

NUCQX®

Fully Automated Nucleic Acid Extractor N-96

Model: N-96 | User Manual



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Preface

Thank you for using the N-96 Fully Automatic Nucleic Acid Extraction Instrument. Please read this manual carefully before using the instrument, especially the sections on precautions, warnings, and tips. For easy access, keep this manual in a place where it can be readily retrieved.

In this manual, the term "user" refers to an operator who has undergone proper system training. Any operation beyond the scope outlined in this manual is strictly prohibited.

Basic Information

Product Name	Fully Automatic Nucleic Acid Extraction Instrument
Model Number	N-96
Software Name	N96 Nucleic Acid Extraction Main Control Software
Software Version	V1
Product Dimensions	Length 87 cm, Width 45 cm, Height 50 cm
Manufacturing Date	See product label
Service Life	5 years
Registrant/Manufacturer	SHT technology GmbH
Address	SHT technology GmbH, Niederhöchstädter Str. 64, 61476 Kronberg im Taunus, Germany
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After-sales Service Provider	SHT technology GmbH
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1. Overview

1.1 Instrument Introduction

The N-96 is an integrated automated nucleic acid preparation system that can purify nucleic acids from a variety of biological samples, including whole blood, viruses, tissues, plants, bacteria, and cultured cells. With intelligent pre-installed extraction programs, compatible magnetic bead-based nucleic acid extraction kits, and consumables, this system provides laboratories with an efficient, automated, and high-quality nucleic acid purification solution, serving downstream gene analysis and molecular diagnostics.

1.2 Instrument Structure

The N-96 Automatic Nucleic Acid Extraction Instrument consists of mechanical and electrical parts. Specifically, it includes the casing, upper cover, sample mixing motion mechanism, magnetic bead transfer motion mechanism, heating module, HEPA filter device, UV sterilization device, color touch screen, fully automated nucleic acid extraction operation software, and human-machine interaction control software.

The N96 fully automated nucleic acid extraction instrument has two models: 96-well and 24-well large volume. The detailed diagrams are as follows:



Figure 1: N96 Fully Automated Nucleic Acid Extraction Instrument (96-Well) | Figure 2: N96 Fully Automated Nucleic Acid Extraction Instrument (24-Well Large Volume)

1.3 Intended Use

This instrument is intended for the extraction and purification of nucleic acids from research samples.

2. Working Principle of the Instrument

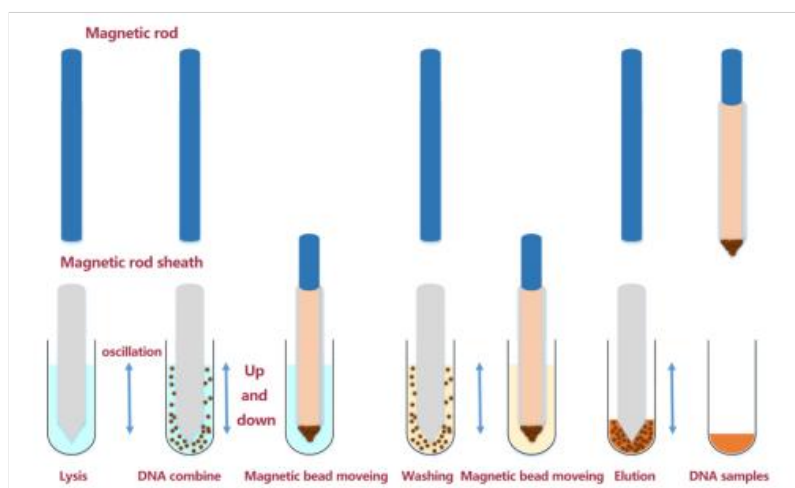


Figure 3: Schematic Diagram of the Nucleic Acid Extraction Instrument's Working Principle

The principle of this product is based on magnetic bead adsorption: the N-96 Automatic Nucleic Acid Extraction Instrument can process up to 96 samples simultaneously. Using magnetic rods on the magnetic rod rack inside the experimental chamber, the magnetic beads adsorbed with nucleic acids are moved to different reagent wells. Then, a magnetic rod sleeve placed around the magnetic rod is used to rapidly mix the liquid up and down in a repeated motion, ensuring uniform mixing of the liquid and magnetic beads. After processes including cell lysis, nucleic acid adsorption, washing, and elution, the instrument ultimately extracts high-purity nucleic acids.

