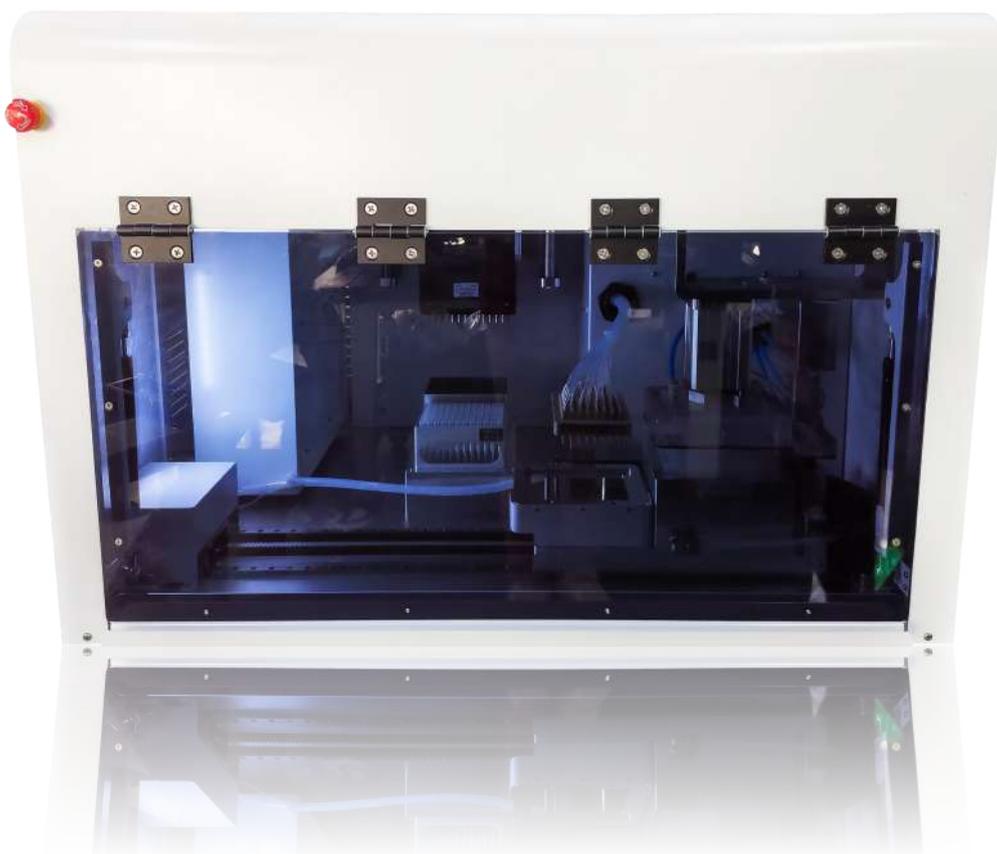


(HY-08)



NUCLEIC ACID PURIFICATION SYSTEM

USER'S MANUAL

For Research Use Only.

— 2023 V1 —



Manufacturer of DNA/RNA Synthesizer,
Accessories Equipments,
Oligo Synthesis Consumable & Reagents.

About Us

Hunan Honya Biotech Co.,Ltd. was founded by a PhD in automation and a master in molecular biology with over 10 years of experience in the DNA/RNA field.

We are a scientific and innovative enterprise integrating R&D, production and sales, focusing on DNA/RNA Synthesizer, Pipetting Workstations, Elution Equipment, Deprotection Equipment, Amidite Dissolved Equipment, Purification Workstation, Synthesis Columns, Phosphoramidites, Modification Amidite, Synthesis Reagents, and various consumables etc. Providing End to End solutions for automated laboratories, the equipment can be customized to make DNA/RNA synthesis more efficient and flexible.

The HY-08 Nucleic Acid Purification System is a fully automated apparatus that our company has specifically

designed and manufactured for high-throughput nucleic acid purification. It can simultaneously transfer and purify 96 samples, suitable for IVD enterprises, nucleic acid pharmaceutical companies, commercial synthesis sequencing companies and other related industries. However, it is only suitable for research purposes and shall not be used in any clinical procedures or diagnostic purposes. This series of equipment can also be customized and upgraded based on the specific requirements of customers.

This manual is applicable to the HY-08 Nucleic Acid Purification System instrument produced by our company. Please read this manual in detail before using the equipment to avoid accidents and injuries to the instrument and personnel during use.

This Manual is only for Honya Biotech HY-08 Nucleic Acid Purification System, before start to operation, please do read this manual careful, to avoid any physical injury or defects in workmanship.



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1—Basic Information



Figure 1-1

Product Name: Nucleic Acid Purification System

Model: HY-08

Software Name: Nucleic Acid Purification System

Dimensions (L × W × H): 1020×690×665 mm

Weight: 120 kg

Reagent Bottle Capacity: 8

Pipette Channel: 96

Pipette Range: 50-300ul

Usage Lifespan: 4 years

Manufacturer: Hunan Honya Biotech Co.,Ltd

Address: No.246 Shidaiyangguang Blvd, Yuhua District,
Changsha City, Hunan Province, China

Tel: 010-89781933 15802572548

Website: www.honyabio.com

E-mail: sale@honyabio.cn

2—Security Information

Basic safety rules serve as a guide for proper operation of Honya Biotech equipment. All personnel who work with this instrument should learn this information.

Before installing, operating or maintaining the product, all users must read and understand the entire contents of this chapter to become aware of the hazards involved.

- 1.It is strictly prohibited for personnel without training and instrument operation qualification certificate to use equipment;
- 2.Prohibit the installation and use of equipment in violation of operating procedures under conditions and requirements that do not conform to the manual;
- 3.It is strictly prohibited for any personnel without the permission of the service department of Honya Biotech to install or repair equipment, replace parts or software;
- 4.Working Conditions:
 - 4.1 Supply voltage:100-240 V ~
 - 4.2 Frequency:50-60 Hz
 - 4.2 Ambient temperature:25±15 °C;
 - 4.3 Relative humidity tolerance: 10%-60% ;
 - 4.4 Atmospheric pressure: 0.2-0.4 Mpa.
- 5.Caution safety precautions



Figure 2-1

Warning – Danger Electrical Risk (Figure 2.1). Alerts user to presence of dangerous voltage and risk of electric shock.



Figure 2-2

Warning – Caution Mechanical Injury (Figure 2.2). Found on movable components where there is a chance of a body part getting caught in instrument.



3—Owner responsibilities

Users must follow all procedures and precautions. Users should establish appropriate procedures for continued safe operation of instrument. Honya Biotech is not responsible for any deviations from instructions in this manual.

Equipment is designed for generally accepted safety standards. Users are responsible for following the operating, maintenance, and servicing procedures outlined in this manual to ensure safe operation of this equipment.

Do not allow persons to operate instrument until they have read user's manual and are completely familiar with all safety precautions.

Always wear safety glasses/goggles and any other required safety equipment as required by your company's Personal Protective Equipment (PPE) policy.

Do not allow persons under the influence of alcohol, medications, or other drugs that can impair judgment or cause drowsiness to operate or maintain instrument.

Ensure operator's area is clear of any distracting objects. Keep work areas clean and free of debris to avoid slipping or falling.

Operators are responsible to know the location and function of all emergency stop and safety switches. Periodically check all guards, safety switches, emer-

gency stop buttons and instrument structure. Replace or repair anything that could cause a potential hazard.

If any safety devices are not functioning properly, do not use instrument. Remove it from service until it has been properly repaired. Contact Honya Biotech. Do not replace components or parts with other than factory-recommended parts. To do so could lead to injury or possible death. It may also decrease the effectiveness of the unit.

Do not perform maintenance while instrument is running unless noted otherwise in a procedure within this manual.

When doing maintenance work on structural parts or repairing any moving parts: Disconnect and lock-out and tagout all power sources. Know Occupational Safety and Health Standard (OSHA) requirements. Be aware of overhead objects while working in or around instrument to prevent head bumps or injury from falling objects.

Be aware of cords/trailing cables while working around the instrument to prevent tripping.

Operate and maintain this instrument in a safe manner and in accordance with all applicable local, state, and federal codes, regulations and/or laws; and in compliance with on-product labeling and this user's manual instructions.

