

Fully Automatic Special Stainer and Coverslipper

User Manual



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Chapter 1 matters needing attention

This manual and the information on the product label will contain all the information required for operation and maintenance.

Please note the emphasis as well as the standard laboratory regulations and local laboratory regulations. The table below lists all points for attention/warning.

Symbols	Instructions
	Note: Gloves should be worn when handling reagents and opening reagent containers. During transportation The reagent container may be tilted, which may cause the reagent to adhere to the reagent lid.
	Warning: in the use of machinery, certain reagents (including potentially hazardous reagents) May accumulate around the slide stain apparatus. When inserting or removing the slide holder, these try The agent may contaminate the slide holder, which in turn may contaminate the preparation tray (if used) . Despite the minimal risk of adverse environmental and staff effects, users are in the process of handling slide holders and preparing them Wear protective clothing, including appropriate gloves, when panning.
	Warning: wash spills with alcohol. Xylene, chloroform, acetone, strong acids (e. g. 20% hydrochloric acid) , strong bases (e. g. 20% sodium hydroxide) or other similar solutions shall not be mixed Get close to the operator. If such solution spills, it should be removed immediately. Do not use xylene or Other alternatives are used as dewaxing solutions because this may cause the machine to denude some parts, Which in turn causes the solution to leak out.
	Warning: users must be aware of local regulations and correct procedures when handling and handling dangerous goods Step by step.
	Warning: Danger voltage inside the machine. Only our approved technical service personnel are allowed Open the operator's shield or touch the operator's internal components.
	Warning: The operating voltage of the machine is set at the time of system installation and initial setup, except for qualified technicians No one may change the voltage except the technical service personnel. The machine must be connected to a grounded mains The seat is connected, and the position of the seat must be convenient for the operator to make the power connection of the machine.

Symbols	Instructions
	Caution: the temperature of the slide staining device can be very high and can cause severe burns. Do not touch the staining device or the area around it for 10 minutes after the operator stops working.
	Warning: the slides in and around the slide-staining device and in the slide-staining device may be very hot and may cause severe burns if touched. Do not touch the slide stain until the temperature is indicated by the software. If the software is not running, wait at least 20 minutes after powering off the operator.
	Caution: during the operation of the system, some reagents (including potentially hazardous reagents) may accumulate around the slide staining device. As slides are placed into and removed from the slide holder, the accumulated reagents may contaminate the slide holder, potentially contaminating the preparation tray (if used) . Users should wear protective clothing and appropriate gloves to operate the slide holder despite minimal risk to the environment and personnel;
	Warning: ● The operator has a safety switch that stops operation when the instrument cover is opened. Do not attempt to open the instrument cover during operation, nor try to avoid the safety switch. ● During operation, the operator uses a liquid level probe, the position of which is determined by a moving metal auto-control mechanism. There is no warning for the movement of the manipulator and the level probe, and the speed at which they move can cause injury.
	Note: Do not use glass slides with cut corners. A chipped slide may fall off the slide holder and fail to achieve the desired results.
	Note: always make sure the level probe is raised before turning on the operator. If operating
	The level probe is lowered when the instrument is energized, and the control device may move before the probe is raised, potentially damaging the probe.
	Note: Before turning on the operator, make sure that the lids of the two external waste drums are secured. If the lid of the container is not secured properly, waste liquid may spill out of the container or spray out if the level sensor fails.

Use the system as designed. Improper use can result in damage to the instrument, or inaccurate results, or a failure to service the instrument.

Chapter 2 overview

2.1 Model

CNT520

i Note: If the contents of this manual do not specify a specific model, then the general model.

2.2 Construction and intended use

Automatic dyeing machine with separate drip dyeing, CNT500 support special staining, CNT520 support special staining, HE staining. CNT500 is composed of staining module and slide processing module, CNT520 is composed of staining module, slide processing module and sealing module. Staining module: it is composed of sample transfer, staining and control parts. Slide Processing Module: it is composed of slide processing platform (mechanical arm and heating module) , system control center and pipeline system. Chip sealing module: it is composed of control system, sample transfer, sample adding and collecting system and heating part. It is used with cover glass or adhesive tape.

Used for sample staining, dewaxing and sealing before pathological analysis.

2.3 Initial steps

For first-time users of cynosure automatic dyeing machines, this section details how to consult the user's manual for complete product Operation Knowledge.

Steps		Instructions	Chapter
1	Installation and commissioning	Initial assembly of hardware, installation of software, and inspection of systems shall be carried out by our technical representatives or by the relevant dealers.	--
2	Read the DO's and don'ts	Familiarize yourself with machine considerations.	Chapter 1
3	Know your hardware	Familiar with the name and use of machine parts	Chapter 3
4	Know the software	GAIN a basic understanding of software and how to use it	Chapter 4
5	Inspection procedures and reagents	Note: the setup of programs and reagents may have been completed for you at the time of installation. If in doubt, do the following: ● Check to see if the program you are planning to run is set. ● Check that the reagents you need are set up.	Chapter 2 Chapter 4 Chapter 7
6	Daily operation	Provides a brief overview of daily operations	Chapter 2
7	System maintenance	Maintain the automatic dyeing machine	Chapter 8

2.4 Day-to-day procedures

The standard procedures for staining slides by a fully automated stainer are outlined below. Other workflows can also be used with different options.

Steps		Description	Chapter
1	Initial check	1. Please do the initial check when you start the automatic dyeing machine or at the scheduled time of the day.	
2	Set up the slide	1 Click“Settings” in the upper right corner of the home screen to create a case (or patient) on the slide screen. 2 Right-click add to enter slide details for each case (including stain type and stain procedure) . 3 Print the slide label and paste it onto the slide. 4 Place the slide in the slide holder. 5 Place the slide holder in the reaction chamber (choose between positions 1-4) .	
3	Load the reagents	1. Please place the small kit in the reagent holder. 2. The barcode on the side of the kit is scanned with an external scanning gun, and the kit holder is put into the reagent bin of the operator. 3. The computer side selects the location where the code needs to be scanned (select the corresponding reagent bit on the left side of the interface-left click is selected, and the color changes from gray to yellow) , pulls out the reagent bin, opens the reagent box cover, and pushes the reagent bin back into place, automatically scan the code on the kit	
4	Operating procedures	1. Close the top cover of the instrument, the computer click on the scan code (just slide holder to place which bit to click on which bit in the lower left corner of the scan code) ; 2. After the slide is scanned, the color of the activation button changes. 3. Click to start running the loaded slide.	
5	Extraction of slides	1. Remove the slide holder and remove the slide from the slide holder. 2. Then proceed with your lab's procedures.	
6	Clean up after the operation	1.2 Clean the slide and reagent holder. . Use 75% alcohol and a clean cloth when necessary to clean around the slide staining device. 3. Reagent and waste solution drums were inspected and disposed of accordingly;	



Important note:

- The system should not be left unattended for too long, but we recommend:
 - Each operator runs a power cycle every 24 hours (off, wait 30 seconds, then turn it back on) .
 - The software should be closed every day. This clears the accumulated buffers, making the software more suitable for long-term operation and maintaining system performance.

Chapter 3 hardware description

3.1 Overview

This chapter is intended to tell you:

- 1.The names of the various devices
- 2.What the devices do and how they relate to the overall system
- 3.Where to find more detailed information, such as operating and maintenance procedures related to the equipment.

3.2 System composition

The system consists of the following major components:

- 1.An operator in which tissue samples fixed to slides are stained. For information on the performance of the operator, see section 3.3, “Operator”.
 - 2.The computer controls the operator.
 - 4.Slide Labeler, which generates the labels used by the system to identify the slide.
 - 5.To print the report, you will also need a printer with a USB connection.
- It also includes the following auxiliary hardware:
- 6.Large reagent VAT (see sections 3.3.6 and 8.9)
 - 7.Waste Tank (see sections 8.10)
 - 8.Slides (see sections 3.6.1)
 - 9.Slide holder (see sections 6.2)
 - 10.Reagent bottle base-11 points (see sections 3.6.3)

3.3 Operator

The operator is the dyeing platform of the system, each operator must be initialized after the button switch is opened. This is specified in section 3.3.1 “Operator initialization”.

The main components of the operator are shown in figures 1,2,3 and 4. The components marked with numbers are:

NO	Name	Chapter	NO.	Name	Chapter
1	Instrument clamshell	3.3.2	7	Washing area and mixing station	3.3.8
2	Robotic Arm	3.3.3	8	Probe for liquid level	3.3.7
3	Scanning module	3.3.3	9	Reagent zone	/
4	Front of enclosure-left/right	/	10	Power switches	3.3.10
5	Staining apparatus for glass slides	3.3.4	11	Die attach module	3.3.3
6	Sealing tape and bellows	3.3.5			

