

BIOBASE[®]

Automatic Nucleic Acid Extraction System
BK-AutoHS96
User Manual

BIOBASE GROUP

Version 2020.07

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Preface

Thank you for choosing Automatic Nucleic acid extraction system (BK-AutoHS96). Please read this operator manual carefully before using the instrument to ensure proper operation.

Please keep this operator manual properly for reference when needed.

Product name: Automatic Nucleic acid extraction system

Model : BK-AutoHS96

Tel.: 0531-58533532

Fax.: 0531-81219880

Intellectual Property

This operation manual and the intellectual property of the instrument belong to Biobase Biodustry(Shandong)CO.ltd.

Without the written consent of Biobase Biodustry(Shandong)CO.ltd. any person or entity shall not copy, revise or translate any part of this manual.

Manufacturer's Statement

The contents of this operator manual are consistent with the situation of this product. Biobase Biodustry(Shandong)CO.ltd. reserves the final right to interpret this operation manual.

Biobase Biodustry(Shandong)CO.ltd. shall be responsible for the safety and reliability of the products when all the following requirements are satisfied:

- Assembly, commissioning and maintenance of the instrument are performed by Biobase Biodustry(Shandong)CO.ltd. after-sales service engineers or other authorized professionals by Biobase Biodustry(Shandong)CO.ltd.;

- All the accessories and consumables used for replacement and maintenance are provided or accepted by Biobase Biodustry(Shandong)CO.ltd.;

- The relevant electrical equipments comply with national standards and the requirements of this operator manual;

- The operation of this instrument is in accordance with this operation manual.

Warranty and maintenance services

The standard warranty period of this product is 1 year. Within this warranty period, the products are entitled to enjoy free after-sales service; however, the product needs to be repaired due to the following reasons, which does not fall into the free after-sales range.

You need to pay for maintenance and accessories:

- Improper use and man-made damage.
- Grid voltage or electromagnetic interference does not conform to the product specified range.
- Irresistible natural disasters.
- Replace or use parts, accessories, consumables not approved by Biobase
- After the warranty period expires, Biobase Biodustry(Shandong)CO.ltd. can continue to provide maintenance services for fees.

- Disassemble the instrument by yourself.

- Failures caused by other than the product itself.

- After-sale service provider: Biobase Biodustry(Shandong)CO.ltd.

User qualification

This system should only be operated by professionals, doctors, or experimenters trained by Biobase Biodustry(Shandong)CO.ltd. Or the agents of Biobase Biodustry(Shandong)CO.ltd., and the operators must be systematically trained in Automatic Nucleic acid extraction system(BK-

AutoHS96) to meet the corresponding requirements, and have the following qualifications:

- You must read and understand the operator manual.
- You must have good computer skills, and have a good command of the instrument and software system operation.
- You must be familiar with corresponding laboratory requirements and local laws and regulations.



Warning:

Individuals without professional training are forbidden to operate this instrument.

About this operation manual

This manual provides descriptions about main structure, function, performance, installation, use, operation, maintenance, repair, storage and safety practices to protect the operators and the instruments related with the Natch CS. Please refer to the corresponding chapter for details. The users should read the manual carefully for better understanding and command of the operation knowledge before using the instrument.

Note:

The user manual is intended for the following professionals:

- Daily operation personnels;
- Maintenance and troubleshooting personnels
- People who learn to operate.

The "extractors, instruments, and systems" mentioned in this article all refer to "BK-AutoHS96 Automatic Nucleic acid extraction system".

Software interface

Simplified diagrams of system may be showed in the user manual which may differ from the actual software interface. Please refer to the actual instrument you purchased.

Appearance of the instrument

Appearance simplified diagrams of instrument, parts, consumables, etc may be showed in the user manual which may be different from the actual ones. Please refer to the actual instrument you purchased.

Convention description

This manual describe some basic operations on the system software interface:

- **【XX】**: Means system software interface buttons.
- Click [XX]: Means to touch and click the corresponding button by mouse.

Signs, labels and symbols

Foreword

The following signs, labels and symbols may appear to remind operators of the warnings and potential dangers, please make certain the meaning of the symbols before use.

Graphic / symbol Description	Content description
	Biohazard: Remind the user to follow the instructions, otherwise there is a danger of Biohazard
	In vitro diagnostic medical devices
	Product serial number
	Special attention: Refer to the instruction manual
	Telectric shock hazards. Please refer to the detailed instructions on the Operator Manual and operate carefully to prevent electric shock
	Be careful to pinch and prick. Please refer to the detailed instructions on the Operator Manual and handle it carefully.
	Do not lean against it.
	Pay attention to the UV lamp inside the device. Please close the door when using and do not stare or stay in front of the device for a long time after opening,
	Do not pour liquid.
	Pay attention to the laser light source Don't stare at it so as not to cause burns to the eyes.
	Watch out for hot burns
	Refer to the Operator Manual

Prompt text description in Operation

Manual Text description

Text	Description
Note	It is used to explain important information in the operation steps or other contents that needs to remind the user.
WARNING	Remind the user to follow the instructions, otherwise personal injury may be caused.

Safety Precautions

For safe and effective use of the system, please read the following safety precautions carefully. Any violation of the following safety precautions may result in damage to the system or personal injury. If the user does not follow the instructions to use the system, the protection provided by the system may be invalid.

Electricity safety

In order to use electricity safely and prevent electric shock and damage to the instrument, please observe the following precautions.



It is a non-household equipment which cannot be directly connected to the residential low-voltage power supply network.

If there is an external switch or fuse or overcurrent protection device, make sure them available near the equipment.

Do not place the instrument where it is difficult to operate the disconnection device. If the plug of the power supply cannot be disconnected immediately in an emergency, make sure that the wall socket connected to the instrument's power supply can be touched by hand at all times.

After the installation is completed, customers are not allowed to move the instrument without authorization. If it must be moved, please contact the installation engineer for on-site service.

This system is grounded via ground wire. The power ground wire must be grounded to avoid electric shock.

The AC power supply must be stable. It is forbidden to share the power supply with high-power appliances.

Don't touch the power connector on the back of the system while running or maintaining it, otherwise there may be danger of electric shock.

Ac power supply must be stable and share power with high-power electrical appliances.

When the user is running or maintaining the instrument, do not touch the power interface at the back of the system, otherwise there may be the risk of electric shock.

When the main power of the instrument is turned on, non-authorized maintenance personnel must not disassemble the cover of the instrument.

Spilling the solution into the instrument may cause the instrument to malfunction and cause electric shock. Don't place objects on the instrument. In the event of a spill, immediately turn off the power and contact the customer service department or the local service representative of Biobase Biodustry(Shandong)CO.Itd.

Do not plug or unplug the power supply with wet hands.

Disconnect it from all power sources before opening the instrument for any maintenance or repair which should only be performed by skilled operators.

Make sure that the replaced power supply meets the requirements of this instrument.

If the instrument may be damaged, disconnect it from the power outlet and do not operate it again.

Electrical danger

Please observe the following precautions to prevent electrical hazards



WARNING:

- ⌘ The operator must always observe the electrical safety operation regulations. Only professional personnel can perform electrical repairs. Please wear static-free wrist straps or gloves during maintenance to protect the sensitive components on the instrument from electrostatic damage.

Mechanical danger

Please observe the following precautions to prevent mechanical hazards

WARNING:



- ⌘ . The instrument compartment door must be closed during operating it because its moving parts may cause personal injury during operation. It is strictly forbidden to extend the body parts into the machine work area. Unless the system has stopped working, you can open the compartment door to place samples, reagents, and guntips, otherwise it may cause injury to the operator. At the same time, the instrument may be damaged. Please note the following possible mechanical hazards:

- Injury caused by mechanical arm squeeze.
 - Injury caused by the pipette tip.
-

Protection against fire and explosion

Please observe the following precautions to prevent fire and explosion,

WARNING:



- Alcohol is flammable and should be handled with care.
-

Electromagnetic interference prevention

Please observe the following precautions to prevent electromagnetic interference,

WARNING:



In order to ensure the normal operation, the user has the responsibility to ensure that the instrument operates in an environment of electromagnetic compatibility

- ⌘ The system can't be installed with strong electromagnetic field interference which may affect the normal operation.
 - ⌘ Don't use other medical devices that may generate electromagnetic interference around the instrument, otherwise it may affect the normal operation of the instrument.
 - ⌘ This instrument complies with EMC requirements which may cause radio frequency interference in indoor environments. Appropriate
-

measures should be taken to reduce interference.

Biohazard prevention

Please observe the following precautions to prevent biohazard effectively,

**Biohazard:**

- ⌘ All liquids and solids in the laboratory are considered to be biological hazards and the user must take general laboratory precautions.
 - ⌘ All clinical samples are considered to be potentially infectious. Improper use may result in infection. Do not touch the samples directly with your hands. Always wear gloves and overalls to prevent infection during operation. Wear protective glasses when necessary.
 - ⌘ If the sample accidentally comes into contact with the skin, please immediately follow the work standards for users to handle it and consult a doctor.
-

Waste disposal

To prevent environmental pollution and personal injury caused by waste products, please observe the following precautions.