3. Performance Parameters

3.1 Performance Indicators

3.1.1 Performance

96-Well Version	24-Well Large Volume Version
Processing Capacity: 1 to 96 samples	Processing Capacity: 1 to 24 samples
Working Volume: 20 μ L to 1,000 μ L	Working Volume: 50 μ L to 10,000 μ L
Magnetic Bead Recovery Rate: > 99%	Magnetic Bead Recovery Rate: > 99%
Permanent Magnet Column: 4,000 Gs to 6,000 Gs	Permanent Magnet Column: 4,000 Gs to 6,000 Gs
Temperature Control Range: Room temperature to 120 $^{\circ}$ C	Temperature Control Range: Room temperature to 120 $^{\circ}$ C

3.1.2 Appearance

1. The housing of the automatic nucleic acid extraction instrument consists of a plastic front shell and a sheet metal chassis. The plastic front shell is made of ABS material and is treated with a white, alcohol-resistant spray coating. It must have no sharp edges, and the outer surface should be smooth and free from dents, scratches, or other defects. The sheet metal chassis is made of metal and treated with black matte spray coating, which is also alcohol-resistant. The surface must be smooth and free from peeling, cracks, whitening, drips, scratches, pinholes, orange peel texture, or other defects.
2. The silk screen printing must not have shadowing, overflow, missing corners, misprints, or ink shortage. The printing should have strong adhesion and be resistant to alcohol wiping, with no fading.
3. Fastener connections must be secure and reliable, without looseness, and all fixing holes must have screws installed.
4. The door and chassis should fit tightly, and the door should open and close without interference or jamming.

3.1.3 Software Application Functions

Through the software interface, the horizontal and vertical motion of the device's motion module, the temperature of the heating module, and the UV sterilization device and LED illumination device can be controlled:

1. The software can set positions, waiting times, mixing modes, mixing times, pause options, magnetic adsorption times, volumes, temperatures, save times, motor parameters, and more. The system settings allow adjusting the mixing speed, with 10 different mixing speeds available for free use with various mixing modes. The position settings allow fine adjustments for each station, and motor parameters can be adjusted for position and speed during operations such as mixing and magnetic adsorption. During the program's operation, heating can be applied to preset stations, while adjacent stations can be actively cooled to prevent temperature crossover, ensuring ideal experimental results. After the program finishes, saving operations can be performed for preset stations.
2. Horizontal Movement: The robotic arm moves from station 1 to station 6. Position and speed parameters can be input via the color touch screen's human-machine interface, and during operation, the sequence and timing of each action should match the settings. The robotic arm should move smoothly without interference, abnormal noises, or jerks.
3. Vertical Movement: Sample mixing and magnetic adsorption. Position and speed parameters can be input via the human-machine interface on the color touch screen, and the sequence and timing of each action should match the settings. The magnetic rod and sleeve should lower to the deep well plate in the center without interference or abnormal noises.

4. Enter the UV lamp settings interface to set the UV exposure time. The UV lamp can be turned on or off by pressing the run or stop button.
5. During machine operation, the LED light can be turned on or off at any time by clicking the virtual button on the screen.
6. The air filter switch should function normally during program operation/end.

3.1.4 Electrical Safety

The instrument should comply with the following safety standards: GB 4793.1-2007 "Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, Part 1: General Requirements"; GB 4793.6-2008 "... Part 6: Special Requirements for Laboratory Heating Equipment"; and YY 0648-2008 "... Part 2-101: Special Requirements for In Vitro Diagnostic (IVD) Medical Equipment".

3.1.5 Electromagnetic Compatibility

The instrument should comply with the following electromagnetic compatibility standards: GB/T 18268.1-2010 "Electromagnetic Compatibility Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, Part 1: General Requirements" and GB/T 18268.26-2010 "... Part 26: Special Requirements for In Vitro Diagnostic (IVD) Medical Equipment".

3.1.6 Environmental Testing

The instrument should meet the requirements of GB/T 14710-2009 "Environmental Requirements and Testing Methods for Medical Electrical Equipment", including Group I for Climate Environment, Group I for Mechanical Environment, and the requirements in Table 1.

Table 1: Environmental Test Requirements and Inspection Items

Test Item	Duration (h)	Recovery Time (h)	Test Conditions	Power Voltage
Rated working low-temperature test	1	—	10 °C, powered on during test	99 V (rated -10%)
Low-temperature storage test	4	4	-40 °C, powered on after test	220 V
Rated working high-temperature test	1	—	30 °C, powered on during test	253 V (rated +10%)
Operation test	4	—	10-30 °C, powered on during test	253 V (rated +10%)
High-temperature storage test	4	4	55 °C, powered on after test	220 V
Rated working damp-heat test	4	—	30 °C, 70%±3% RH, powered on during test	220 V
Damp heat storage test	48	24	40 °C, 93%±3% RH, powered on after test	220 V
Vibration test	—	—	Frequency cycle range 5-20-5 Hz, amplitude 0.15 mm, 10 scan cycles, ≤1 frequency range/min, non-working status, powered on after test	220 V
Transport test	—	—	Grade 3 road surface, driving distance 200 km, driving speed 30-40 km/h, powered on after test	220 V

Note: Reference test conditions include an ambient temperature of 23 °C ± 2 °C and a humidity of 45%-75%.

