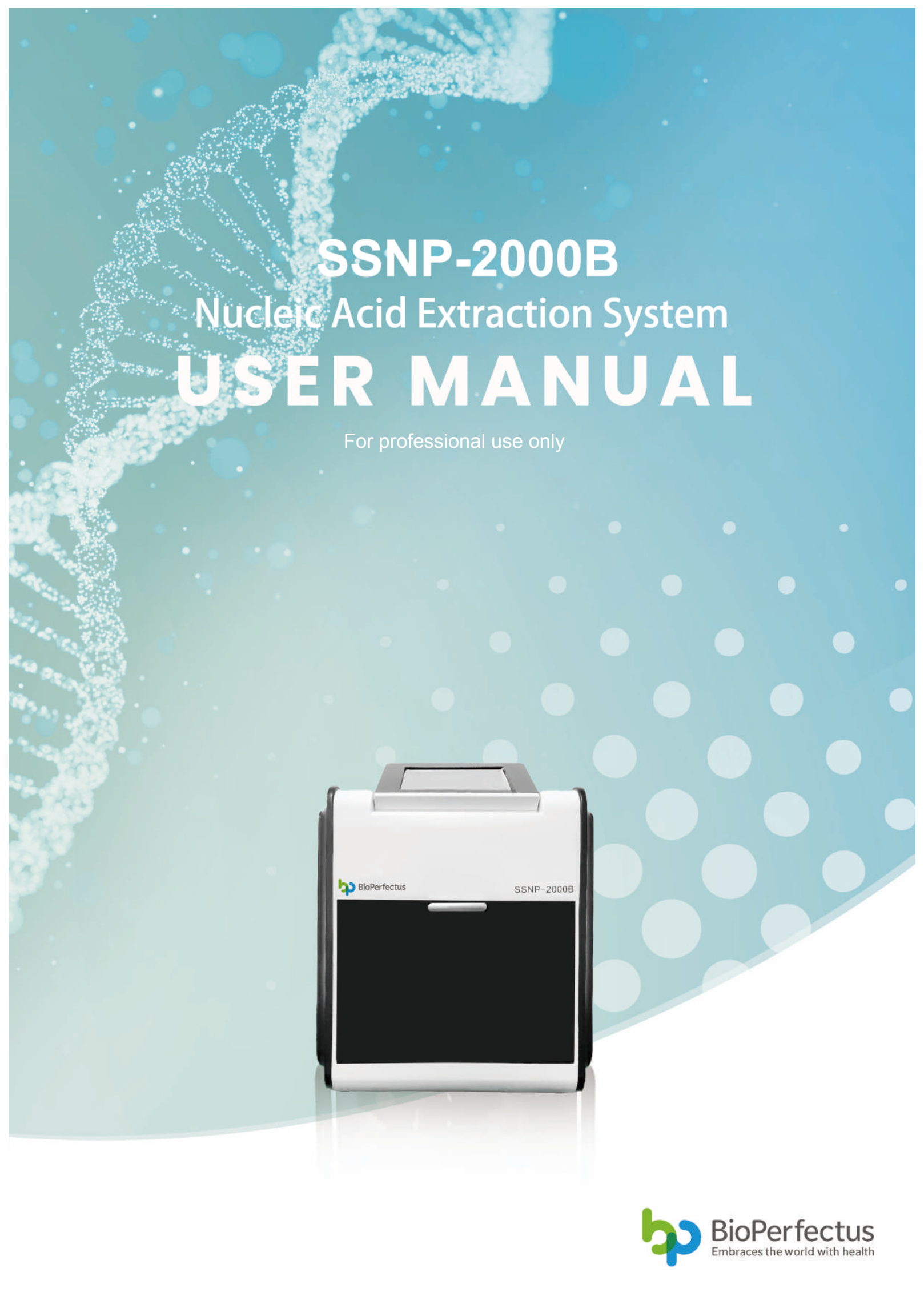




SSNP-2000B

Nucleic Acid Extraction System

USER MANUAL

For professional use only



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Introduction

Thanks for choosing the nucleic acid extraction system produced by Bioperfectus technologies Co.,Ltd.