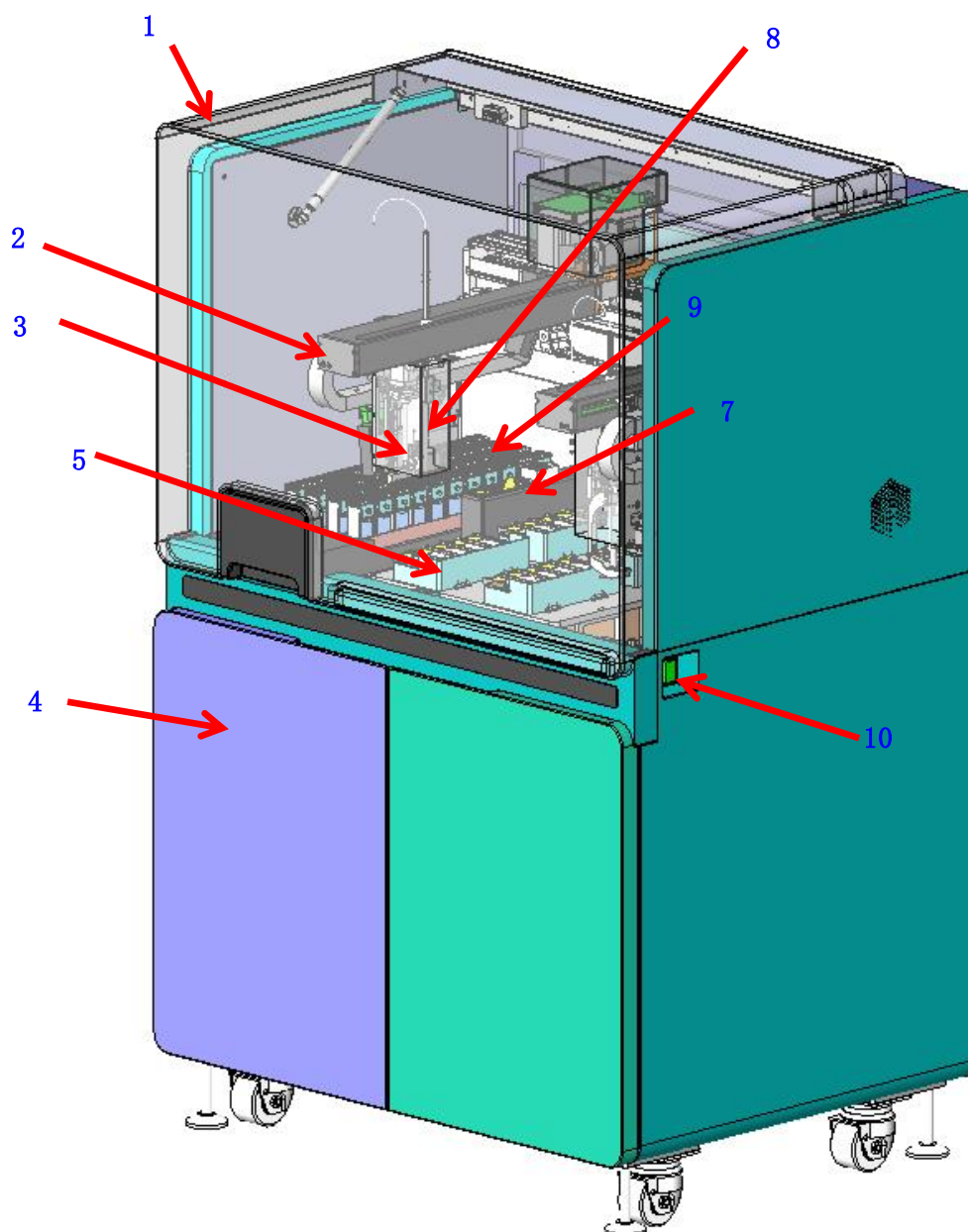


Figure 1: Stereo right view of the operator

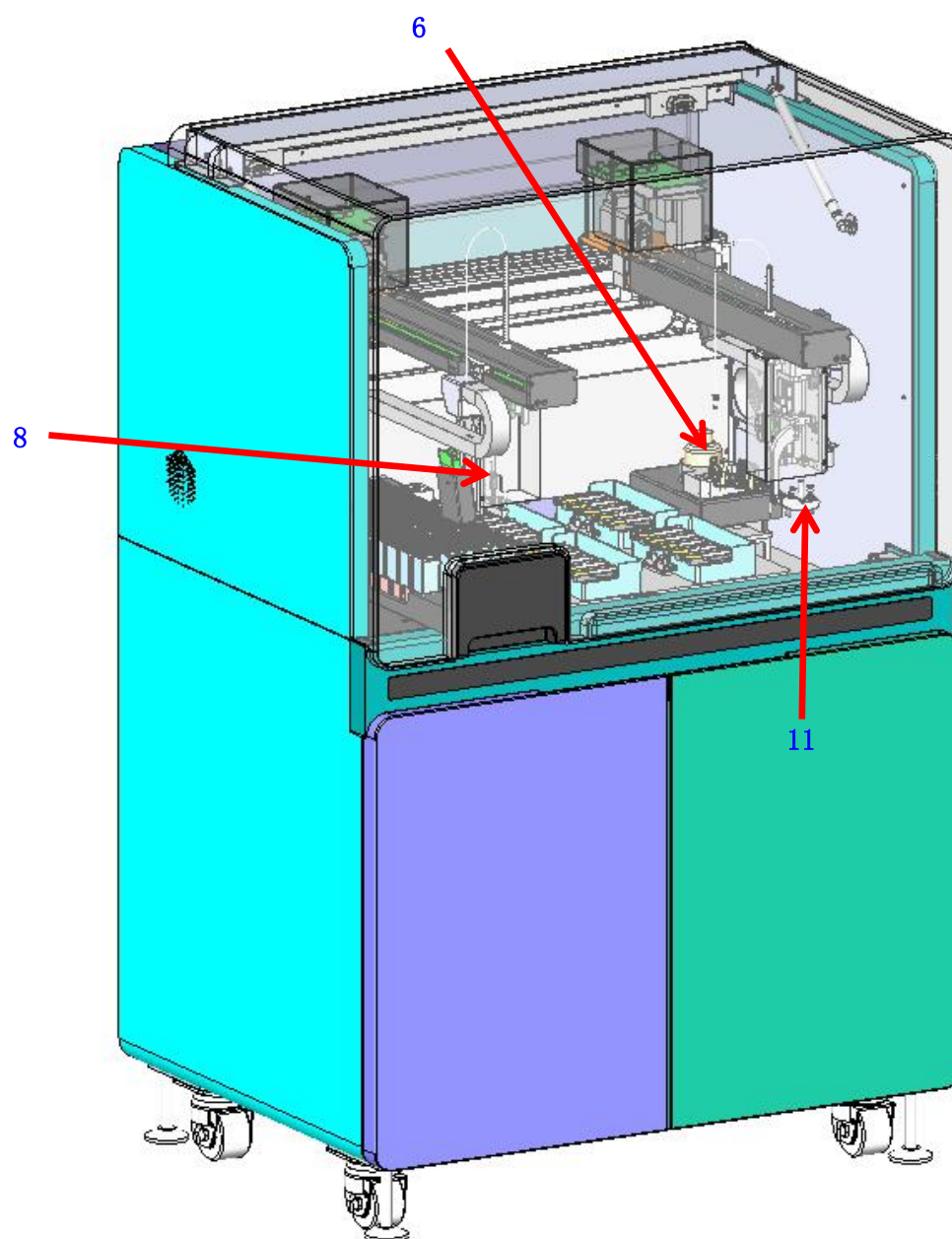


Figure 2: Stereoscopic left view of the control panel

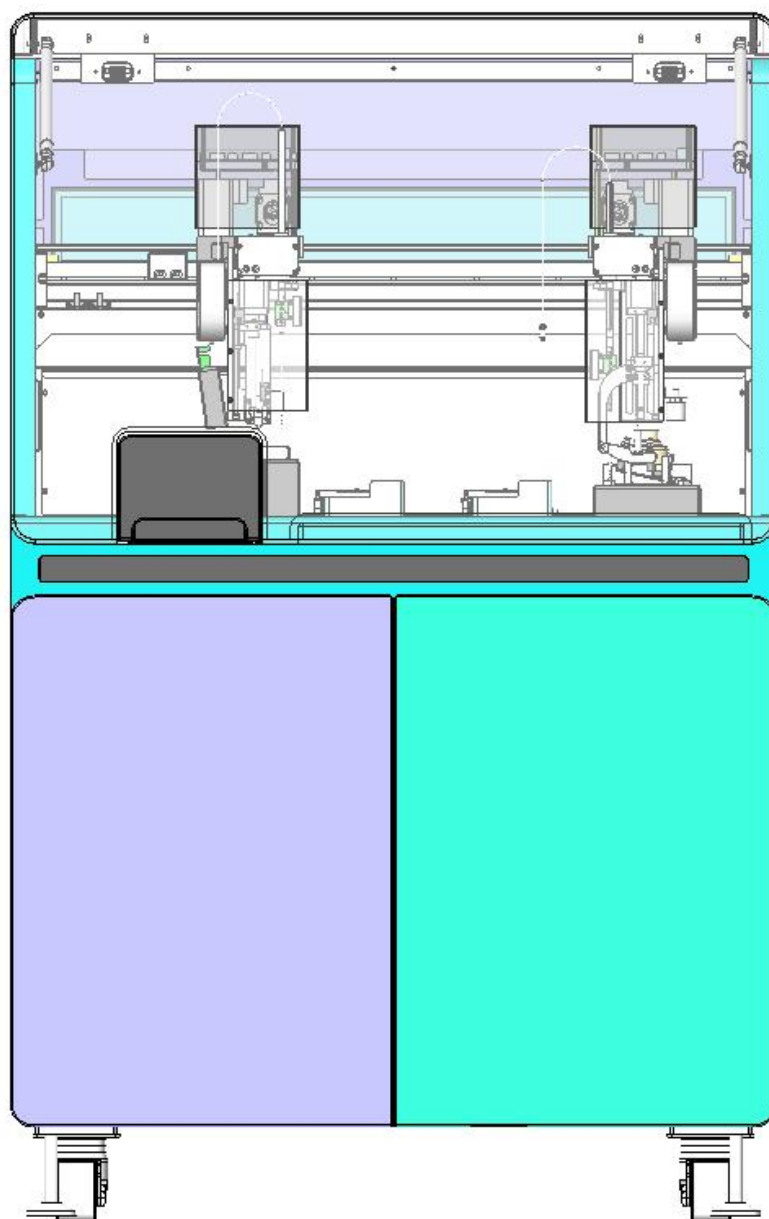


Figure 3: Front View of machine operator

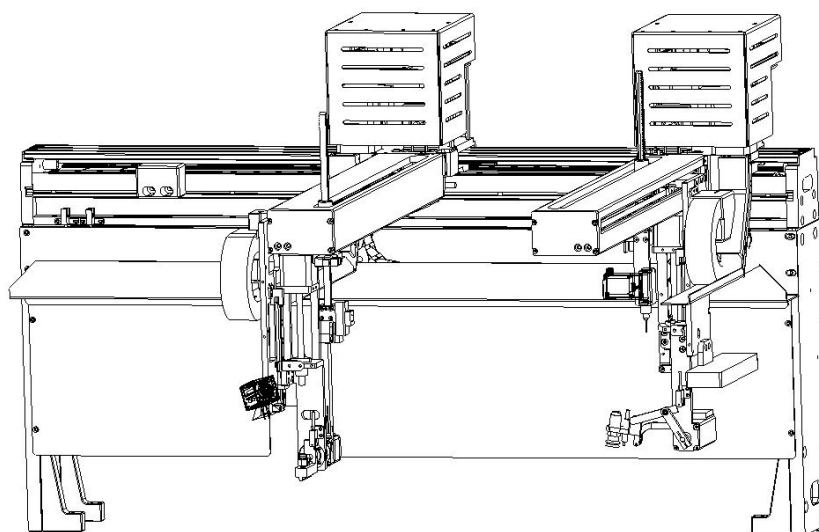


Figure 4: two manipulators

3.3.1 Operator Initialization

When you start the operator, the system performs internal checks and completes the reset of the motion components. Before attempting to start the operator, check the following:

1. Make sure that the level probe and glue adder are raised
2. Make sure the instrument clamshell is closed
3. Make sure that the large waste liquid drum is not filled;
4. Make sure the large reagent bottle is not empty;
5. Make sure the mixing station is located correctly;
6. Make sure the mixing bottle is empty.



Note: always make sure that the level probe and dispensing pin are raised before turning on the operator. If the level probe and gelling pin are lowered while the operator is energized, the control device may move before the probe and gelling pin are raised, potentially damaging the probe and gelling pin.

When the initialization process is over, the instrument status indicator on the front of the operator will turn green, and the software will show that the instrument is connected. Do not attempt to use the operator until it has been fully initialized.

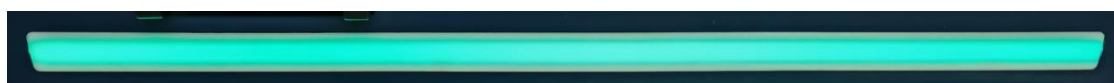


Figure 5: status light



Figure 6: Glue quantity and sealing quantity

3.3.2 Instrument clamshell

The instrument clamshell should be closed during operation and protected by a safety switch. If it is not closed, the experiment can not be started.



Warning:

- 1.The operator has a safety switch that stops operation when the instrument flips open. Do not attempt to open the instrument clamshell during operation, nor try to avoid the safety switch.
- 2.During operation, the operator uses a liquid level probe, the position of which is determined by a moving metal auto-control mechanism. There was no warning of movement of the robotic arm, liquid level probe, and sealing and dispensing module, and the speed of movement may cause injury.

3.3.3 Robotic Arm

Left manipulator: as shown in Figure 7, the left manipulator controls the position of the sampling needle for suction and dispensing of reagents. A scanning module is mounted on the ARM (to identify the slides and reagents loaded into the operator) . At the same time, air, water and alcohol fixing blocks are installed on the left mechanical arm. When staining, water, alcohol and air are added to the slide (rotating a certain angle) ;

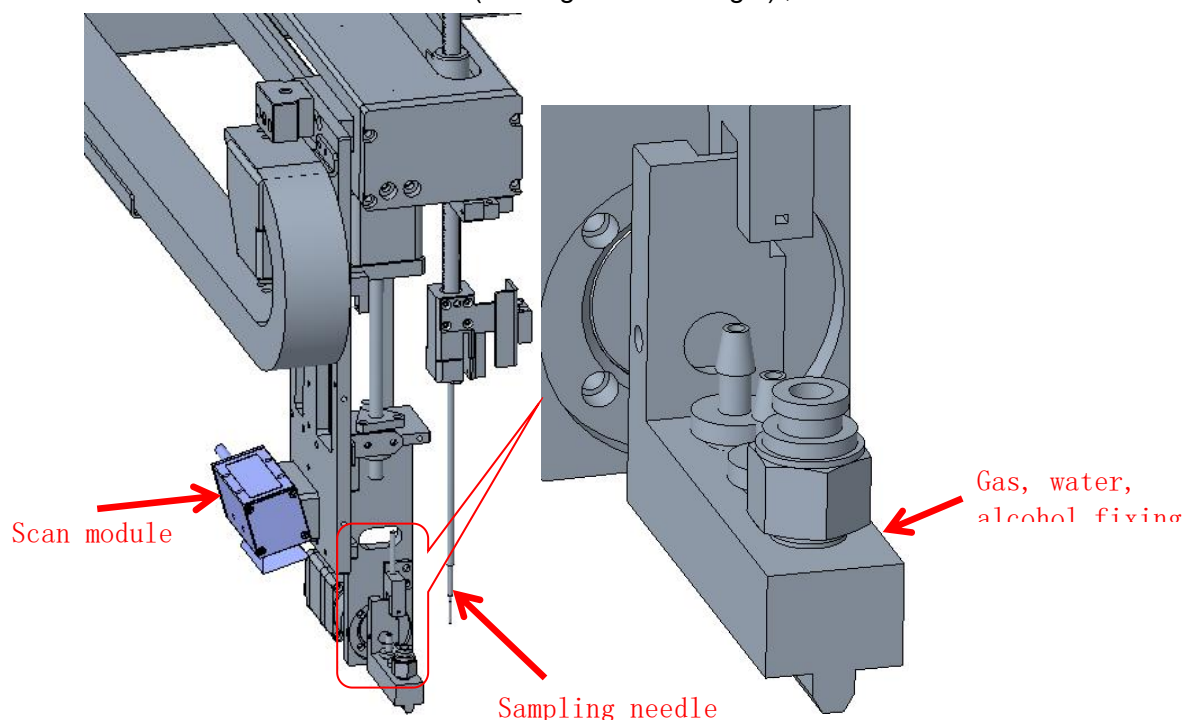


Figure 7: left arm



Note:

- 1.The scanning window of the scanning module should be cleaned regularly.
- 2.If the level probe is broken or bent, replace it as described in 8.3.2“Replacement”.

Right mechanical arm: as shown in Figure 8, the right mechanical arm controls the gluing module, the sealing module and the UV curing lamp;

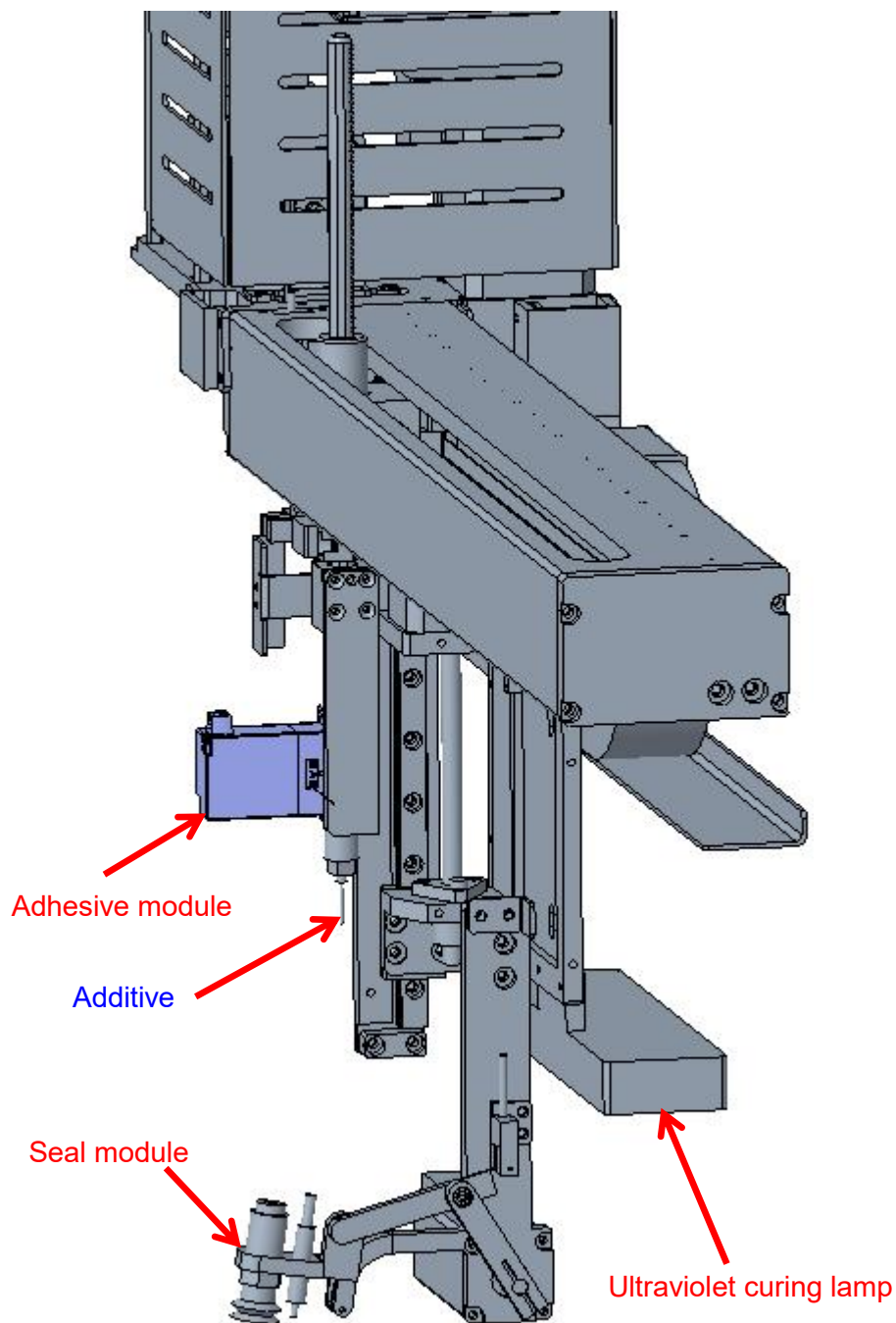


Figure 8: Die Block diagram



Note:

- 1.The gluing needle of the gluing module should be cleaned regularly.
- 2.If the glue needle is broken or bent, screw the glue needle to replace it.