Biohazard: Follow the relevant local laws and regulations for the disposal of used samples, reagents and other wastes.

Other precautions

To use the instrument correctly, please observe the following precautions:

WARNING:

Do not smoke or eat near the instrument.

Avoid direct sunlight when the instrument is in operation..

Please use the software installation package provided by BIOBASE when installing user software

During user software startup or running, it is prohibited to change the date and time of the host.

Don't run other applications while the user software is running

I. Product Overview

BK-AutoHS96 is a Automatic Nucleic acid extraction system developed by Biobase Biodustry(Shandong)CO.ltd. with high throughput, high precision, high efficiency and pollution prevention. The system adopts a vacuum blood collection tube to directly load the machine, which integrates a sample carrier, a reagent carrier, a gun carrier, a sample loading arm, a grasping arm, an oscillation heating module, a refrigeration module, a magnetic suction module, a barcode scanning module, a protection system, a transportation system and industrial control system into a whole with one-button convenient operation and standardized work flow. It can greatly reduce manual operation errors, improve the accuracy of test results and provide solution for highly refined, simple, automated, and systematic laboratories

1.1 Basic Product Information

Product Name : Automatic Nucleic acid extraction system, Product model : BK-AutoHS96

1.2 Product Scope

This product is intended for extract nucleic acid from specimens such as serum, plasma, throat swabs, anal swabs, feces, reproductive tract secretions, exfoliated cells, urine, sputum, etc. which can be used in clinical gene amplification testing laboratories, CDC Centers for Disease Control, Research institute laboratories, medical college laboratories, etc.

1.3 Product specifications and performance indicators

Items	Parameter
Sample type	Serum, plasma, throat swab, anal swab, stool, reproductive tract secretions, exfoliated cells, urine, sputum, etc.
Supported reagent types	Pro HBV, HCV, HPV, STDs, EB, HCMV, TB, HFMD and etc
Language	Simplified Chinese / English
Display method	10.4 inch touch screen
Communication Interface	2 RS232, 4 USB, 2 network ports, 1 HDMI
Power supply	Input: AC 110V-240V, 50/60Hz, 350VA
Dimensions	1320 mm×850 mm×1600 mm (length x width x height)

Items	Parameter
Net weight	≤350Kg
Barcode scanning	Code39、Code93、Code128、Ean128、EAN/UPC、Codabar
Level detection	Pressure detection / capacitance detection, automatic detection of liquid level
Clot detection	Pressure detection, automatic detection of liquid aspiration and liquid clogging
Illumination	White cold light source
UV disinfection	Timed opening and closing
Instrument life	8 years. See the label on the production date. The life of this product is determined based on the life of the key components.

1.4 Product Principle

The instrument include sample carrier, reagent carrier, gun head carrier, sample loading arm, grasping arm, oscillation heating module, refrigeration module, magnetic module, barcode scanning module, protection system, transportation system, industrial control system, etc. which can be used for nucleic acid extraction from specimens accompanied with reagents,

1.5 Definition

LIS system: Laboratory (Inspection Division) information system
HIS system: Hospital Management Information

System PCR: Polymerase Chain Reaction, English name Polymerase Chain Reaction.

CDC: Center for Disease Control and Prevention.
System: Refers to the Automatic Nucleic acid extraction system (BK-AutoHS96).

Software: refers to the software used by the Automatic Nucleic acid extraction system (BK-AutoHS96).

II. Product installation

2.1 Unpacking inspection

Check the packaging and instrument after unpacking the outer box of the Natch CS, Please contact the transportation company or local distributor immediately if any damage.

Check out the packing list for the accessories of the instrument main unit after unpacking the outer box . Please contact the dealer immediately. whether the items are complete if any inconsistency or missing.

2.2 Storage and transportation conditions and working environment

Storage and transportation conditions

- Ambient temperature: $-20\text{ }^{\circ}\text{C} \sim 55\text{ }^{\circ}\text{C}$.
- Relative humidity: $\leq 93\%$.

Working environment

- The installation environment should be as clean as possible without dust, mechanical vibration, pollution, large noise sources, and electromagnetic interference.
- For indoor use, avoid direct sunlight or place it in front of heat and wind sources. Choose a well-ventilated location.
- Ambient temperature: $15\text{ }^{\circ}\text{C} \sim 35\text{ }^{\circ}\text{C}$.
- Relative humidity: 15% to 90%.

Power requirements

- Power supply: It must be used in a well-grounded power outlet. Before installation, Make sure the input voltage meets the requirements.

Voltage:

AC220V \pm 22

V Frequency:

50Hz Power:

350VA

Space requirements

Leave enough space behind the machine and on both sides of the machine to prevent poor heat dissipation which may cause the internal temperature of the machine to rise and malfunction. The space where the instrument is placed must be larger than the dimensions of the machine to ensure the space required to conduct maintenance, and turn the power off in emergency.

The space must meet the following conditions, as shown in Figure 2-1:

- 1) The reserved space between the right side of the instrument and the wall (or adjacent object) is
≥50cm;
- 2) The reserved space between the left side of the instrument and the wall (or adjacent object) is

- ≥10cm;
- 3) The reserve space between the back of the instrument and the wall (or adjacent objects) is ≥20cm.
- 4) The front of the instrument is ≥60cm.