4—Hardware Description

4.1 Appearance

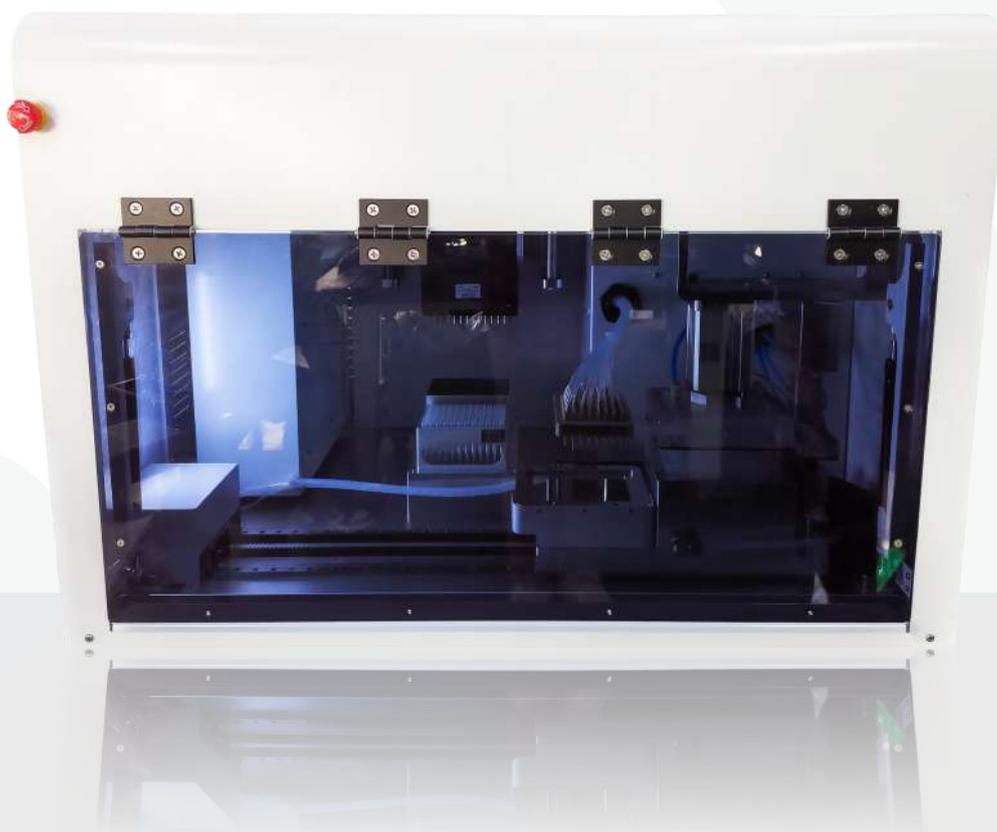


Figure 4-1

4.2 Structural diagram

Front View



Figure 4-2

① Scram Button	③ Operational Area
② Visual Window	④ Lighting

Left View

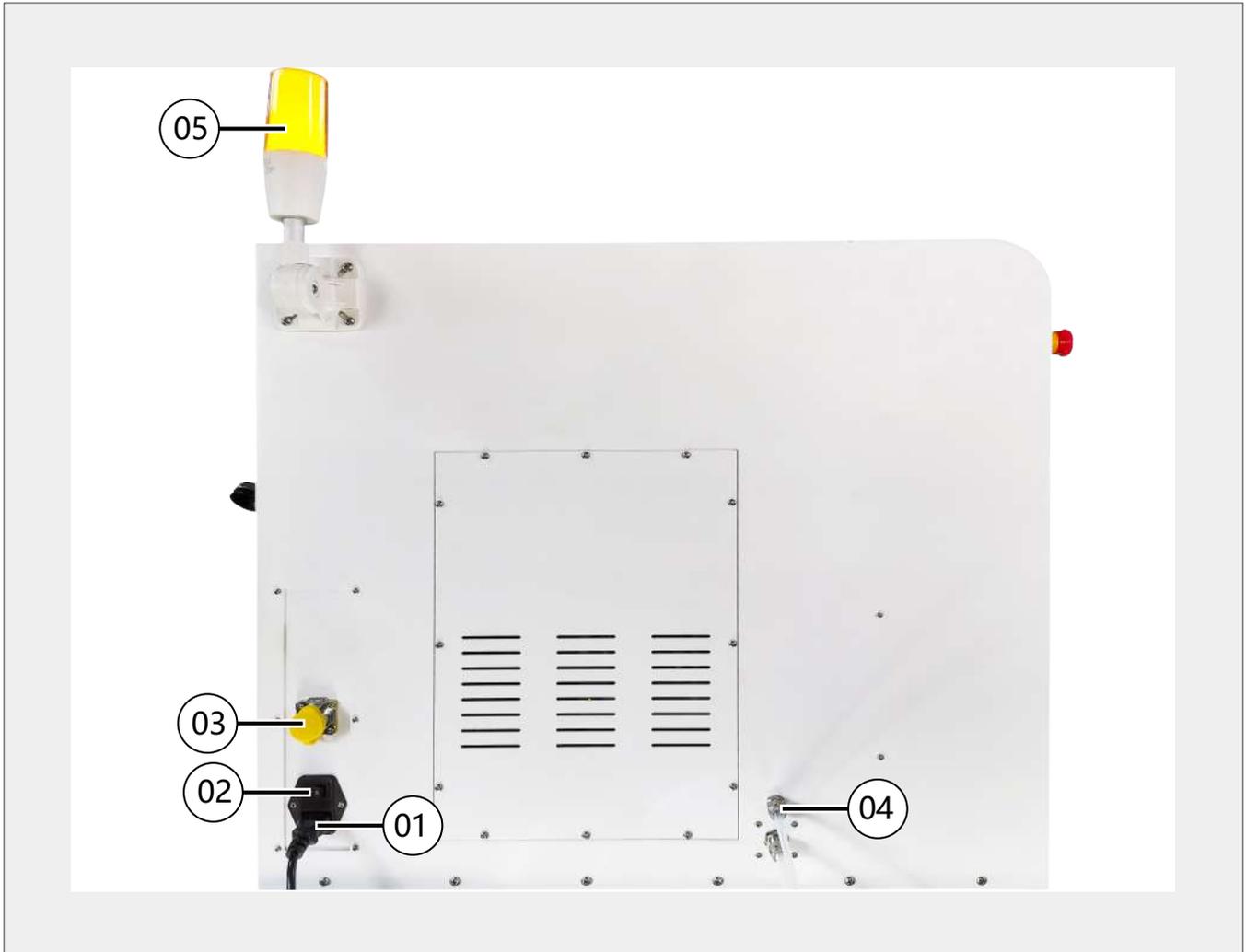


Figure 4-3

① Mains power inlet	④ Waste Out
② Power Switch	⑤ Status Indicator Light
③ Network cable port	(yellow:waiting;green:running;red: Fault)

Right View

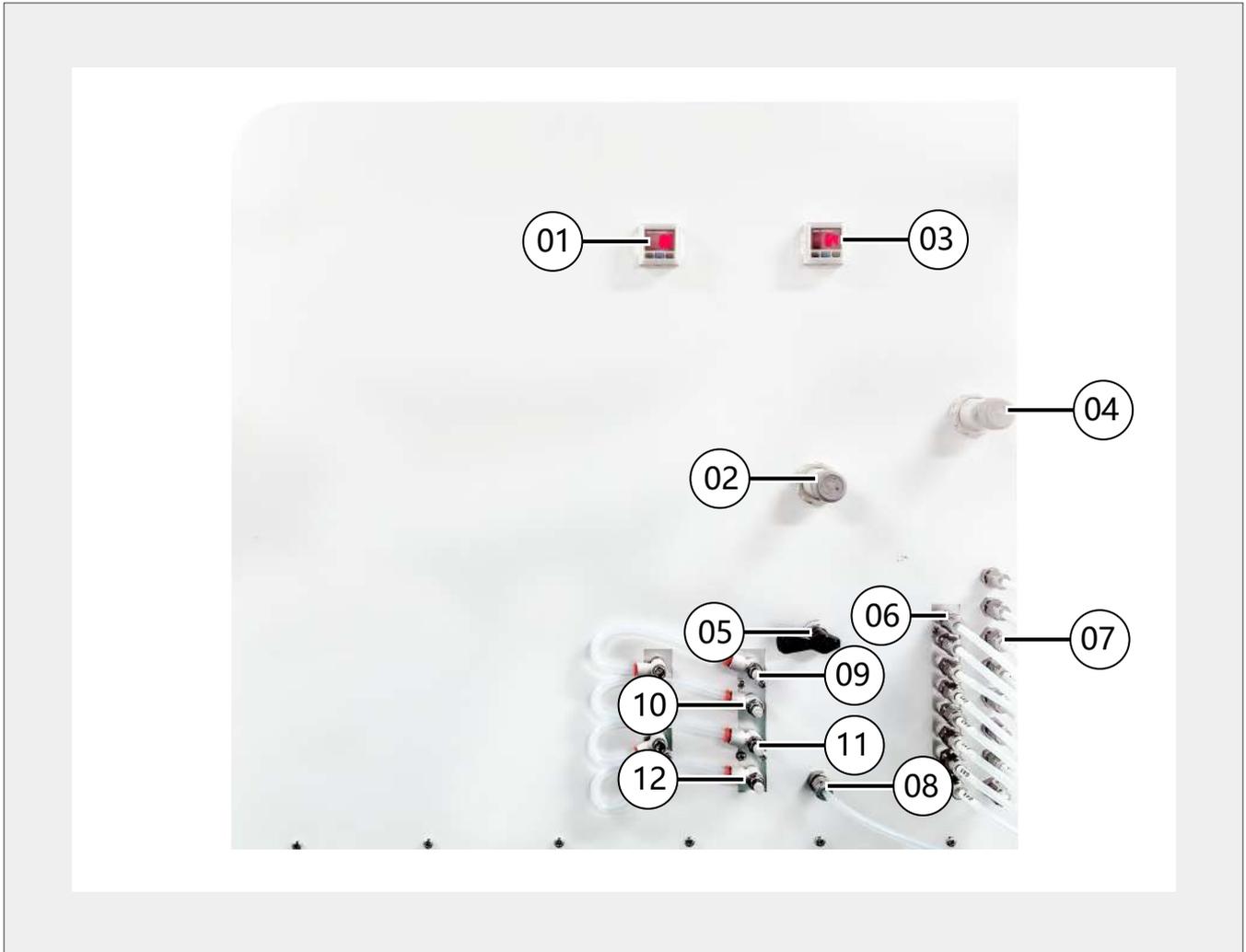


Figure 4-4

① Drain pressure	⑤ Argon On/Off	⑨ Waste drain Regulator
② Argon Regulator	⑥ Reagent Gas	⑩ L Flow Regulator
③ Reagent Pressure	⑦ Reagent Liquid	⑪ M Flow Regulator
④ Reagent Regulator	⑧ Argon	⑫ H Flow Regulator