4. Installation Instructions

4.1 Installation Environment Requirements

The N-96 Fully Automated Nucleic Acid Extraction Instrument must be installed and used indoors under the following environmental conditions:

- Ambient temperature: 10 °C–40 °C
- Relative humidity: 30%–80%
- Altitude: below 2,000 meters
- Power supply: 110–230 V~ / 350 W, 50/60 Hz
- Well ventilated, avoid direct sunlight

The installation table should have a space of at least 100 cm × 70 cm × 80 cm (length×width×height), be flat, stable, and able to bear a weight of over 100 kg.

4.2 Instrument Unboxing

The N-96 Fully Automated Nucleic Acid Extraction Instrument is stored and transported in an aviation case. The packing list is as follows:

Order Number	Content	Quantity
1	Automated Nucleic Acid Extraction Instrument	1
2	Power Cord	1
3	Fuse	2
4	User Manual	1
5	Warranty Card	1
6	Certificate of Conformity	1

4.3 Power On

The back panel has the following interface: power cord interface. Insert one end of the power cord into the interface and connect the other end to the mains power.



Figure 4: Rear Interfaces

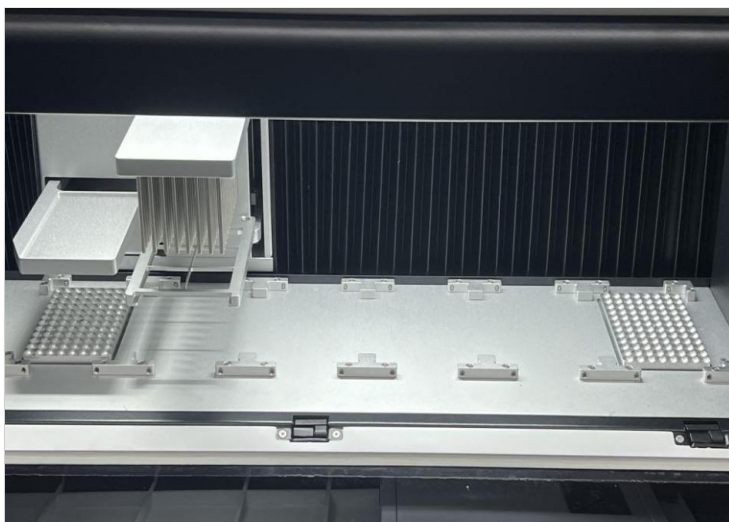


Figure 5: Experimental Chamber

The power button is located on the right side of the instrument. Before powering on, ensure that there are no foreign objects in the experimental chamber, then press firmly to turn on.



Figure 6: Right-side Power Button

After normal power-on, the instrument will perform a self-check. If the self-check is normal, it will enter the home page. If there is any abnormal noise or error pop-up during the self-check, please power off immediately and contact the distributor or manufacturer. Do not disassemble the instrument.

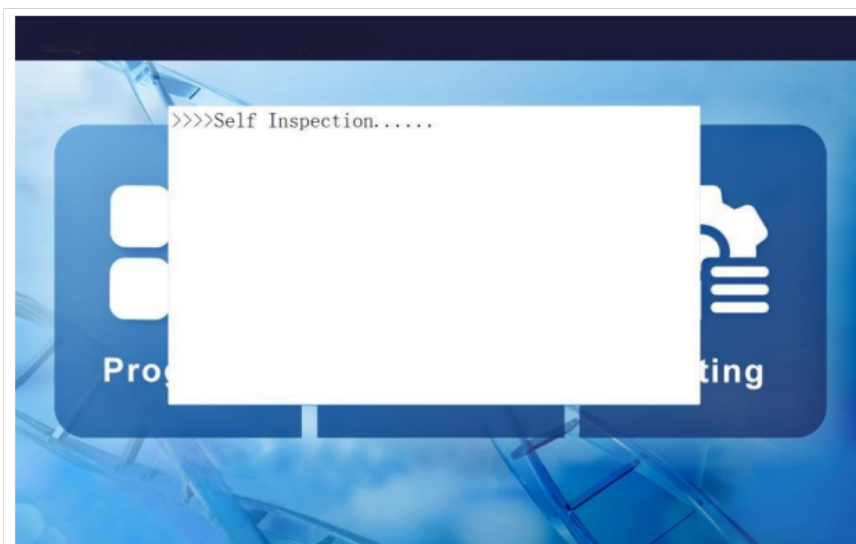


Figure 7: Error Message

5. Nucleic Acid Extraction Operation Instructions

5.1 Home Page Icons

The home page icons are: Program List, UV Light, and System Settings.