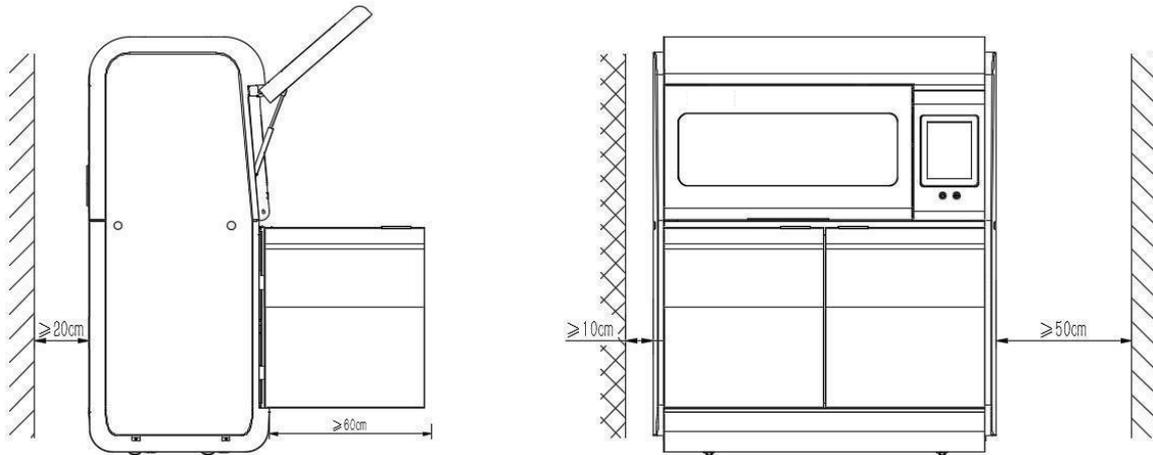


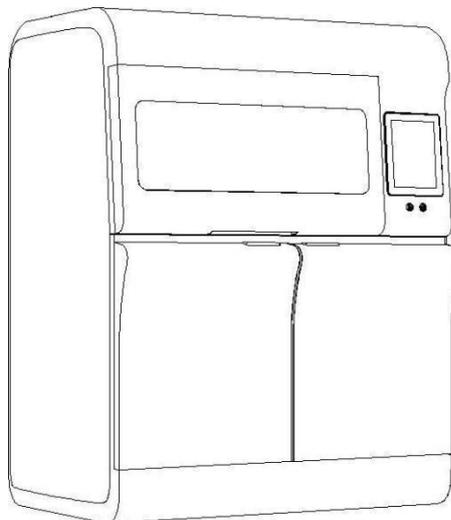
Figure 2-1 Instrument placement space

2.3 Product outline structure

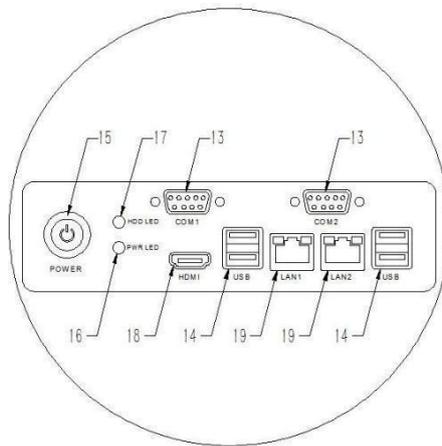
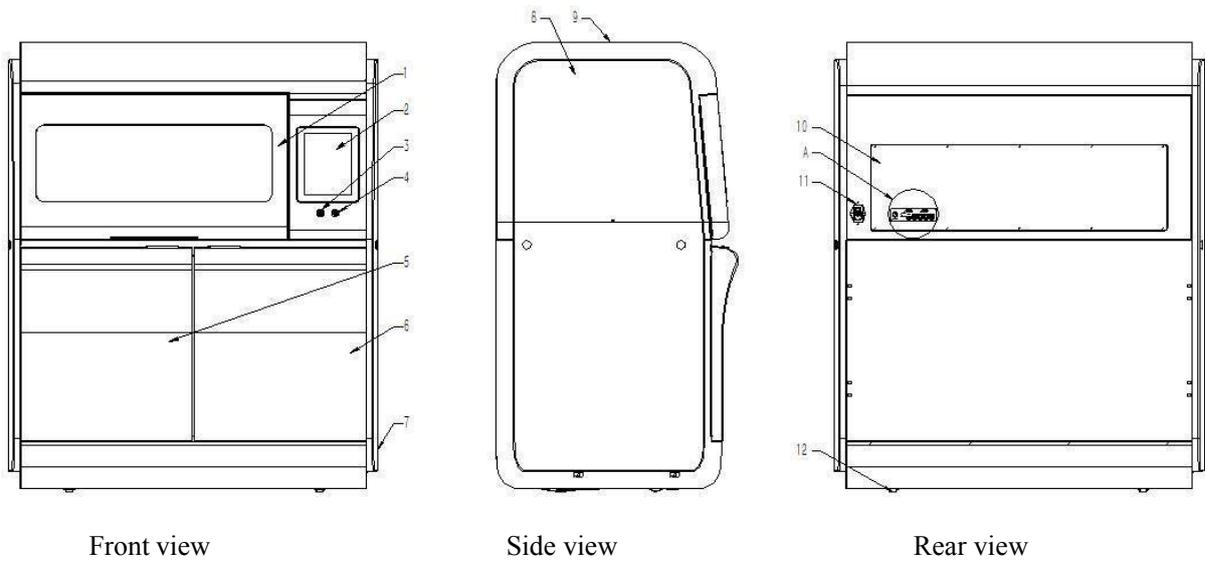
Automatic Nucleic acid extraction system (BK-AutoHS96) is consisted of sample carrier, reagent carrier, tips carrier, sample loading arm, grasping arm, oscillation heating module, cooling module, magnetic module, barcode scanning module, protection system, transportation system, industrial control system, etc.

2.3.1 Product external structure

The appearance of the product is shown in Figure 2-2 below.



Appearance of this instrument



Communication interface diagram (enlarged view at A)

Figure 2 Appearance of 2 Automatic Nucleic acid extraction system (BK-AutoHS96)

Table 2 Structure of 1 BK-AutoHS96 Automatic Nucleic acid extraction system

No.	Name	Function
1	Security door	For safety protection
2	Touch screen	To display the operation interface
3	Power switch	For internal power supply of the instrument
4	Lighting switch	Provides interior lighting
5	Left cabinet	For waste tips storage
6	Right cabinet	For item storage
7	Right hanging plate	For circuit board maintenance
8	Left hanging plate	For decoration
9	Top service panel and air pipe joint	Robotic arm maintenance and connection of exhaust pipes.

10	Rear service panel	For mechanical arm maintenance.
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Table 2 Structure of 1 BK-AutoHS96 Automatic Nucleic acid extraction system

No.	Name	Function
11	Power input socket	Used for power cord connection.
12	Casters and adjustable foot cups	Used to adjust the level of the instrument during transportation and installation.
13	Serial port	Used for communication.
14	USB	Used for communication.
15	Computer forced switch	Long press for 5 Seconds to force shutdown computer.
16	Computer power indicator	To display the computer is powered on or off
17	Computer running indicator	To display computer operation status
18	HD output interface	To connect external display device.
19	Network port	Used for communication.
20	Computer reset switch	Used to recover computer programs.

2.3.2 Internal structure

The internal structure of the product is shown in Figure 2-3 below.

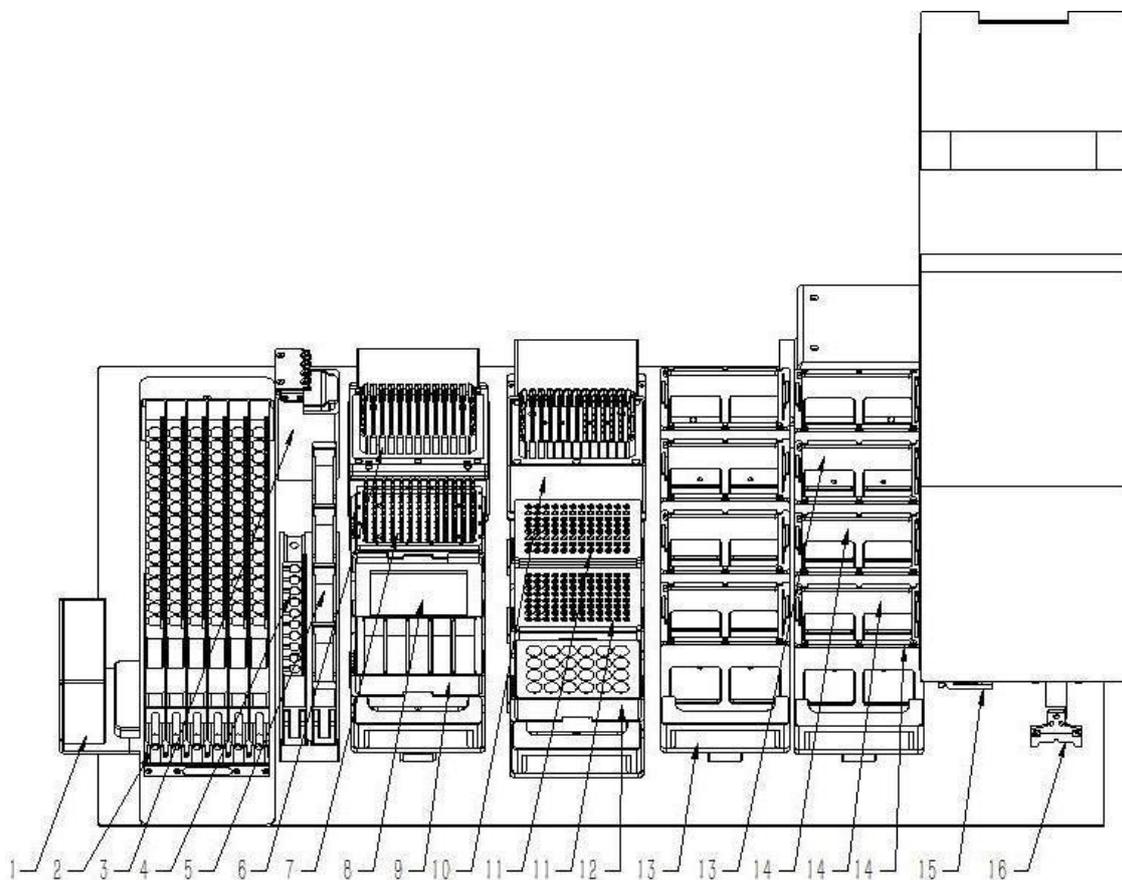


Figure 2 3 Internal Structure of Automatic Nucleic acid extraction system (BK-AutoHS96)

Table 2- 2 Structure of Automatic Nucleic acid extraction system (BK-AutoHS96)

No.	Name	Function
1	Bar code scanner	Collect barcode information.
2	Sample carrier	Place sample tubes.
3	Nozzle head module	Take Off tip.
4	Standard Block	Place standards and controls.
5	Waste liquid tank holder	Place the waste tank.
6	Oscillation heating module	Shake and mix the solution in the deep well plate and control the heating.
7	Magnetic module	Nucleic acid isolation and purification.
8	Deep hole plate	Place the deep well plate.
9	Reagent tank carrier	Place the reagent tank.
10	Refrigeration module	Temperature control of deep well plate solution.
11	8-tube strip carrier	Place eight -tube strips.
12	cryopreservation tube carrier	Place the reagent bottle.
13	1000 μ L tip carrier	Place 1000 μ Ltip.
14	200 μ L tip carrier	Place 200 μ Ltip.
15	Pipetting arm	Liquid distribution.
16	Gripper	Orifice plate transfer.

2.3.3 Product Consumables

Table 2- 3 Consumables of Automatic Nucleic Acid Extraction System (BK-AutoHS96)

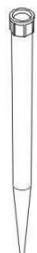
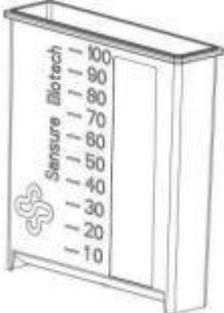
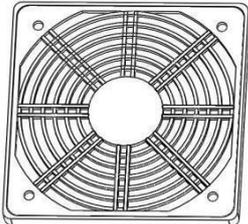
No.	Name	schematic diagram	Function
1	1000 μ L tip		Liquid distribution.