Internal View

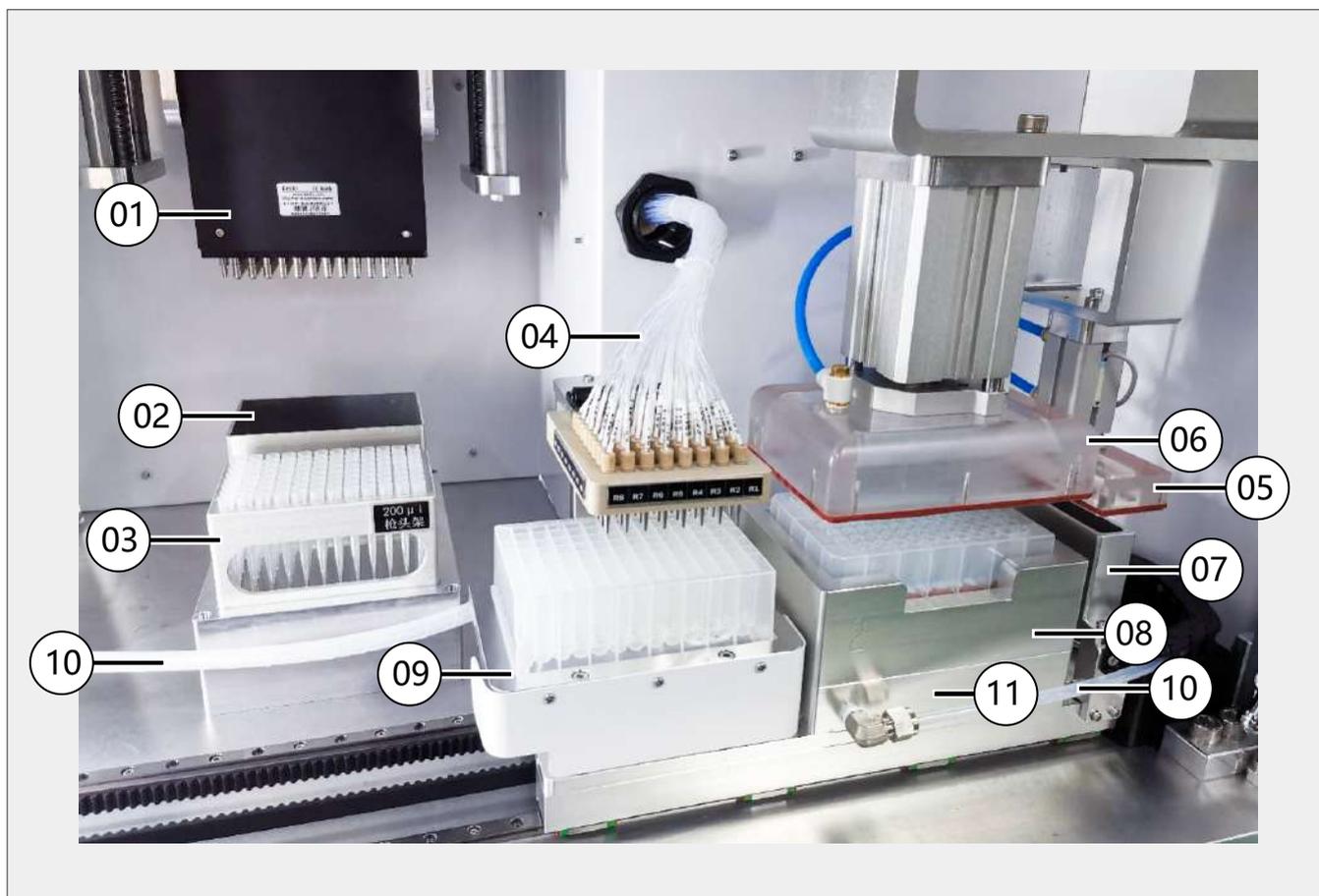


Figure 4-5

① 96-channels Pipette	⑤ Waste Drain	⑨ Sample Tray
② Waste tips	⑥ Plate Drain	⑩ Drain Lines
③ Tips holder	⑦ Waste Tray	⑪ Deep well Plate Tray
④ Injections Lines	⑧ Purification Plate Tray	



Notice:

The tips, deep-well plates, and purification plates are consumables, not the accessories of the device itself. Only the tips and deep-well plate samples are given away for free.



5—Software overview

The operation software of this device is a set of management operating system suitable for the nucleic acid purification instrument developed by our company. It fully meets the functional requirements of device liquid transfer, elution, and purification, and also has permission management function. In order to facilitate operation, the operation interface of the software has been divided into functional areas.

5.1 Instrument start-up

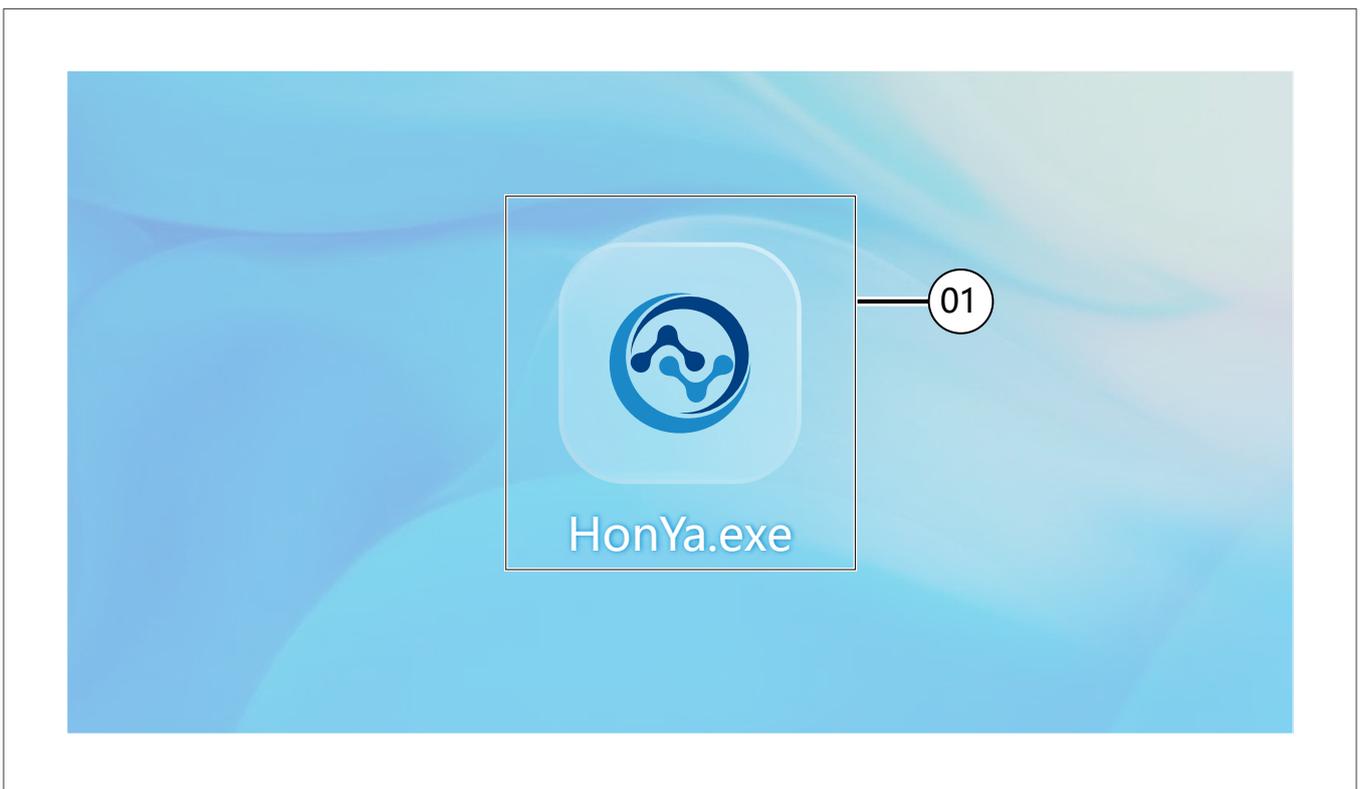


Figure 5-1

Double click "HonYa" icon (1) (Figure 5.1) on desktop.