3.3.4 Staining apparatus for glass slides

Slide manipulation is performed in a slide-staining device. Each operator includes four slide staining devices.

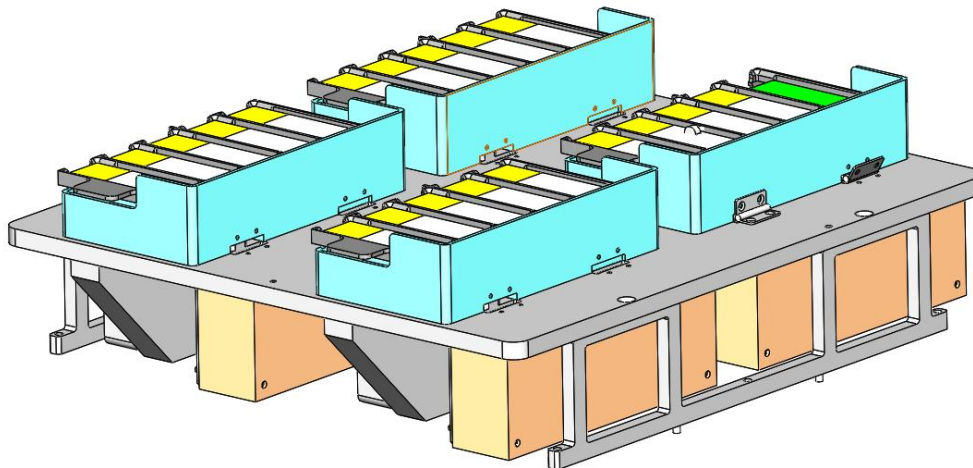


Figure 9: Staining Reaction Chamber module



Caution: the temperature of the slide staining apparatus can be very high and can cause severe burns. Do not touch the staining device or the area around it for 20 minutes after the operator stops working.



Caution: during the operation of the system, some reagents (including potentially hazardous reagents) may accumulate around the slide staining device. Slide holders are filled with operator and slave operators

When removed, the accumulated reagent may contaminate the slide holder, potentially contaminating the preparation tray (if used). Although the risk to the environment and personnel is minimal, users should wear protective clothing and appropriate gloves for slide rack and preparation tray operations.

When preparing the operation, the operator places the slide holder in the reaction chamber, and the user can begin the subsequent operation. When the system is in the process of operation, do not try to open the flip, take out the slide holder, should first give up the operation.

3.3.5 Slide staining unit heater

The instrument has a heating element at the position of each slide. Each heating element is monitored independently. Contact your service provider in case of temperature error or heater failure.

3.3.6 Large reagent vats

The large reagent barrel is placed on the large container tank. To open the door, pull lightly over the sides of the door. Two waste containers are located outside the instrument



Note: during the dyeing process, the large reagent tank door should be kept closed. Facing the operator, the following containers are placed in fixed positions, in the following order from left to right:

Containers	Volume (L)	Color	Reagents
50% ALCOHOL	3.6	Ice blue	50% ALCOHOL
95% ALCOHOL	3.6	Light Brown	95% ALCOHOL
ALCOHOL	3.6	Orange	100% ALCOHOL
DI WATER	3.6	Blue	DI water
DI WATER	3.6	Blue	DI water
DI WATER	3.6	Blue	DI water
OVERFLOW BUCKET	3.6	Yellow	Condensate and overflow from the mixing tank

Upper level from left to right:

Containers	Volume (L)	Color	Reagents
Dewax solution	3.6	Red-brown	Dewax solution
WASH BUFFER	3.6	Green	Wash buffer
BUFFER SOLUTION	3.6	Purple	Buffer solution

The large reagent barrel is equipped with a liquid level sensor, which warns when the liquid level of the reagent is low, and the reagent needs to be supplemented in time;

The waste container is also equipped with a float switch to react when the waste level is too high. Check the waste drum regularly (at least once a day) and empty it if the container is going to be full.



Note:

1. If the waste level warning is activated during the dyeing operation, the waste drum needs to be disposed of after this round of tests to avoid spillage of waste liquid.
 2. Make sure the container is in the correct condition every morning: empty the waste drum and fill the large reagent drum. Before using the operator, make sure the container is in the correct position. If a large container is missing, the operator will stop.
 3. Make sure the waste drum is less than half full and the container lid is firmly closed before operating the operator. If the lid of the container is not securely closed, waste liquid may spill or eject from the container in the event of a level sensor failure.
 4. The waste drum is heavy when filled. When emptying, use proper handling:
- Put on latex gloves, eye protection and appropriate protective clothing before touching the reagent or cleaning the instrument.
 - All relevant laboratory procedures and government regulations should be followed when using and handling reagents and waste fluids.

3.3.7 Probe for liquid level

The level probe sucks the reagent from the container and sends the reagent to each slide in the slide staining device. The probe is equipped with a level sensor. Each container has a residual capacity that can not be reached by the probe, called the "Invalid capacity". Each type of container has a different amount of invalid capacity.

Methods for replacing level probes: see Section 8.3.2

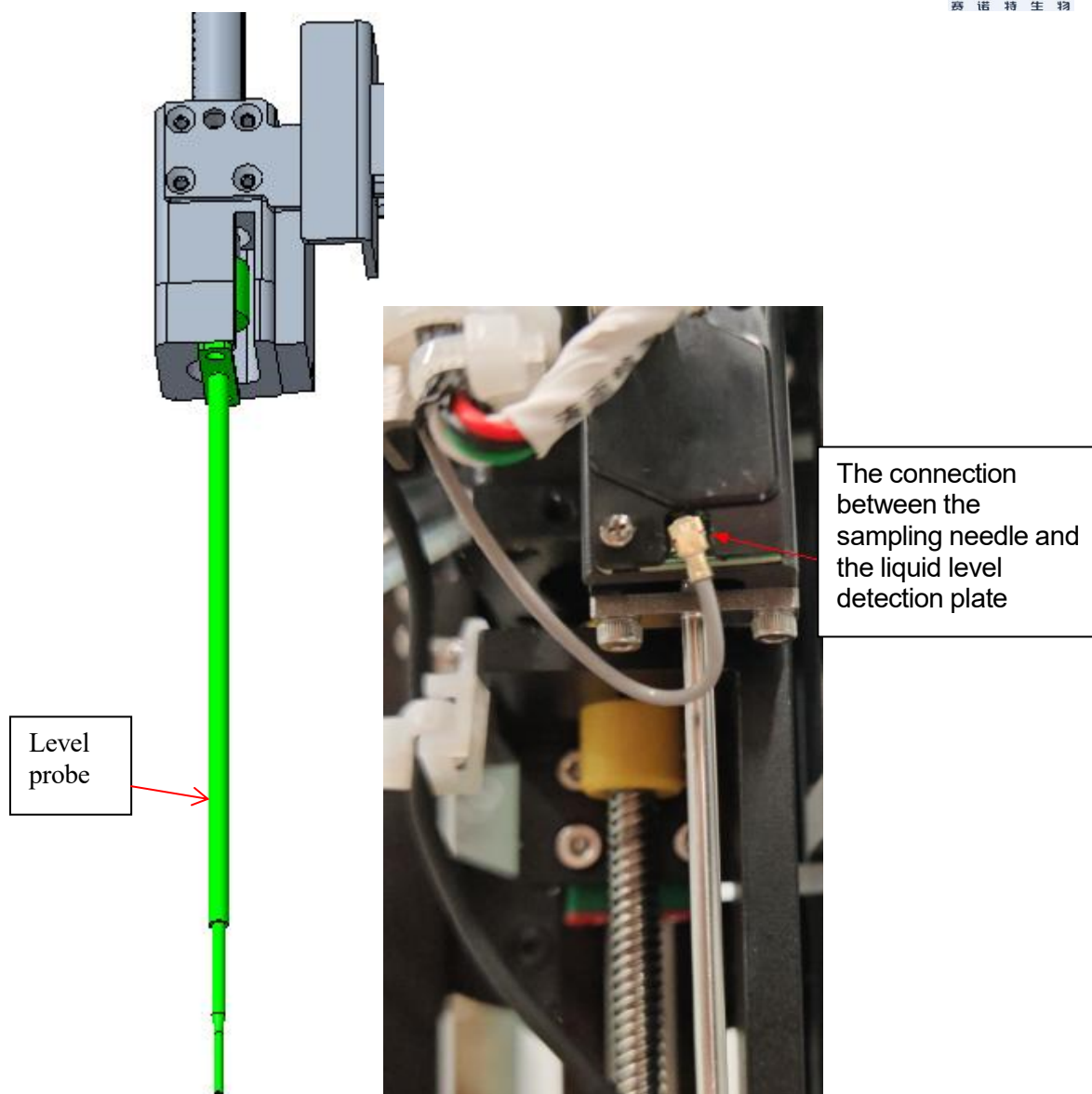


Figure 10: Schematic diagram of a level probe mounted on a robotic arm

3.3.8 Washing area and mixing station

As shown in figures 11 and 12, the small holes in the wash area are used for level probe wash and tip wash. The mixing tank consists of six circular holes. The mixing tank can be inserted into a mixing tube and is used to hold freshly prepared reagents that must be mixed before use. This is determined by the software and the type of reagent and is done automatically when needed.



Figure 11: Schematic of washing area and mixing tank

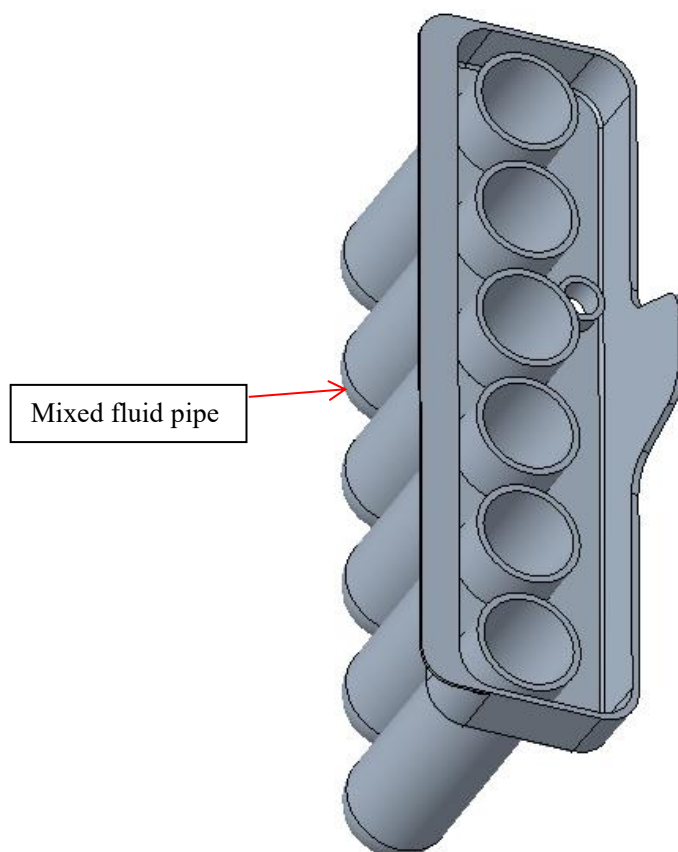


Figure 12: mixing pipe

3.3.9 Syringe, large-volume reagent area, air-pressure-valve-adjusted digital display area

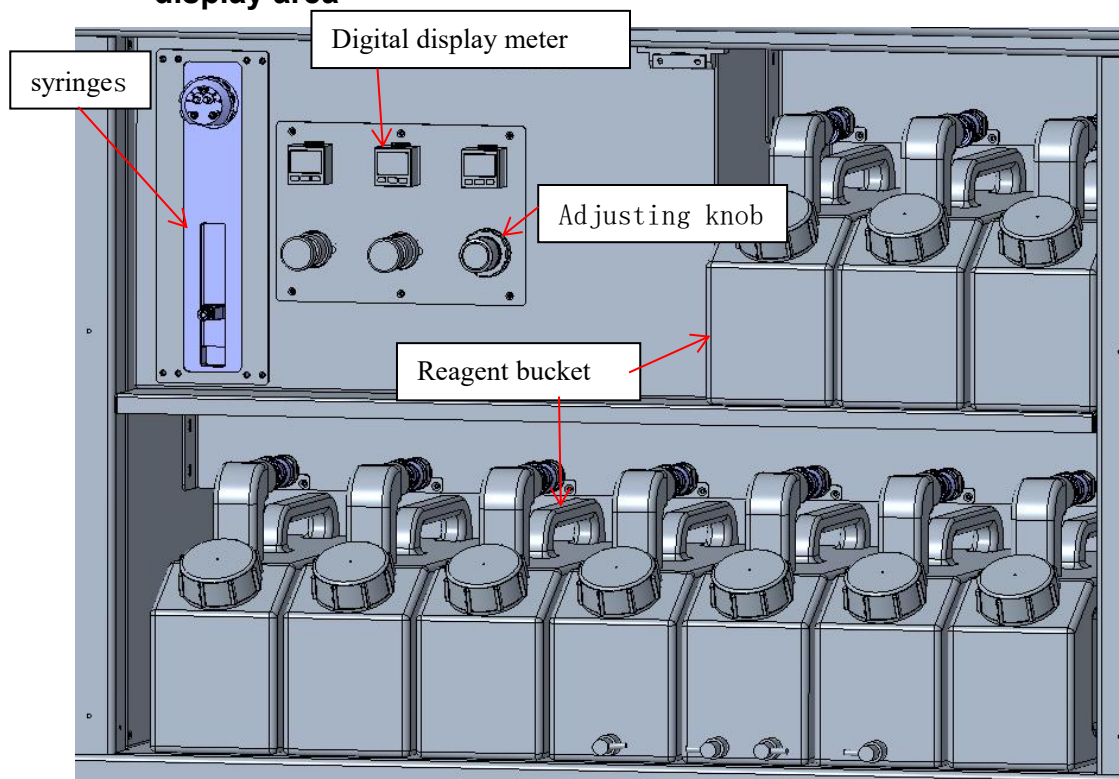


Figure. 13: Schematic diagram of syringe, large volume reagent area and air pressure valve adjustment digital display area

As shown in Fig. 13, opening the front of the enclosure to the left and the front of the enclosure to the right, in order from top left to right: syringe, air valve adjustment digital display area, large volume reagent area (described in detail in 3.3.6) .