Table 2- 3 Consumables of Automatic Nucleic Acid Extraction System (BK-AutoHS96)			
No.	Name	schematic diagram	Function
2	200μL tip		Liquid distribution.
3	96 deep well plate		Solution storage and reaction
4	Reagent tank carrier		Storage reagent
5	cryopreservation tube		Storage reagent
6	Filter		Reduce the risk of system pollution

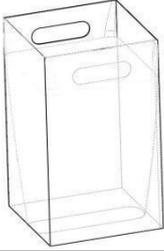
7	Waste tip bag		Collect abandoned tips
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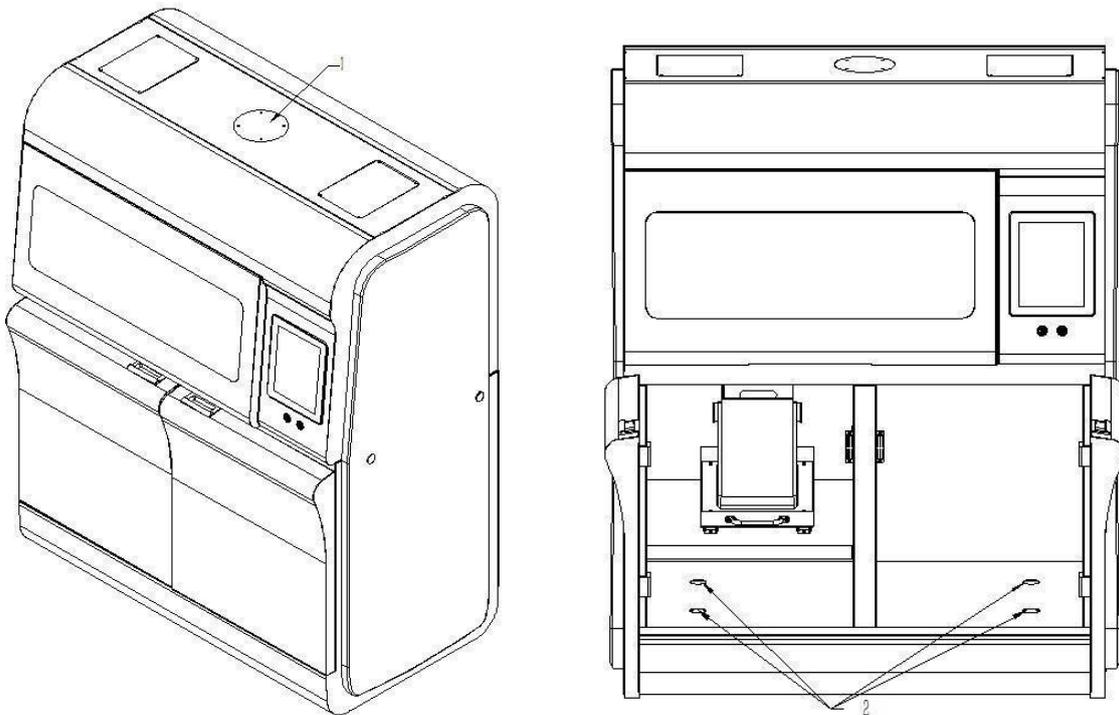
Table 2- 3 Consumables of Automatic Nucleic Acid Extraction System (BK-AutoHS96)			
No.	Name	schematic diagram	Function
8	8-tube		Store extraction products, reaction solutions, etc.

2.4 Instrument installation

Make sure the instrument be installed by a qualified technician.

Make sure check out all parts of the model specified in the attached list are included in the package after receiving the instrument,

The product installation instruction is shown in Figure 2-4 below.



1. air duct cover 2. screw hole of the foot cup

Figure 2 4 Automatic Nucleic Acid Extraction System (BK-AutoHS96) installation structure diagram

- 1) Open the shipping outer packaging of the instrument;
- 2) Open the door of the bottom cabinet of the instrument, take out the accessory box, find the screw cup tool and ratchet wrench from the accessory box, and screw the foot cup of the instrument to the highest position at the screw hole of the foot cup, so that the instrument can be moved by casters;
- 3) Place a piece of packing box with a sloping plate at one end of the instrument to be flat with the base of the packing box, and push the instrument out of the package;
- 4) Unscrew the 4 screws of the air duct cover with an Allen wrench, remove the air duct

- blocking plate, wrap and place it in a proper position;
- 5) Assemble the outer joint of the duct to the original position of the duct blocking plate;
 - 6) Measure the required length of the air duct according to the position of the instrument, connect the air duct to the union joint of air duct, tighten the joint with the hoop;
 - 7) Move the instrument to the selected place;
 - 8) Open the safety door of the upper cabinet and place the horizontal ruler on the platform; open the two doors of the lower cabinet and adjust the height of the foot cup at the screw hole of the foot cup with the screw cup tool and ratchet wrench until the foot cup holds the entire instrument up, then observe the horizontal ruler and adjust the foot screw to make instrument level properly in both X and Y directions
 - 9) Lead the air duct to outdoor and fix it;
 - 10) Check the appearance and moving parts of the instrument, gently wipe the dirt and dust on the moving rail with a clean cloth strip, and add lubricants in accordance with maintenance requirements regularly;
 - 11) Connect the power cable;
 - 12) Power on, enter the control software, and instrument self-check begins.

III. Product software description

The main functions of the software include:

- 1) Software start up
- 2) User login
- 3) Experimental tasks
- 4) Data query
- 5) System management
- 6) Equipment control
- 7) Helpful information
- 8) Exit the system

3.1 Software start up

Software start up: Double-click the software start up icon.

3.2 User login

The User Login interface contains a user icon, a 'UserName:' text box, a 'Password:' text box, and two buttons labeled 'Login' and 'Cancel'.

Login interface: Input the user name and password on this interface to log in to the system.

【Login】 : User login.

【Cancel】 : Cancel login.

3.3 Experimental task

The interface for the Automated Nucleic Acid Extraction System V1.0 features a menu bar with options: Test, Data, Setup, Help, Exit, Init, Tools, Run, Monitor, and Program. Below the menu are input fields for Program (dropdown), Sample Qty, Segment, QC Qty, and Start No., each with a corresponding button (Submit, Auto No.). A table with 6 columns and multiple rows is provided for data entry. At the bottom, there are buttons for Editing, Repeat, Normal, and Blank, along with status information like 'Pos 1 (1, 1)', 'User: admin', and 'Time: 2020-04-20 10:35:21'.

Experiment test interface : Add experiment tasks, submit tasks, experiment run, equipment self-test, etc. in this interface.

【 AutoNo. 】 : Each sample is automatically numbered in order from the starting number.

【 Submit 】 : Select the experimental program, input the number of samples and the number of quality control, and then click Submit.

【Run】 : After submitting the experimental task, click Run.

【Monitor】 : Click it to display the experimental running status.

Program: Select the name of the desired experimental program.

Sample Qty: Input the number of samples, including the number of all samples, standards and quality controls in the sample rack.

QC Qty: The quantity of all samples, standards and QCs placed on the standard rack.

Segment: Sets the steps to start the experiment. By default, it starts from the first

step. **Start number:** When using the automatic

numbering function, it is used to define the number of the first sample.

3.4 Data query

1-1

Data query interface : Query the experiment history and system log in this interface.

【 Run History 】 : Experiment history query. Run an experiment to save a historical record.

【 Search 】 : You can select the program name, program type, experiment state, operator, and start and end dates of the experiment, and then click to query experimental history information.

1-2

【 Test Logs 】 : Test log records query. The software starts one log record saved at a time.

3.5 System Management

1-1



Setting interface: System settings and user management are performed on this interface. This interface requires administrator rights to enter.

【 Setting 】 : System related settings. Barcode file: Set the folder path and file separator for the barcode file output.

System alarm: Select the sound file for the system alarm tone.

Complete alarm: Select the sound file for the experiment completion sound.

Default QC Qty: Set the default QC quantity. This quantity is the sum of the number of standards and QCs placed on the standard seat. When it is set to empty, you need to manually enter the QC quantity for each experiment.

UV lamp life: Set the service life of the currently used ultraviolet lamp, which is convenient for timely replacement of the expired ultraviolet lamp.

Sound alarm: Enable the voice prompt when the software pops up the warning message.

Light alarm: When the software pops up a warning message, the light prompt is enabled.

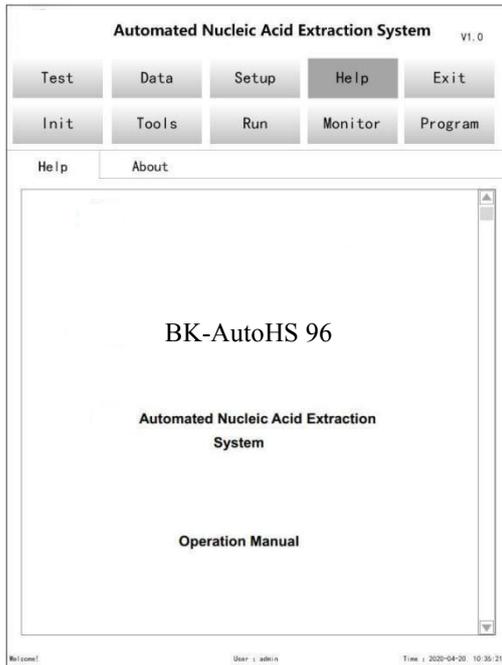
the exhaust fan to turn on when the software starts. Turn off Fan Automatically: It is used to set the exhaust fan to turn off when the software exits.