5.2 Log in screen

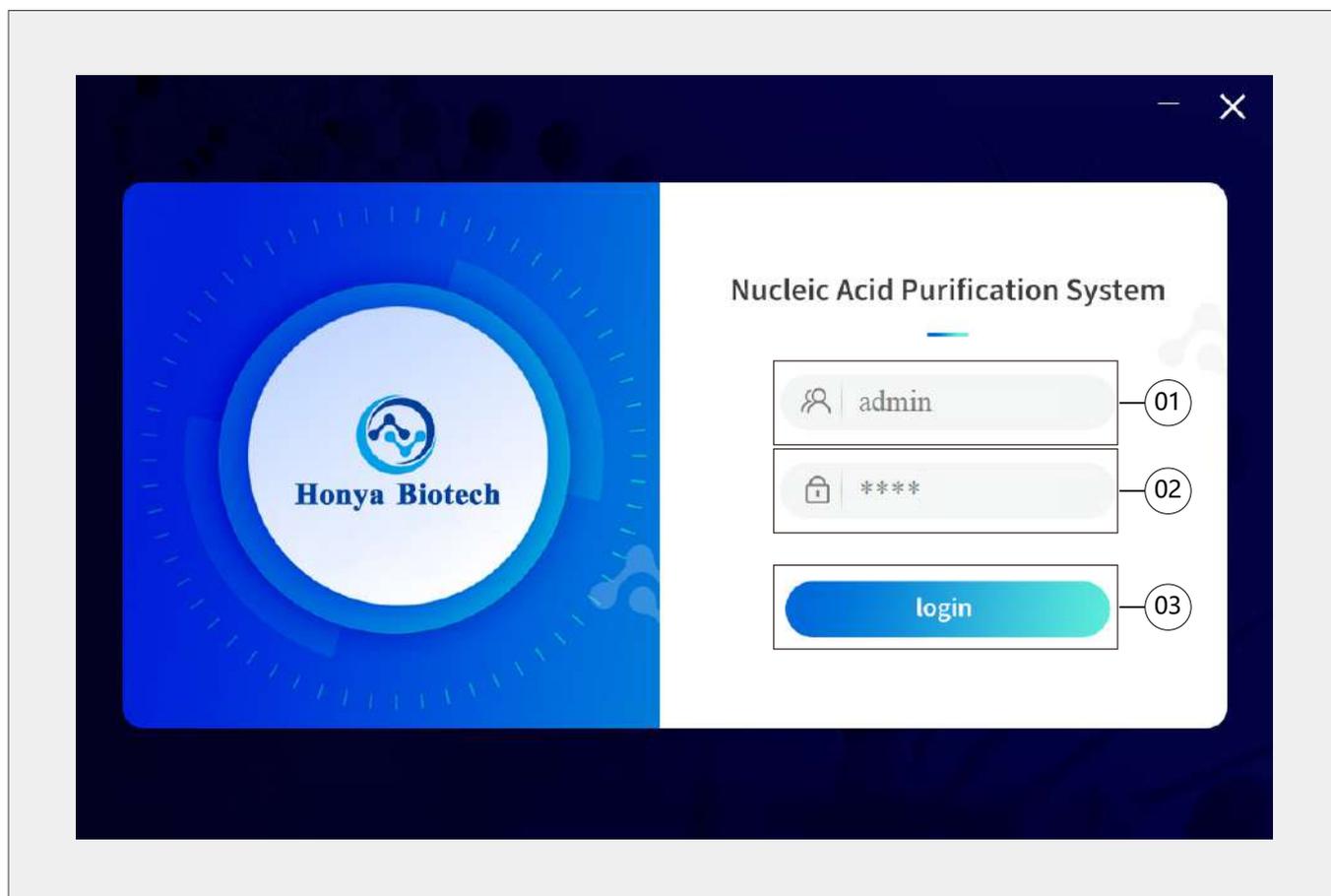


Figure 5-2

Refer to (Figure 5.2).

1. Enter "Username" (1).and "Password" (2).
2. Click "Login" (3).



5.3 Main screen

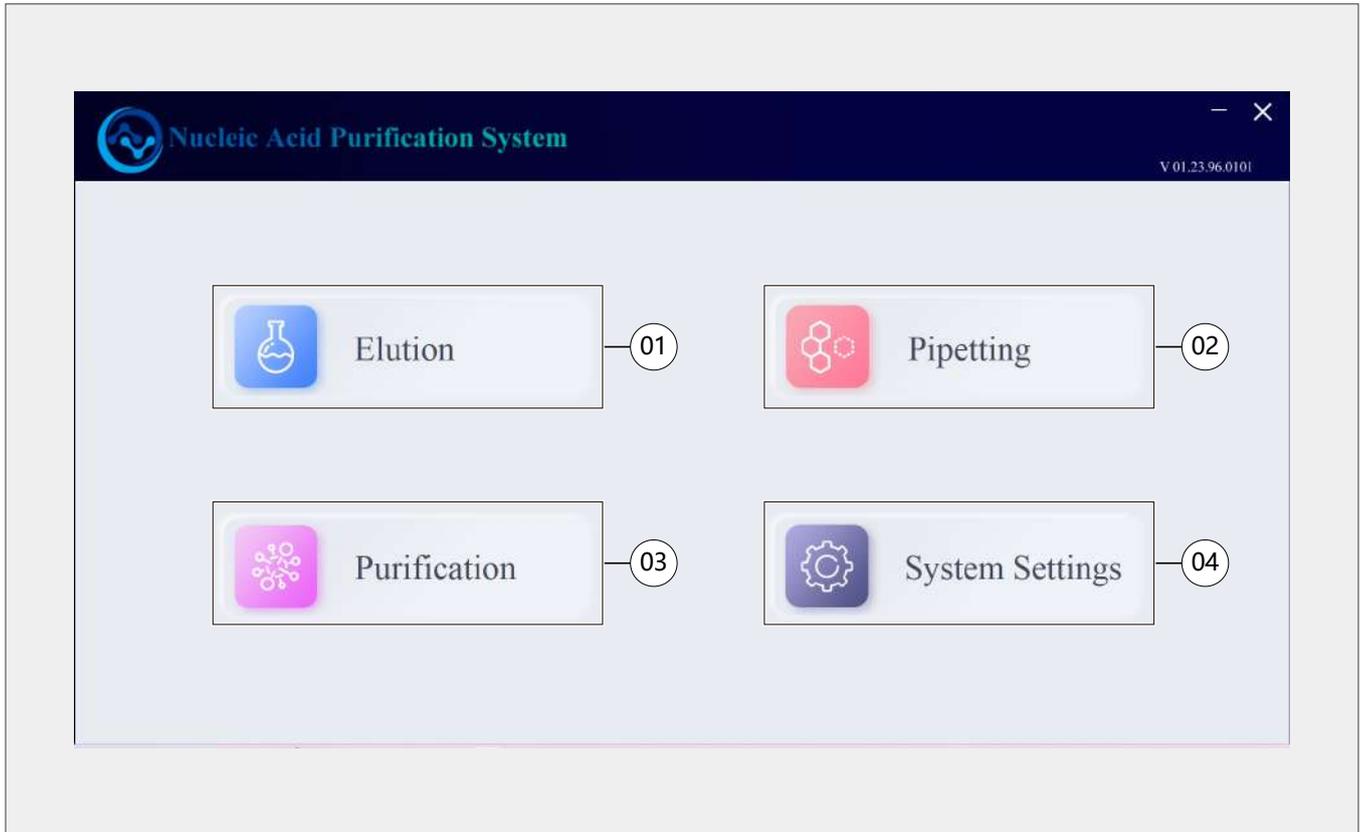


Figure 5-3

Refer to(Figure 5.3)

- 1.**Elution**—Opens Elution display screen
- 2.**Pipetting**—Opens Pipetting display screen
- 3.**Purification**—Opens Purification display screen
- 4.**System Settings**—Opens System Settingr display screen(Administrator)
- Personal Center**—Opens Personal Center display screen(Operator)

5.4 Elution screen

Allow users to select an appropriate process for elution, eluting the sample from the carrier and collect it.

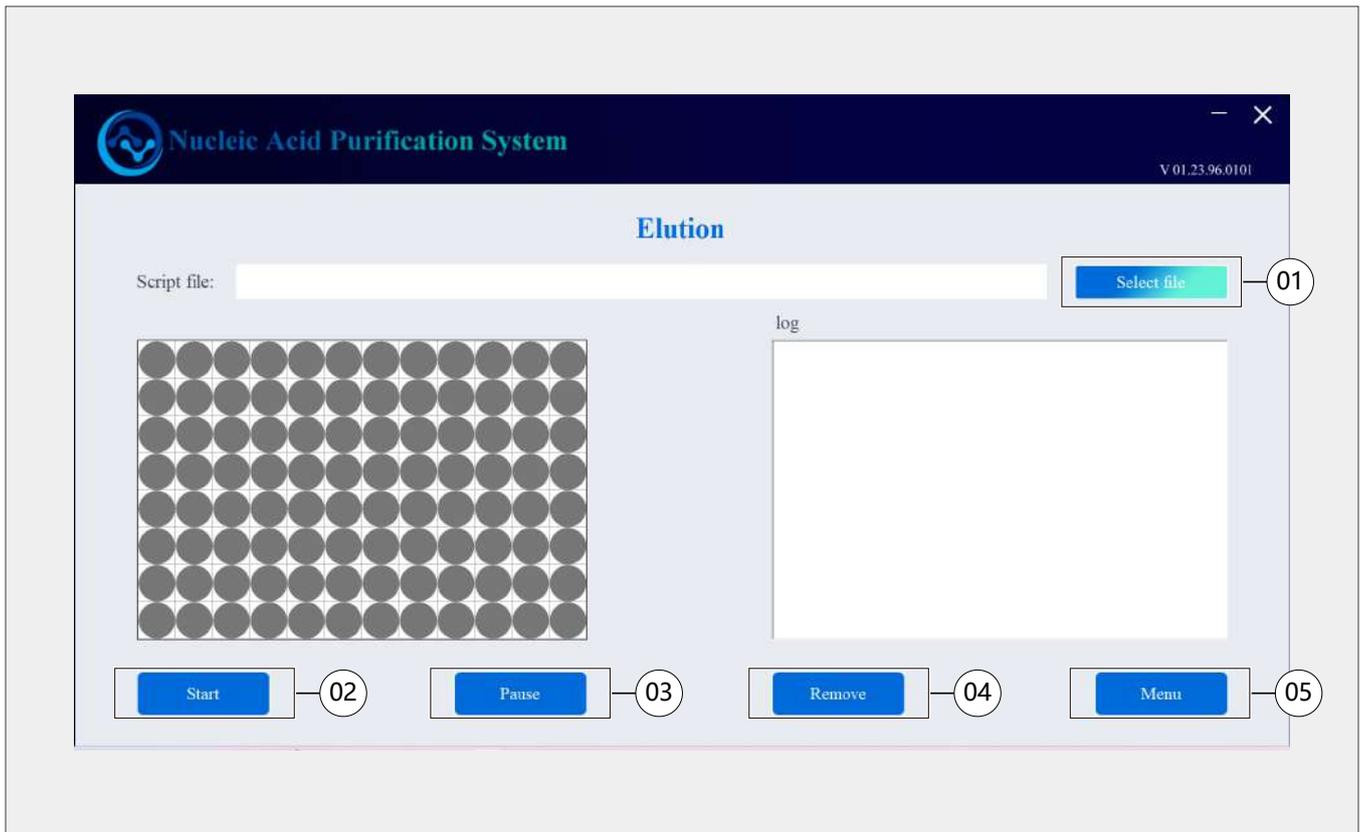


Figure 5-4

Refer to(Figure 5.4)

1. **"Select"** Allow user selects a script file to run for elution.This will bring up file explorer.
2. **"Start"** Start the run, Ensure the 96-well plate is placed in the Deep well Plate Tray before click the "start" button.
3. **"Pause"** The run will paused end of the current step, and "Pause" button will turn into "Resume" button.
4. **"Remove"** The pasued run will be terminated.
5. **"Menu"** Return **Main screen**.