Nucleic acid extraction system SSNP-2000B (referred to as “SSNP-2000B” below) produced by Jiangsu Bioperfectus Technologies Co.,Ltd (Referred to as Bioperfectus) is an in vitro diagnostic medical device, which integrates cutting-edge mechanical, electronic and software technologies to enable automated extraction of nucleic acids from samples.

The equipment is intended for isolation and purification of nucleic acids from biological and clinical samples with Bioperfectus magnetic-bead nucleic acid extraction kits.

Please read this manual carefully before using this equipment, and operate the equipment correctly according to the precautions.

Put the manual near the extraction system for reference when necessary.

Note

1. All or part of the manual shall not be copied in any form without prior permission.
2. For professional use only.
3. The information contained in this manual may change without notice.
4. Bioperfectus will not be responsible for the failure and damage caused by it if the equipment is not installed, moved, transformed, maintained and repaired by the distributor designated by Bioperfectus.
5. Bioperfectus will not be responsible for the failure and damage by it if the products are not from Bioperfectus.
6. Bioperfectus will not be responsible for the failure and damage by it if the repair parts designated by Bioperfectus are not used to rebuild, maintain and repair the equipment.
7. Bioperfectus will not be responsible for the failure and damage by it if the equipment is not used according to the precautions and operation methods in this manual.
8. Bioperfectus will not be responsible for the failure and damage by it if the environmental conditions, such as power supply, installation environment, etc., exceed the normal working conditions of the product listed in this manual.
9. Bioperfectus is not responsible for the failure and damage caused by natural disasters such as fires, earthquakes, floods and lightning strikes.
10. Jiangsu Bioperfectus Technologies Co.,Ltd reserves the copyright of this extraction system.

Safety Instructions

1. Security considerations for operation

This section contains safety precautions that must be followed to operate the extraction system safely.

Please read this manual carefully before using this equipment, and operate the equipment correctly according to the precautions.

1.1 Definition of specific safety precautions

- Failure to follow these instructions may result in personal injury or death, or a dangerous condition that may result in spreading the source of infection.
- Failure to follow these instructions may result in minor or moderate personal injury or damage to equipment.
- Failure to follow these instructions and improper operation may result in a negative impact on the measurement accuracy.

1.2 Cautions for operating this equipment

- Please read this manual carefully before using this equipment to operate the equipment correctly according to the precautions.
- When operating this equipment, the precautions described in this manual shall be followed at all times, otherwise it may harm the operator, cause equipment damage, or produce incorrect test results.
- If the equipment is not used following the manufacturer's specifications, the protection provided by the equipment may be destroyed.
- The equipment is designed for nucleic acid extraction

reagents. The equipment shall not be used for other purposes.

- The equipment can only be operated by properly trained personnel, and used following the intended use and in the correct manner.
- Under no circumstances should the patient be in direct contact with the equipment.
- The equipment has a service life of six years. If you have some trouble in installing and using it, please consult for technical support.

1.3 Biohazards and the dispose

- Used (contaminated) consumables (e.g., kits and magnetic sleeves produced by Bioperfectus) and contaminated cotton swabs or wipes for cleaning equipment are infectious waste. These wastes should be disposed of following applicable national regulations, such as by incineration, melting, inactivation or disinfection.
- When discarding the body of the extraction system that may have been contaminated by the patient's sample, it must be properly disposed of following applicable national regulations, as it is strictly prohibited as general waste.
- When handling samples (patient samples) and performing maintenance (cleaning the extraction system), biohazard treatment procedures should be followed (e.g., wear gloves, overalls, and safety glasses). Refer to your unit's biohazard treatment regulations. If any part of the body comes into contact with the sample, rinse the contaminated area thoroughly under running water and disinfect with ethanol. Seek medical attention when necessary.

- **DO NOT** touch the used kit, sample tube, and dispensing needle with bare hands, as this may cause contamination. If any part of the body comes into contact with contaminated consumables, rinse the contaminated area thoroughly under running water and disinfect with ethanol. Seek medical attention when necessary.
- The sample should not be in direct contact with the extraction system unit and, if this occurs, the part should be cleaned and disinfected immediately.

1.4 Explosive hazards

- Since this equipment is not explosion-proof, **DO NOT** use flammable or explosive gases around the equipment.

