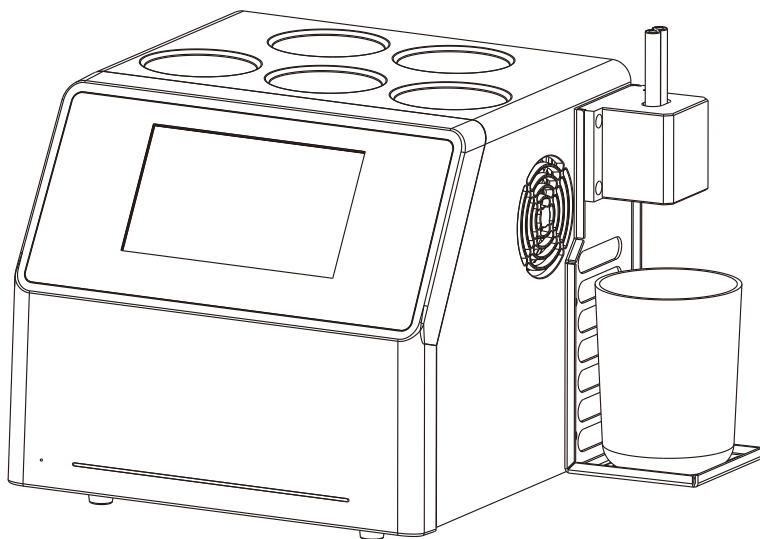




# User Manual

## Gel Casting System

### T-20 PLUS

Please read the instructions carefully and keep them properly before using the product for future reference.

Wuhan Servicebio Technology Co., Ltd.

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# 01 Precautions

## Safety precautions

Please observe the following safety measures during all stages of operation, maintenance and repair of this instrument. Violations of safety measures will affect the normal use and service life of the instrument. The company shall not be held responsible for any consequences arising from the user's violation of safety measures.

### ! Attention

- This product is for indoor use only

#### 1. Keep away from live circuits

It is strictly forbidden for operators to disassemble the instrument or replace components without authorization. If the equipment needs to be repaired, it should be done by professional maintenance personnel with a certificate while the equipment is powered off.

#### 2. Pay attention to the power supply

Before connecting the power supply, ensure that the voltage of the power supply is consistent with the voltage required by the instrument (allowing a deviation of  $\pm 10\%$ ), and ensure that the rated load of the power socket is not less than the requirements of the instrument.

#### 3. Pay attention to the placement of the instrument

The instrument should be placed in a place with low humidity, little dust, and away from water sources, ensuring good indoor ventilation and avoiding interference from corrosive gases or strong magnetic fields.

Do not block the ventilation holes of the instrument. Keep the area within 25cm to the left and right of the instrument clear, avoid direct sunlight, and stay away from heat sources. If the instrument has not been used for a long time, cut off the power supply and cover it with a soft cloth or plastic paper to prevent dust.

### ! Attention

In the following situations, immediately cut off the power supply of the instrument and contact the supplier or request a maintenance personnel for handling

- Liquid spills into the instrument
- The instrument falls or its casing is damaged
- The instrument is exposed to rain or water
- There are noticeable changes in the functions of the instrument
- The instrument operates abnormally, such as making strange noises or emitting strange odors

# Instrument Maintenance

The maintenance access is located on the back. When performing maintenance or servicing the fluid system, unscrew the screws of the maintenance panel and remove it.

If there are stains on the surface of the instrument, they can be wiped off with a soft cloth that has been soaked in water and wrung dry.

## **Warning**

- When cleaning the surface of the instrument, the power must be cut off
- It is strictly prohibited to use corrosive cleaning agents on the surface of the instrument