5.5 Pipetting screen

Allow users to select an appropriate process for pipetting, transfer the samples from the sample plate to the purification plate.

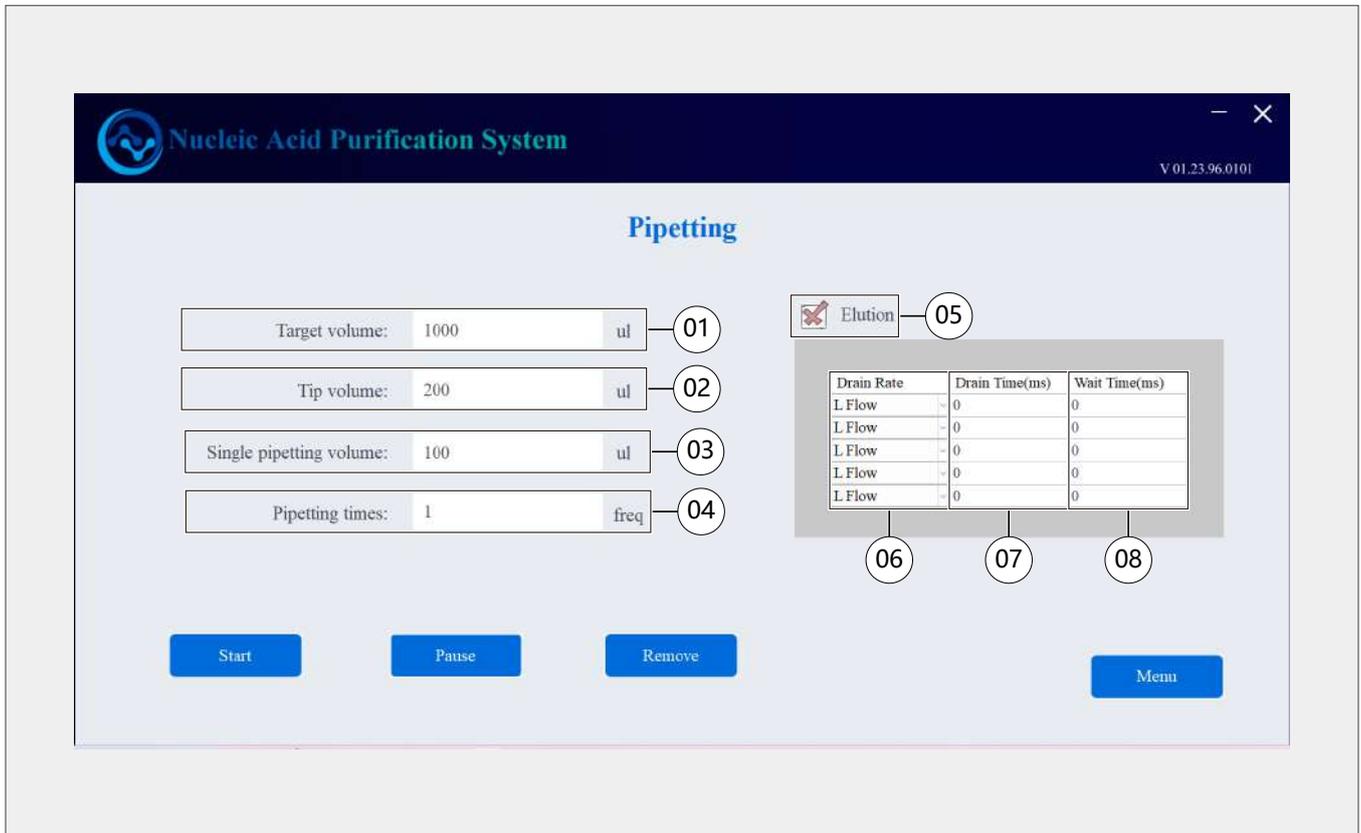


Figure 5-5

Refer to(Figure 5.4)

1. Enter the standard volume(single pore volume) of the purification plate.
2. Enter the standard volume of the tip.
3. Enter the volume of single pipette.
4. Enter the pipetting times in "Pipetting times".
5. Choose whether to perform elution after pipetting.
6. Choose a drain rate(L Flow, M Flow or H Flow) for elution
7. Set the drain time for elution.
- 8 Set the wait times between two drains.



Notice:

Ensure the tips, sample plate and 96-well plate (if needed) is ready in their position before click the " start " button.

5.6 Purification screen

Allow users to select an appropriate process for purification, purify and collect the samples.

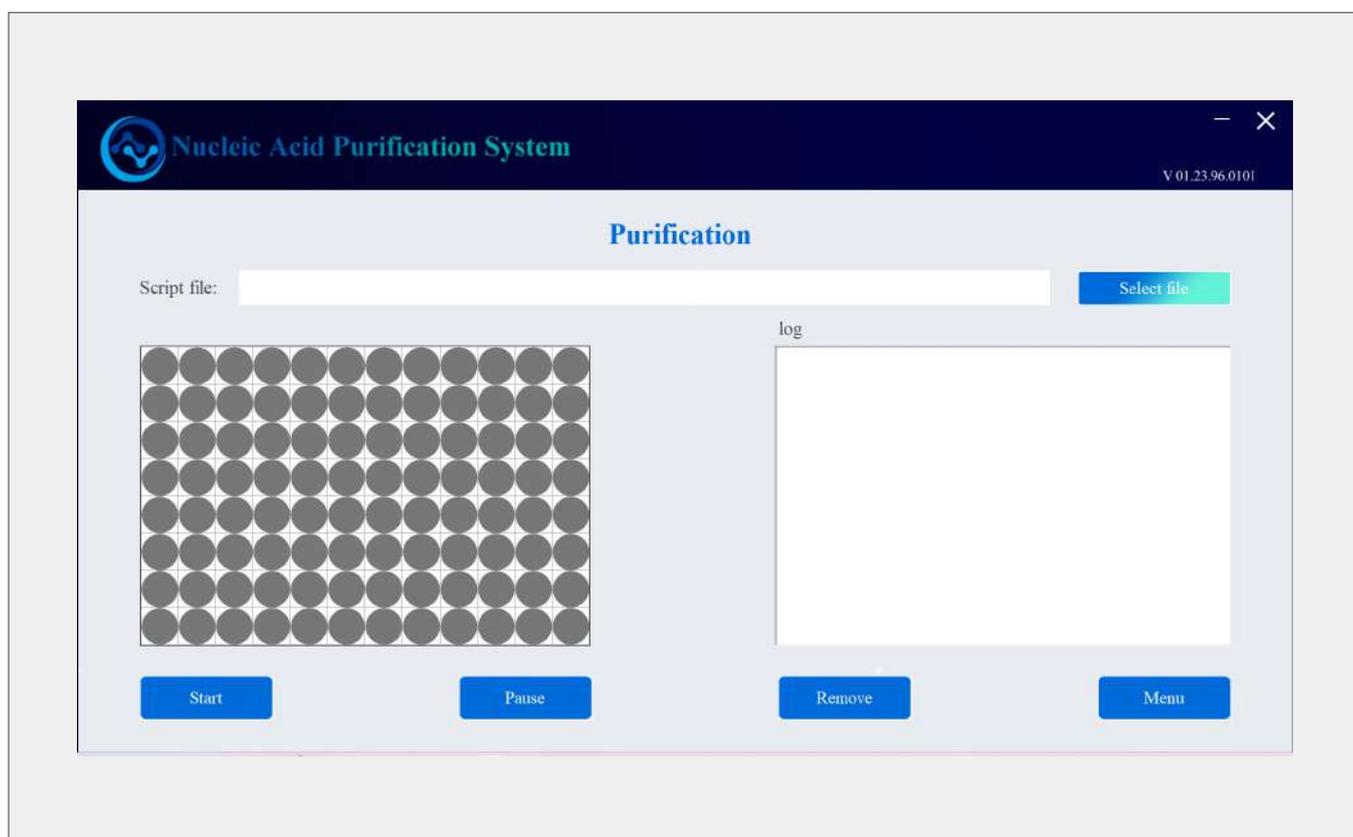


Figure 5-6

Same as **5.4 Elution screen**.



5.7 System setting screen

Allows user access controls involving system related options (Figure 5.7):



Figure 5-7

1. **Motion Options:** Opens motion options screen.
2. **Calibrate valve:** Opens valve calibration screen. Valves have to be calibrated manually by using a collection tube and a pipette.
3. **Edit Script File:** Opens edit script file screen.
4. **Injection Head Test:** Opens head valve test screen.
5. **Reagent Name:** Opens reagent name edit screen.
6. **User Management:** Opens User Management screen.

5.7.1 Motion Options screen

Allows user access to motion options (1) (Figure 5.8) including, Set Reference Point, and Motion options.



Figure 5-8

Set Reference Point

The instrument arrives from the factory with the injection head already aligned to the synthesis plates. The well-to-well distance of columns in column chucks and the spacing between each reagent in the injection head are standard values hard-coded in a configuration file and do not need to be changed.

The moving distance of the **96-channels Pipette** at different positions need user to set up according to the trial consumables.

For example, move to the tips:

1. Select tips from "Select a reference position" (1), "Option (2)" will turn into tips;
2. Click "Move" (6), the **96-channels Pipette will**

go to tips position;

3. Enter a value in "Step" (3), for example 5 (mm).
4. Click "UP"; "DOWN" (3) to move the pipette up, or down in relation to user.
5. Click "Save" (5) to save position.

Motion Options screen

Allows user to check motion system and to perform certain motion related functions.

"Home" Software will re-zero slide and find right-most limit switch, inner-most limit switch and top-most limit switch. Homing also happens each time software is initialised. If instrument is not homing properly there will be problems entering a run. Please contact HonYa Biotech if table is not homing correctly.