1.5 Electrical hazards

- The equipment is powered by 100-240V~.
- To prevent electric shock, please observe the following precautions:
 - (1) **DO NOT** install the equipment where water may spill onto the equipment or where it may be similar.
 - (2) Make sure the equipment is properly connected to the indoor protection ground cables.
 - (3) Make sure all cables are connected properly.
- Plug the equipment power cord into a socket that has a grounding jack. If the equipment is not connected to a protective ground, it may cause an electric shock.
- When plugging or unplugging the power plug, hold the plug instead of just holding the cord to avoid pulling the cord.
- In order to avoid electric shock caused by high voltage partial exposure or personal injury caused by moving parts,

DO NOT disassemble the equipment cover or other parts fixed with screws.

1.6 Electromagnetic compatibility

- This equipment has been tested and found to comply with electromagnetic compatibility (EMC) technical standards.

- This equipment complies with the emission and immunity requirements specified in this part of IEC61326.

- **Note:**

(1) This equipment generates and can radiate radio frequency energy and, if not installed and used following the instruction manual, this equipment may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be responsible for resolving the interference problem.

(2) If the equipment does cause harmful interference to other devices and this interference only occurs when the equipment is started, the user is advised to take one or more of the following measures to overcome this interference:

- a. Relocate the direction or position of the interfered equipment.
- b. Increase the spacing between the two devices.
- c. Connect the equipment to a separate outlet that does not share the circuit with other equipment
- d. Please consult the manufacturer or field technicians for help.

(3) **DO NOT** use devices (such as mobile phones,

transceivers, etc.) that generate and radiate radio wave energy near the extraction system. Otherwise, the interference of electromagnetic waves may lead to the malfunction of the extraction system.

(4) It is recommended that users evaluate the electromagnetic environment before using the equipment.

- **Warning:**

(1) In a domestic environment, this equipment may cause radio interference and protective measures may be required.

(2) **DO NOT** use this equipment near strong radiation sources (such as unshielded RF sources) as this may interfere with the proper operation of the equipment.

(3) In addition to accessories and cables supplied by the manufacturer of this equipment, the use of accessories and cables outside of the regulations may result in increased emissions or reduced immunity.

(4) This equipment should not be used close to or stacked with other equipment. If it must be used close to or stacked, it should be observed that it can operate normally under the configuration used.

(5) The interference caused by the operation of this equipment may have adverse effects on the operation of other electronic devices.

1.7 Requirements for installation location

- Plug the equipment power cord into a socket that has a grounding jack. If the equipment is not connected to a protective ground, it may cause an electric shock.

- **DO NOT** place the extraction system in a location where it is difficult to disconnect the equipment.

- Avoid installing the equipment in the following locations:

- (1) Potentially spilled or leaking into the water;
- (2) The equipment is exposed to direct sunlight;
- (3) Near a heat source such as a heater;
- (4) The temperature may change dramatically;
- (5) Vibration or support is not stable.

- The equipment installation environment conditions are:

Position:	For indoor use, the workbench can bear 200 kg/m ²
Temperature:	10°C-40°C
Humidity:	10%-90% relative humidity (no steam condensation)
Atmospheric pressure:	860 hPa-1060 hPa

- The electrical conditions of the equipment are as follows:

Voltage:	100-240V~
Frequency:	50-60Hz
Rated power:	250VA

- The AC power outlet of the extraction system must not be shared with other devices.
- Leave at least 15cm on both sides of the equipment and at least 20cm on the back of the equipment.
- If the equipment is not used for a long time, unplug the equipment from the AC outlet.

- It must be operated in accordance with the instructions for use of the kit and all provisions of its corporate standards.

1.8 Sample processing

Always follow biohazard treatment procedures when handling samples (e.g., wear gloves, overalls, and safety glasses). Refer to your unit's biohazard treatment regulations. If any part of the body comes into contact with the sample, rinse the contaminated area thoroughly under running water and disinfect with ethanol. Seek medical attention when necessary.