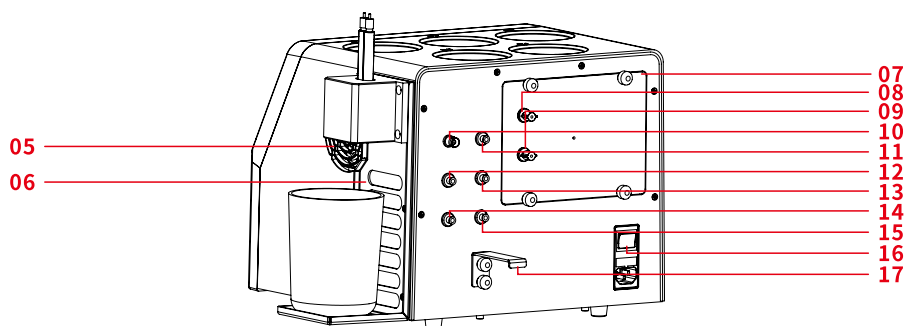
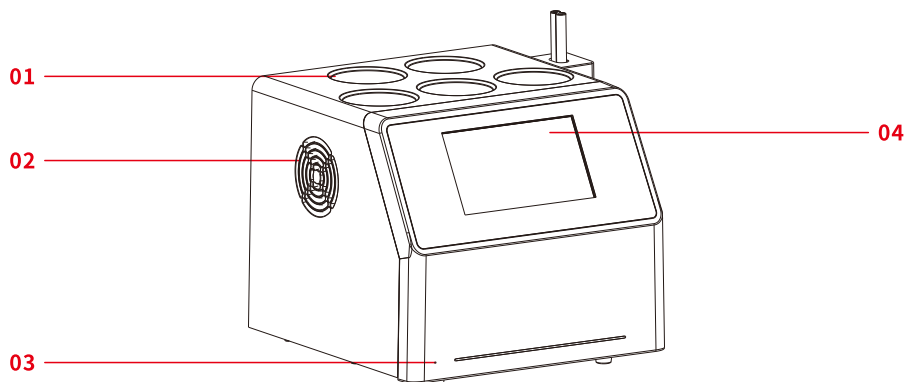
# 02 Product Description

The T-20 PLUS Gel Casting System is characterized by its compact size, convenient storage and access, quick installation, and portability. It is compatible with various glass gel plates such as 0.75mm, 1.0mm, and 1.5mm. This product can be used for rapid gel making and batch gel making in laboratories.

# 03 Product Parameters

|                                   |                                                                                                                                |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Product Name                      | Gel Casting System                                                                                                             |
| Cat.No.                           | T-20 PLUS                                                                                                                      |
| Applications                      | Production of polyacrylamide gradient gels for Western Blot process                                                            |
| Gel Concentration Range           | 4%~20%                                                                                                                         |
| Gel Specifications                | Mini-sized gel, thickness of 0.75mm / 1.0mm / 1.5mm                                                                            |
| Gel Electrophoresis time          | Approx. 40s per gel                                                                                                            |
| Reagent Bottle Rack               | 5×500mL round-mouth, round-shoulder reagent bottles (4 for reagents, 1 for cleaning) / 1× waste liquid cup (500mL beaker)      |
| Automatic Cleaning                | Supports automatic flushing of mixing lines during gel filling intervals to prevent gelation, and one-button cleaning of lines |
| Lotion Ingredients                | 20% Ethanol                                                                                                                    |
| Automatic Pre-filling             | Supports automatic filling of gel filling lines                                                                                |
| Fault Indication                  | Equipped with fault indication function                                                                                        |
| Operation Mode                    | 7-inch English color LCD touch screen                                                                                          |
| Operating Environment Temperature | 10°C~35°C                                                                                                                      |
| Input Voltage                     | 220V AC, 50/60Hz                                                                                                               |
| Rated Power                       | 270W                                                                                                                           |
| Dimensions                        | 305×305×270mm                                                                                                                  |
| Weight                            | 12.5Kg                                                                                                                         |

# 04 Product Structure



- |                                  |                        |                                       |
|----------------------------------|------------------------|---------------------------------------|
| 01 Bottled Liquid Placement Area | 02 Air Inlet           | 03 Buzzer Port                        |
| 04 Color LCD Touch Screen        | 05 Air Outlet          | 06 Gel Filling and Drainage Component |
| 07 Access Panel                  | 08 Outlet for Liquid A | 09 Outlet for Liquid B                |
| 10 Liquid level sensor           | 11 Washing Solution    | 12 Inlet for Liquid A                 |
| 13 Inlet for Liquid B            | 14 Inlet for Liquid C  | 15 Inlet for Liquid D                 |
| 16 Power Switch                  | 17 Bumper              |                                       |

# 05 Operation Guide

## 5.1 Instrument adaptation

Before operating the instrument, please install the liquid tubes A, B, C, D, and the cleaning solution onto the back panel of the instrument and tighten the connectors. Place the other ends of the liquid tubes A, B, C, D into their corresponding reagent bottles and refill the cleaning solution. Position the waste liquid bottle on the waste liquid tray on the right side and place the gel casting pen in the pen holder. Remove the bumper from its packaging and secure it to the rear housing using either adhesive or screws. Install it in accordance with the positions indicated in the product structure diagram.