5.7.2 Calibrate valve screen

Allows user to check reagent valves to ensure correct volume is being delivered. Valve alibration is used to determine number of milliseconds that valve must be open to get correct volume delivered as defined by user in script file.

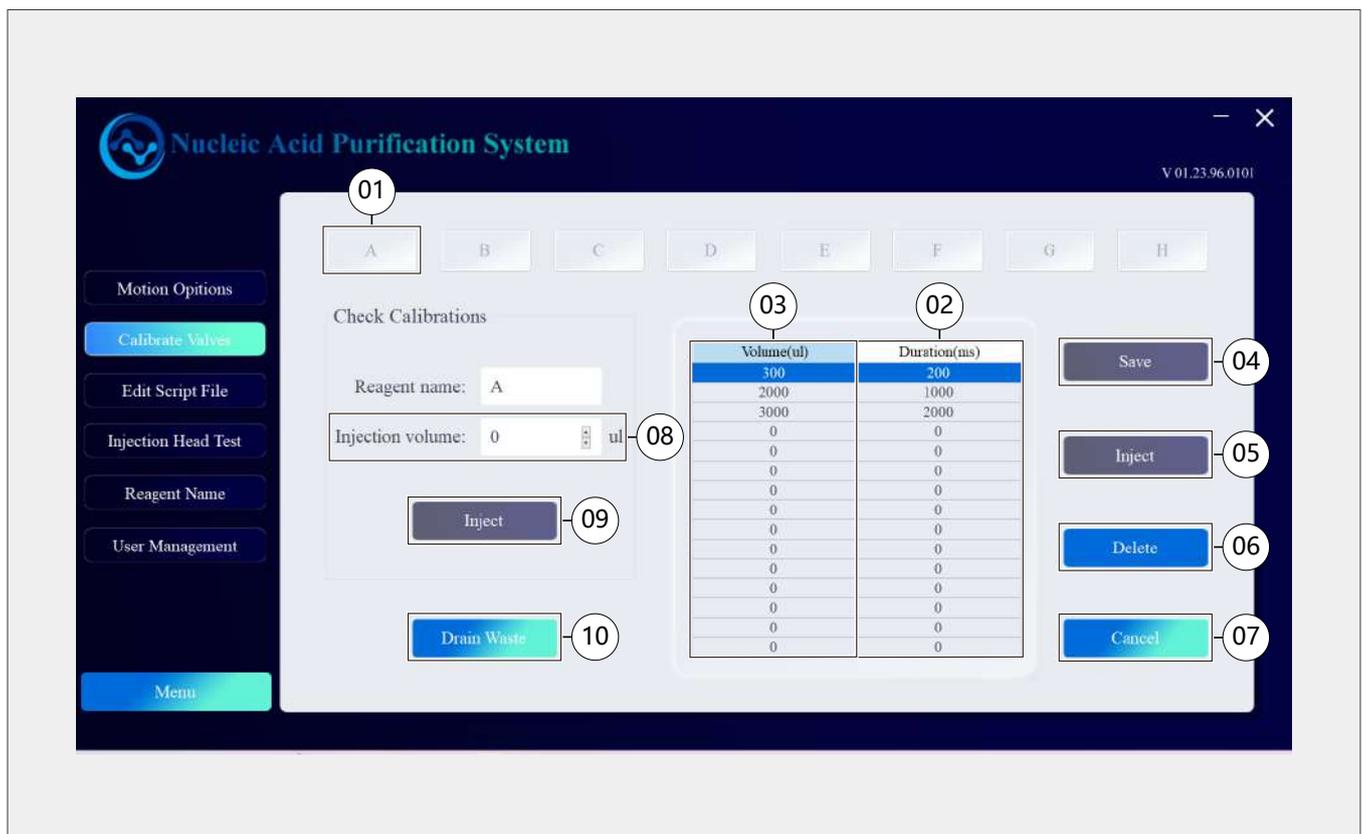


Figure 5-9

Valves have to be calibrated manually by using a collection tube and a pipette. reagent pressure must be kept stable to ensure calibration accuracy.

Liquid dispensing valves can each be calibrated for a minimum volume and a maximum volume. Software will then determine all volumes between minimum and maximum points. Each valve must be calibrated for a minimum and a maximum point and values outside these points cannot be injected. Valve liquid delivery will be more accurate if more points are calibrated between these points.

Add calibration point

Refer to (Figure 5.9)

1. Click "A" (1), select the reagent.
2. To calibrate another point, highlight appropriate line with a mouse click.
3. Set a number of milliseconds (ms) for valve opening into "Duration(ms)" (2).
4. Click "Inject" (5), place tubes under correct injection pin to collect dispensed liquid measure it, and then enter value into "Volumes (μL)" (3).
5. Click "Save" (4) to save the calibration point

Note: click "Cancel" (6) to delete changes.

Click "Delete" (7) to delete the selected calibration point.

Check Calibration

Allows user to check calibration curve for each valve.

For example, reagent A Valve is calculated for 1 for 300 μL and 3000 μL and an entered target volume of 1000 μL .

1. Enter 1000 μL in "Injection Volume" (8).
2. Click "Inject" (9)
3. Collect reagent in the tube and check volume with a pipette. Software will calculate necessary valve open time, based on volume to be delivered and slope between two calibration points.



Notice:

Data should be saved after calibration, you can save alone each time point or several time points be saved once, the saved data can not be canceled and modified;

The filter should be replaced before calibration. The filter can filter out the large of insoluble material, to avoid obstructions injection pipes and valves, resulting in inaccurate of injection.

liquid volume calibration should be used corresponding reagent. The viscosity of each reagent is different, and the flow speed through different, it calibration by other reagent.

5.7.3 Edit Script File screen

Allow user to modify and create script files.

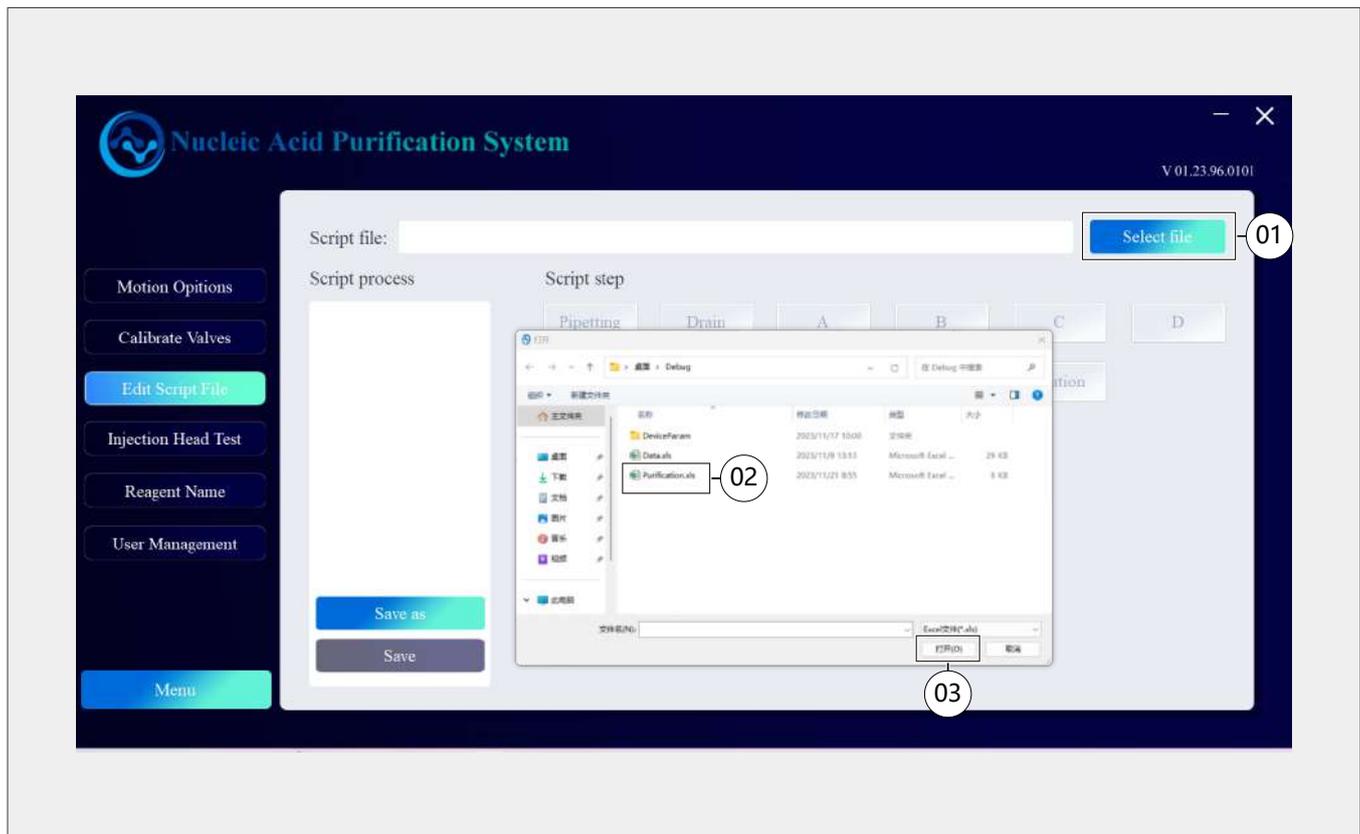


Figure 5-10

During process of setting up a run for elution or purification, user will be asked to a pre edited script file.

Opening a script file

Refer to (Figure 5.10).

1. Click "select file" (1).
2. Select "Script file" (2).
3. Click "Open" (3).

Script file will be loaded.

Editing a script file.