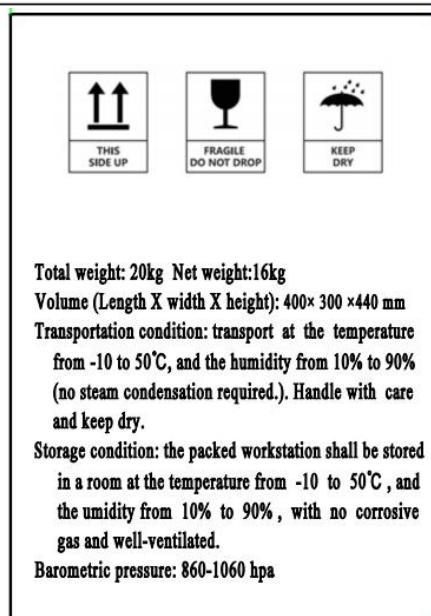
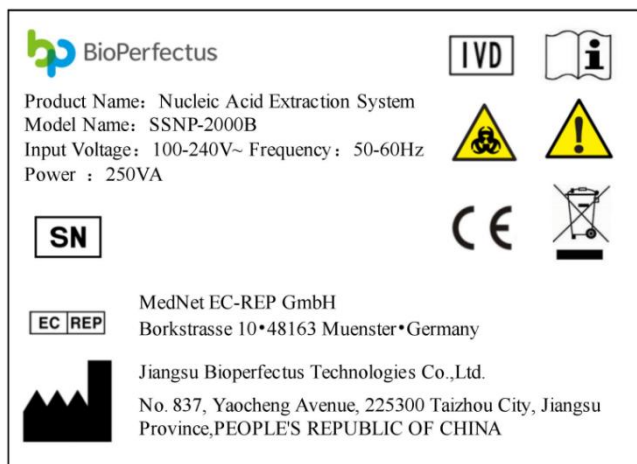
1.9 Warning and label information

- Warning:

Graphic symbol	Explanation
	Protective conductor terminal
	Caution, biohazard risk
	In Vitro Diagnosis Medical Device
	Caution, risk of danger
F 3.15AL 250V	Fuse
	On (Supply)

	Off (Supply)
	CE mark
	Caution, hot surface
	Consult instructions for use
	WEEE symbol

● Label:



1. Performance Indicators

1.1. Operating conditions

(1) The equipment installation environment conditions are:

Position:	For indoor use and benchtop instrument, the workbench can bear 200 kg/m ²
Temperature:	10℃-40℃
Humidity:	10%-90% relative humidity (no steam condensation)
Atmospheric pressure:	860 hPa-1060 hPa

(2) The electrical conditions of the equipment are as follows:

Voltage:	100-240V~
Frequency:	50-60Hz
Rated power:	250VA

(3) The AC power outlet of the extraction system must not be shared with other devices.

(4) Leave at least 15cm on both sides of the equipment and at least 20cm on the back of the equipment.

(5) If the equipment is not used for a long time, unplug the equipment from the AC outlet.

1.2. Technical features

Model Parameter	SSNP-2000B
Sample throughput	32 samples/run (~96 samples/h)
Extraction time (minutes)	Approx. 10-50 mins
Size (L x D x H), Weight	40x30x44 cm, 16kg
Plate type	96-deep-well plate
Processing volume	Approx. 10 μ L -1000 μ L
Magnetic bead recovery efficiency	$\geq 98\%$
Oscillating mixing	Multi-mode and multi-speed for adjustment
Heating temperature	Cracking heating temperature: room temperature to 120°C
	Elution heating temperature: room temperature to 120°C
Extraction method/ Compatible kit	Bioperfectus magnetic bead-based nucleic acid extraction kits
Contamination control	

2. Scope of Usage

2.1. Working principle

SSNP-2000B is used for the extraction and purification of nucleic acids from clinical samples with magnetic bead nucleic acid extraction kits.

The product is used by laboratory technicians in PCR laboratories and biosafety cabinets. The sample should be processed first, and then transferred to the sample wells in the 96-deep-well plate of the pre-packaged reagent for the nucleic acid extraction system. Open the instrument door, place the 96-deep-well plate and the magnetic sleeve. The extraction system should be started after closing the door.

The nucleic acid extraction operation will firstly heat the sample for cell lysis, and then the magnetic bars and sleeves absorb the magnetic beads and move them to the sample wells. After the magnetic beads absorb the nucleic acids released from cell lysis, they are transferred to the washing wells through the magnetic bars and sleeves. Specific steps: lysis - binding - washing - elution. Purified nucleic acids are ready for use after the magnetic beads are removed.