## 5.2 Instrument startup and shutdown

After connecting the power supply, press the power button located at the rear left of the instrument screen. The screen will light up, displaying the startup interface as shown in Figure 1. Press the power button again to turn off the instrument—the fan will stop, and the screen will go dark.

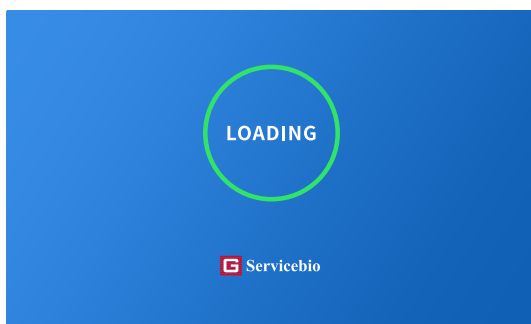


Figure 1

## 5.3 Operating Procedure

After startup, the main interface shown in Figure 2 will appear. Please confirm whether the machine status in the upper left corner is "Connected" and whether the version number in the lower right corner is correct.



Figure 2

Click “Maintenance” in the top right corner to access the maintenance interface as shown in Figure 3.

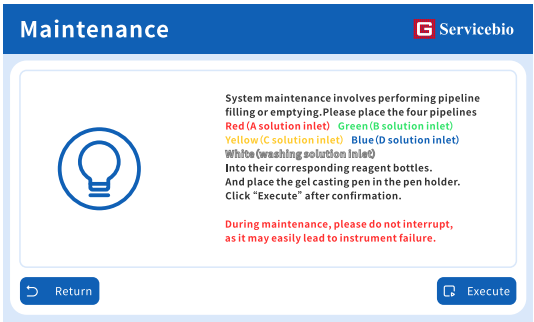


Figure 3

After maintenance is complete, the system will return to the main interface. Click "Gel Casting" to enter the concentration selection interface as shown in Figure 4 (the selected concentration will be highlighted in dark green).

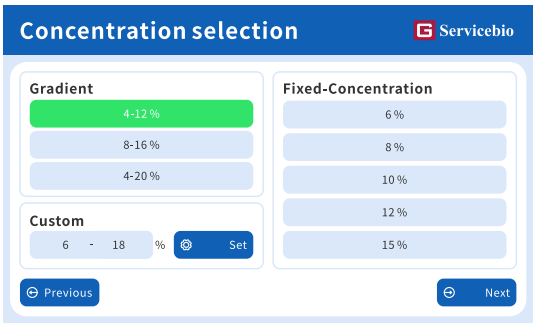


Figure 4

Click "Next" to enter the Volume Selection Interface as shown in Figure 5 (the selected concentration is highlighted in dark green).

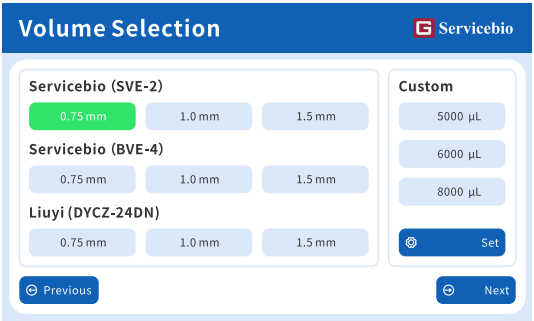


Figure 5

Click "Next" to enter the Parameter Confirmation Interface as shown in Figure 6. Clicking "+" or "-" can adjust the gelation time to a certain extent: "+" prolongs the gelation time while "-" shortens it. Normally, no adjustment is required, and the default value is 0. The adjustment range is -4 to 4. Do not make intermittent adjustments to avoid excessive changes that may cause instrument clogging.