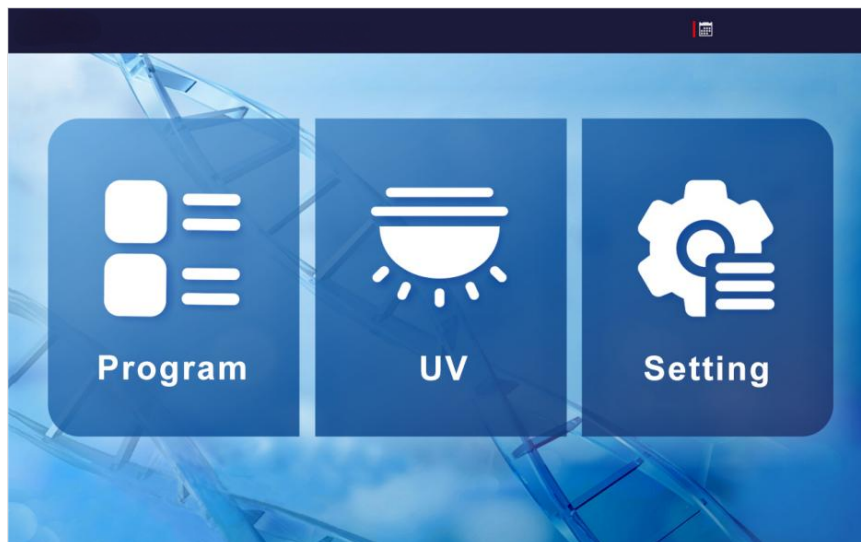


Figure 8: Home Page Interface

5.2 How to Switch Between 96-Well and 24-Well Large Volume Parameters?

For users who have purchased the N96 Fully Automated Nucleic Acid Extraction Instrument (24-Well Large Volume), the details of the experimental chamber are as follows. You need to switch parameters in the UI interface. The specific operations are as follows:

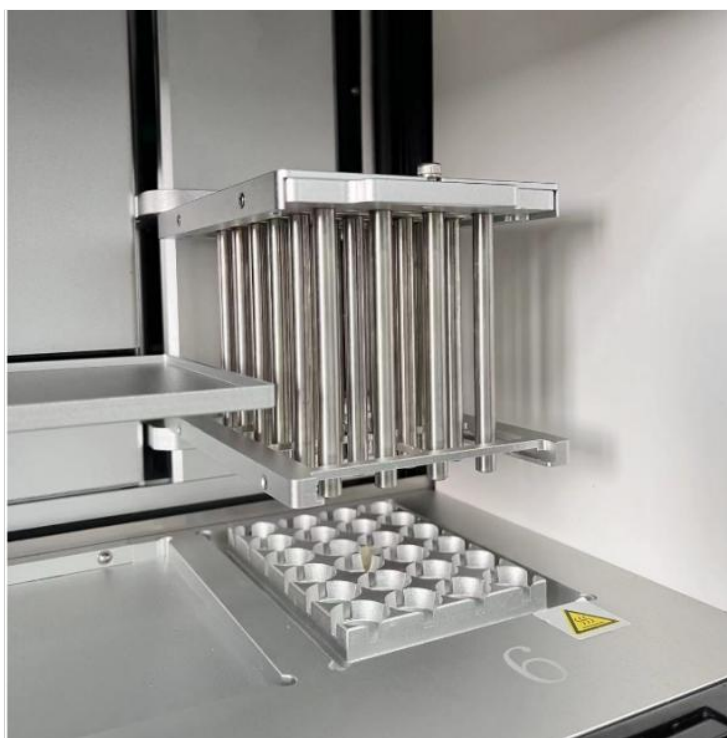


Figure 9: Detailed Magnetic Rod Experimental Chamber Diagram

Home Page – Program List, click the search bar, and enter "NC_N24N96".

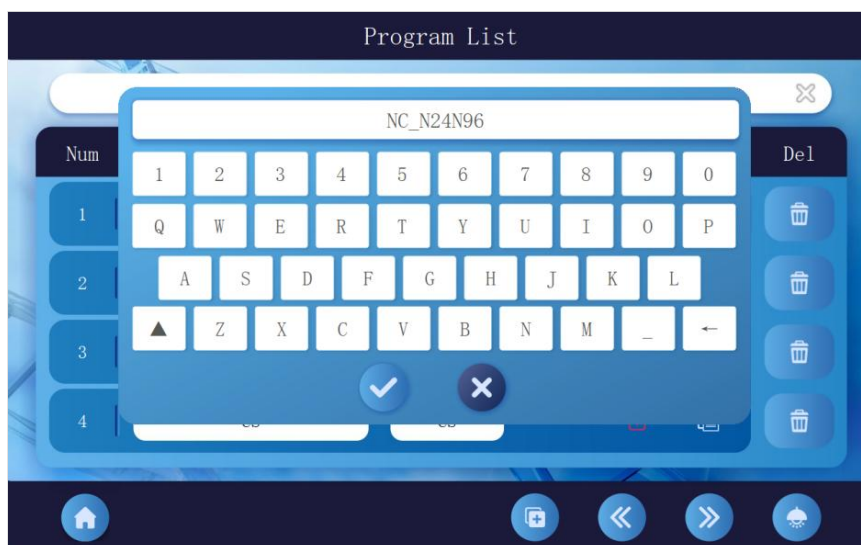


Figure 10: Program Search

Enable the 96-Well and 24-Well Large Volume Parameter One-Key Switching Function.