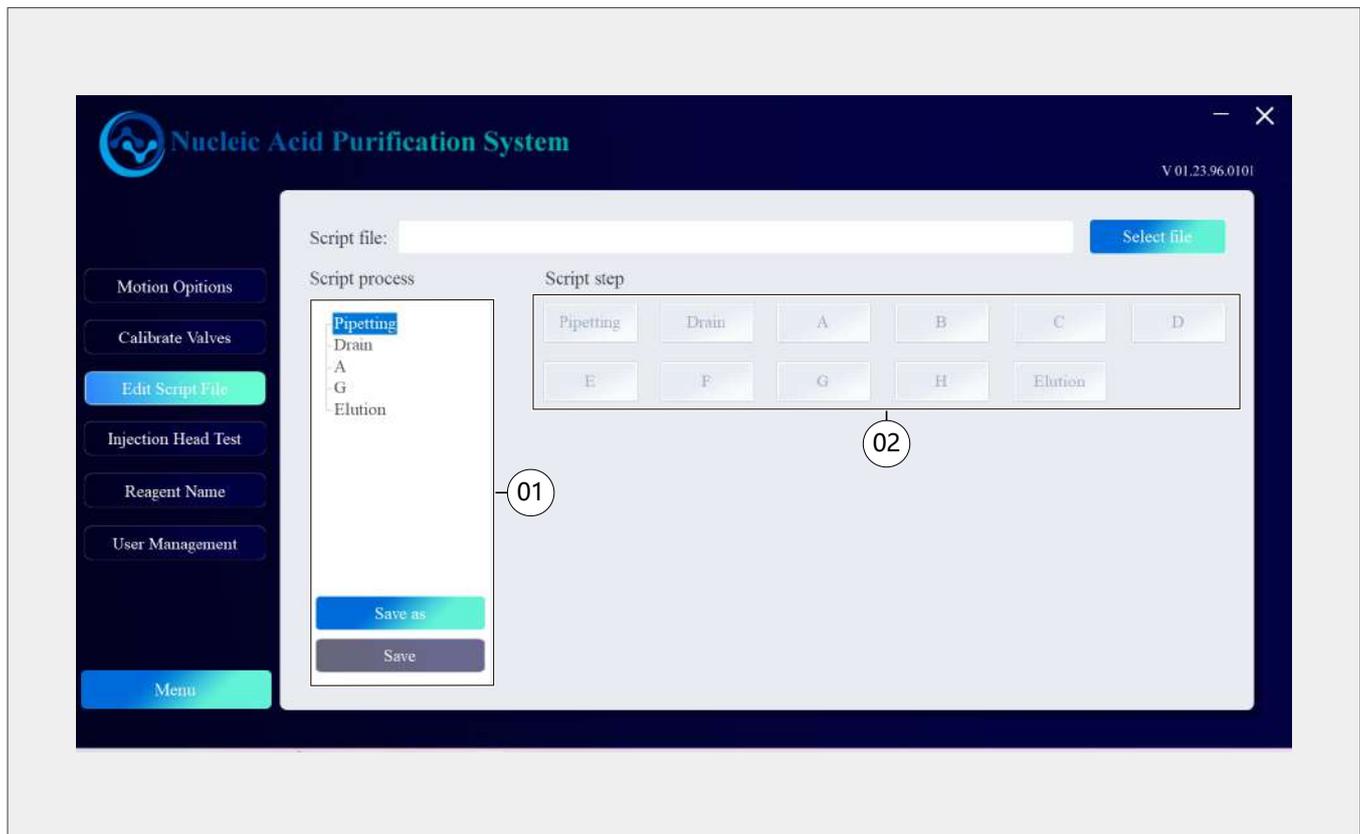


Figure 5-11

Refer to (Figure 5.11).

Once script file is open, user can add, remove, and modify individual steps as needed. Left window (1) contains loaded script process and right side (2) contains script steps.

Script process can include one or more steps.

Script step allows user to click to select which steps to put into script files.

Step available:

Pipetting

Drain

Reagent 1-8

Elution

Pipetting Properties: Refer to steps 1-4 of 5.5 Pipetting screen.

Drain Properties: Refer to steps 6-8 of 5.5 Pipetting screen.

Reagent Properties: Within each step of a cycle, in a script file, there are reagent properties that are unique to that reagent and that specific step.

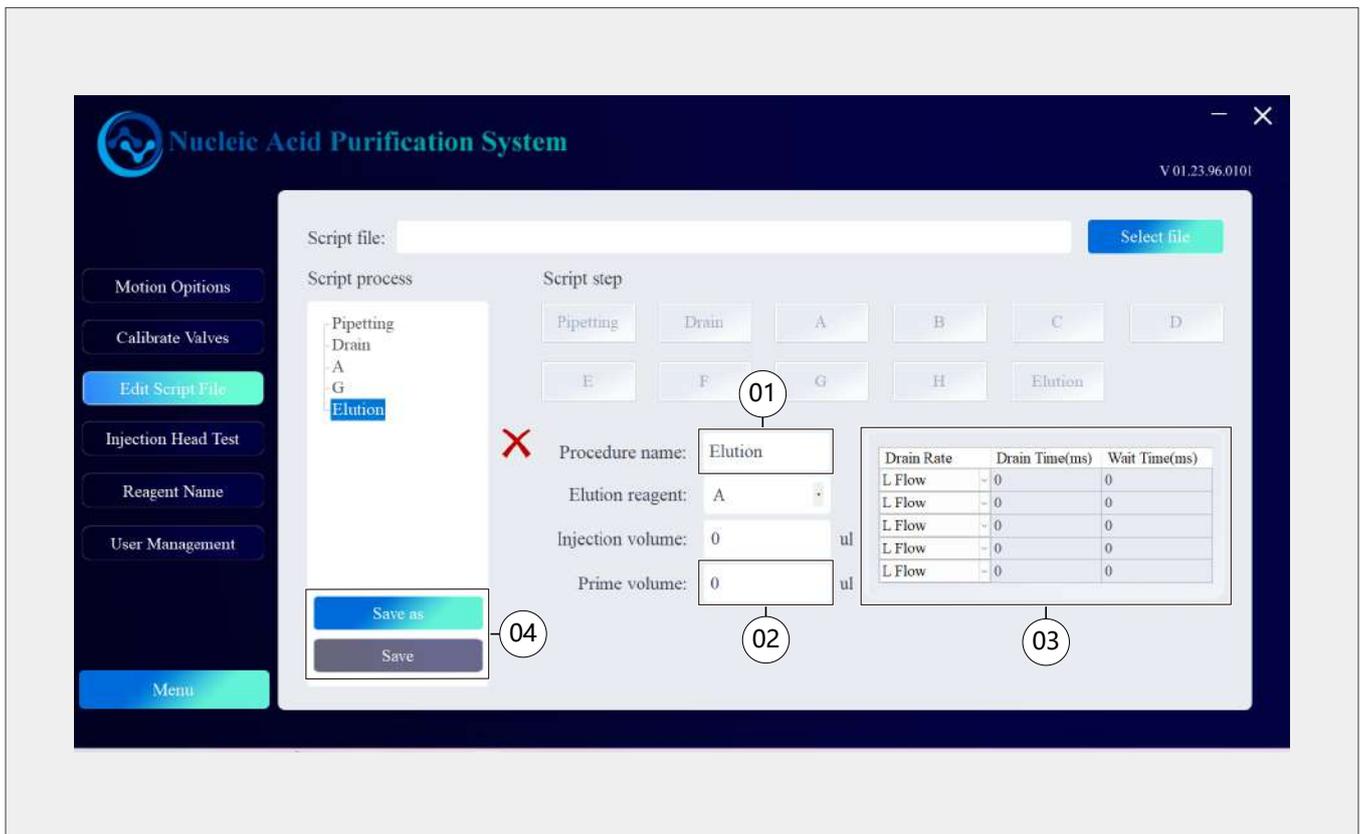


Figure 5-12

Refer to (Figure 5.12).

- 1 Enter "Injection volume" (1)
- 2 Enter "Prime volume" (2)
- 3 Set drain process(3), Refer to steps 6-8 of 5.5 Pipetting screen.
- 4 Click "Save" or "Save As" (4).



Notice:

Elution need select a reagent . Priming is necessary to prevent build up and crystallisation on injection head. Reagents can also evaporate during times of no use. Priming will ensure that reagents is delivered accurately. Amount of priming will depend on reagents being used.

5.7.4 Injection Head Test screen

Allows user to test and prime lines.

Note: Do not put hand in **operational area** when using Injection Head Test screen. Instrument moves X table to align injection head over waste tray. Always wear safety goggles and gloves when using this screen.



Figure 5-13

Refer to (Figure 6.9).

1. Click one valve (1) or group valves(2) in displayed valve array, valves will be open.
2. Click it again, valve will be closed.

Note: Value will stay open until button is clicked again. In case of emergency user can turn off power on right side of control box to shut all valves off.

When the valve is opened, observe the corresponding reagent's liquid dispensing head. After the reagent comes out, it should form a continuous line. If no reagent out or the reagent out not smooth after clicking, please check according to the following

steps:

1. Check the bottle pressure is normal or not, and check whether the reagent bottle mouth and pipe joint are leakage;
Make sure there's reagents in the bottle, and the inlet is below the liquid level;
Whether need replace new filter;
Check whether Obstruction of the injection head, injection pipe, valve inlet pipe ;
Check whether the valve can open and close normally.

5.7.5 Reagent Name Screen

Allows user to rewrite name of each reagent.