The syringe is used to control the absorption and distribution of the reagent. To check the condition of the syringe components, if there is any leakage or damage to the syringe components, please contact and consult our after-sales service.

From left to right, the digital display area of air pressure valve adjustment is: left arm blowing pressure display (pressure display range: 80 ~ 100 kpa) , glue adding pressure display (pressure display range: 25 ~ 30 kpa) , suction pressure display (pressure display range: 40 ~ 60 kpa) , the digital display below the corresponding pressure for the rotating adjustment rod; if the pressure value is not correct, please contact and consult our after-sales service.



Note:

Check the syringe at least once a week to make sure no air is entering the fluid tube. Air entering the liquid tube can cause uneven staining.

Each time you open the front left and front right of the housing, check the values of the three pressure display meters.

3.3.10 Switch



Figure. 14

The instrument switch is on the right of the instrument:

1. Press the switch to “—”, the switch light is on: the operator is on;
2. Press the switch to “O”, switch indicator light off: the operator is closed;
3. When the instrument is restarted, after shutting down the instrument, it needs to wait 30 seconds before turning on

3.4 Computer

A master computer controls an operator and provides data storage. The instrument-configured computer must be used. The host computer also provides connections to these devices if slide labelers and standard printers are to be installed. During the installation of the system, the host computer has been set up and connected to the operator.



Note: Do not shut down the computer during operation. To switch users who are logged on to the computer, use log off on the start menu of the operating system, instead of shutting down the computer.

The following ports are used by the system:

1. USB port: for connecting handheld scanners
2. USB: for standard printers
3. USB: for slide labels
4. External network connection: connect to the operator, which is an additional network card installed on the computer.

3.5 Label apparatus for Glass Slide

The system provides a unique slide label for each slide. The slide labeler is used to print these unique marks on the slide label, which is then affixed to the slide. When the slides are loaded into the operator, the software acquires an image of the slide label to determine the position of each slide.

The slide labeler is connected to the computer through a parallel port and is installed and tested when the system is installed. For information on labels, label tape replacement and cleaning, please refer to the documentation provided with the label maker.

3.6 Auxiliary equipment

This section describes the ancillary equipment that you may use with your system.

3.6.1 Slides

There are two types of slides used in the instrument:

1. Slides are positive and negative, need to distinguish, need to be in the organized side of the bar code;
2. Cover glass has no positive or negative difference;



Figure 15: Slides



Figure 16: Coverslip

Cover Glass Specification:

Size	Width: 24mm	
	Length: 50mm	
	Thickness: 0.13-0.16 mm	
Materials	Glass, ISO8037/1	

Slide specification:

Size	Width: 25mm
	Length: 75mm
	Thickness: 1-1.2 mm
Label area	Width: 25mm
	Length: 16.9-21.0 mm
Materials	Glass, iSO8037/1



Note:

Do not use a glass slide with a missing corner.

3.6.2 Slide holder

The slide (bar code pasted) is fixed to the slide holder when it is loaded into the operator.
Each slide holder can hold 5 slides

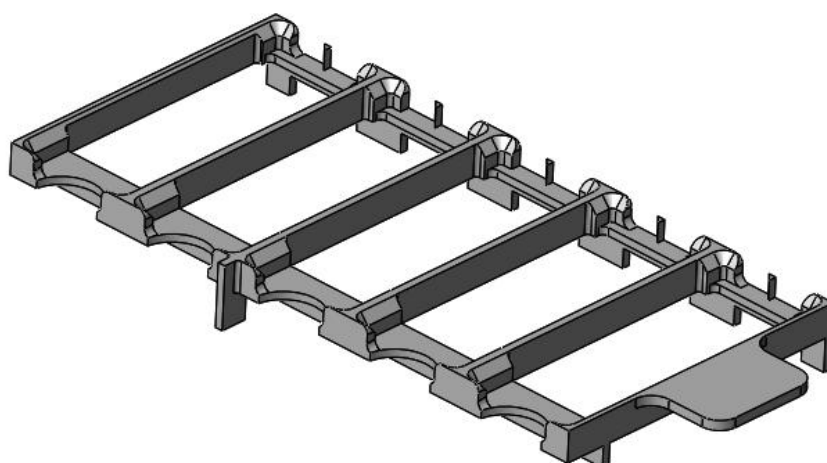


Figure 17: Slide holder



Figure 18: glass slide holder

3.6.3 Reagent bottle base-11 points

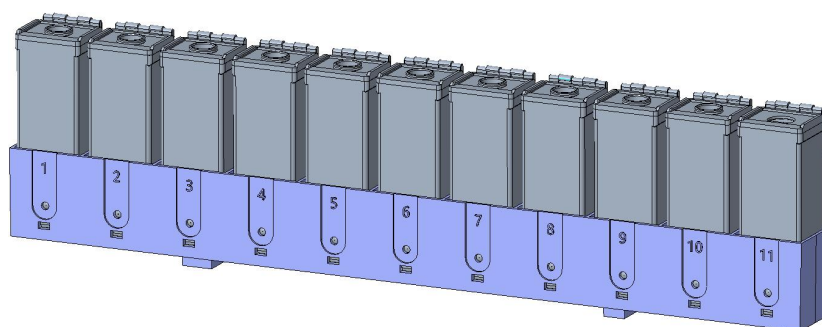


Figure 19: reagent bottle base-11 cavity (reagent rack)

- Reagent bottle base can be installed 5 mL, 10 mL, 25 mL, 30 mL of reagent containers, the reagent rack on the reagent platform, before the experiment, the reagent container cover should be opened, bar code exposed.
- Two foolproof holes are arranged on each side of each cave of the reagent bottle base to ensure that the reagent container is placed on the reagent bottle base in a fixed direction. This is important because the ID tag at the top of the container must be placed in the specified position for the scan module on the robotic arm to successfully capture its ID image.

3.6.4 Reagents

Large amounts of reagents

In large containers as described in "3.3.6 large reagent baths".

Small amounts of reagents

Use 5 mL, 10 mL, 25 mL, 30 mL containers suitable for the reagent holder.

3.6.5 Capsule (cover glass) and rubber bottle

The capsule can hold 100 coverslips at a time, but no more than 100.

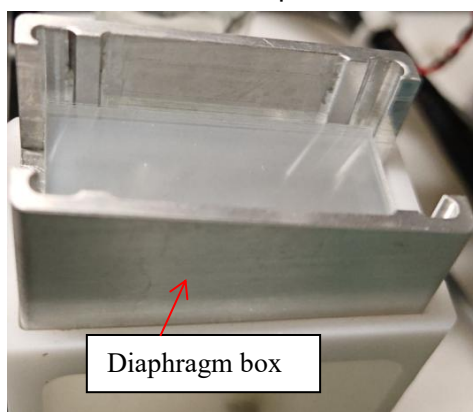


Figure 19:



Figure 20:



Note:

Before the experiment, the cover glass was loaded in the capsule and the glue bottle was placed.

Chapter 4 software overview

4.1 Overview

Automatic dyeing machine software using standard Windows operating principles and methods. To run and use the system software, you should be familiar with using the mouse and standard Windows.



Note:

- Because software is responsible for controlling critical hardware and storing critical data, do not run other applications that take up virtual memory on the computer that controls the operator. If other applications take up too much virtual memory, this software may be closed, and at the same time show an alarm error. If this happens, restart the software.
- Do not shut down the computer while it is running. To change who is logged on to the computer, use log off from the start menu instead of shutting down the computer.
- The software, like most Windows applications, uses the system settings to print the report date and time. In some cases, excessively long date and time formats may exceed the available space for the date. To ensure that your information is not lost, format a short date to be a maximum of 12 characters and a long date to be a maximum of 28 characters.

This section is designed to tell you:

- Start the software
- Run message dialog box
- Basic settings of the system

4.2 Start the software

Once you've started Windows with your username and password, double-click the software icon to launch the software. This icon is placed on the desktop of your computer's operating system during installation. During boot, the "Boot" screen is displayed.

The home screen is displayed after the software has finished booting. On the top left of this screen are some of the features common to all software pages. The following sections describe these features and explain the general functionality of the software.

4.3 Run message dialog box



Right-click on the right side of the main interface, the warning icon pops up the running information dialog box, you can view the timely status of the instrument, when the instrument fails, you can view the status in the running information dialog box, and carry out the next step of troubleshooting.

Operation information			
No.	Time	Type	Information
1	14:46:42	Mark	connecting!
2	14:46:42	Mark	Communication connection...
3	14:47:03	Error	Unable to establish a communication connection!
4	14:47:04	Mark	以太网 2:The computer IP has been matched successfully!
5	14:47:04	Mark	以太网:The computer IP has been matched successfully!
6	14:47:05	Mark	connecting!
7	14:47:05	Mark	Communication connection...
8	14:47:05	Mark	Establish a communication connection!
9	14:47:05	Mark	Get device status:5A-A5-01-02-03-0C-00-01-02-94-37-0C-00-01-04-01-09-01-01-01-00-B8-48
10	14:47:05	None	Midpoint data transfer:5A-A5-01-04-03-00-00-00-04-16-93
11	14:47:05	None	Medium data transfer on the computer:5A-A5-01-04-03-00-00-00-04-16-93,ack Return OK
12	14:47:06	None	Midpoint data transfer:5A-A5-01-01-03-12-00-01-04-12-2E-12-00-01-04-01-03-04-06-00-00-00-00-00-00-A4-EA
13	14:47:06	None	The upper computer sends an ACK:5A-A5-01-04-03-00-00-00-04-16-93;ACK resolutionExecuted successfully
14	14:47:06	None	Medium transmits system information on the machine:5A-A5-01-01-03-12-00-01-04-12-2E-12-00-01-04-01-03-04-06-00-00-00-00-00-00-A4-EA,04:Device statuscommandExecuted successfully
15	14:47:06	Mark	Successful initialization
16	14:47:06	Mark	Gain weight!5A-A5-01-02-02-12-00-01-02-AF-DF-12-00-01-01-05-02-01-01-01-01-00-00-00-00-00-B8-21
17	14:47:06	Mark	Get sensor status!5A-A5-01-02-02-12-00-01-02-AF-DF-12-00-01-01-05-01-01-01-01-01-00-00-00-00-00-B4-65
18	14:47:06	Mark	Acquire01-Main boardVersion number instruction:5A-A5-01-02-03-0C-00-01-05-D5-ES-0C-00-09-03-01-02-01-01-01-00-6A-EF
19	14:47:06	Mark	Acquire02-Reaction chamber 1Version number instruction:5A-A5-01-02-03-0C-00-01-05-D5-ES-0C-00-09-03-02-02-01-01-01-01-00-6A-DC
20	14:47:06	Mark	Acquire03-Reaction chamber 2Version number instruction:5A-A5-01-02-03-0C-00-01-05-D5-ES-0C-00-09-03-03-02-01-01-01-01-00-6B-0D
21	14:47:06	Mark	Acquire04-Reaction chamber 3Version number instruction:5A-A5-01-02-03-0C-00-01-05-D5-ES-0C-00-09-03-04-02-01-01-01-01-00-6C-0E

Figure 21



Note:

Not all notifications or messages appear on the operator tab, but they do appear on the run information page of the software. Check the run information page to make sure that no information is ignored and take action accordingly.

Chapter 5 status screens

In the clinical client program, the status screen provides system control by displaying a view of the slide and reagent position in the operator; The“Program status” screen toggles display of program progress information with the mouse wheel.

5.1 System status screen

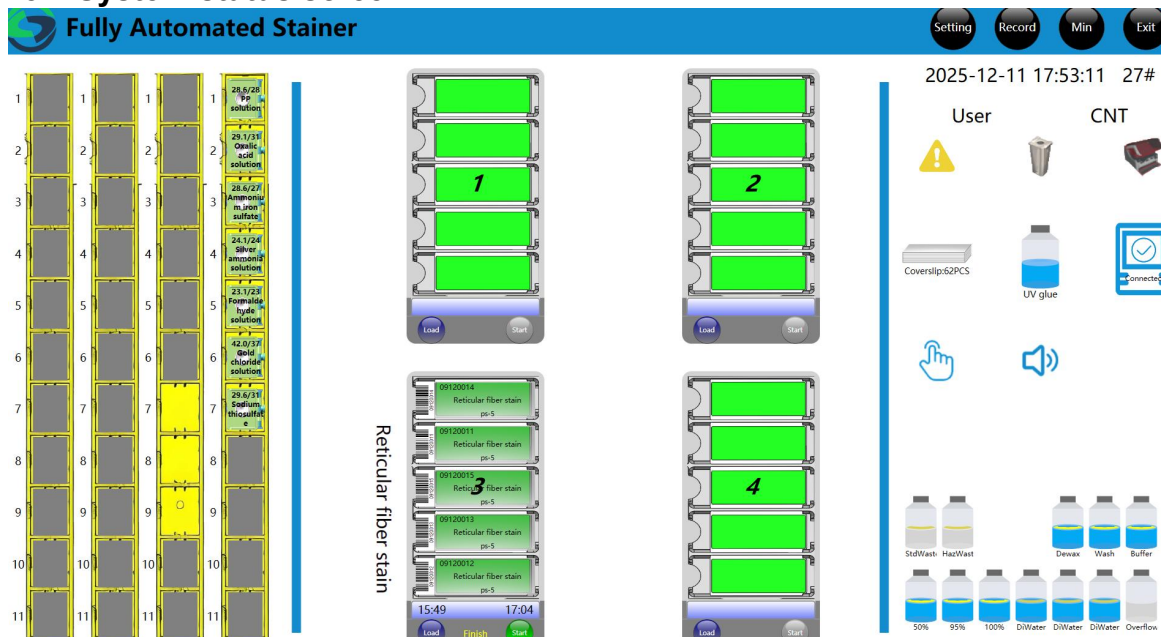


Figure 22: status screen



Figure 23: status screen

The screen allows you to control the operation, it can display the mounting of the slide holder and reagent details, as well as reagents, waste liquid and system safety switch status.

