BIO BASIC
Quality-Affordable Research

Product information

QF 24 V4
V5 Sept 2020

Nucle@i, Nucleic acid automation machine

Catalog #: NA-01 / NA-02
Size: 1 UNIT
Storage: 18-25°C*

Table of Contents

Introduction

Product Description:

The Nucle@i magnetic particle processor is designed for automated transfer and processing of magnetic particles in microplate format. The Nucle@i system is based on the use of magnetic rods covered with a disposable, specially designed tip comb and plates. The instrument functions without any dispensing or aspiration parts or devices. Samples and reagents, including magnetic particles, are dispensed into the plates according to the corresponding instructions. The protocol that is selected by the user via touchscreen has already been transferred onto the onboard software. Bio Basic Nucle@i Software can be used to create and run protocols.

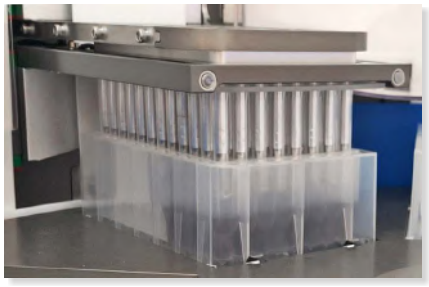
The Nucle@i magnetic particle processor is intended for professional research use by trained personnel. The instrument is intended for automated transfer and processing of magnetic particles in a microplate format. Use for self-testing is excluded.

NA-01: Nucle@i - Nucleic acid intelligence automation machine

NA-02: Nucle@i - Nucleic acid intelligence automation machine, compatible with UV sterilization

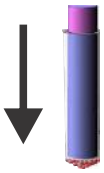
Automation Workflow

*Note that **magnetic particles are transferred** throughout the process and **not the liquids***

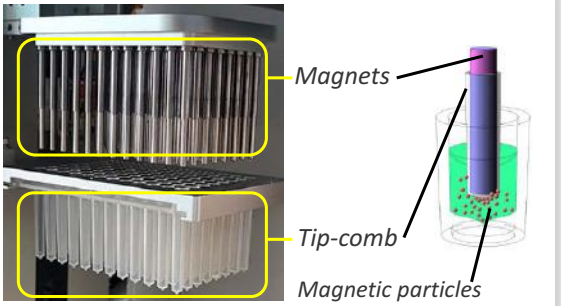


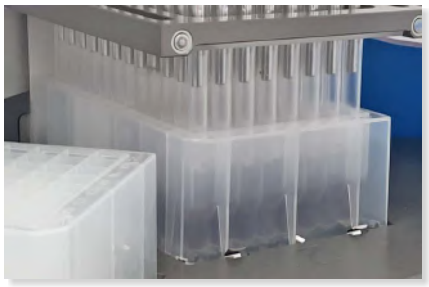
Step 1: Particle collection

Magnetic particles are collected from separate wells. The plastic tip-comb moves slowly to collect the particles on the edge of the tips.



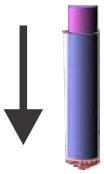
PARTICLE TRANSFER



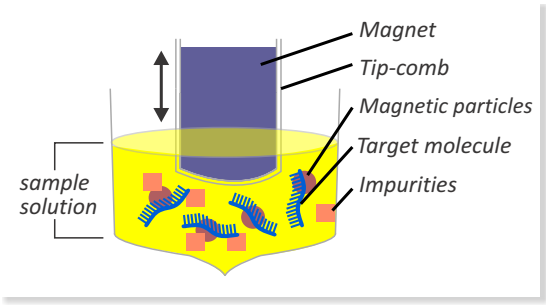


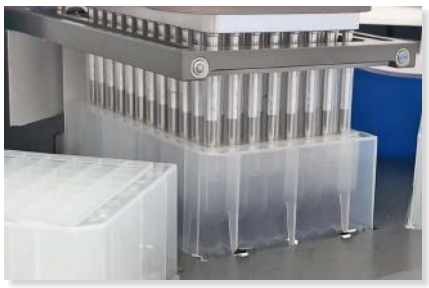
Step 2: Binding

Magnetic particles are added into sample-wells for binding. The tip-comb moves up and down at a high speed until all particles are mixed efficiently with the sample.