【Turn on Blue Lamp】 : Click to turn on the blue lamp.

【Turn off Blue Lamp】 : Click to turn off the blue lamp.

3.7 Helpful information

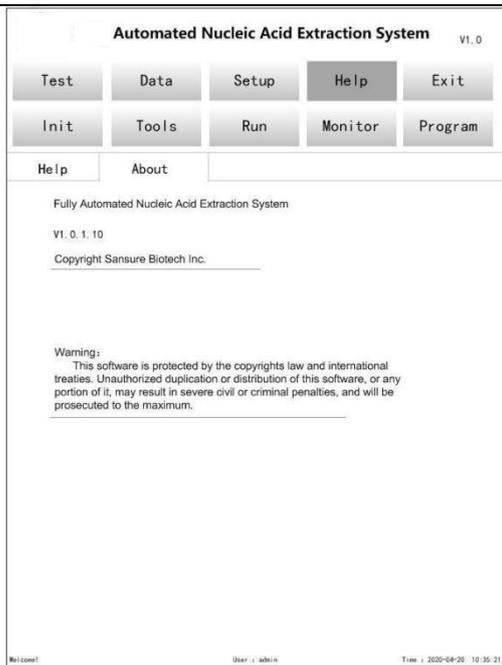
1-1



Helpful information interface : In this interface, you can click to view the Instrument Operation Manual and software version.

【 Help 】 : Click to view the Operation Manual of the instrument.

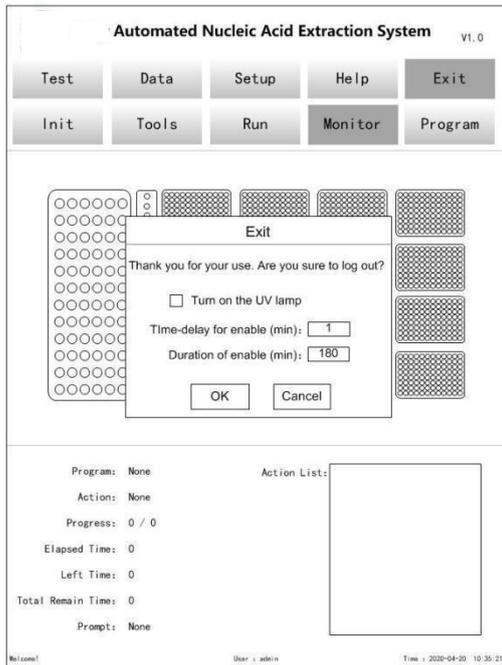
1-2



【About】 : Click to view software version and copyright information.

3.8 Exit system

1



Exit the system interface : Click on this interface to exit the system;

【 Exit 】 : Click the Exit button, and the Exit System dialog box will pop up.

【 OK 】 : Click to exit the software system. If you select "Turn on the UV lamp", the UV lamp will be turned on and off according to the set delay time and on time when you exit the software.

【 Cancel 】 : Exit the current dialog window.

IV. Experiment process

4.1 Experiment process

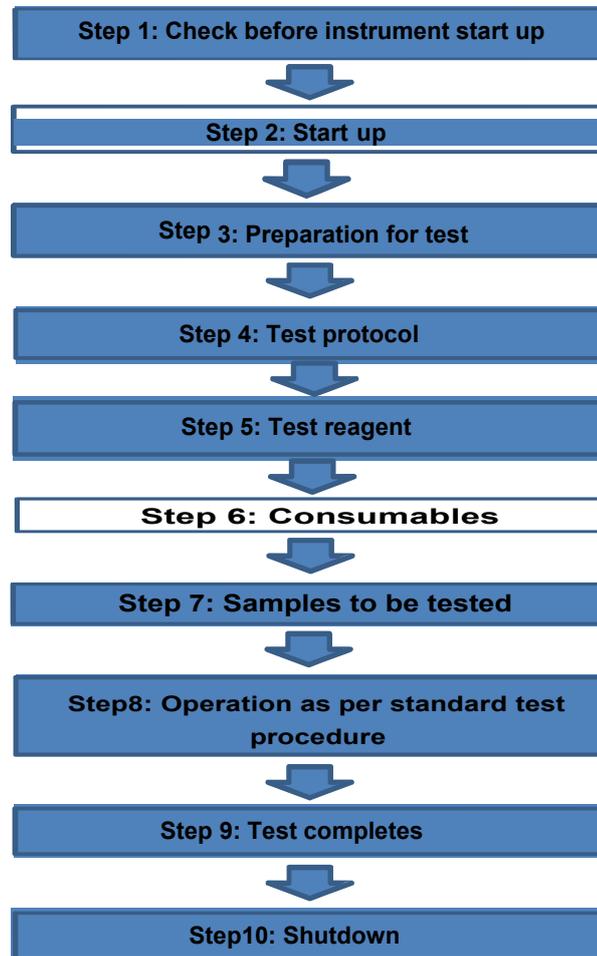


Figure 4-1 Experimental flowchart

4.2 Check before starting

Be sure to check the instrument carefully before the experiment.

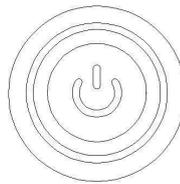
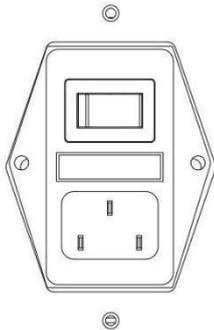
Notice :

Make sure that the power cord and communication cable connected to the instrument both are properly connected and provides a stable voltage.

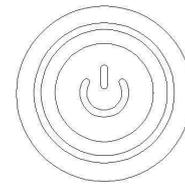
Please make sure that there are no debris or pollution on the instrument table, running track, etc. If there are any problems affecting the experiment, please deal with them in time.

4.3 Boot

- (1) Turn on the main power switch on the back panel of the instrument;
- (2) Turn on the front panel switch of the instrument;
- (3) Turn on the front panel lighting switch of the instrument;
- (4) Enter the software login interface, input the user group, user name, password and other information, and click login to enter the experiment management interface;
- (5) Click the device self-test button in the experiment task interface, and the system will automatically perform the initial detection.



Power



Light

Figure 4-2 Main power switch diagram Figure 4-3 Power switch Figure 4-4 Lighting switch

Note: The main power switch of the instrument is shown in Figure 4-2. The boat-shaped switch "1" means on and the indicator light is on; "0" means off and the indicator light is off.

Instrument power switch as shown in Figure 4-3 and 4-4, which is a key lock switch. The indicator will go out while pressing the switch that means turning off the power, and the indicator will turn on while pressing the switch again that means turning on the power.

4.4 Experiment preparation

4.4.1 Experimental program

Please formulate an experiment plan before the experiment including the following:

- ✎ Determine the type, quantity, quality, etc. of the sample items to be inspected;
- ✎ Determine the specifications and dosage of reagents and consumables;
- ✎ Determine experimental items;

After confirming the experimental items, please place the waste liquid tank, deep well plate and 8-tubes in the corresponding positions.

Note : Consumables used in the experiment, such as 96-well deep-well plates, 100mL reagent tanks, 5mL cryopreservation tubes, 1000µL tip, 200µL tip, waste liquid tanks, waste tip bags and other consumables must be provided by BIOBASE, There may be damage to the instrument in the use of other types of consumables failure of the experiment, etc. Please strictly observe this regulation.

4.4.2 Experimental reagent

Before the reagents sub package, please handle them according to BIOBASE Reagent Operation Manual, such as thawing, mixing, centrifugation, enzyme / internal standard configuration, etc .;

- Subpackage for one-step reagents

- 1) Transfer the processed nucleic acid release agent into a 5mL cryopreservation tube and label it accordingly;
- 2) Transfer the configured reaction mixture PCRmix into 5mL cryopreservation tubes and mark them accordingly.

- Subpackage for Magnetic bead reagent

- 1) Transfer the configured magnetic bead extraction solutions 1, 3, and 4 to 100mL reagent tanks respectively and mark them accordingly;
- 2) Mix the configured extraction solution 2 with shaking, centrifuge, transfer it to a 100mL reagent tank and mark it accordingly;
- 3) Transfer the configured reaction solution PCRmix to a 5mL cryopreservation tube and mark it accordingly;

- Subpackage for SUPRall reagent

- 1) Transfer the configured magnetic bead extraction solutions 1, 2, 3, and 4 to the 100 mL reagent tanks respectively and mark them accordingly;
- 2) Transfer the configured magnetic bead solution and eluent to 5mL cryopreservation tubes respectively and mark them accordingly;
- 3) Transfer the configured reaction solution PCRmix into 5mL Cryopreservation tubes respectively and mark them accordingly;

Note : Please read the Reagent Operation Manual carefully before the experiment, and perform reagent pretreatment as required, such as thawing, mixing, and centrifugation.

Due to the loss of reagents in automated instruments, please configure the reagents according to the amount of reagents required to prepare the reagents to ensure that the experiment can be performed smoothly.