5.1.1 Hardware status

If a part of the system fails, an icon on the right side of the screen displays a warning sign;

	When an instrument cover or large container door is opened during a dyeing run, these doors must be closed to use the operator. If the staining run is not in progress, an information symbol is displayed No.
	Reagents missing or insufficient.
	Insufficient dose of reagent.
	When the instrument fails, you can right-click to view the specific fault information, as well as the specific process steps.

0

5.1.2 Temperature indication

When the slides need to be heated for staining, the temperature indicator appears on the right side of the slide corresponding to the system status screen.

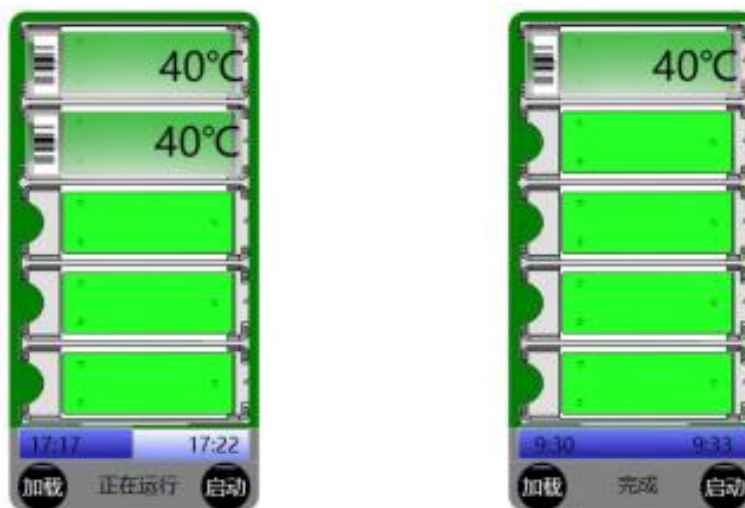


Figure 24: Temperature Indicator bar



Warning:

The slides in and around the slide-staining device and the slides in the slide-staining device can be very hot and can cause severe burns if touched. Do not touch the slide stain until the temperature indicated by the software is lowered. If the software is not running, wait at least 20 minutes after powering off the operator.

5.2 Program status screen

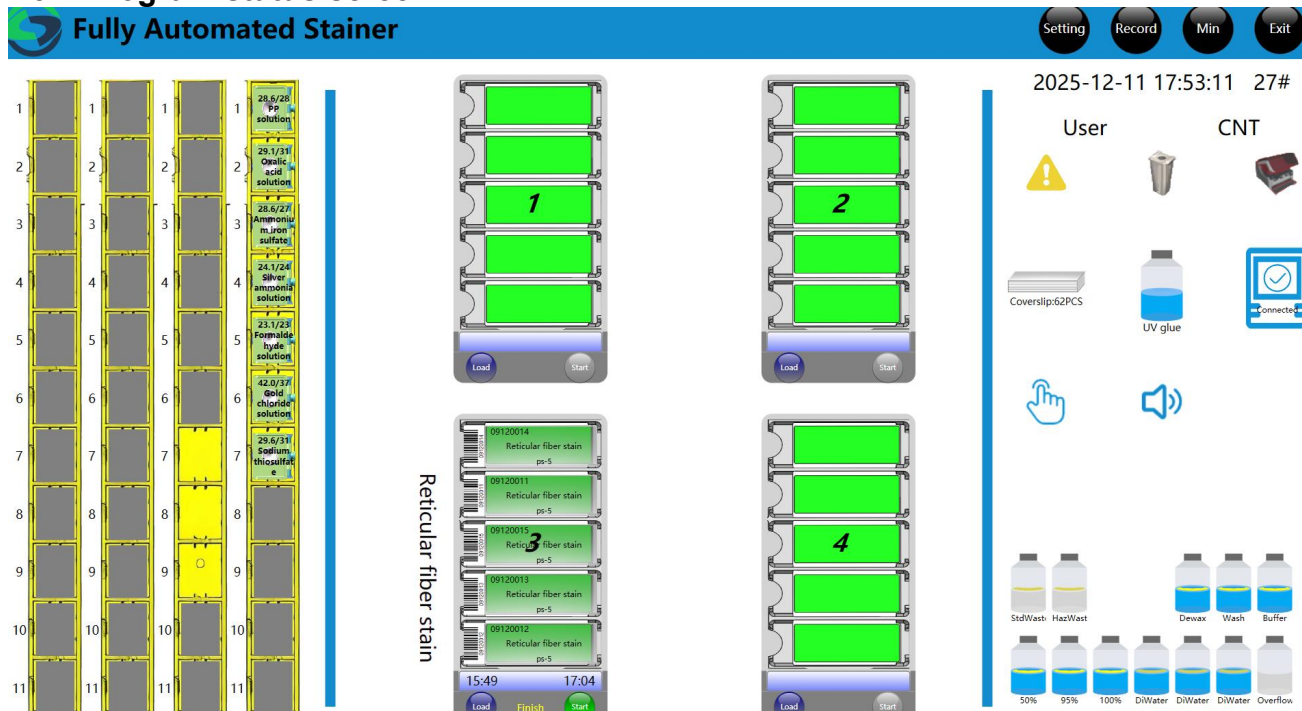


Figure 25: application status screen

To see the progress of the chamber, Scroll to the progress screen, as shown below.



Figure 26: Program flow status screen

The current step is highlighted in gray; the completed step displays a check mark, and the × icon displays if an unexpected event occurs, indicating that the current step is running in error.

Chapter 6 experimental setup

The standard workflow for creating a slide for processing with an operator consists of the following main steps:

- 1.Preparation of slides.
- 2.Create a case for the slide in the system software.
- 3.If necessary, add or edit physician details.
- 4.Enter slide details.
- 5.Create control slides according to standard laboratory procedures.
- 6.Pasting slide labels.
- 7.Place the slide on a slide holder and place the slide holder in an operator.

When slide processing begins, a series of slides, cases, and run reports are generated on the slide history screen. If the standard workflow doesn't fit your lab, there are others.

6.1 Experimental setup

This product can be used for specialty staining. A variety of staining types can be set.

Before setting up the experiment, you need to place the slides and then operate the software.

6.1.1 registration kit: scan the side code on the kit with a scanning gun connected to the computer and mount the kit on the kit holder;



Figure 27

6.1.2 the computer selects the location of the code to be scanned (select the corresponding reagent bit on the left side of the interface-left click is selected, and the color changes from gray to yellow) , pulls out the reagent bin, and then loads the reagent rack into the reagent bin, open the cover of the kit, Push the kit back to its original position, and automatically scan the code on the kit

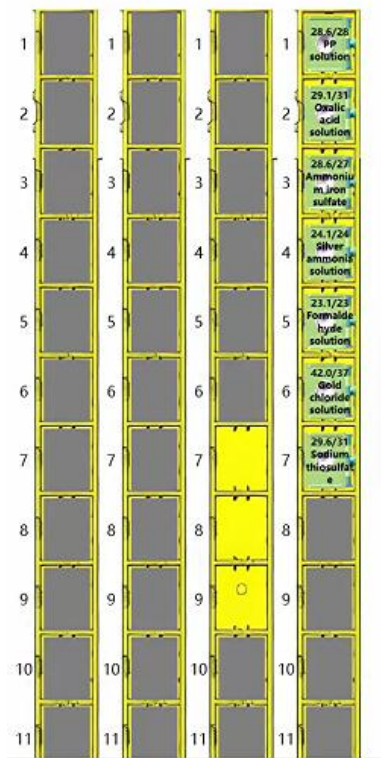


Figure 28

6.1.3 establishment of cases and printing of experimental barcodes and pasting of barcodes onto glass slides;

1. Click“Settings” in the top right corner of the screen

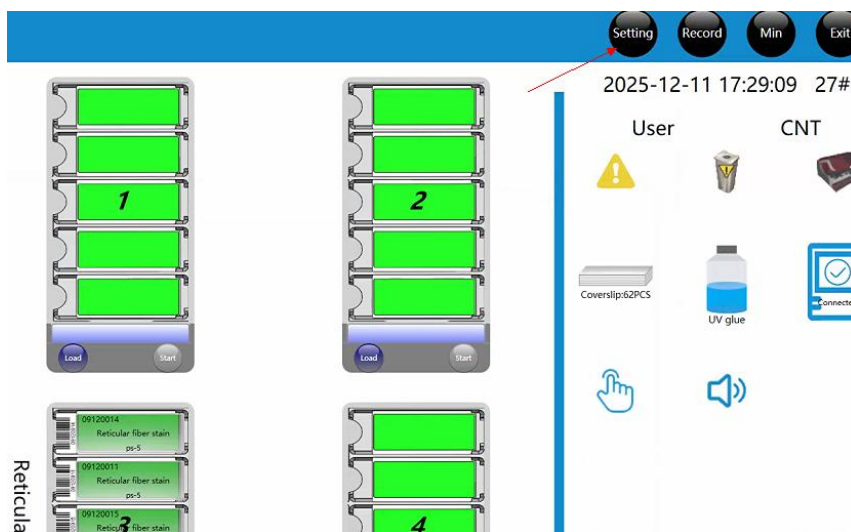


Figure 29

2. Right-click the yellow area of the mouse, then left-click to select add, patient information input, click“Confirm”;

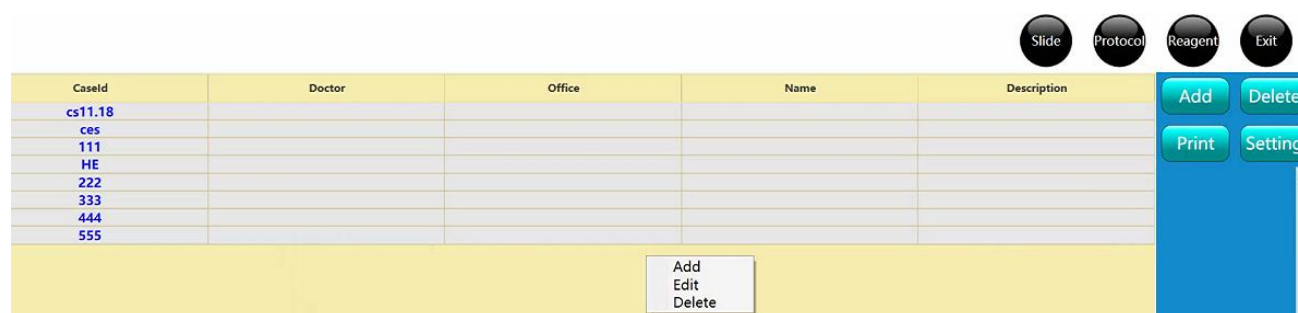


Figure30

Case information

Caseld

Doctor

Office

Name

Description

OK
Exit

Figure31

3. Then select the case, and then click on the right side of the interface“Add”, pop-up slide information, at this time select the case needs the type of staining And staining process, and finally click“Confirm”, this time the right side of the bar code, this case has a few slide samples to click a few times to confirm;

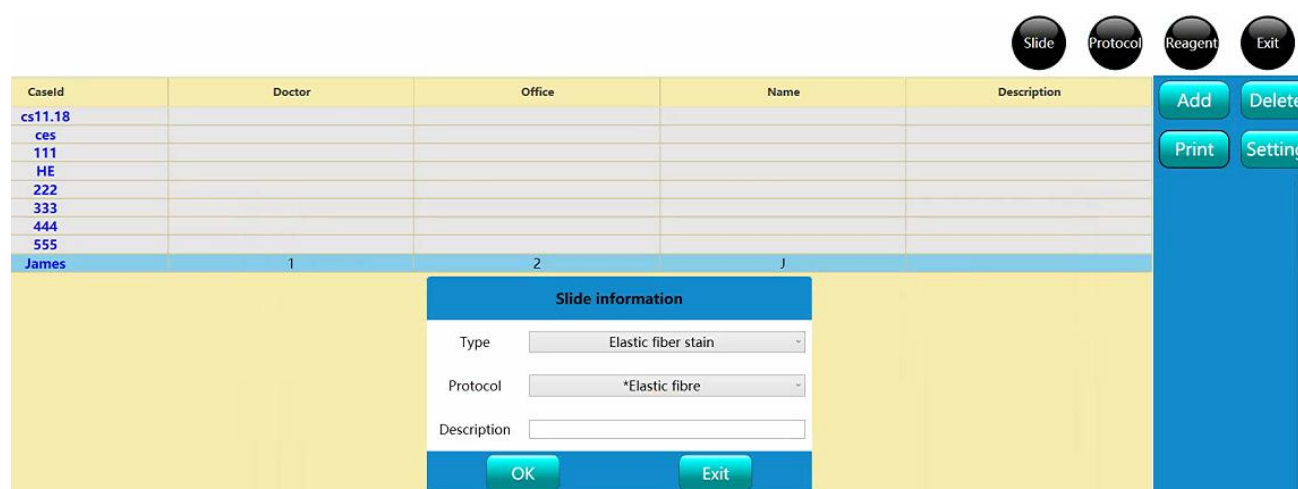


Figure32

4. Then left-click the mouse to select the bar code, and then click“Print”, the printer will label printing, the label will be affixed to the corresponding glass slide;