Figure 11: Right-Side One-Click Switch

Home Page – System Settings – Motor Configuration, click to select "N96" or "N24" to complete the switching between 96-Well and 24-Well Large Volume.

5.3 How to Start Running a Pre-Set Extraction Program?

5.3.1 Click the "Program List" button on the main interface to enter the program list interface.

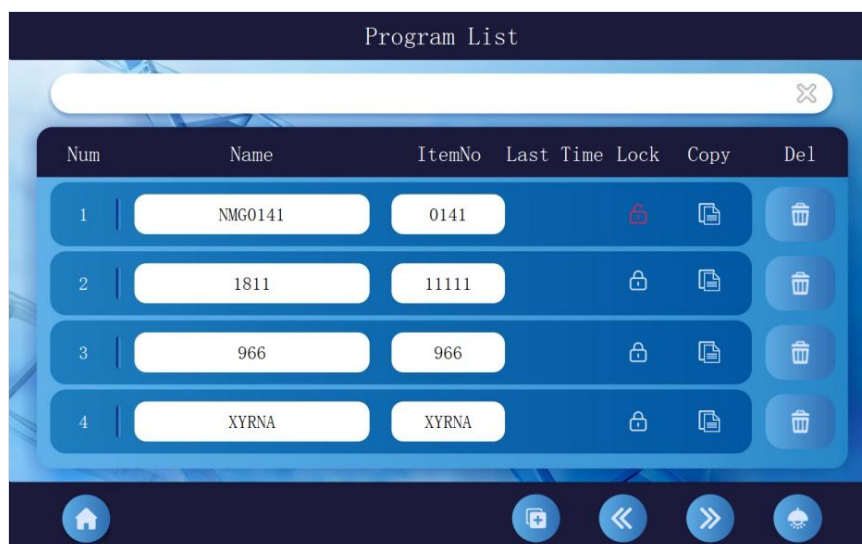


Figure 12: Program List

The buttons at the bottom from left to right are: Home Button, New Program Button, Left Page Turn Button, Right Page Turn Button, and Light Button.

5.3.2 Click the "Number - Name - Part Number" area to enter the program editing interface.

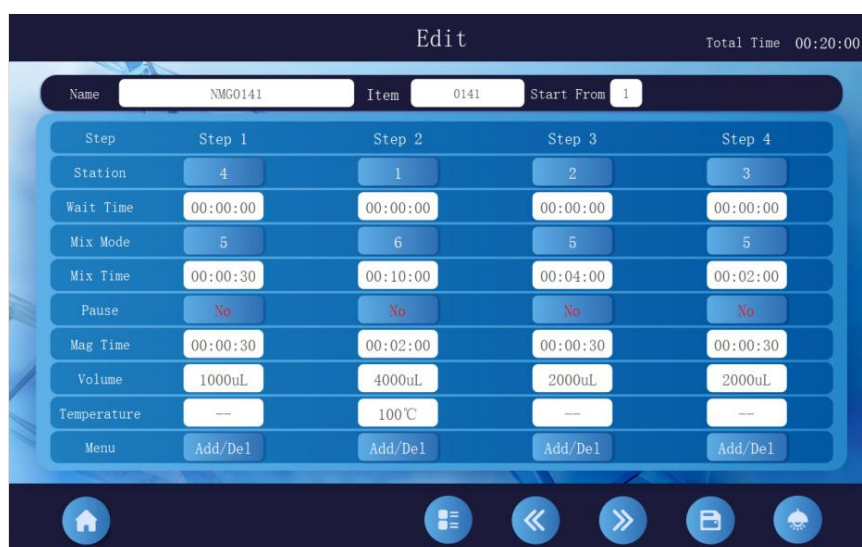


Figure 13: Program Editing

The buttons at the bottom from left to right are: Home Button, Return to Program List Button, Left Page Turn Button, Right Page Turn Button, Run Button, and Light Button.

5.3.3 Click the "Run Button," and a "Magnetic Sleeve Installation Prompt" pop-up will appear. Please be sure to check if the magnetic sleeve is installed! If the magnetic sleeve is installed, click "✓," and the instrument will start running. If you mistakenly exit, click "×."