4.4.3 Experimental consumables

4.4.3.1 Load one-step reagent and consumables

- Load 5mL cryopreservation tube

As shown in Figure 4-5 and Figure 4-6:

- 1) Place the 5 mL cryopreservation tube with the nucleic acid release agent in the No. 1 well in the cryopreservation tube holder;
- 2) Place the 5mL cryopreserved tube with the reaction solution PCRmix in the No. 4 hole in the cryovial rack;
- 3) Please check whether the position is placed correctly and securely, and handle it if there is any abnormality after loading the cryopreservation tube,
- 4) Push the drawer where the carrier is back to return the drawer to the limit position;
- 5) Check that the drawer is pushed back into place.

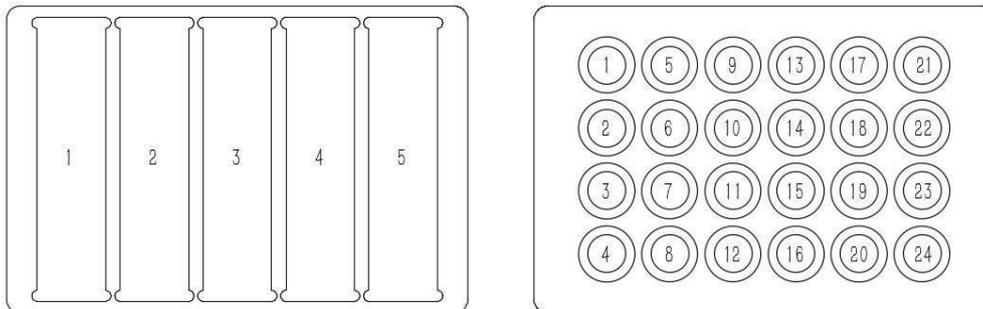


Figure 4-5 Reagent tank and cryotube carrier area map

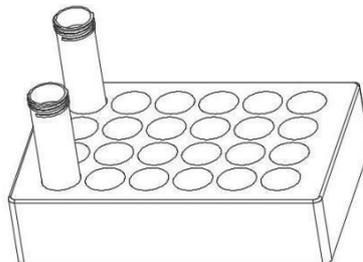


Figure 4-6 5mL cryopreservation tube loading (one step method)

- Load 96-well deep well plate

As shown in Figure 4-7:

- 1) Place the 96-well deep-well plate in the deep-well plate position, with the sinker facing outward;
- 2) Ensure that the deep hole plate is placed smoothly and tightly against the edge;
- 3) When loading the deep hole plate, please check the product model specifications, whether there are defects, warping deformation, liquid leakage and other defects if there is any abnormality, please do not use it.
- 4) Push back the drawer where the deep hole plate is located to return the drawer to the limit position;
- 5) Make sure that the drawer is pushed back into place.

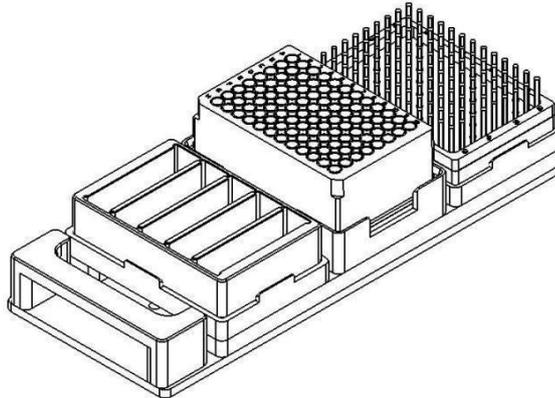


Figure 4-7 96-well deep well plate loading

- Load 1000 μ L tips

As shown in Figure 4-8:

- 1) Draw out the drawer where the 1000 μ L tip carrier is located;
- 2) Check whether the tip carrier has a plate rack that was not removed in the previous experiment, if so, please remove it before installation.
- 3) The tip is taken out of the packing box with the arc notch on the plate rack aligned with the cylindrical pin on the tip carrier, and the board rack is clamped between the two elastic pieces, so that the lower plane of the board rack and the upper plane of the carrier are stuck on.
- 4) Load other 1000 μ L tips according to experimental needs;
- 5) Push the tip carrier drawer back so that the drawer is on the stop block; 6) Check that the drawer is pushed in place.

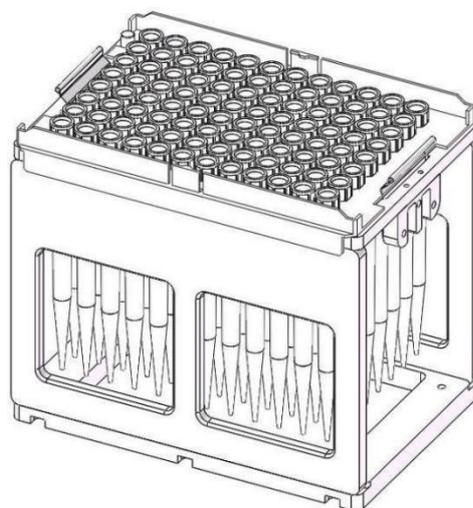
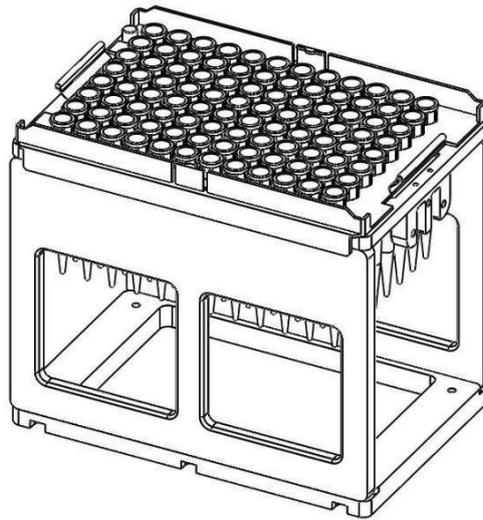


Figure 4-8 1000 μ L tip loading (one step method)

- Load 200 μ L tips

As shown in Figure 4-9:

- 1) Draw out the drawer where the 200 μ L tip carrier is located,
- 2) Check whether the tip carrier has a plate rack that was not removed in the previous experiment,,if so, please remove it before installation..
- 3) The tip is taken out of the packing box with the arc notch on the plate rack aligned with the cylindrical pin on the tip carrier, and the board rack is clamped between the two elastic pieces, so that the lower plane of the board rack and the upper plane of the carrier are stuckon
- 4) Load other 200 μ L tips according to experimental needs;
- 5) Push the tip carrier drawer back to return the drawer to the limit position; 6) Check that the drawer is pushed in



place.

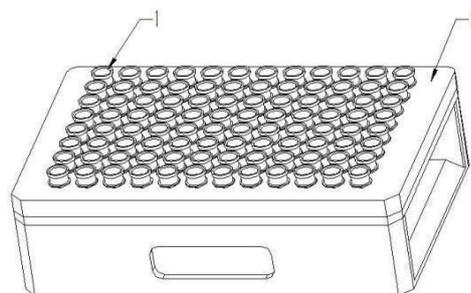
Figure 4-9 200 μ L tip loading (one step method)

• Load 8-tube strips

As shown in Figure 4-10:

- 1) Place the 8-tube strip one by one on the 8-tube strips carrier;
- 2) Check whether the 8-tube strips are placed flat. If there is any abnormality such as warping or unstable placement, please replace them in time;
- 3) Install the loaded 8-tube strips carrier to the PCR position.

Note: Check whether the 8-tube strips carrier is tight against the limit side.



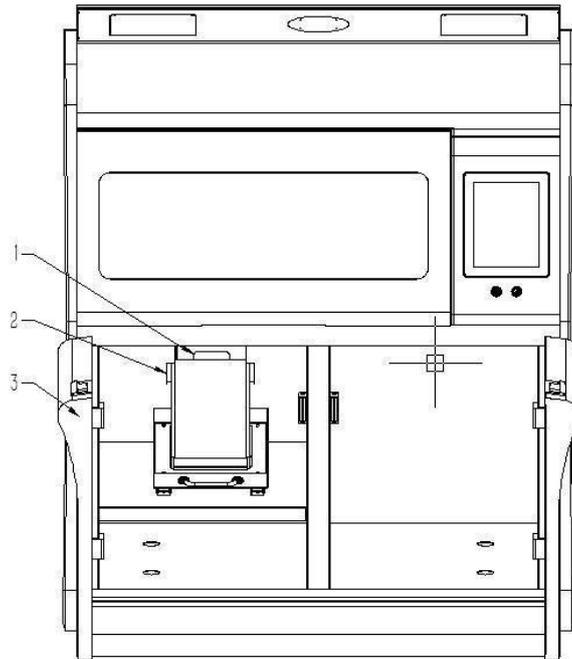
1. 8-tube strip 2. 8-tube strip carrier

Figure 4-10 8-tube loading (one-step method)

• Load waste tip bags

As shown in Figure 4-11:

- 1) Open the left cabinet door of the instrument lower cabinet and take out the waste tips bag
Base from the drawer.
- 2) Snap the waste tip bag into the base, and open the waste tip bag;
- 3) Put the base of the waste tip bag back into the drawer and push the drawer to a fixed position;
- 4) Close the lower cabinet door.