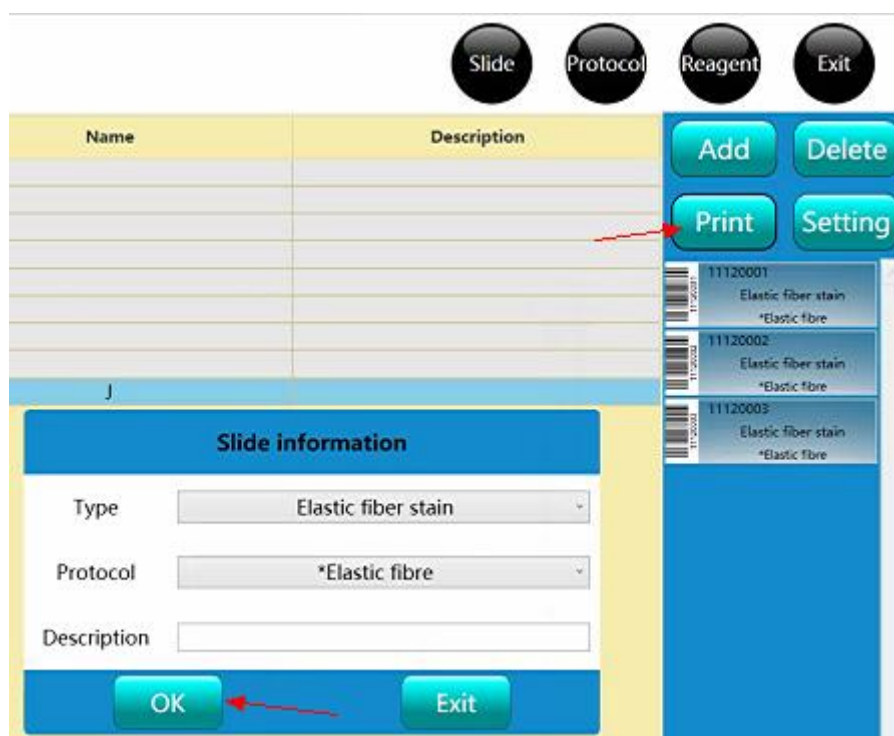


Figure33

6.1.4 slides are placed in slide holders and reaction bins (1-4) are placed in slide holders, one for each staining system and up to four staining systems are supported simultaneously.



Figure34



Figure35

6.1.5 close the security door after making sure the slide is placed correctly; click on the scan code at the computer end (click on the lower left corner of the code at the place where the slide holder has just been placed) to confirm that it is correct and that the slide identified by the scan code is not the same as the actual slide, need to check whether there is a bar code error, if necessary, re-code, re-scanning code identification;

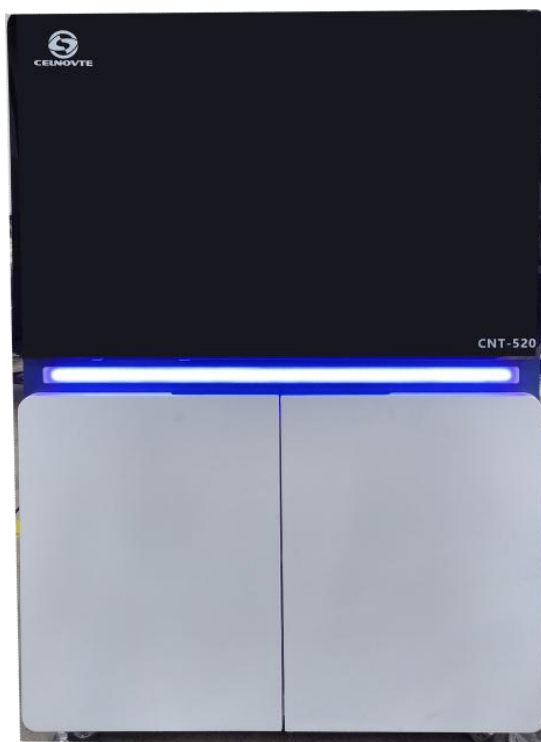


Figure 36: Safety Door status

6.1.6 click on "Start" in the lower right corner to start the experiment

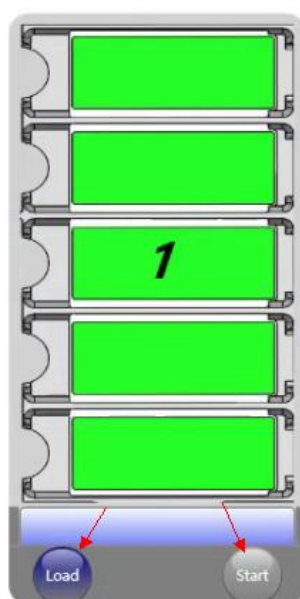


Figure37

6.2 delete slide

To delete a slide from the slide list, right-click the slide in the slide list on the slide setup screen, and select the delete slide experiment from the submenu;

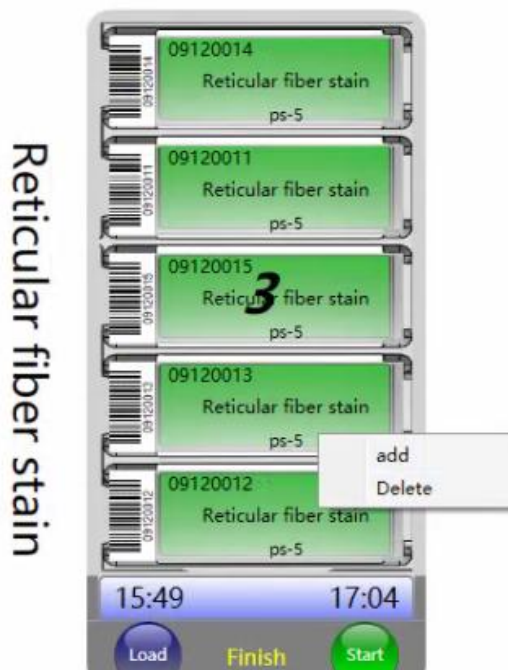


Figure 38: delete the experiment

6.3 running experiments

6.3.1 do not open the safety door after the experiment has started and wait for the experiment to finish, as shown below.

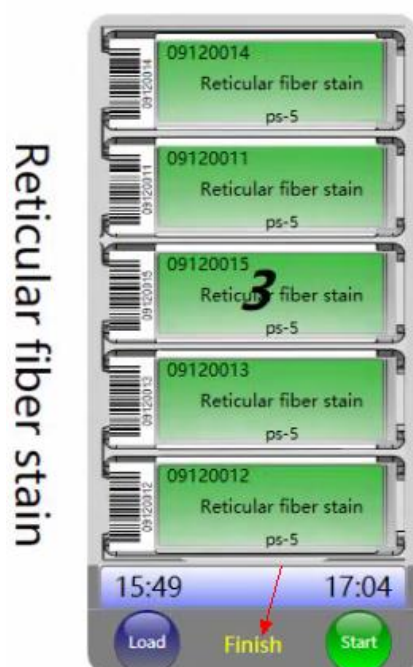


Figure 39: the experiment is complete

6.4 completion of the experiment

6.4.1 after the completion of the experiment, the safety door is opened, the slide holder is removed, and the countertop of the reaction chamber and the mixing tank are cleaned;

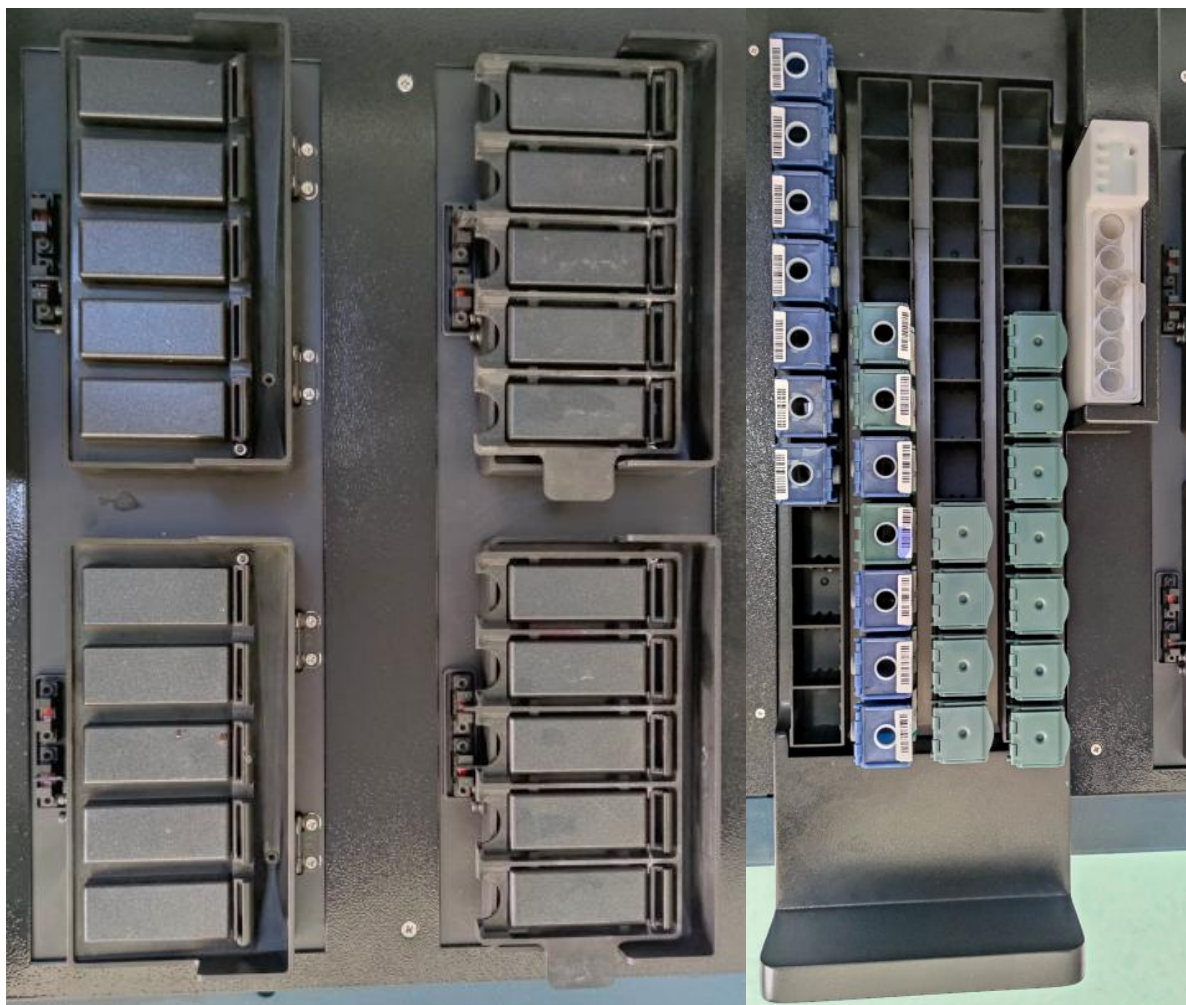


Figure 40

Figure 41

Chapter 7 management of reagents

The reagent list screen is used to display the expiry date and the balance of the reagent;



Note:

When handling reagents and opening small containers, wear gloves. During transportation, the reagent container may be tilted, which may cause the reagent to adhere to the reagent lid.

7.1 Overview of reagent management

- The procedure for running slides in an operator requires that the reagent and the amount in 5 mL, 10 mL, 25 mL, 30 mL containers are sufficient. In order to use reagents, the reagents must be loaded (see 6.1.1-6.1.2) and added to the software“List of reagents”.
- After a reagent has been used, the system calculates the amount remaining.

											Slide	Protocol	Reagent	Exit
UPI	BatchNo	Validity	Specification	Dosage	Specification\	DosageWarn	LastUseTime	PersionMaxD\	PersionCurren\	TableReagent	GroupName	Name	Description	
32372946	51019	2026/8/28	30.00	30.00	30.00	30.00		200.00	0.00		Hematoxylin-Eosin stain	Dewax A		
32371131	51019	2026/8/28	30.00	30.00	30.00	30.00		200.00	0.00		Hematoxylin-Eosin stain	Hematoxylin		
32377020	51019	2026/8/28	30.00	30.00	30.00	30.00		200.00	0.00		Hematoxylin-Eosin stain	Differentiation solution		
32376643	51019	2026/8/28	30.00	30.00	30.00	30.00		200.00	0.00		Hematoxylin-Eosin stain	Blue return solution		
32376612	51019	2026/8/28	30.00	30.00	30.00	30.00		200.00	0.00		Hematoxylin-Eosin stain	Eosin dye		
32354493	51018	2026/9/25	30.00	30.00	30.00	30.00		200.00	0.00		Elastic fiber stain	PP solution		
32357189	51018	2026/9/25	30.00	30.00	30.00	30.00		200.00	0.00		Elastic fiber stain	Oxalic acid solution		
32357298	51018	2026/9/25	30.00	30.00	30.00	30.00		200.00	0.00		Elastic fiber stain	Victoria blue A		
32359985	51018	2026/9/25	30.00	30.00	30.00	30.00		200.00	0.00		Elastic fiber stain	Victoria blue B		
32358052	51018	2026/9/25	30.00	30.00	30.00	30.00		200.00	0.00		Elastic fiber stain	Nuclear fast red		
30157747	30015	2025/5/22	28.96	28.63	52.96	52.96		200.00	26.96		Reticular fiber stain	PP solution		
30154043	30015	2025/5/22	31.67	29.14	55.67	55.67		200.00	29.67		Reticular fiber stain	Oxalic acid solution		
30158136	30015	2025/5/22	27.55	28.63	51.55	51.55		200.00	25.55		Reticular fiber stain	Ammonium iron sulfate		
30156465	30015	2025/5/22	24.04	24.12	48.04	48.04		200.00	22.04		Reticular fiber stain	Silver ammonia solution		
30157745	30015	2025/5/22	23.68	23.11	47.68	47.68		200.00	21.68		Reticular fiber stain	Formaldehyde solution		
30154655	30015	2025/5/22	37.02	42.02	51.02	51.02		200.00	25.02		Reticular fiber stain	Gold chloride solution		
30152862	30015	2025/5/22	31.97	29.64	55.97	55.97		200.00	29.97		Reticular fiber stain	Sodium thiosulfate		

Figure 42

7.2 Reagent identification

- Each reagent container is individually identified by a unique number called a“Unique package identifier”(barcode) . When you load reagents into the system, the external scanner and the built-in scanner are read into the software when they scan the barcode on the kit.