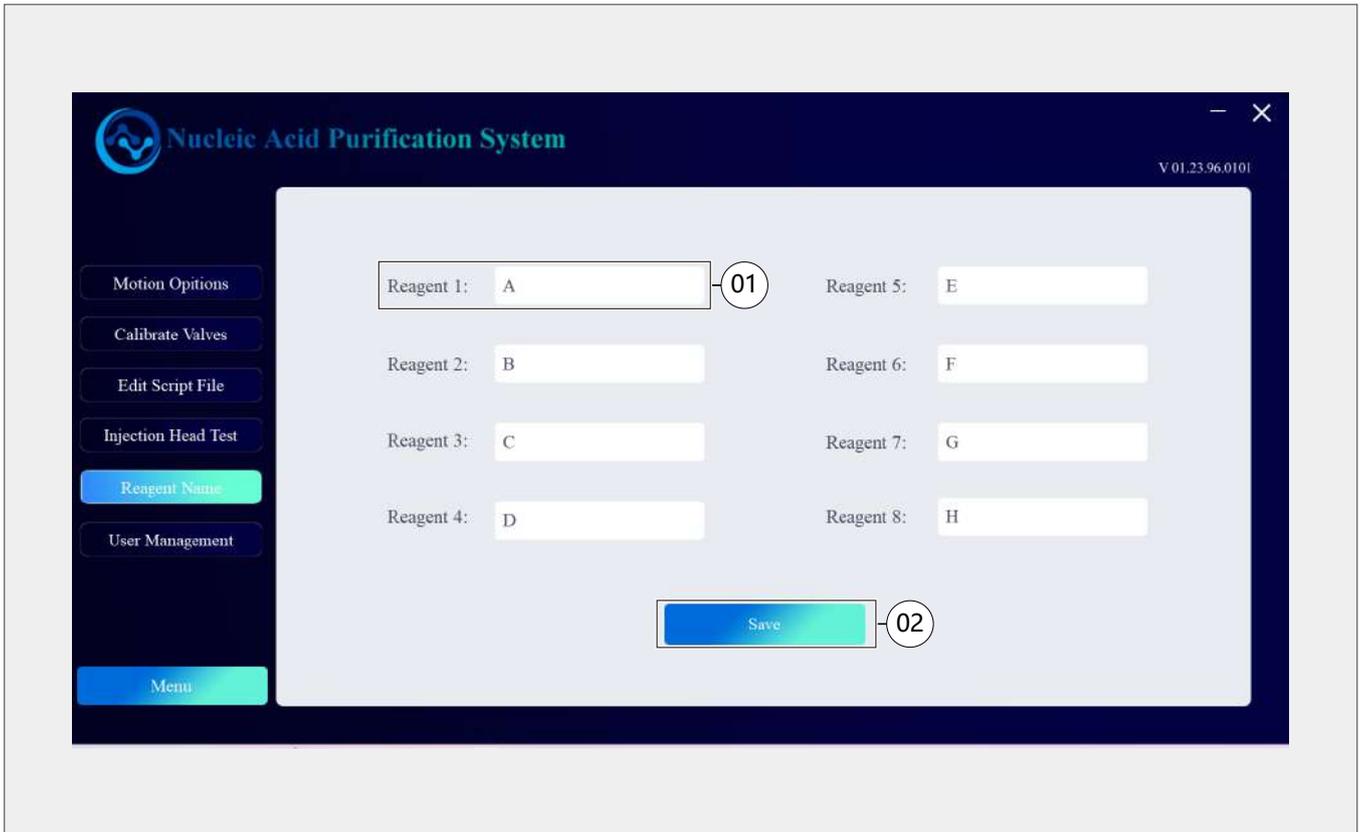


Figure 5-14

Enter the full name of reagent in the box 1 2 3..., save it.

5.7.6 User Management screen

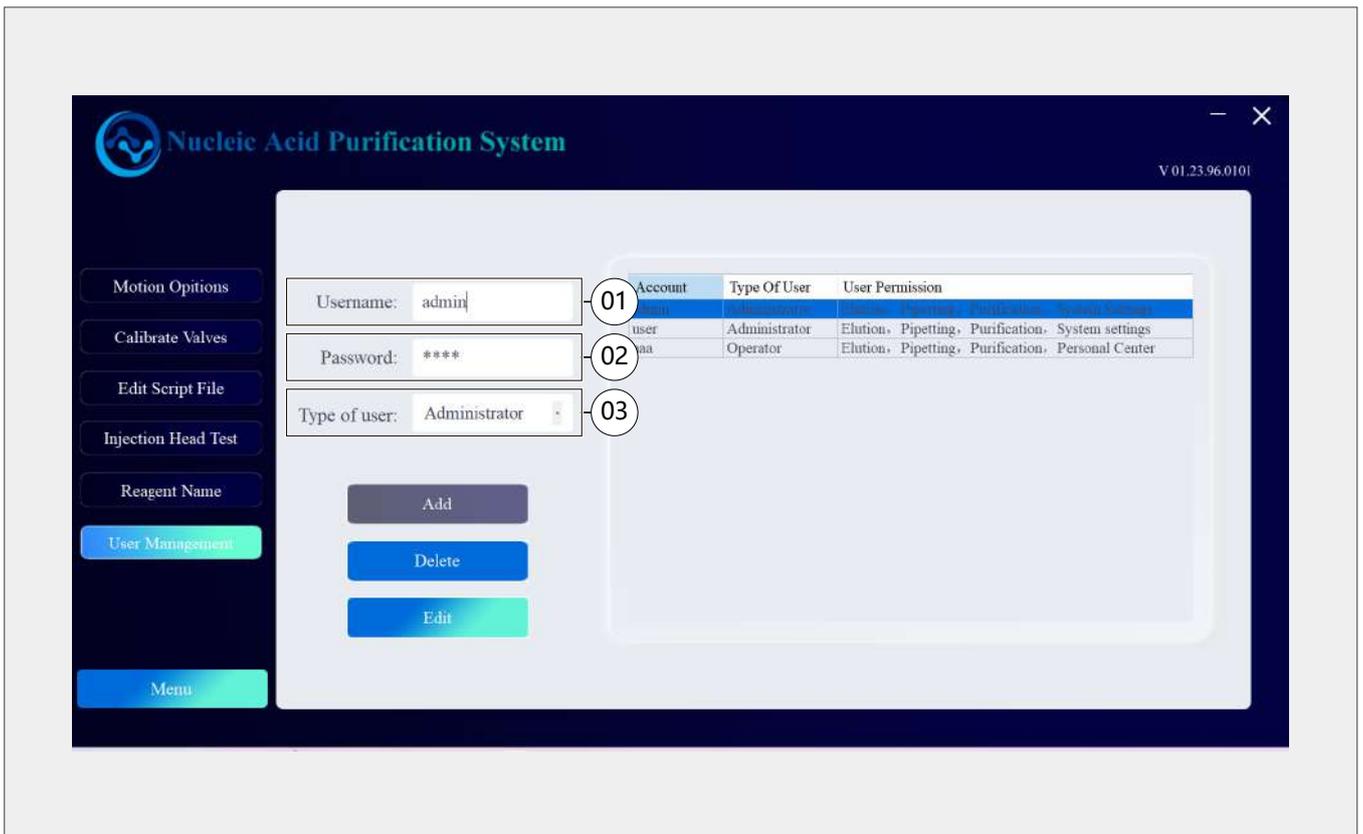


Figure 5-15

Allows different levels of user access to software. Username and password can be created and a role may be assigned to user.

Add: Adds additional user.

Delete: Deletes selected account

Edit: Edit selected account.

1. Enter "Username" and "Password"
2. Selecte "type of user"
3. Click "Add" to add a new account.

Note: The operator account can only modify their own password.

Maintenance

Proper maintenance can maintain the stability of the instrument and extend its service life. We recommend the following aspects of maintenance when using the instrument:

1. Before and after use, try cleaning the dispensing head with acetonitrile;
2. Use alcohol to scrub the outer surface of the equipment;
3. Change the filter of the reagent within one month or less;
4. When the machine is just started or has been idle for a long time, it is necessary to test run the instrument once before proceeding with normal operation;
5. The parameters need to be revalidated after a midway shutdown or power outage;
6. Verify the liquid volume calibration data once a month;
7. Clean and lubricate the movement shaft and sliding rod of the equipment once a month;
8. Test the air tightness of the equipment once a month. Turn Argon On/Off to OFF, observe whether the reagent pressure decreases rapidly ($> 2\text{psi}/15\text{min}$).



Common Problems & Solution

device cannot turn on.	Check if the power is turned on	Turn on the power switch
	Check whether the power cord is loose	Re-plug the power cord tightly.
	Check if the power outlet has any electricity	Confirm that the power supply line is normal
Initialization error	Check if the moving parts are stuck, and there should be no tips on the pipette	<ol style="list-style-type: none"> 1. Turn off the power switch 2. Move the moving part to the middle 3. Remove the tips 4. Re-turn on the power switch.
	Check the status of the scram button	Rotate left to make the scram button popped out
Unable to operation after start software	WLAN is may not connected	Check WLAN port, restart the system
The Injection head can not dispensing liquid	Crystal buildup on injection head	Clear the injection head with ACN
	Obstructions on Injection Valve	Replace new valve
Disconnected injection	Obstructions on filter	Replace new filter
	Obstructions on injection lines	Clear or replace new injection lines
	Crystal buildup on injection head	Clear the injection head with ACN
Injection without interrupted after Value off	Injection Valve with obstructions	Disassemble the valve module to cleaning
	Injection Valve break down	Replace new injection valve
Insufficient Amidite reagent pressure	Bottle cap not tightened	Tighten it again
	Bottle sealer damaged	Replace new bottle sealer
	Pressure regulator damaged	Replace Pressure regulator
Plate stop movement	Plate position sensor breakdown	Replace Plate position sensor



**ONE DREAM, ONE GOAL! TO BE YOUR BEST
PARTNER IN OLIGONUCLEOTIDE SYNTHESIS**

Honya Biotech

No.246 Shidaiyangguang Blvd, Yuhua District,
Changsha City, Hunan Province, China

in f  @Honya Biotech

Email : sale@honyabio.cn

Tel : +86 15802572548

Web : www.honyabio.com