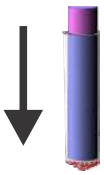
PARTICLE TRANSFER



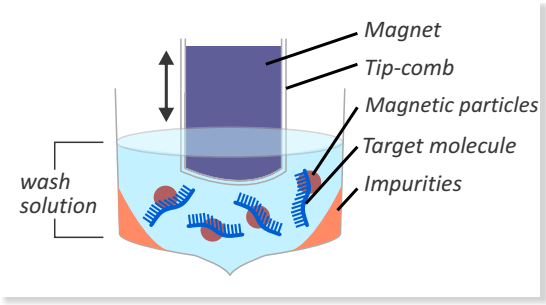


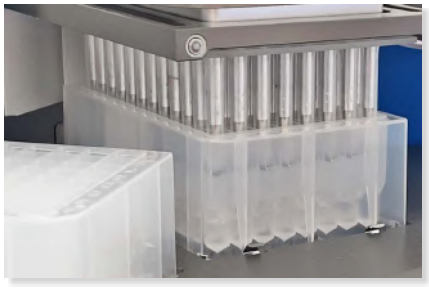
Step 3: Washing

Target molecules are washed using a magnetic release and collection process, leaving impurities behind. There can be multiple washing steps depending on the desired settings.



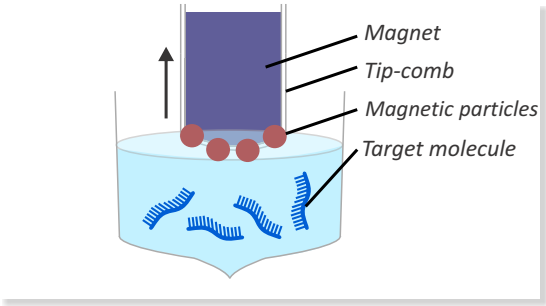
PARTICLE TRANSFER





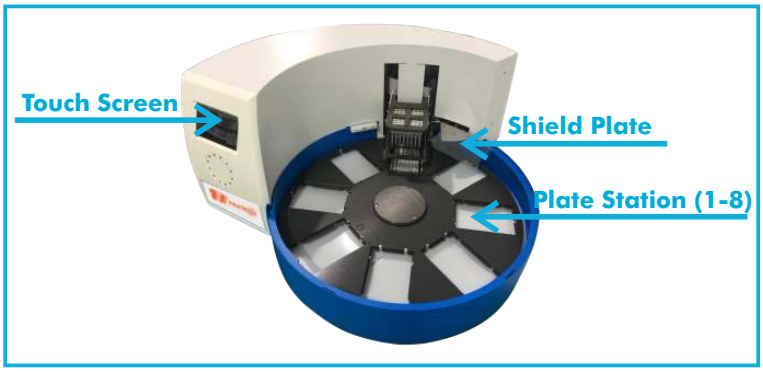
Step 4: Elution

Purified target molecules are released into a small end-volume for downstream applications. Particles are removed.

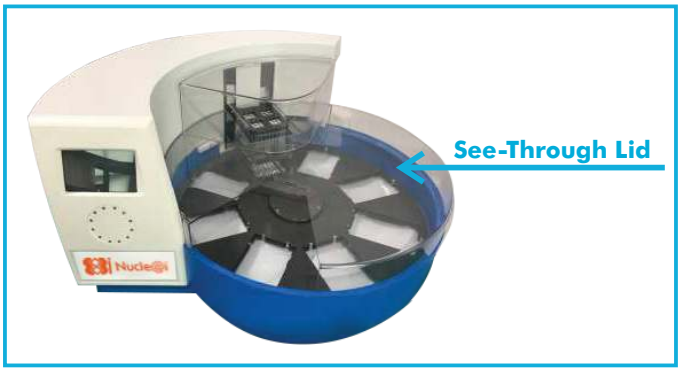


Functional Description

Front View:

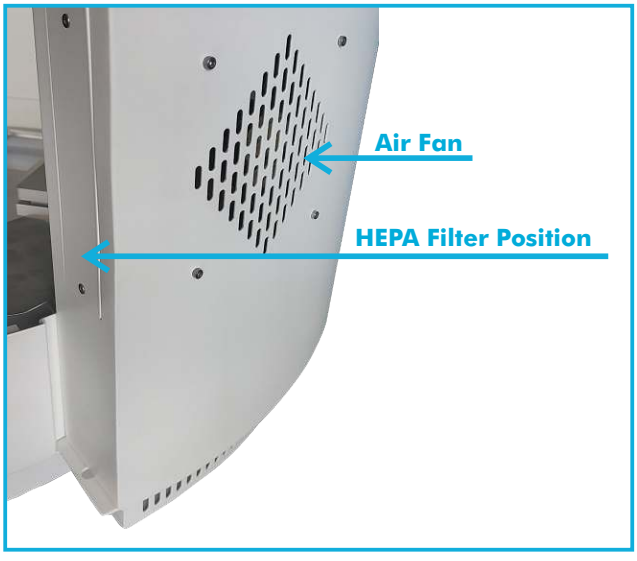


NA-01: Nucle@i, front view without see-through lid



NA-01: Nucle@i, front view with plates and see-through lid

Back/Internal View:



NA-01: Nucle@i, back view

NA-01: Nucle@i, side view

Nucle@i Magnetic Particle Processor:

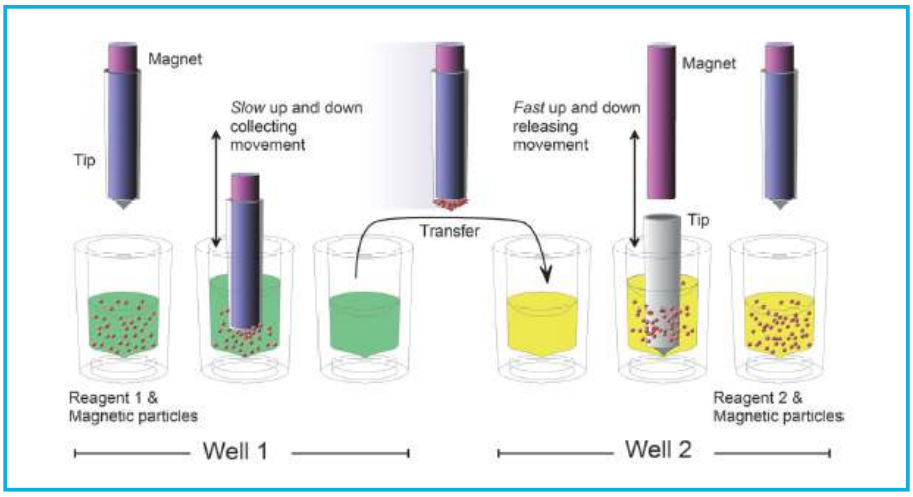
The Nucle@i , Nucleic acid intelligence automation machine has room for eight plates. The tip combs are compatible with the plates. During the individual steps, the plates are kept stationary, and the only moving assembly is the processing head with tip comb and magnetic rods. The head consists of two vertically moving platforms. One is needed for the magnetic rods (24 or 96 pieces) and the other one for the plastic tip comb.

Up to eight plates can be simultaneously on the turntable. However, during one sample processing, the protocol enables the use of more than eight plates in total. One tip comb contains 24 or 96 tips used for processing 24 or 96 samples at a time.

Before starting the magnetic particle processing via the touchscreen, the samples and reagents are dispensed into the plates and the tip comb is placed onto a deepwell plate, from which it is automatically loaded. The plates are placed onto the turntable into the corresponding plate stations according to the protocol instructions.

The operating principle employed is IMPP (inverse magnetic particle processing) technology. Rather than moving the liquids, the magnetic particles are moved plate wise on the plates containing specific reagents, in contrast to the external magnet method. Magnetic particles are transferred with the aid of magnetic rods covered with a disposable, specially designed plastic tip comb.

Principle of Magnetic Particle Processing:



Inverse magnetic particle processing

Working with a Magnetic Rod:

Working with magnetic particles can be divided into five separate processes:

- Collecting magnetic particles
- Releasing magnetic particles
- Washing magnetic particles
- Incubation
- Concentration

Collecting Magnetic Particles:

During the collection of the magnetic particles, the magnetic rod is fully inside the tip. The magnetic rods together with the tip comb move slowly up and down in the plate and the magnetic particles are collected onto the edge of the tips. The magnetic rods together with the tip comb, having collected the magnetic particles, can be lifted out of the wells and transferred into the next wells.