7.3 Determine the dose of the reagent

There are two common methods for determining the reagent dose: one is based on the initial reagent dose, and the other uses a level sensing system that is immersed in a container to determine the reagent volume.

The calculation of the reagent dose depends on the initial reagent dose. This method is very accurate for detecting system components and system reagents because the containers are accurately filled during manufacture. However, errors can occur if reagents are spilled, large amounts evaporate, or if reagents are used in other systems. The dose in the system open container depends on the accuracy of the reperfused information and is subject to errors due to overflow, evaporation, and use of the system, as are the system reagents and detection system components.

When the sampling needle is inserted into the container, the liquid level detection system determines the reagent dose by detecting the height of the reagent. When the liquid level is abnormal, the sampling needle absorbs the liquid at the lowest point to ensure the completion of the experiment, and the problem needs to be checked after completion

Chapter 8 cleaning and maintenance

Precautions

Warning:



When performing cleaning or maintenance tasks, ensure that the operator is turned off -LRB-except when performing level probe cleaning or high volume flow control cleaning) .

Warning:



Hazardous liquids can build up on various parts of the operator's equipment. Always wear protective clothing and gloves when using the operator and its components, including reagent containers. Spillage should be removed immediately in accordance with standard laboratory procedures.

Warning:



The temperature of the slide-staining apparatus inside the machine can be so high that it can cause severe burns. Do not touch the staining device or the area around it for 20 minutes after the operator stops working.



Note:

Clean all removable components by hand only. To avoid damage, do not clean any components with an automatic dishwasher; do not clean any parts with solvents, strong or abrasive cleaning fluids, or rough or frosted fabrics.

❗ Every time you use the machine, look for leaks, abrasions, or damage. If there are instructions in this chapter for repairing or replacing worn or defective parts, follow these instructions; otherwise, please contact our after-sales service department.

8.2 Cleaning and maintenance schedule

Tasks	Chapter
Daily-when your routine begins	
Check to make sure the waste drum is full *	
Check to make sure the bulk reagent container is at least half full and filled with the correct reagents *	
Check the adequacy of the cover glass inside the capsule	
Check the amount of glue in the bottle *	
Daily-at the end of the day	
Cleaning the reaction chamber	8.6
Every week	
Clean the reaction chamber, wiping the place where the glue drips	8.4
Check the slide holder for distortion	8.5
Restart the operator	8.18
Rub the left arm with the sampling needle and the right arm with the glue needle	8.3
Check washing areas and mixing stations and clean or replace as necessary	8.9
Clean instrument small reagent chamber and instrument cover	8.8
Clean the scanning module	8.14
Monthly	
Clean the reactor	8.10
Replacement of the hybrid station	8.9
Cleaning large reagent containers	8.12
Cleaning waste tanks	8.13
Clean slide holder	8.7
Slide label cleaner	8.15
Check the syringe	8.16
When the cue appears	
Clean the sampling needle and add the glue needle	8.3
Replace the syringe	8.16

* increase the frequency of these tasks as necessary.

8.3 Liquid level probe and glue adder

8.3.1 Cleaning

Use a clean cloth soaked in 75% alcohol to carefully scrub the needle to clean the level probe. Inspect the needle to make sure there are no objects in the needle and the needle should be kept clean.

8.3.2 Replace and remove the level probe assembly

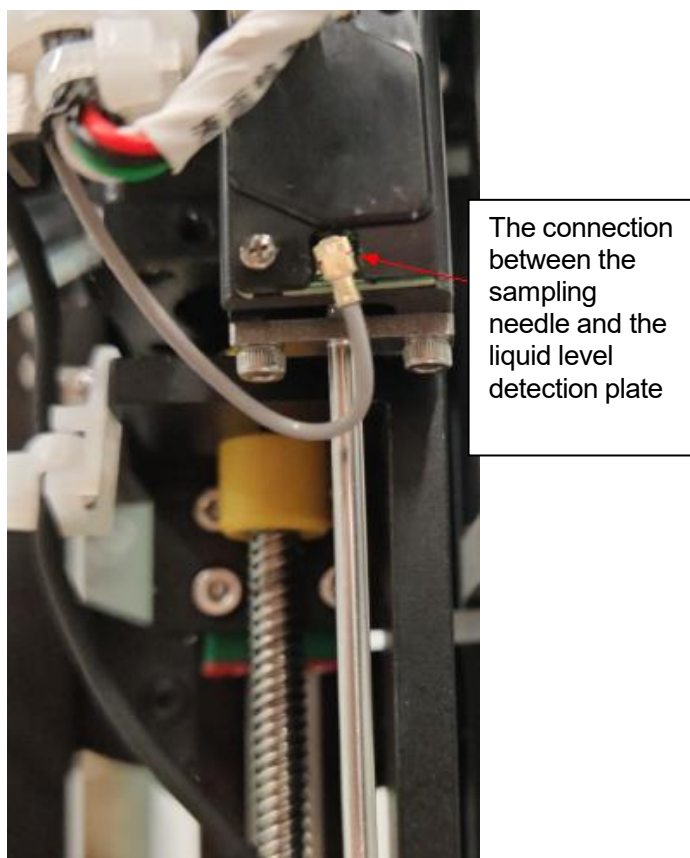


Figure 43: Level Probe Assembly

Remove the level probe assembly as follows:

1. Make sure the operator is idle with no loaded, planned or running slides, and turn off the instrument.
2. Start replacing, open the instrument cover, and unscrew the two M3 hexagon screws below the sampling needle with a hexagon wrench.
3. Lift the sample needle down with your hand.
4. Unscrew the inverted cone connector above the sampling needle and wipe the needle with a paper towel to dry the liquid or droplets.
5. The connecting line of the sampling needle and the liquid level detection plate is removed, and the sampling needle can be removed.

8.3.3 Install a new level probe

The installation of a level probe is a critical operation. If the probe is not installed correctly, it will affect the dyeing quality of the instrument. If you have any concerns about performing this procedure, please contact our after-sales service department.

Install the new sample needle assembly as follows, taking care not to damage the needle:

- 1.The inverted cone connector is screwed onto the new sampling needle.
- 2.Secure with the two M3 screws that were removed earlier.
- 3.The wire is connected to the liquid level plate.
- 4.Look at the sampling needle from the front and side, making sure it is perpendicular to each horizontal plane. If the sampling needle is not vertical, loosen the screw to observe and then tighten. If the sampling needle is still not vertical, i.e. bent, a new sampling needle should be used.
- 5.Turn on the operator. After the operator is started, right-click on the interface to set-debug-start perfusion in the liquid valve system and check the sampling needle to ensure that there is no liquid leakage during perfusion of the system.
- 6.If you are not sure if the new sampling pin is installed correctly after the replacement, contact our after-sales service department.

8.4 Staining apparatus for glass slides

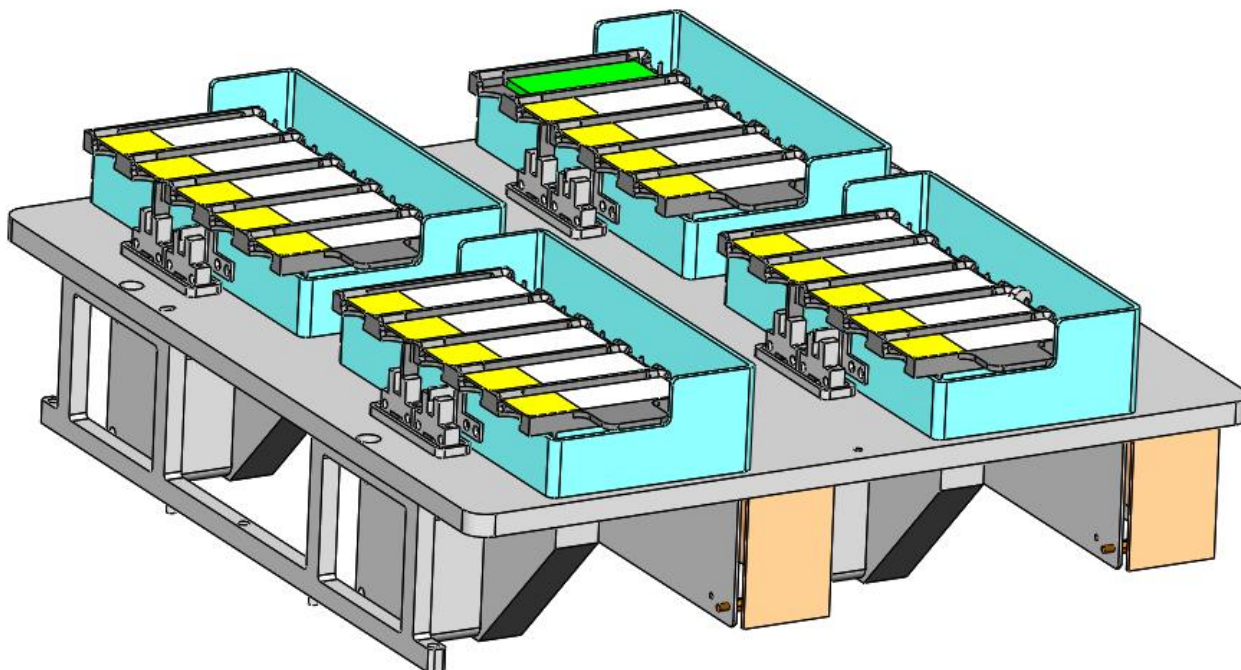


Fig. 44: Slide staining apparatus

Warning:



The operator has a heater and heating surfaces and may be subject to ignition hazard if flammable materials are placed nearby:

- Do not place combustibles on or near heaters.
- Do not place inflammables on any heating surface of the operator.
- After refilling or emptying large containers, ensure that all lids are tightly closed.

Warning:



The slide staining device and its surroundings, as well as the slides in the slide staining device may be very hot if in contact can cause severe burns.

Do not touch the staining device until the temperature indicated by the software is low. If the software is not running, wait at least 20 minutes after powering off the operator.



Note:

Before cleaning or maintaining the slide staining device, make sure that the operator has completed any operation and cut off the power;

8.4.1 Cleaning

To clean the glass staining device, clean the reaction chamber with a clean cloth and a 75% alcohol solution.

When cleaning the glass staining device and its components, check for

deformation and permanent damage. Deformed slide holders should be replaced, as they can affect the fixation of slides and hence the quality of staining. Contact your service representative if there is any damage to the slide staining device components.

8.5 Slide holder

Clean the slide holder with a 75% alcohol solution. Replace distorted or damaged slide holders.

8.6 Instrument clamshell

Use a damp lint-free cloth to wipe away dust from the guard and instrument cover to prevent dirt from accumulating. If the shield or instrument cover is out of shape or damaged, contact your service representative for replacement.

8.7 Mixing station

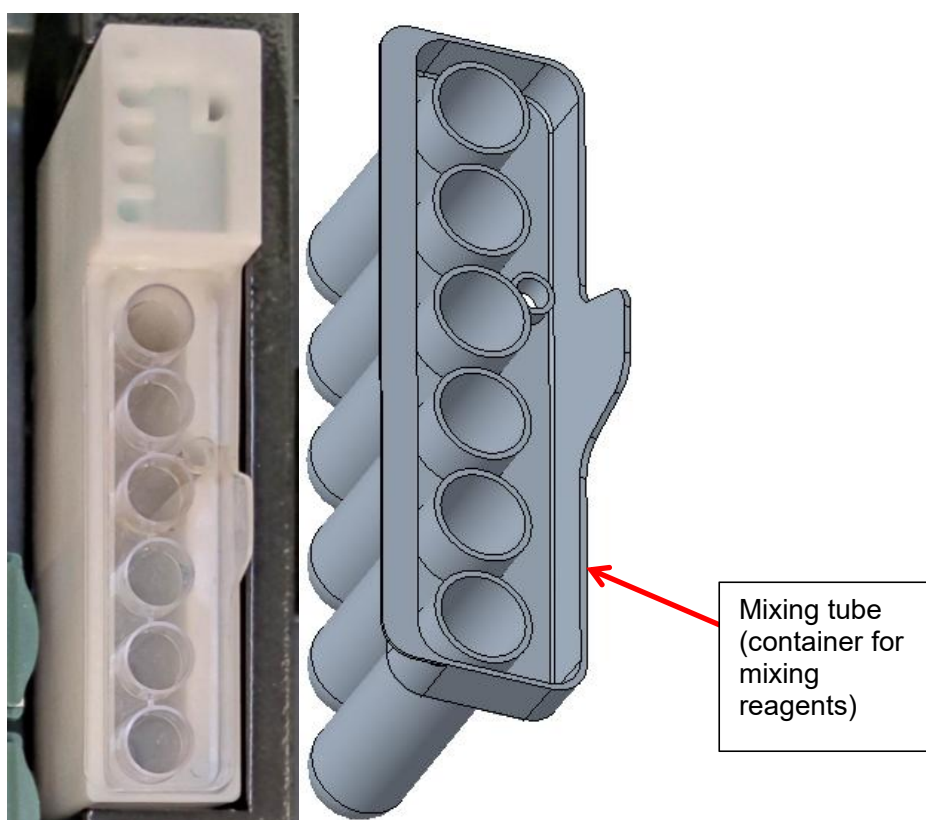


Figure 45: mixing station

The mixing reagent container in the mixing station should be changed once a month (at the rate of 60 slides per day. If more or fewer slides are used, change the frequency accordingly) . Replace the old mixing reagent container with a new one. The mixing reagent container should be installed in place (the bottom of the container should be in contact with the bottom of the mixing station circular groove) .

8.8 Reagent rack

Clean the rack with a 75% alcohol solution, then air-dry or dry the rack upside down.

Note:



Do not use hot water or hot solvents to clean the rack, and do not use high-pressure heating. Hot water, hot solvents, or high-pressure heating can distort the stand.