Parameter confirmation

Servicebio

Please confirm the gel casting parameters and place the gel casting pen in the pen holder

Gel Casting concentration

4 - 12% (Gradient Gel)

Gel plate type

ServicebioSVE-2 0.75(3800μL)

The length of gel time

-

0

+

Please confirm if A, B, C, D and cleaning solution are sufficient.  
If the liquid level is below the warning line of the bottle, please replenish in time.

Previous

Next

Figure 6

Click "Next" to enter the Gel Casting Preparation Interface as shown in Figure 7.

Gel Casting

Servicebio

Gel casting preparation...

Figure 7

After the gel casting preparation is complete, it will proceed to the Gel casting Interface as shown in Figure 8.

Gel Casting

Servicebio

Please remove the gel pen and click the "Start Gel Casting" button to execute gel casting

If no action is taken within 2 minutes, the system will enter automatic cleaning mode

Number of gel plates filled

0

block

Gel Casting concentration

4 - 12% (Gradient Gel)

Gel Casting volume

Servicebio SVE-2 0.75(3800μL)

Remaining time for auto stop

2 : 00

Stop gel filling

Start

Figure 8

Click “Start” or “Next Block” to enter the Gel Preparation in Progress Interface as shown in Figure 9. Upon completion of gel casting, it will automatically return to the Gel Casting Interface, and the number of casted gels will increase by 1. Click “Stop” to enter the Prompt Interface as shown in Figure 10. Click “Yes” to enter the Clean Interface as shown in Figure 11. After cleaning is completed, it will proceed to the Completion Interface as shown in Figure 12. Click “OK” to return to the Main Interface. Click “No” to enter the Prompt Interface as shown in Figure 13. After placement is complete, click “OK” to enter the Maintenance Interface as shown in Figure 14. After the maintenance is completed, you will enter the emptying prompt interface as shown in Figure 15. Click “OK” to enter the emptying interface as shown in Figure 16, and you will return to the main interface once the emptying process is finished.