Figure 14: Magset Installation Tips

5.3.4 The instrument running interface will display the total countdown, current action, and remaining time for the current action.

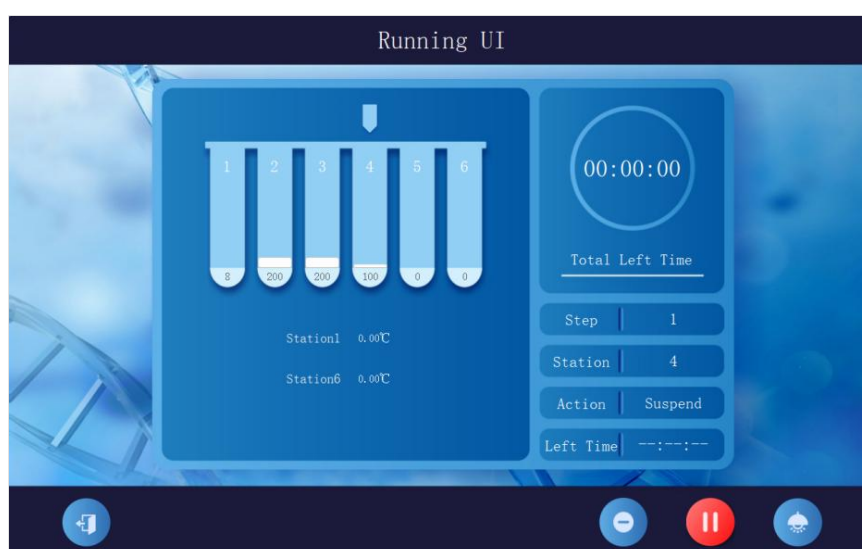


Figure 15: Running Interface

The buttons at the bottom from left to right are: Return to Program Editing Interface Button, Stop Button, Pause Button, and Light Button.

During program operation, the user can click the "Pause Button" to pause the current running program or click the "Stop Button" to terminate the current program.

Note: After pressing the pause button, the mechanical arm will stop moving, but the workstation will not change, and the program can still continue to run. After pressing the stop button, the program will terminate, and the mechanical arm will automatically return to the initial workstation.

5.4 Program Search Function

If there are many programs in the program list, making it difficult to search, you can click the "Search Area". A keyboard will pop up, and by entering keywords, you can quickly find the corresponding name or item number, making it easier to locate the desired program.

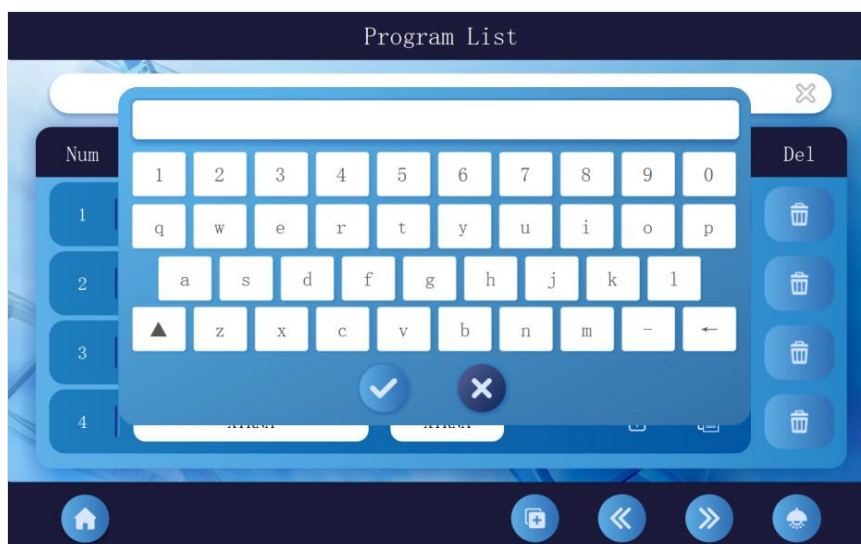


Figure 16: Program Search

5.5 Program Deletion Function

If the "Encryption" area of the program displays a red lock-like icon, it indicates that the program is encrypted, and a password is required to delete the program or modify its parameters. If the "Encryption" area shows a white lock-like icon, it means the program is not encrypted, and you can freely delete the program or modify its parameters.

When you click the delete button, an unencrypted program will directly pop up a confirmation window. Clicking "v" will delete the program, while clicking "x" will cancel the deletion.