8.9 Large containers

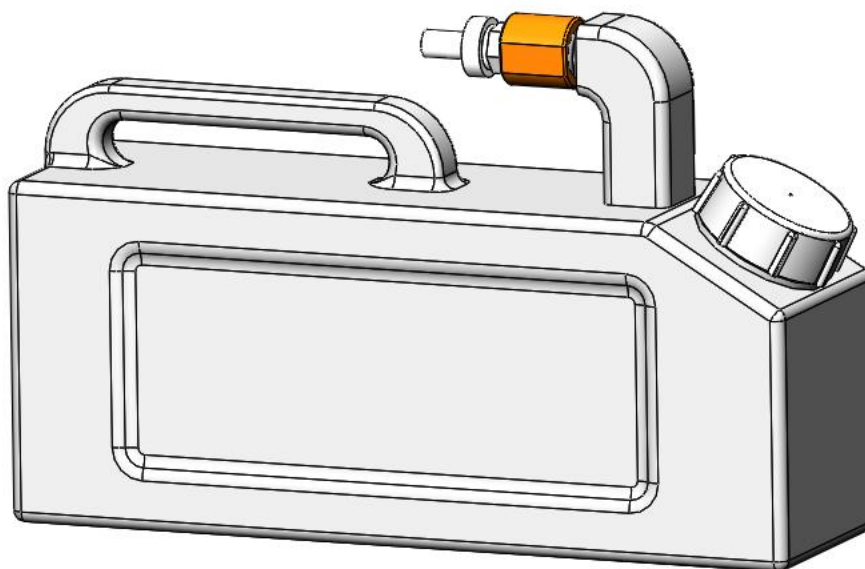


Figure 46: large containers

- ① For large reagents, open the container lid and fill as needed without removing the container from the large container tank.

Warning:



Automatic dyeing machine using some of the reagents are harmful, do not hand direct contact, need to wear gloves, do a good job of protection;

To fill a large vat of reagents, do the following:

1. Make sure the operator is not running.
 2. Open the left/right front panel.
 3. Load the reagents.
- For large reagents, open the container lid and fill as needed without removing the

container from the large container tank.

- ① Push the container back into place to ensure leak-free connections. Daily cleaning of large reagent drums (if necessary) can be done with Decon or similar detergent and rinsed with deionized water. Empty reagent containers monthly and wash with bleach or industrial strength detergent, then rinse thoroughly with deionized water.

8.10 Waste liquid drum

Note:



Wear gloves, do a good job of protection, open, waste container cover, should be disconnected from the liquid level sensor (aviation plug removed) . This will prevent the instrument from continuing to drain. When installing the waste liquid container cover, install the container cover and the waste liquid pipe first, and then connect the sensor (insert the aviation plug) .

When handling waste drums, wear gloves and handle with care.



Figure 47

To empty the waste tank:

1. With gloves on and guards in place, unscrew the metal fittings (aviation plug nuts) on the lid of the container, then pull them out and disconnect the level sensor from the cap.
2. Press the metal button on the waste liquid pipe joint (quick plug joint) on the container cover and separate it from the container cover.
3. Remove the lid and dispose of the waste according to your laboratory's procedures.
4. Reinstall the cap and then the liquid waste nipple until it is fully embedded.
5. Reinstall level sensor connector (air plug) .

8.11 Mechanical Arm and scanning module

To clean the robotic arm, wet a clean cloth with 75% alcohol solution and wipe the arm. Avoid rubbing the level probe bracket, as this will dissolve the lubricant on the bracket. Also, do not clean the carriages used for arm movement, as this will rub off the oil and may degrade the performance of the operator.

Note:



Please turn off the operator before cleaning the mechanical arm to minimize the risk of short circuit caused by liquid dripping. Do not clean the ID scanner with a damp cloth, as residual moisture on the windows can cause malfunction. Do not clean windows with alcohol or solvents.

- ① Use a cotton swab or lint-free cloth with distilled water to clean the window weekly, or when the scan module repeatedly fails to perform an ID scan correctly.

8.12 Slide labeler

The slide label comes with an instruction manual. Refer to these manuals for instructions on cleaning and loading labels and printer tape.

8.13 Syringes

A syringe pump pumps and dispenses precisely the amount of fluid required by the system. The plunger forms a fully sealed space within the syringe. The glass needle and plunger must be free of any damage to ensure accurate suction and distribution of fluid. Any breakage must be replaced.



Figure 48: Diagram of syringe decomposition

8.13.1 Check the syringe

Check syringes at least once a week by following these steps. Contact your service representative if there are signs of leakage or if the syringe is loose.

Caution: do not use any tool to secure or secure the syringe.



1. Make sure the operator is not running.
2. Check for signs of leakage around the connection and at the lower part of the syringe connection.
3. Only use your fingers to make sure the glass syringe is securely attached to the plastic valve.

8.13.2 Maintenance

Dirt residue on the inner wall of the injector requires maintenance. This can be done by your service provider, or you can do it yourself.

Sampler maintenance steps (indicating that the cleaning solution is pure water, additional precautions are recommended depending on the reagent used) :

1. Prepare a cleaning solution that neutralizes the residual liquid in the injector (deionized water, alcohols such as ethanol, or other organic solvents are recommended)



2. Insert the M 4 Hex Wrench into the sampler push rod mounting hole and pull out the piston assembly (as shown below)



- 3 use a clean cloth or paper towels, wet wipes, etc. dipped in the cleaning fluid wrapped

piston, wipe the surface of the piston, remove foreign bodies after using dry cloth, paper towels to wipe again.



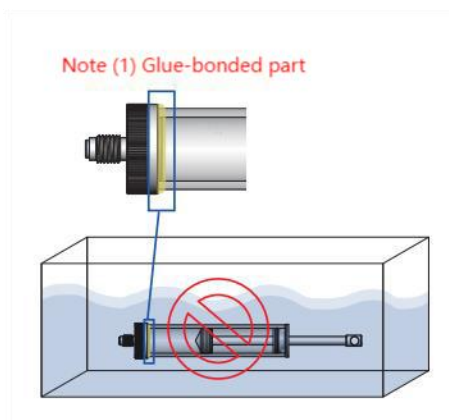
4 plug the outlet of the sampler, pour the cleaning liquid into half of the glass tube, and shake it evenly for many times to remove the foreign matter in the glass tube, the residual cleaning fluid in the tube is naturally air-dried or cleaned with a dust-free cloth or paper towel inserted into a glass tube to erase the residual. (it is recommended to use a tube brush to remove the residue in the glass tube)



5. Install the cleaned piston assembly vertically into the cleaned and dried glass tube. Install the lower sealing cover (K60) of the piston assembly to the lower opening of the glass tube.



Note: Do not immerse the glass tube in an organic solvent. The glue bond (shown below) will dissolve.



8.13.3 Remove the syringe

Follow these steps to remove the injector:

- 1.Ensure that all operating instruments are not in operation and that no batch slides are loaded, ordered or operated.
- 2.When the operator is disconnected, turn off the operator and host.
- 3.Open the instrument front panel to the left.
- 4.Remove and retain the plunger hand screw that secures the injector push rod to the injector push rod seat (see Fig. 41) .
- 5.Rotate the injector in the direction of the schematic arrow through the antiskid pattern on the injector head until it is removed (see Fig. 41) .

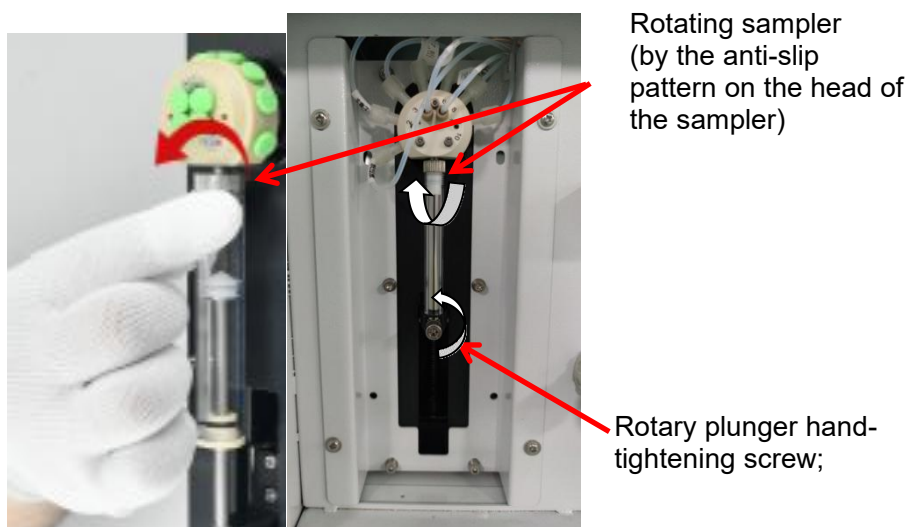


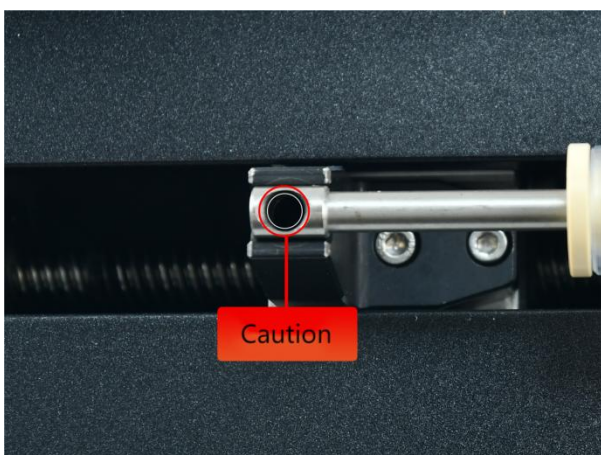
Figure 41: Rotary Plunger Hand Screw + rotary injector

8.13.4 Replace the syringe

- 1 pull the injector down to half of the glass tube. The bottom of the injector push rod is placed in the same position as the fixed groove of the push rod seat of the injection pump, so that the injector and the valve head public port are in a straight line. (see figure below)



- 2 screw the sampler into the common mouth thread (the direction of rotation is shown in the diagram, note: Tighten the sampler) , and use the hexagon wrench to put the sampler into the push rod hole, align the injector push rod bore with the injector push rod seat bore, insert and tighten the hand screw. (note: After locking the hand screw, tighten the anti-slip grain again, make sure whether to tighten or not to prevent leakage)



Caution: the pressing ring should be attached to the injector push rod.

Note:



Connect the product to the field equipment and piping. It is recommended to test the circulating pure water. Observe for leakage at the injector piston and valve head connections.

Restart operator and host.

Check the operator for proper perfusion and check for air bubbles or leaks around the syringe.



8.14 Disconnect the operator

To disconnect the operator from the mains, follow these steps:

1. Use the switch to the right of the operator to turn off the power.
2. Follow the operator's main power connection cable to the wall outlet and turn off the main power supply to the wall outlet.
3. Disconnect the plug from the back of the operator.

8.15 Restart the operator

Each operator should be shut down and restarted once a week. This is important because it allows the operator to perform a system self-diagnostic check.

For the operator, make sure there are no slides loaded, planned or running, then turn off the power switch on the right side of the instrument and wait 30 seconds before turning it on. Once started, the system performs a series of system tests.

Chapter 9 technical parameters

9.1 Using parameters

Specifications	CNT520: 930mm (length) * 700mm (width) * 1450mm (height)
Weight (dry)	CNT520:210KG
Space requirements	≥600 mm above left ≥100 mm ≥150 mm on the right Back ≥200mm, but the user must not move the operator Be able to disconnect the main power cord
Maximum distance from the standard waste drum	CNT520:1500mm
Life expectancy	7 years

9.2 Electrical

Operating voltage and supply frequency	CNT520: Power Supply voltage compatible AC220V/50Hz and AC110V/60Hz (transformers required)
Power consumption	1500va

9.3 Environment

Maximum operating temperature	35 °C (95 °F)
Minimum operating temperature	5 °C (41 °F)
Temperature required to meet standards for dyeing operations	18-26 °C (64-79 °F)
Working humidity (no condensation)	10-80% Rh
Maximum working altitude	0-1600 m (5250 ft.) above sea level
Sound pressure level output (1 m)	< 65db
Maximum heat energy output	1500va

9.4 Operation

Slide handling capabilities	20 slides at a time. Batch slides that have been processed can be replaced continuously.
Capacity of reagent container	5 mL, 10 mL, 25 mL, 30 mL
Number of small reagent containers	44
Large reagent tank capacity	3.6 L
Waste drum capacity	15L
Standard waste tank capacity	15L
Chemical compatibility	Standard reagents for all systems 50% , 95% , 100% alcohol solution
Temperature indication	Default (can be changed by service representative) : WARM: 37 °C; HOT: 80 °C

9.5 Microscope slides

Slides

Size	Width: 24.64-26.0 mm Length: 74.9-76.0mm thickness: 0.8-1.3mm
Label area	Width: 24.64-26.0 mm length: 16.9-21.0 mm
Materials	Glass, ISO 8037/1

Cover glass

Size	Width: 24mm Length: 50mm Thickness: 0.13-0.16mm
Materials	Glass, ISO 8037/1

9.6 Transport and storage

Temperature of storage and transportation	-20 to + 40 °C (-4 to + 104 °F)
Storage and transportation humidity (no condensation)	10-80% Rh
Mode of transport	Both by land and air.

10 After-sales service commitment:

All automatic dyeing machines ordered from our company have 12 months of free after-sales service (not in accordance with the manual operation, except man-made damage) .
The company provides life-long after-sales service, the cost may be charged according to the actual situation.

11 basic information

Filer/manufacturer: Henan Sinot Biotech Co. , Ltd.

Address: No. 109 Cuizhu Street, Zhengzhou high-tech Industrial Development Zone
Contact: 0371-56596916

After-sales service name: Henan Sinot Biotechnology Co. , Ltd. , contact: 0371-56596916

Production address: Zhengzhou high-tech Industrial Development Zone Yulan Street No. 55 Factory F area

Production Record Certificate Number: Yuzheng Food and drug supervision equipment production preparation 20140010(more)

[medical device record certificate number/product technical requirements number]

RYuzhenghEquipmentmPreparationtNo. no. 20220248

[date of manufacture and expiry date] see label

[specification approval date] October 28,2024

[specification revision date -RSB- first revision date] May may 2025
Second Revision Date: 17 July 2025