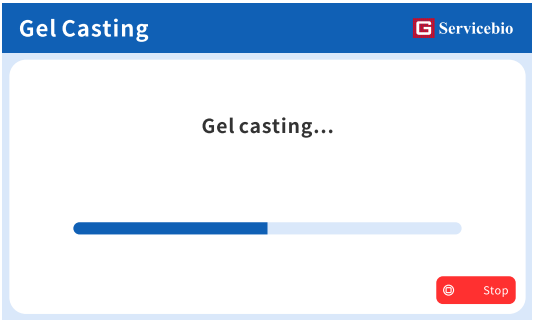


Figure 9

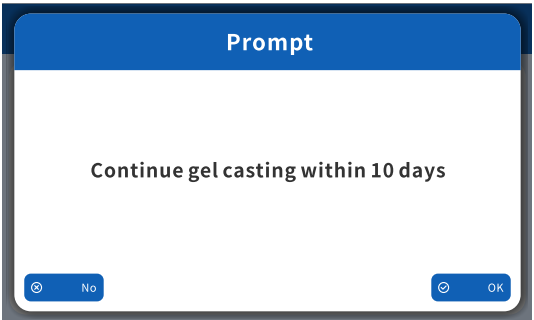


Figure 10

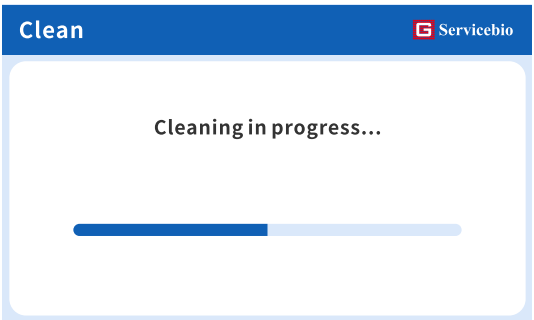


Figure 11

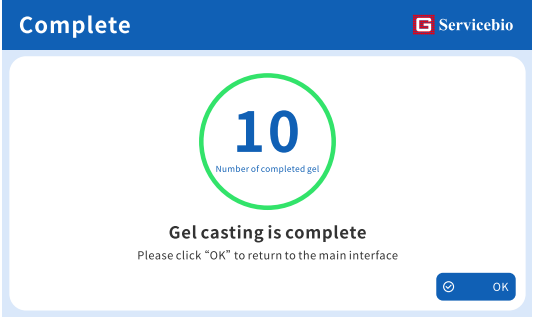


Figure 12

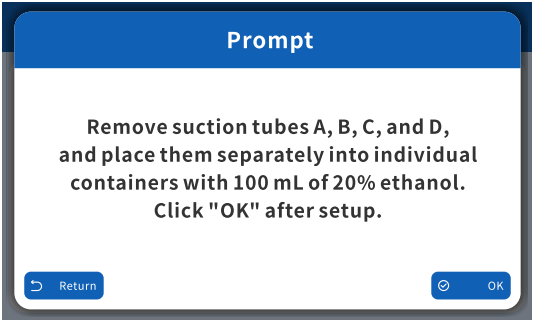


Figure 13

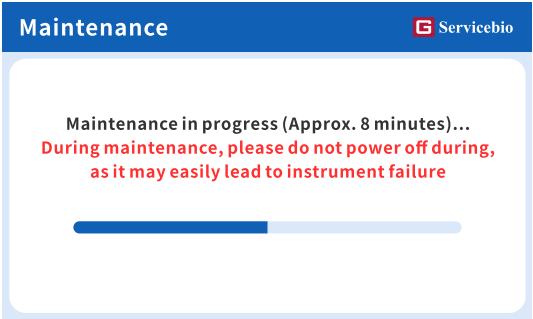


Figure 14

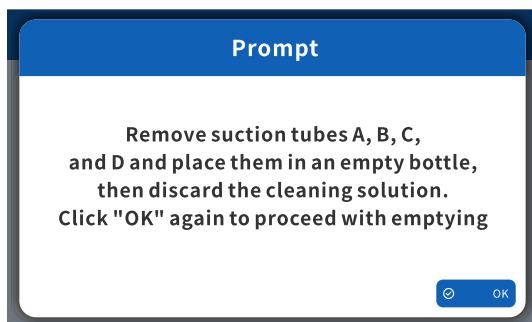


Figure 15

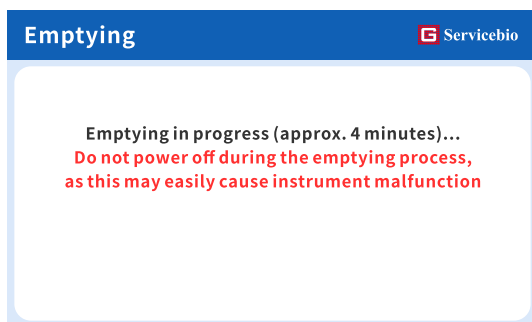


Figure 16

## 5.4 Prompt

A pop-up prompt will appear as shown in Figure 17 when the gel casting pen is not in the pen holder.

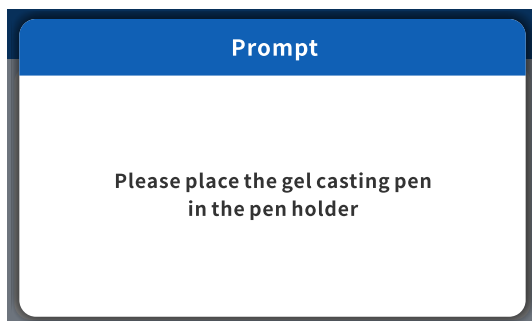


Figure 17

A pop-up prompt will appear as shown in Figure 18 when the cleaning solution is insufficient.

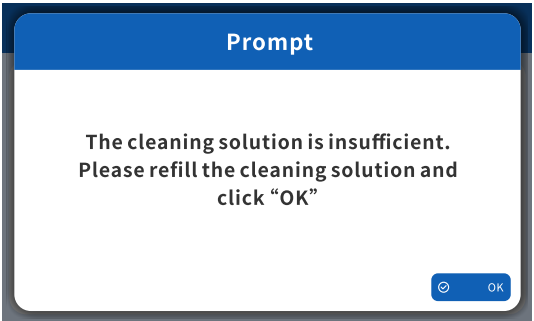


Figure 18

A pop-up prompt will appear as shown in Figure 19 if an error occurs during the gel casting process.