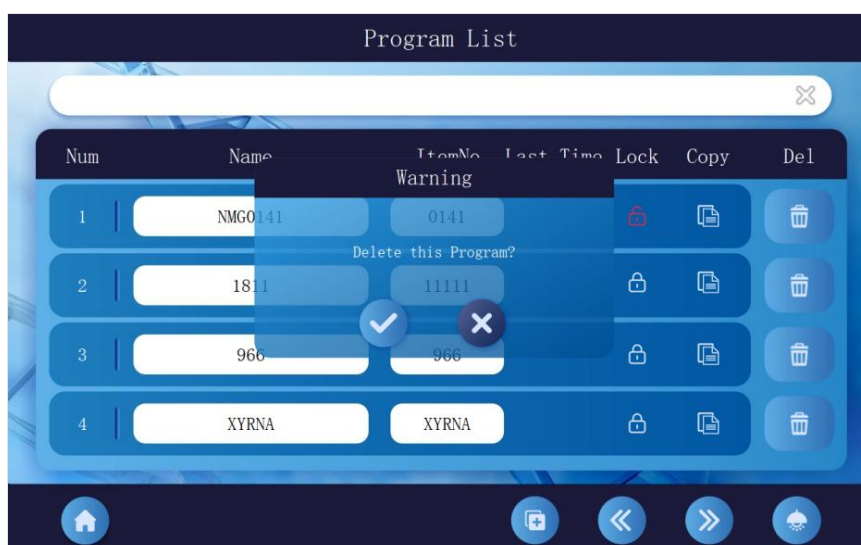


Figure 17: Program Deletion

When you click the delete button, an encrypted program will pop up a password prompt. After entering the correct password, clicking "v" will delete the program, while clicking "x" will cancel the deletion.

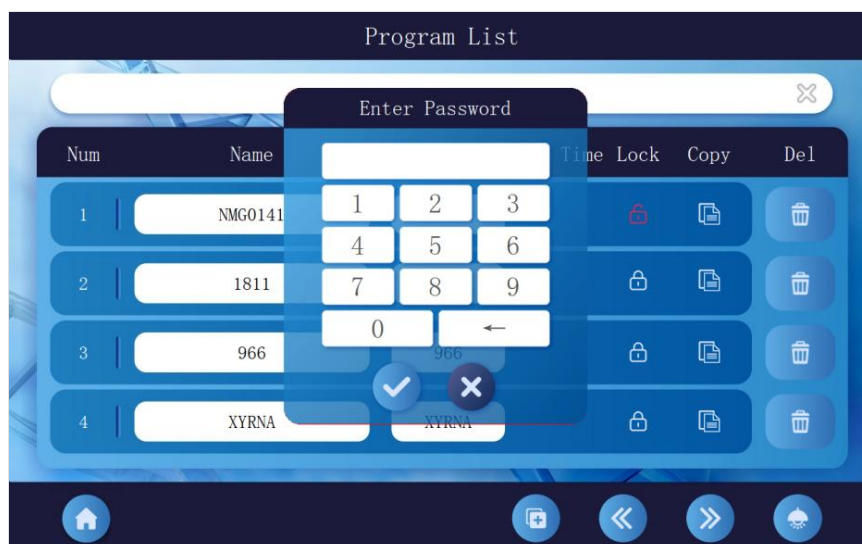


Figure 18: Program Deletion Password Confirmation

5.6 Power Protection Function

If the instrument experiences a power failure during operation, the instrument will remember the program's status. After power is restored and the instrument is powered on again, the operator will be prompted whether to continue the program from where it left off. Click "✓" to continue the unfinished program, or click "x" to return to the home page.

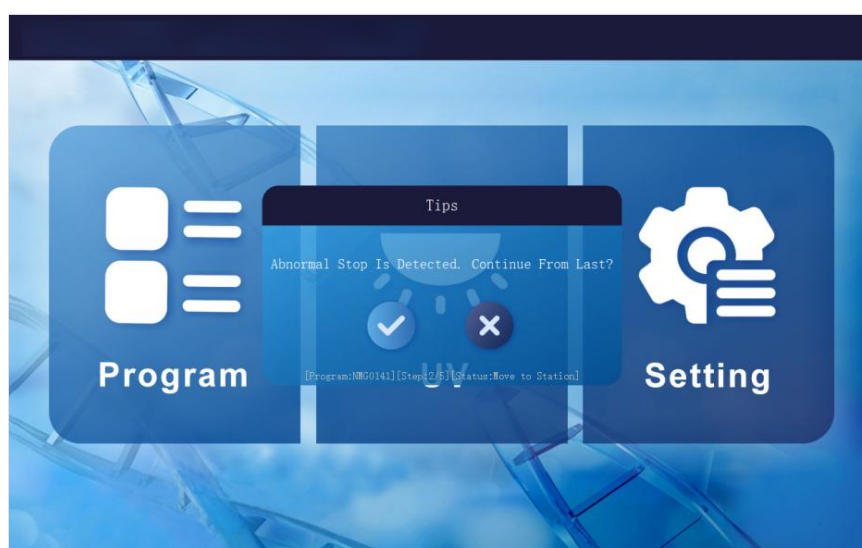


Figure 19: Power Failure Protection

5.7 UV Lamp Disinfection Function

Click the "UV Lamp" button on the homepage to enter the UV lamp settings interface, where a 15-minute UV exposure time is pre-set. Click the "Run" button to turn on the UV lamp and the "Stop" button to turn it off. If you need to change the exposure time, click the numbers to bring up the time keyboard. "00:00:00" represents hours, minutes, and seconds.