The system utilizes the magnetic bead technology for nucleic acid extraction, which uses a protein denaturant as the cell lysis buffer to lyse cells of plants and animals, denature DNA/RNA-binding proteins, and release DNA/RNA. The magnetic beads are used to specifically adsorb the DNA/RNA and are washed to remove impurities such as proteins and polysaccharides. The eluent is used to elute the DNA/RNA from the magnetic beads to obtain pure DNA/RNA at a high concentration, which is ready for PCR, real-time PCR, genetic engineering and other procedures.

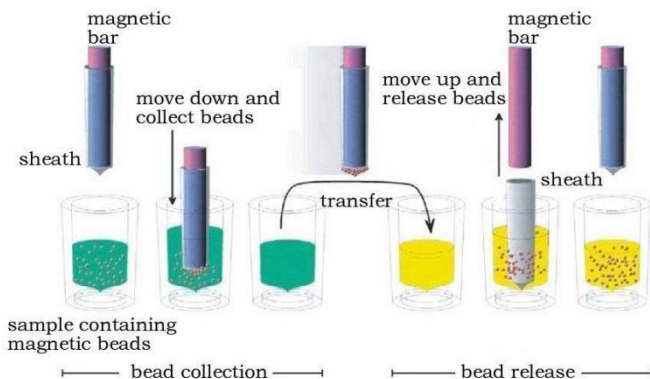


Figure 1. The Principle of Extraction on SSNP-2000B

2.2. Scope of application

The equipment is widely used in routine scientific research, genomics, disease control, food safety, forensic medicine, molecular biology experiments.

3. Overview

3.1. Product composition

SSNP-2000B consists of the host part and software. The host part includes an extraction system (two vertical modules, one horizontal module), a temperature control system, a UV lamp disinfection system.

The software is industrial control type software.

Product	Structure and composition		Software
	Host part	Consumables	
SSNP-2000B	Extraction system, temperature control system, UV lamp disinfection system	Magnetic sleeve, extraction kit	Name: Bioperfectus SSNP-2000B Nucleic Acid Extraction Software Short name: SSNP-2000B Release version: V1.0

3.2. Structural schematic diagram



Figure 2: Side view of SSNP-2000B



Figure 3: Front view of SSNP-2000B

3.3. Unpacking checklist

SN	Item	Model	Unit	Quantity
1	Nucleic Acid Extraction System	SSNP-2000B with 10.1" touch screen PAD	Set	1
2	Power Cable	AC250V 10A	Pc	1
3	User Manual	/	Pc	1
4	Ground Connector	Banana plug	Pc	1
5	Certification	/	Pc	1
6	Hepa Filter Cotton	/	Pc	2
7	L-Type Screwdriver (4mm)	/	Pc	1
8	Plastic Cover	/	Pc	1
9	Desiccant	/	Pc	1
10	Fuse - 3.15A	/	Pc	1
11	Standard Operation Process Card	/	Pc	1
12	Packing List	/	Pc	1
13	Test Report	/	Pc	1
14	Assembly Guide	/	Pc	1
15	96-Deep-Well Plate	/	Pc	1
16	Mixing Sleeve	/	Pc	2
17	Warranty Card	/	Pc	1

3.4. Touch screen

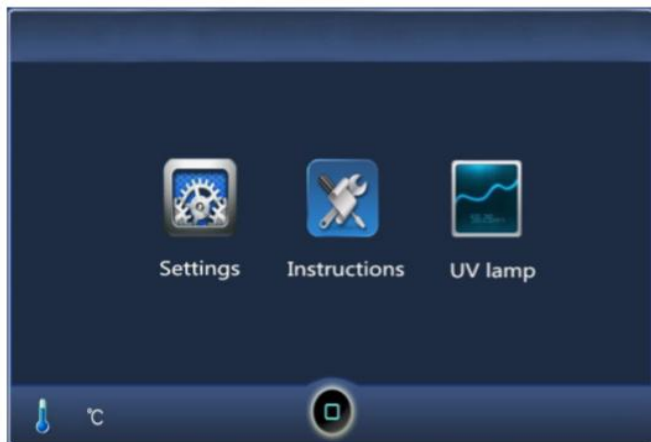


Figure 4: The Main Menu Interface of Touch Screen

3.6. Power switch and socket

From top to bottom, there is a power switch button, a fuse and a power outlet.