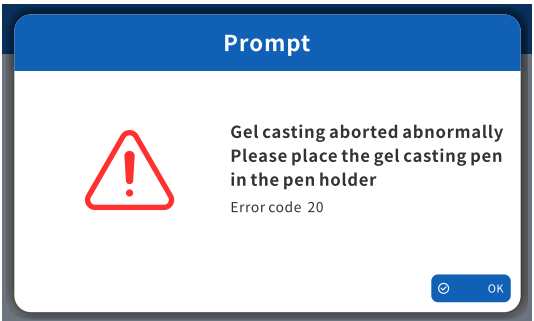


Figure 19

A pop-up prompt will appear as shown in Figure 20 if an error occurs during the maintenance process.

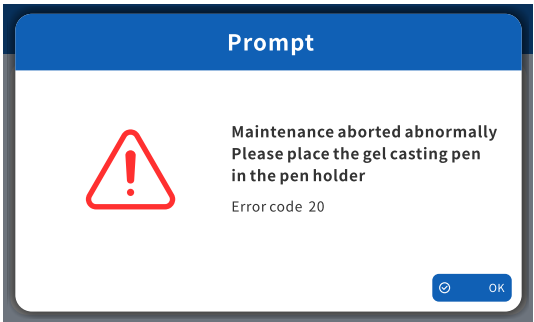


Figure 20

When the gel pen needs to be removed or the pen sensor is blocked by gel, a pop-up message will appear as shown in Figure 21.

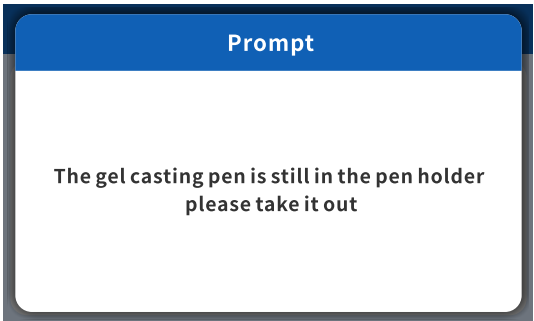


Figure 21

When a pressure alarm occurs, a pop-up window will appear as shown in Figure 22.

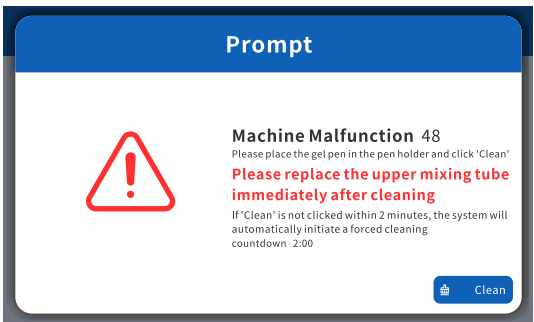


Figure 22

When the mixing tube needs to be replaced, a pop-up window will appear as shown in Figure 23.

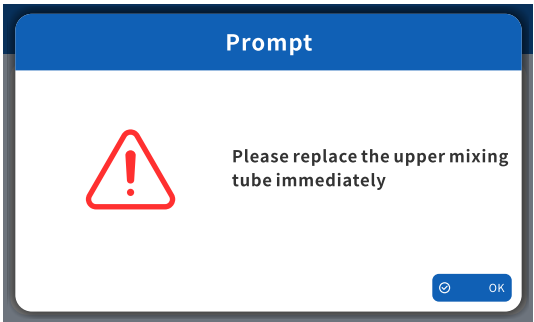


Figure 23

Mixing Tube Replacement Steps:

1. Complete the cleaning process as prompted by the instrument interface;
2. Unscrew the four hand-tight screws on the back of the instrument;
3. Follow the instrument prompts to select the upper or lower mixing tube that needs replacement;
4. Remove the manifold block, mixing tube, and outlet tube;
5. Rotate the mixing tube 90° counterclockwise and pull it out. Then unscrew the outlet tube from the mixing tube;
6. Take the new mixing tube from the instrument. Remove the O-ring from the manifold block and insert it into the corresponding circular groove at the head of the mixing tube. Insert the mixing tube into the outlet post of the manifold block and rotate it 90° clockwise to secure;
7. Screw the outlet tube onto the mixing tube until a clicking sound is heard;
8. Insert the manifold block into the sheet metal slot and press the mixing tube into the plastic component slot;
9. Replace the rear cover and secure it with the four hand-tightened screws.