Releasing Magnetic Particles:

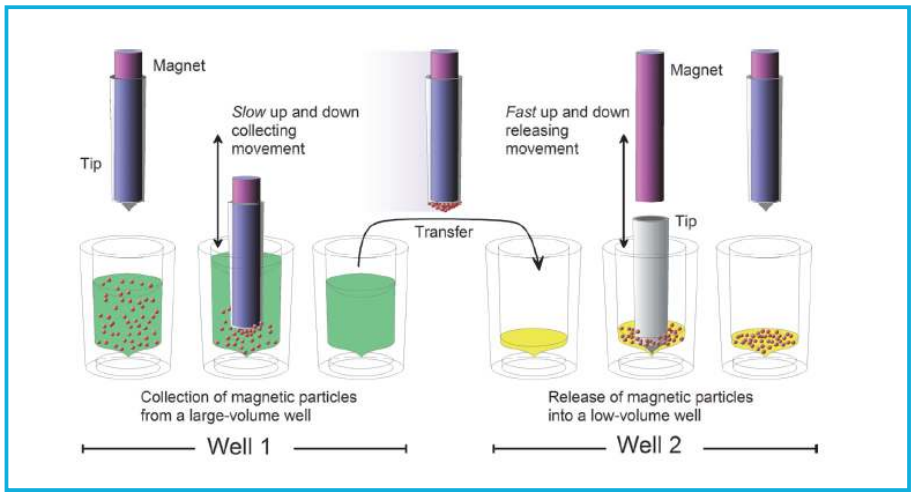
After collection of the magnetic particles, the magnetic rods together with the tip comb are lifted from the wells and transferred into the next wells containing the reagent, the magnetic rods together with the tip comb are lowered into the wells and the magnetic rods are lifted off.

Washing Magnetic Particles and Incubation:

Washing the magnetic particles is a frequent and an important processing phase. Washing is a combination of the release and collection processes in wells filled with washing solution. To maximize washing efficiency, the magnetic rods together with the tip comb are designed to have minimized liquid-carrying properties. To keep the magnetic particle suspension evenly mixed in incubating long-running reactions, the tip comb can be moved up and down in the solution.

Changing the Volume During the Magnetic Particle Processing:

The volume of the first plate can be larger than the volume of the next plate, and this is used for concentration purposes.



A concentration step during magnetic particle processing

USB Port for PC:

There is a USB port for PC located on the front panel which is used for update the software of touchscreen and mainboard.

NFC:

Reagent company can develop kit products on the Nucle@i and optimize the experimental conditions to put the optimized workflow on the NFC chip. Users can scan the reagent company's chip, and automatically call out the corresponding program.

Installation

Unpacking the Instrument:

Move the packed instrument to its site of operation. To prevent condensation, the instrument should be left in its protective, antistatic plastic wrapping until the ambient temperature has been reached. Unpack the Nucle@i instrument and accessories carefully with the arrows on the transport package pointing upwards. Remove the instrument from the package and place it on a level surface.

Caution: Do not touch or loosen any screws or parts other than those specifically designated in the instructions. Doing so might cause misalignment and will void the instrument warranty.

Warning: The Nucle@i weighs approximately 25 kg [55 lbs.] without the transport package and should be lifted with care. It is recommended that two persons lift the instrument together, taking the proper precautions to avoid injury.

To lift the instrument, put your fingers under the bottom on either sides and lift it with your back straight. Retain the original packaging and packing material for future transportation. The packaging is designed to assure safe transport and minimize transit damage. Use of alternative packaging materials may invalidate the warranty. Also retain all instrument-related documentation provided by the manufacturer for future use.

Environmental Requirements:

When you set up your Nucle@i, avoid sites of operation with excess dust, vibrations, strong magnetic fields, direct sunlight or UV light, draft, excessive moisture or large temperature fluctuations. Place the instrument on a normal laboratory bench. Make sure that:

- The working area is flat, dry, clean and vibration-proof and leaves additional room for accessories, cables, and reagent bottles.
- There is at least 10 cm on the laboratory bench of free space around the instrument for ventilation.
- The ambient air is clean and free of corrosive vapors, smoke and dust.
- The ambient temperature range is between +5°C (41°F) and +40°C (104°F).
- The humidity is low so that condensation does not occur (relative humidity is between 10% and 80%).

Install the Nucle@i in a protected location where no one can step on or trip over the power cord, and where the power cord remains accessible if the unit needs to be unplugged.

Caution: Do not operate the instrument in an environment where potentially damaging liquids or gases are present.