Figure 5: Power Switch Button and Socket of SSNP-2000B

3.6. Test chamber

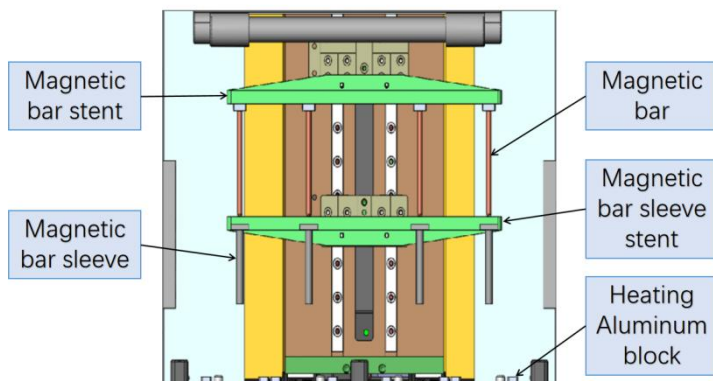


Figure 6: The Inside Structure of Test Chamber

3.7. Product features

- User-friendly design. The interface is humanized and simple to operate.
- Modular design. With a modular structure and upgraded core components, it has higher accuracy and a lower failure rate.
- Simple to operate. Compatible with Bioperfectus's extraction kits, it will simplify the complicated extraction process.
- Stable result. It can reduce the difference caused by manual operation, with high extraction sensitivity and excellent repeatability.
- Safe and reliable function. The equipment is fully automatic and can be matched with disposable consumables to reduce operator contact with hazardous

reagents.

- Magnetic rod structure. It adopts an integral magnetic rod and multi-layer coating treatment on the surface, which is not easy to adhere and polluted by samples and reagents.
- The structure of the magnetic rod module and the magnetic sleeve module. Both the magnetic rod module and the magnetic sleeve module adopt the independent screw structure, which ensures the long-term operation of the instrument with low noise and low wear.
- Avoid resonance. The magnetic rod frame and magnetic sleeve frame adopt independent modules to avoid instrument vibration and resonance.
- Display screen. The large full-color display screen provides touchable operation which is simple and easy to use.
- Cost-effective consumable requirement. Prefilled nucleic acid extraction kits are provided in different specs for various sample sizes, such as 1, 8 and 16 tests/plate format. It will help to reduce waste costs for labs.
- Self-cleaning function with built-in timing UV disinfection function and HEPA filter.
- Oscillation mixing function with multi-mode and multi-gear adjustable speed (> 20 gears).
- Operation mode (including two modes). remote touch screen control of equipment and key operation of the instrument panel.

3.8. Advantages

- High-purity nucleic acid products

- Fully automated nucleic acid extractor, easy to use
- High throughput of 1 to 32 samples processed at the same time for saving time
- Compatible extraction kits for optimized extraction process
- Precise temperature control function to ensure the optimum reaction temperature during purification
- User-friendly and intuitive interface with no need for special training
- Compact and robust with a long service life
- Built-in programs

4. Operation Instructions

4.1 Main menu

Power the instrument and turn it on, the screen will be opened automatically. Then it will perform a self-test. After three short beeps, it will enter the main menu operation interface which is shown in figure 4.



Figure 4: The Main Menu Interface of Touch Screen

The interface mainly includes instrument functions and file shortcuts.

- The first one: <Settings> includes specific instrument debugging and parameters setting. **Technicians without authorization by Bioperfectus should not adjust these parameters.**
- The second one: <Instructions> includes extraction operations for different protocols.
- The third one: <UV Lamp> includes the ultraviolet light sterilization settings.

4.2 Program Interface

Touch <Instructions> on the main interface to enter the preset and editable program interface <Preprogrammed Protocol>.