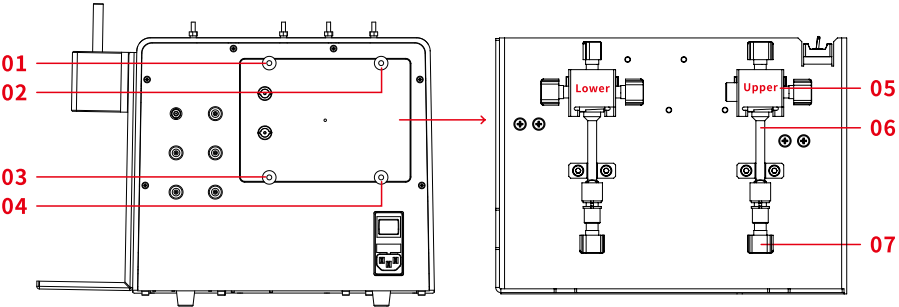


Figure 24

- 01 Hand-tight Screw 1
- 02 Hand-tight Screw 2
- 03 Hand-tight Screw 3
- 04 Hand-tight Screw 4
- 05 Manifold
- 06 Mixing Tube
- 07 Outlet Tube

When the temperature exceeds the limit, a pop-up window will appear as shown in Figure 25.

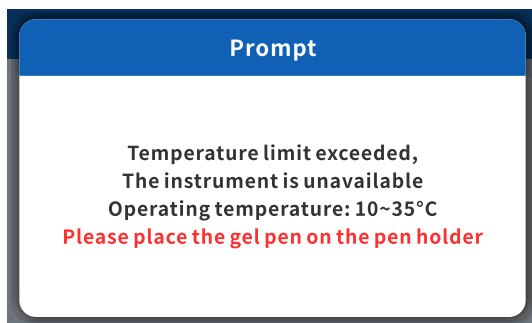


Figure 25

## 5.5 Customized Functions

### 5.5.1 Customized Concentration

Enter the Concentration Selection Interface as shown in Figure 4 and click “Settings”. This will take you to the Custom Concentration Settings Interface as shown in Figure 26, where you can define a custom concentration range. After setting, click “Save”.

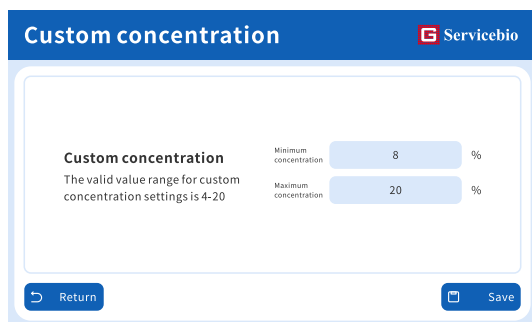


Figure 26

5.5.2 Customized Volume

Proceed to the Volume Settings Interface as shown in Figure 5 and click “Settings”. This will lead you to the Custom Volume Settings Interface as shown in Figure 27, where you can customize volumes 1~3. After setting, click “Save”.

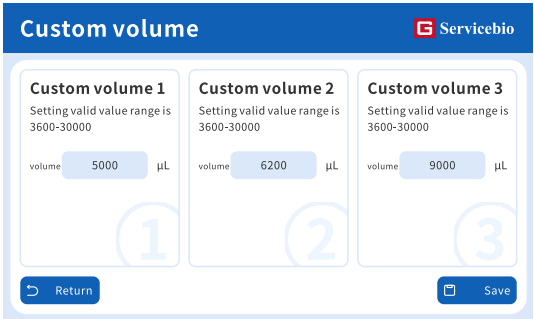


Figure 27

5.6 Automatic Cleaning Function

When entering the gel-casting interface as shown in Figure 15 and no gel-casting stop operation is performed within 2 minutes, a pop-up window as shown in Figure 28 will appear, and the buzzer will sound an alarm. The alarm will last for 30 seconds. If no cleaning operation is performed after the time elapses, the system will automatically initiate forced cleaning.

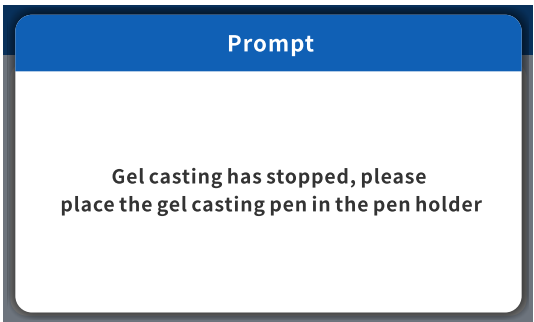


Figure 28

5.7 One-Key Cleaning Function

Before powering off the instrument, please click the cleaning button in the upper right corner. Do not power off until the cleaning process is complete.