Precautions and Limitations:

- Always ensure that the local supply voltage in the laboratory conforms to that specified on the type label on the back of the instrument.
- Do not smoke, eat or drink while using the Nucle@i.
- Observe normal laboratory procedures for handling potentially dangerous samples.
- Wear proper protection clothing, such as disposable gloves and laboratory coats, according to good laboratory practice.
- Ensure that the working area is well ventilated.
- Never spill fluids in or on the equipment.

Caution: The Nucle@i should not be kept in close proximity to magnetic tapes, computer discs or other magnetic storage systems, such as credit cards, as these can be damaged by the strong magnetic field of the Nucle@i heads. Do not uninstall and hold the Nucle@i heads close to a PC display, since this may cause damage to the display.

Warning: This product contains very strong permanent magnets. People wearing a pacemaker or metallic prostheses should not use this product. A pacemaker or prostheses may be affected or damaged if it comes in close contact with a strong magnetic field.

Installation Setup:

Detaching the transport protected blocks:

1. The instrument comes with a 96-tip comb and a 96 DW plate as transport protected blocks. Detach the transport protected blocks, after the machine is power on. Make sure the transport protected blocks is detached before you put the instrument into operation.

Connecting the power supply cable:

Warning: Ensure that the mains switchon the back panel is in the "O" position. Never operate your instrument from a power outlet that has no ground connection. Never use a power supply cable other than the Bio Basic power supply cable designed for your region.

1. Connect the power supply cable to the power supply connector and plug in the instrument.
2. Connect the power supply to a correctly installed line power outlet with a grounded conductor.

Operational Check:

First switch the instrument ON "-". The instrument performs initialization tests and adjustments. The display briefly shows User management interface. It is recommended that you carry out a check run using a maintenance protocol to verify proper instrument operation. If the check is all right, proceed with your own runs.

Routine Operation

Switching On:

Before you switch on the Nucle@i, ensure that the voltage on the type label at the bottom left of the back panel corresponds to the local voltage.

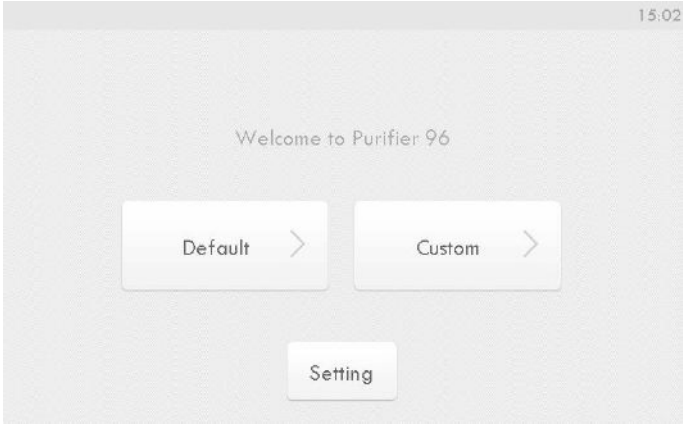
Warning: Never operate your instrument from a power outlet that has no ground connection.

Control Panel:

This section describes the Nucle@i control panel and internal software.

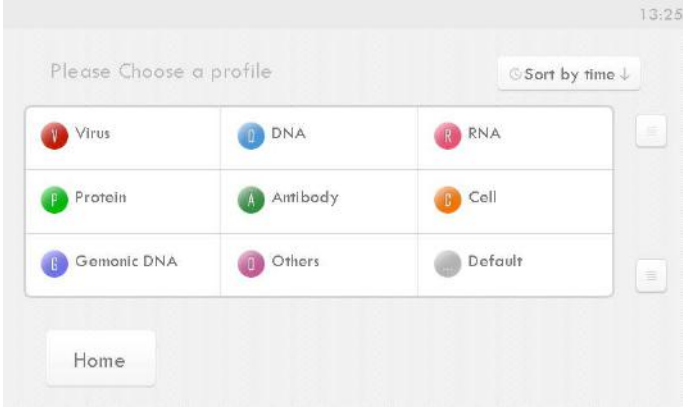
Touchscreen:

The homepage of touchscreen is shown:



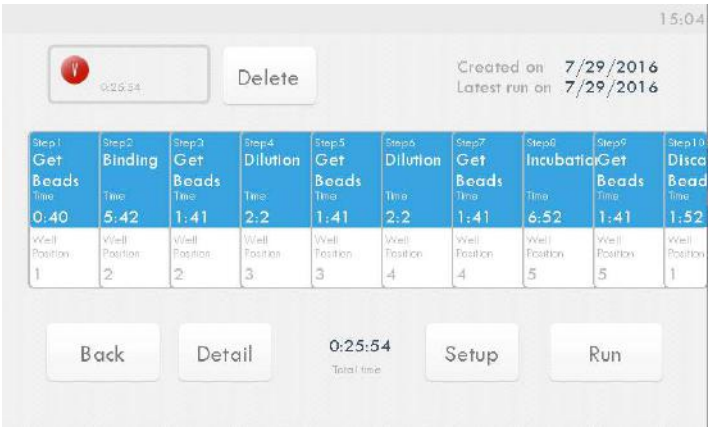
Default:

Press Default, the profile list is shown, which is pre-built in the software of the Nucle@i. These profile can not be edited and deleted. Press homepage.



Selecting the Profile:

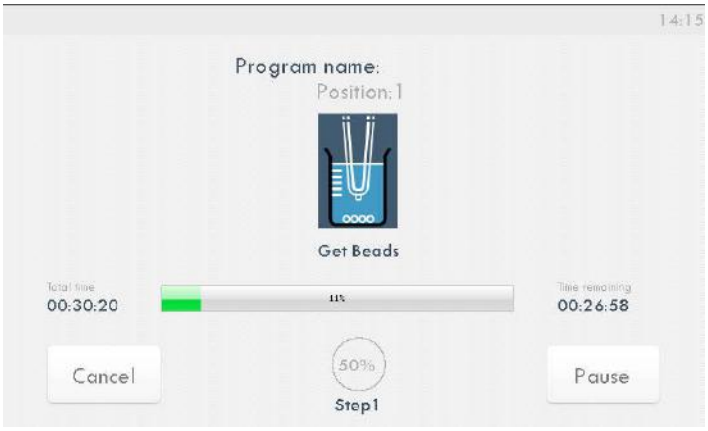
User can select any profiles in table, for example, press the Virus.



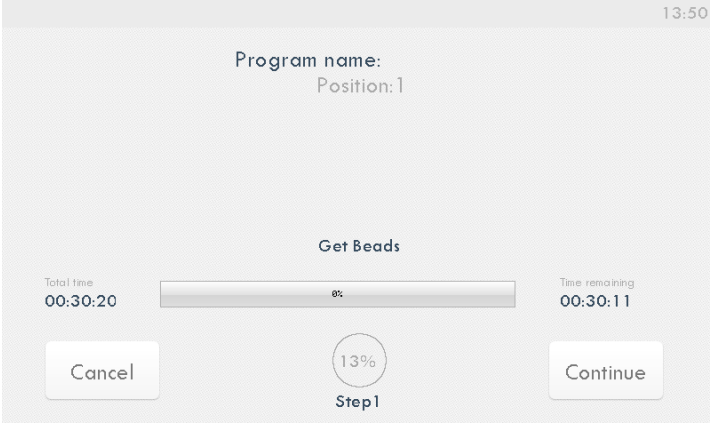
The details of virus protocol is shown: Any one of the steps and parameters can not be edited and deleted.

Run Profile:

Press “Run” to start the profile.

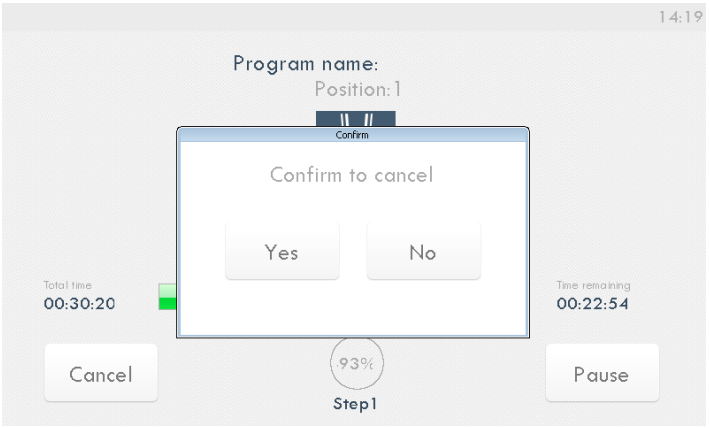


Press “Pause” to pause the profile.