1. waste tips bag 2. base of the waste tip bag 3. left door of the lower cabinet

Figure 4-11 Waste tip bag loading (one step method)

4.4.3.2 Load reagents and consumables for magnetic bead testing

Load 5mLCryovial

As shown in Figure 4-5 and Figure 4-12:

Place the 5mL cryopreserved tube with the reaction solution PCRmix in the No. 4 hole in the cryovial rack;

After loading the cryopreservation tube, please check whether the position is placed correctly and securely, and handle it if there is any abnormality;

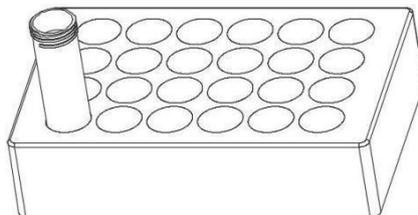


Figure 4-12 5mL cryopreservation tube loading (magnetic bead method)

Load 100mL Reagent tank

As shown in Figure 4-5 and Figure 4-13:

- 1) Place the 100 mL reagent tanks with the extraction solutions 1, 2, 3, and 4 in the reagent tank carrier at positions 1, 2, 3, and 4;

- 2) Check whether the position of the reagent tank is correct whether the installation is in place and secure etc.;

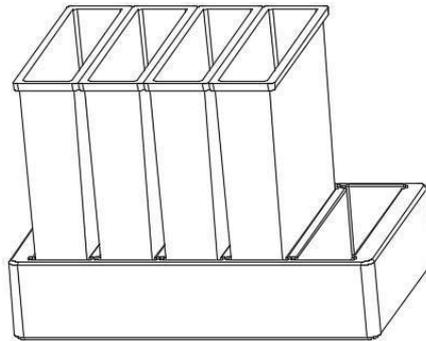


Figure 4-13 100mL reagent tank loading (magnetic bead method)

- Load 1000 μ L tips** 1) Please refer to load 1000 μ L tips in one-step reagent. **Load 200 μ L tips** 1) Please refer to load 200 μ L tips in one step reagent. **Load 8-tube strips** 1 Please refer to load 8-tube strip in the one-step reagent.

- Load waste tip bag
1) Please refer to load waste tip bag in the one-step method.

- Load waste tank
As shown in Figure 4-14:
Add 20 mL diluted 84 disinfectant to the waste tank;
Place the waste liquid tank in the waste liquid tank seat shown in Figure 4-14 below;
Check whether the waste liquid tank is placed securely, and handle it in time if it is unstable.

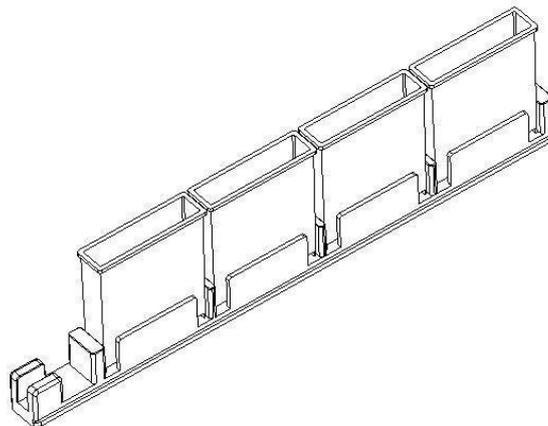


Figure 4-14 100mL waste tank loading (magnetic bead method)

4.4.3.3 Load reagents and consumables for SUPRall platform

Load 5mL Cryovial As shown in Figures 4-9 and 4-20:

- 1) Place the 5mL cryopreserved tube with magnetic bead solution in the No. 2 hole on the cryopreservation tube holder;
- 2) Place the 5 mL cryopreserved tube with the eluent in the No. 3 hole on the cryopreservation tube holder;
- 3) Place the 5 mL cryopreserved tube with the reaction solution in the fixed hole positions of No. 4-24 on the cryopreservation rack according to the project type (from left to right, from inside to outside).
- 4) After loading the cryopreservation tube, please check whether the position is placed correctly and securely, and handle it if there is any abnormality;

Load 100mL Reagent tank

- 1) Please refer to load 100mL reagent tank 1 in the magnetic bead method.

Load 1000µL tip

- 1) Please refer to load 1000µL tips in one-step reagent.

Load 8-tube strips

- 1) Please refer to load 8-tube strips in the one-step reagent. The unified extraction needs to determine the number of eight connected pipes according to the sample and project type.

Load waste tip bag

- 1) Please refer to load waste tip begin the one-step method.

Load waste tank

- 1) Please refer to load waste tank in the magnetic bead method.

4.4.4 samples to be tested

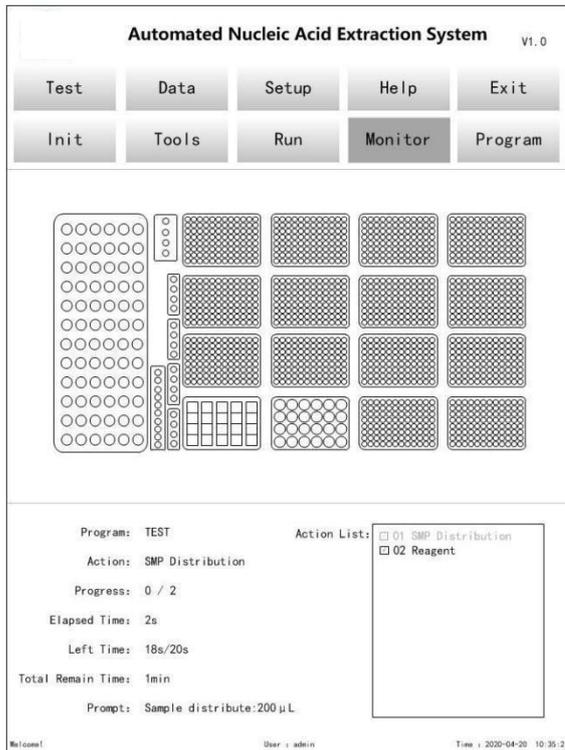
The samples to be tested are loaded as follows:

Determine the type, quantity, and quality of the sample items to be tested. If it's necessary to centrifuge, dilute or transfer, please do ensure the stability and reliability of the system detection.

Push the carrier containing the sample tube into the base of the sample carrier in sequence as shown in Figure 4-15 below, and ensure that the carrier is pushed into right place;

Please note that the bar code on the sample tube is placed to the left to ensure that the bar code is clear and accurate;

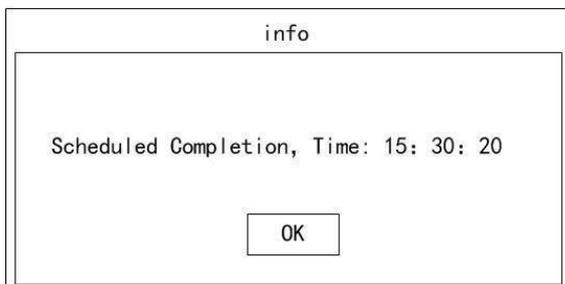
2)



Running the experiment:

1. Click [Run] to enter the main interface of experiment running display;
2. The system automatically runs the experiment. If there are any alarms during the experiment, please handle them promptly, such as prompting to place the reaction solution and prompting the sample / nucleic acid to be retained.

3)

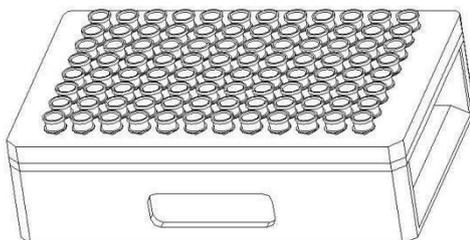


Completing the experiment

1. Click [OK] in the experiment task completion dialog box, and the experiment project is completed.

4)

4)



Extraction amplification reaction

1. Open the security door;
2. Take out the 8-tube strips carrier with eight tubes;
3. Close the safety door;
4. Cover the PCR tube caps column by column;
5. Perform amplification detection on the designated PCR instrument.

Note: When the experiment is running, please strictly follow the standard operating procedures, and never blind spots or continuous clicks.

- ⌘ When the experiment is running, do not open the safety door at will, it is forbidden to put irrelevant materials into the instrument.
 - ⌘ When the experiment is running, please pay attention to the alarm prompt of the instrument and deal with it in time.
-

4.6 End of experiment

- (1) Properly collect experimental samples and reagents according to laboratory requirements;
- (2) Open the door of the instrument cabinet and remove the waste tip bag from the drawer;
- (3) Put the deep well plate, reagent tank, waste liquid tank, reagent bottle, and tip plate rack into the bag after the experiment;
- (4) Properly dispose of medical waste in accordance with the laboratory biosafety system;
- (5) Clean the instrument table and perform necessary inspection and maintenance, such as spraying with alcohol and cleaning with dust-free paper;
- (6) Close the BK-AutoHS96 security door.