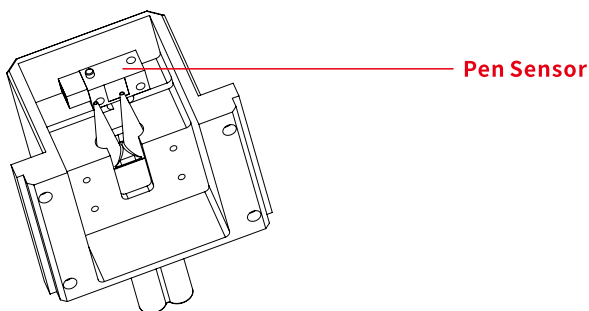


Figure 29

# 06 Fault Analysis and Troubleshooting

| No. | Fault                                                             | Cause Analysis                                                                       | Troubleshooting                                                                                    |
|-----|-------------------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| 1   | The display screen is not bright after turning on the power       | 1.The power is not connected<br>2.The switch is damaged<br>3.Others                  | 1.Check the power and connect it<br>2.Replace the switch<br>3.Contact the supplier or manufacturer |
| 2   | Gel outlet blockage                                               | Gel liquid solidified at the outlet                                                  | Contact the supplier or manufacturer                                                               |
| 3   | Error code 11/12/13/14                                            | Motor self-test abnormality                                                          | 1.Restart<br>2.Contact the supplier or manufacturer                                                |
| 4   | The gel pen is still in the pen holder. Please remove the gel pen | 1.The gel pen has not been removed<br>2.The pen sensor is blocked by gel<br>3.Others | 1.Remove the gel pen<br>2.Clean the gel on the sensor<br>3.Contact the supplier or manufacturer    |

## 6.1 Handling Gel on the Pen Sensor



If the pen sensor surface is covered with gel causing a malfunction, please clean the gel with a clean lint-free cloth or tissue.

# 07 Packing List

| No. | Name                              | Qty.  |
|-----|-----------------------------------|-------|
| 1   | Gel Casting System                | 1 pc  |
| 2   | Product User Manual               | 1 pc  |
| 3   | Warranty Card                     | 1 pc  |
| 4   | Maintenance Record                | 1 pc  |
| 5   | Product Qualification Certificate | 1 pc  |
| 6   | Fluid Circuit Pipe Components     | 1 set |
| 7   | Waste Liquid Cup (500mL)          | 1 pc  |
| 8   | Cleaning Solution Bottle (500mL)  | 1 pc  |
| 9   | Touch Pen                         | 1 pc  |

# 08 After-sales Service

## Warranty Content

During the warranty period, any damage to the instrument caused by the user's failure to comply with safety measures or force majeure factors is not covered by the warranty. The company will repair or replace the damaged instrument within the scope of the warranty based on the extent of the damage. For damage to the instrument outside the warranty period, the company will charge repair costs.

### ⚠ Attention

- After opening the box, the contents of the package should be immediately inspected according to the list on the packing list. If any item is damaged or missing, please contact the supplier immediately
- After passing the acceptance inspection, please fill in the relevant information on the product acceptance form and send a copy back (or fax) to the shipping unit for archiving and maintenance purposes
- Please keep the packing box and packaging materials properly after opening the instrument box for future use during maintenance. The company will not be responsible for any damage to the instrument that occurs due to improper packaging during transportation to the maintenance department

# Warranty Card

|           |  |                   |  |
|-----------|--|-------------------|--|
| User Name |  | Tel.              |  |
| Cat.No.   |  | Manufacturing No. |  |

# Maintenance Records

| Warranty date | Fault and repair log | Date of repair | Maintenance engineer |
|---------------|----------------------|----------------|----------------------|
|               |                      |                |                      |
|               |                      |                |                      |
|               |                      |                |                      |
|               |                      |                |                      |
|               |                      |                |                      |
|               |                      |                |                      |
|               |                      |                |                      |





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