As shown below:

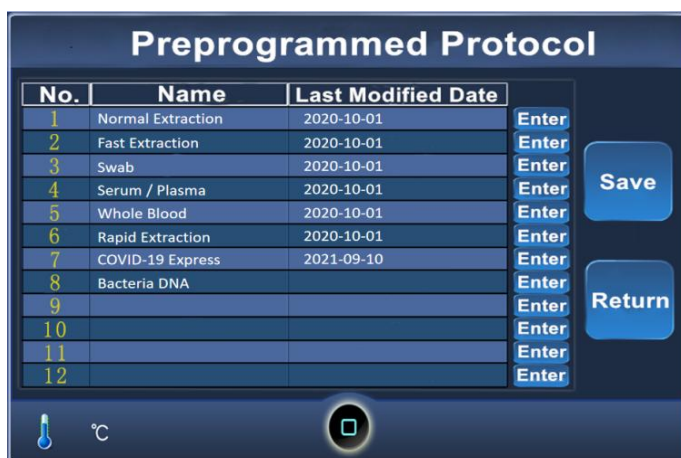


Figure 7: The Preprogrammed Protocol Interface

● Start operation

After selecting the protocol, it turns to the <Extraction Process> interface.

Click <Start> to start the instrument.

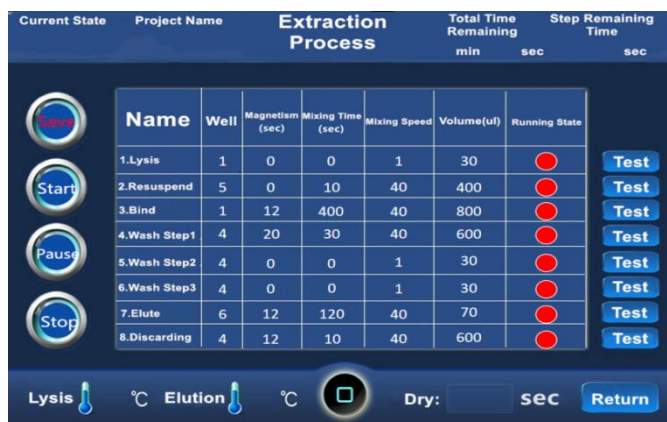


Figure 8: The Extraction Process Interface

Note: The extraction protocols which compatible with Bioperfectus magnetic bead extraction kit have been built-in. No additional settings are required except in special cases.



96-deep-well plate notched outward.



The mixing sleeve should be installed correctly.



It is forbidden to open the hatch during the running of the program. If the door is open, the instrument stops running. After the door is closed, the instrument continues to run.



Only pause can be used in the running state, other buttons cannot be used.

● **Pause operation**

Click <Pause> in the running state, the program will temporarily stop; click <Run> to continue.

● **Stop operation**

Click <Stop> in the running state. The instrument automatically resets and completely stops the current program.

4.3 UV lamp

Touch <UV Lamp> on the main interface to enter the UV Lamp Interface. Click <Lights off> to stop working.



Figure 9: The UV Lamp Interface



The glass door can filter the ultraviolet light. Please

DO NOT look directly at the ultraviolet light.

5. Operation Procedure

- 5.1 Check whether the instrument and power supply are in good condition and turn on the power after confirmation.
- 5.2 Put a 96-deep-well plate into the test chamber, push the mixing sleeve into place, and carefully check whether they are in place.



The notch of the 96-deep-well plate is facing out and the palate is placed in place.



The mixing sleeve has been pushed in place and snapped in place.

- 5.3 Choose the corresponding extraction protocol according to the sample type and extraction kit. The corresponding information can be found in **chapter 10**.
- 5.4 If there is no abnormality, the operator should not open the chamber gate during the running of the program.
- 5.5 The instrument will give a voice reminder at the end of the experiment.

6. Maintenance

Please read the instructions carefully before using the equipment.

- Clean the inside of the chamber with 75% ethanol (non corrosive ingredient) and turn on the UV lamp for more than 30 minutes.
- The exterior of the instrument can only be disinfected with alcohol. Using other oxidizing cleaning agents may cause the instrument to become discolored.
- Keep the front door glass away from organic reagents, otherwise, it may cause cracking. Avoid using alcohol for disinfection. If it is necessary to use alcohol, please wipe it clean immediately after spraying; it is strictly forbidden to use UV light directly after spraying alcohol.
- Clean the surface and extraction chamber of the equipment regularly, and avoid strong base, high-concentration ethanol and organic solvents.
- Ensure the ventilation around the equipment when in use.
- **Do not** use the equipment when the voltage is unstable, too high, or too low.
- Keep the extraction chamber dry.