4.7 Shutdown

Please follow these steps to shut down:

1. Exit the software system, set the UV lamp irradiation time of the instrument as required, turn on the UV lamp for disinfection;
2. Turn off the computer;
3. Press the lighting switch below the touch screen to turn off the lighting inside the instrument;
4. Press the power switch below the touch screen to turn off the power.
5. If the instrument is not used for a long time, press the main power switch on the back of the instrument to turn off the main power.

Note: (1)Users should read this Operator Manual carefully before use

~~(2)Make sure the instrument safety door is closed during the experiment,~~

(3)Don't place reagents, samples, etc. that are not related to the experiment on the workbench to avoid affecting the operation and causing contamination.

(4)The operator must wear laboratory clothes and disposable gloves according to the laboratory requirements to avoid splash and spillage of the liquid on any exposed parts of the body.

(5)When the instrument is finished or not used for a long time, turn off the instrument and shut down the power.

(6)All parts of the instrument may come into direct or indirect contact with the sample and must be treated as a potential infectious agent.

(7)If the malfunction can not be solved as per the trouble shooting measures provided in this manual, please turn off the power immediately, turn off the power socket, do not turn on the instrument again, and contact the distributor or manufacturer as soon as possible.

V. Common fault handling

5.1 Sample loading module

Failure phenomenon	Possible Causes	Action
Dosing pump or gripper cannot run to the set position	The robot arm is blocked or colliding.	Check for obstacles.
	other reasons.	Contact a service technician.
Can't get tip	The tip board is not stuck in place.	Reinstall the tip board rack so that the bottom surface of the board rack and the top surface of the tip carrier fit together.
	The carrier drawer is not pushed all the way.	Push the carrier drawer all the way.
	Motor out of step due to collision	Select initialization as prompted by the software.
	other reasons	Contact a service technician.
Still get alarm	Motor out of step due to collision.	Select Ignore as prompted by the software.
	other reasons	Contact a service technician.
tip can't take off	The instrument is not operating in the operating environment required by the instrument (temperature is too low).	Adjust the laboratory environment to a suitable temperature and humidity.
	other reasons	Contact a service technician.
No alarm or false alarm is reported for liquid	The adapter is blocked by a foreign object	Use a through needle to remove foreign objects, and do regular cleaning according to maintenance requirements.
	other reasons	Contact a service technician.
Cannot read test tube barcodes correctly	The barcode does not face the scanning head	Turn the barcode to the scanning head;
	Barcode quality issues	Replace with a new bar code;
	The scan head glass is dusty	Clean the glass of the scan head with alcohol.
	other reasons	Contact a service technician.
Can't grab the microplate	The gripper is blocked or bumped	Check for obstacles.
	other reasons	Contact a service technician.

5.2 Equipment alarm and handling measures

Alarm prompt	Reason	Action
<p>Get Tips error</p> <p>channel: 1, 2, 3, 4 get tips faailed</p> <p>Retry Abort Ignore</p> <p>Init Retry Init Robot</p>	<p>There is no tip in the current hole position, but there is a tip in the rear face position.</p>	<p>Click "Retry."</p>
	<p>All tips are used up.</p>	<p>Please install a new tip and click "Retry".</p>
	<p>The dosing arm is moving out of step in X or Y direction..</p>	<p>Click on "Init Robot".</p>
	<p>The dosing arm is moving out of step in Z direction.</p>	<p>Click "Init Retry."</p>
<p>Arm message</p> <p>Channel: 1, 2, 3, 4 don't have detected liquid or detected liquid is not enough</p> <p>ReGetTips Retry Retry Asp to lowest pos</p> <p>Abort Ignore Init Robot</p>	<p>Insufficient sample, reagent, or control solution.</p>	<p>After adding an appropriate amount of specimen, reagent or control solution, click "Retry" or "ReGetTips Retry".</p>
	<p>Aspiration does not move to the lowest position.</p>	<p>Click on "Asp to lowest pos".</p>
	<p>Dosing arm is movingt out of step.</p>	<p>Click on "Init Robot".</p>
<p>info</p> <p>the gripper get rack failed</p> <p>Retry Ignore Abort</p>	<p>The gripper did not grab the deep well plate.</p>	<p>Check to see if there is a deep well plate at the position of the gripper. If there is, click "Retry". If not, add the microplate first and then click "Retry".</p>

5.3 Handling when the instrument is deactivated

1. Disconnect the power cable from the device.
2. Close the instrument compartment door to prevent the equipment from contaminating the dust.

3. Clean up reagents, samples, waste tip bags, waste liquid bottles, etc. on the platform in time.

Notice:

Operation not in accordance with this operation manual may result in malfunction.

If the problem cannot be solved by the solutions listed in this chapter, or is not in the scope listed in this chapter, please contact BIOBASE.

VI. Product maintenance

6.1 Detergent

Detergent specifications:

Reagent	specification
water	Distilled or deionized water
alcohol	75% ethanol

WARNING:



- The cleaning agent should be used in accordance with the Operation Manual. Heavy cleaning agents may dissolve the coating on the carrier and equipment.
- Do not use hypochlorite-containing disinfectants (bleach, chlorine) or bleach to clean the instrument and its components.
- Do not use open flames or clean the instrument near a machine prone to sparks. Do not use an air heater to dry the instrument, because flammable liquids are used during the cleaning process which may cause a fire.

6.2 Daily maintenance

- Check if the waste liquid box and waste tip bag are empty before the daily test. If not, please dispose of the waste liquid and waste tips to the designated place according to the laboratory requirements, and perform necessary disinfection treatment.
- After the daily test, check the instrument table to keep the platform clean and free of residual liquid and dirt. If there is liquid remaining, use a blotting paper to remove the liquid first, and then wipe the surface with a clean soft cloth.
- After the daily test, if there are unused tips, please return them to the original box and seal it.
- After the daily test, clean the waste liquid tank, empty tip plate rack, reagent tank, samples, etc.
- After the daily test, the operator needs to turn off the operation switch button of the device, and then turn off the main power switch of the device.
- When the instrument is not used for a long time, cover it with a dust cover and cut off the power.
- The LCD screen must not be scrubbed with water, just wipe it with a clean soft cloth or soft paper.
- After the instrument is installed and debugged, do not move or bump it.
- Do not spill the solution inside the instrument.
- When the instrument is not used for a long time, please turn off the power and unplug the power socket.
- The Fully Automated Nucleic Acid Extraction System is a precision instrument, and the users cannot open the instrument by themselves.

6.3 Monthly maintenance

- After turning off the instrument, clean the sample pump adapter with a through needle, and then wipe the end of the adapter and the outer wall with a cotton swab dipped in alcohol.

6.4 Annual maintenance

- Clean the instrument platform, various carriers and outer cases
- Clean the rails of both robotic arms.
- Check if all the screws are well fixed. If there are loose screws, please tighten them promptly.
- Check the elastic positioning device on each carrier and replace the deformed positioning spring.
- Clean the dosing pump adapter with a needle, and then wipe the end and outer wall of the adapter with a cotton swab dipped in alcohol.
- Check if that the equipment is properly grounded.
- Run "equipment self-test", the loading arm and grasping arm run smoothly without abnormal noise, and the oscillation heating module oscillation reset is normal.
- Check the air tightness of the dosing pump.
- Calibrate the dosing pump accuracy.
- Verify the heating performance of the oscillating heating module.
- Verify the cooling performance of the cooling module.

- Note**
- Annual equipment maintenance must be performed by a BIOBASE after-sales service engineer.
 - When the product needs to be reused after out of device for a long time, there may be problems such as inaccuracy, please contact after-sales service engineer by BIOBASE for calibration and use.

6.5 Exception maintenance

In the event of a serious accident (such as: forgetting to place the corresponding container before running the equipment, which caused liquid splash directly on system internal parts or other samples during operation), it is necessary to immediately use 75% ethanol for cleaning to avoid cross-contamination.

6.6 Precaution

During maintenance and repairs, please observe the following precautionary guidelines: clean:

- Turn off the instrument and main power switch, and unplug the instrument.

Wear lab clothes and disposable gloves, and use a dry, clean cloth to wipe off any liquid remaining on the surface of the instrument. Clean the instrument surface with a disposable rag dipped in 75% ethanol..

6.7 Decontamination

In order to protect the safety of maintenance personnel, the Fully Automated Nucleic Acid Extraction System must be cleaned in accordance with standard laboratory practices (GLP) before maintenance. If the Fully Automated Nucleic

Acid Extraction System or individual parts are

returned to the dealer or manufacturer in need, the necessary cleaning and disinfection must be performed.

The waste liquid produced in the experiment should be checked in time and needs to be poured into the designated place for disposal.

Appendix

Parts List

No .	Component name	Specifications	Quantity
1	Fuse	6.3A	2

BIOBASE GROUP

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China

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Fax: +86-531-81219804

Inquiry: export@biobase.com

Complaints: customer_support@biobase.cc

After-sales service: service_sd@biobase.cc; service_ivd@biobase.cc

Web: www.biobase.cc/www.meihuatrade.com / www.biobase.com