settings to ensure the high voltage is enabled. |
| Positive high voltage output not enabled | Check the high voltage parameter settings to ensure the high voltage is enabled. |
| High voltage overvoltage fault | In the "Settings" page, click the high voltage power-off and power-on buttons under the "High Voltage Power Supply Control" to restart the high-voltage power supply. |
| High voltage arc fault | In the "Settings" page, click the high voltage power-off and power-on buttons under the "High Voltage Power Supply Control" to restart the high-voltage power supply. |
| Push pump setting error | Stop the operation and check the parameters of the three push pumps. After confirming they are correct, restart the operation. |

# 7. 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:
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**Email:** support@stonylab.com
**Phone:** 631-406-6080
**Website:** stonylab.com

This instruction manual is subject to change without prior notice.