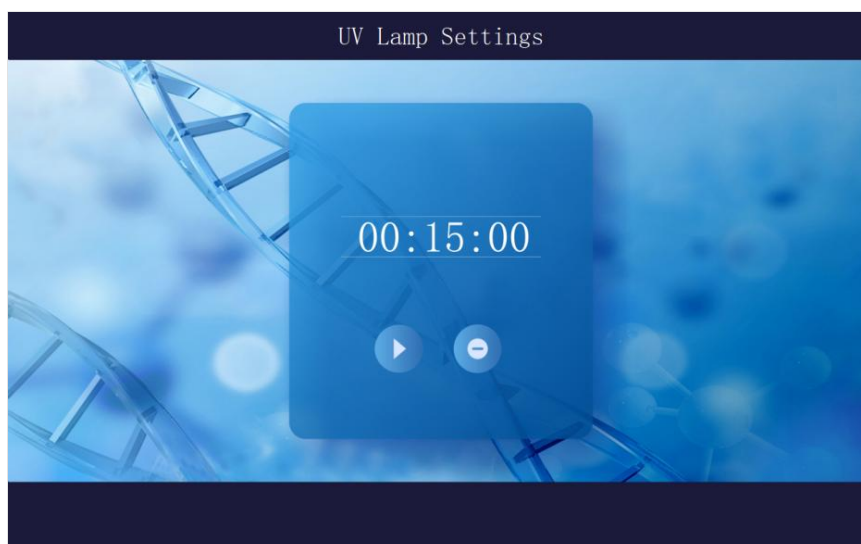


Figure 20: UV Exposure

6. Precautions

6.1 Instrument Maintenance and Safety

1. Before using the instrument, please carefully read the user manual and attend the training organized by the engineers.
2. Regularly clean the instrument with 75% ethanol and disinfect with UV light for at least 30 minutes. Avoid contact with strong corrosive liquids and mechanical impacts.
3. Ensure the instrument operates in a stable environment with stable voltage, temperature, and humidity within required ranges. The surface on which the instrument is placed should be flat.
4. Always install the magnetic sleeve during operation to avoid direct contact between the magnetic rod and the solution, which could damage the magnetic rod. If damaged, carefully wipe with 75% alcohol or distilled water and a clean cloth.
5. Non-professional personnel should not open the instrument to replace components or make internal adjustments. Such actions must be carried out by professional maintenance personnel authorized by the company.
6. Pay attention to electrical safety; never operate the instrument with wet hands.
7. During program operation, do not touch the heating block with bare hands to avoid burns.
8. After the program ends, the instrument will ring. Press the "Return" button to return to the program settings homepage.

6.2 Common Failures and Troubleshooting

Symptom	Checks / Actions
1) Screen Not Displaying	A. Check if the machine's power switch is on. B. Ensure the power cable is properly connected. C. Check if the power outlet has electricity. D. If the issue persists, contact after-sales service.
2) Machine Fails Self-Test or Malfunctions During Operation, Produces Abnormal Sounds	A. Check if there is any obstruction on the track that prevents the robotic arm from moving. B. Check if there is any obstruction on the magnetic rod sleeve rack. C. Ensure the magnetic rod sleeve is properly inserted. D. Verify the deep well plate is correctly placed in the position. E. If the issue persists, contact after-sales service.
3) Instrument Shutdown	A. Restart the instrument using the power switch at the rear. B. If the instrument does not respond after multiple restarts, contact after-sales service.

Symptom	Checks / Actions
4) UV Lamp Not Lighting	A. Restart the instrument and check if the issue was caused by a system crash. B. Ensure the UV lamp is properly connected. C. Replace the UV lamp if necessary.
5) Magnetic Adsorption Incomplete in Some Wells	A. Check for dirt or damage. B. Use a magnet to check if demagnetization has occurred.
6) Heating Block Not Heating or Cooling	A. Ensure the heating temperature and time are correctly set. B. Restart the instrument to check if the issue is caused by a system crash. C. If the issue persists, it may be a hardware problem; contact after-sales service.
7) Liquid Spilled Inside the Instrument or Major Mechanical Impact	Immediately cut off the power and contact after-sales service as soon as possible.

7. After-Sales Service

We provide comprehensive equipment service, including pre-sales guidance, after-sales debugging, usage, maintenance, and other services. The instrument is warranted for one year.