7. Transportation and Package

Please read the instructions carefully before opening and packaging the equipment.

- The instrument is packed with three protections. The innermost layer is a plastic film to prevent water and moisture. The outermost layer is a wooden box to prevent collision and extrusion. The middle layer is EPE foam, which acts as a buffer. The transportation and storage conditions of the product shall comply with the labels on the packaging.

- Retain the shipping container and all packaging materials, including the wooden pallet, plastic film and PE foam. If the instrument needs to be returned for service, the instrument must be shipped in the original container to maintain the same warranty protection. Otherwise, Bioperfectus will not responsible for the damage during transportation.
- Please check the outer packaging of the equipment before unpacking. If there is any defect, collision or water stain, please contact the transportation department or our company.
- Open the external package, and take out the main machine carefully. Check the product and its accessories according to the packing list. If there is any discrepancy, please contact our company in time.
- When there is a need to move the equipment, fix magnetic racks with screws first.

8. Precautions

Please make sure the equipment is powered on before opening the software.

Please **DO NOT** put your hands in the working area when the equipment is working.

The inside of the equipment is a precise part. Technicians without authorization by Bioperfectus should not disassemble the shell of the equipment.

Error Alert	Solution
The power light is off when turning on the switch.	A. Check whether the power outlet is connected properly. B. Check whether the fuse is fusing. And replace the fuse with the rated current of 3.15A.
Temperature does not rise when the heating function is on.	Check whether the temperature control is on.
The magnetic bar is contaminated.	A. Be sure to install a clean mixing sleeve for each operation to avoid accidental contact with residual liquid in the 96-deep-well plate. B. Wipe the magnetic bar carefully with clean cotton or degreasing cotton with water. C. Please DO NOT wipe the magnetic bar with strong alcohol and organic solvents.
Abnormal noise	A. Check whether the mixing sleeve is in place. B. Check whether the 96-deep-well plate is in place.
The magnetic bar does not rise or fall.	A. Check whether the magnetic bar sleeve and 96-deep-well plate are in place. B. Pause first, and then reset to see whether it is back to be normal. C. Please connect our company if it is still abnormal.
System halted or lose control	A. Power off and restart the equipment when the equipment is system halted due to improper operation.

9. Trouble-Shooting

10. Compatible Extraction Kit and Sample Type of Extraction Protocol

Standard Extraction Protocol	Compatible Bioperfectus Automated Extraction Kit (Catalog Number)	Sample Type
Normal Extraction	Viral Nucleic Acid Extraction Kit (Magnetic Bead Method) (SDK60104)	Most samples
Fast Extraction	Viral Nucleic Acid Extraction Kit (Magnetic Bead Method) (SDK60104)	Relatively clear samples with few impurities
Swab	Viral Nucleic Acid Extraction Kit (Magnetic Bead Method) (SDK60104)	Pharyngeal swabs, nasal swabs, urine or other swabs
Serum/Plasma	Viral Nucleic Acid Extraction Kit (Magnetic Bead Method) (SDK60104)	Serum/plasma
Rapid Extraction	Nucleic Acid Extraction Rapid Kit (Magnetic Bead Method) (SDKF60101, SDKF60101D)	Pharyngeal swabs, nasal swabs, serum/plasma, urine or other swabs, body fluids
COVID-19 Express	Nucleic Acid Extraction Rapid Kit (Magnetic Bead Method) (SDKF60101, SDKF60101D)	Pharyngeal swabs, nasal swabs
Whole Blood	Whole Blood DNA Extraction Kit (Magnetic Bead Method) (SDK60110)	Whole blood sample
Bacteria DNA	Bacteria DNA Extraction Kit (Magnetic Bead Method) (SDK60108)	Gram-positive bacterium, gram-negative bacterium

11. After-Sales Services

Please connect our technical supports if there are any problems in daily use.

Manufacturer:Jiangsu Bioperfectus Technologies Co.,Ltd.

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Taizhou City, Jiangsu Province, PEOPLE'S
REPUBLIC OF CHINA

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<http://www.bioperfectus.com> or contact at E-mail:
info@bioperfectus.com.

For any detailed questions about the use of the
Bioperfectus instruments please contact our
Technical Support at E-mail:
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