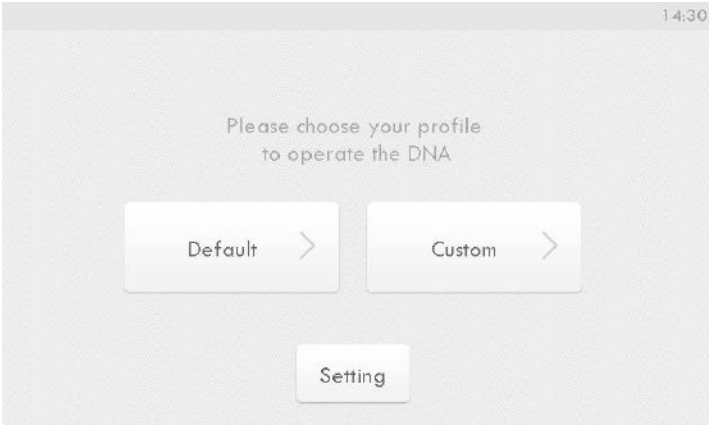
Press “Continue” to go on the profile.

Press “Cancel” to stop and quit the profile.



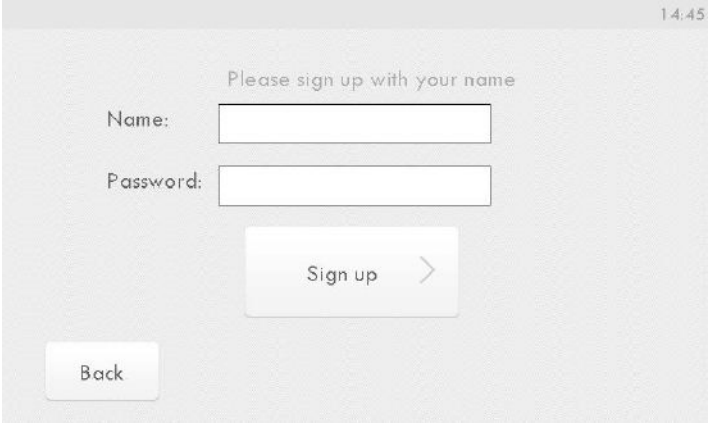
Custom:

There is another function module Custom in the homepage, in which users can create and manage their own accounts, and also can create, modify, save, and delete their own profiles.

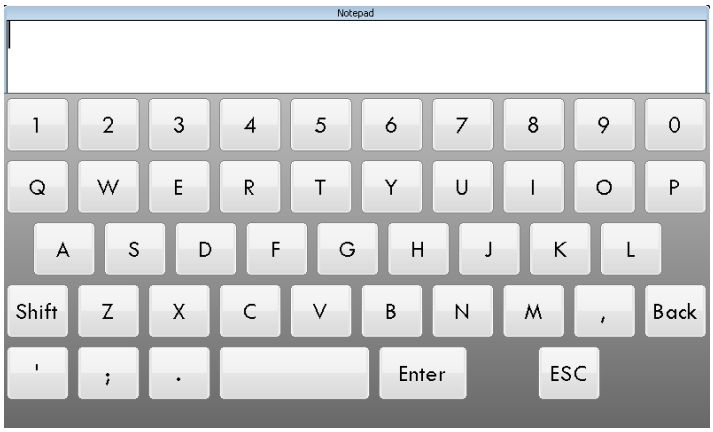


Sign Up:

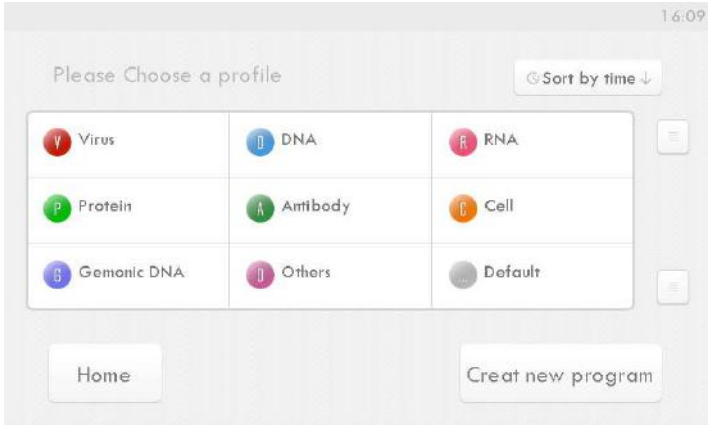
Press “Sign up” to register the account.



Use the keyboard to enter the name and password. The password is not necessary.

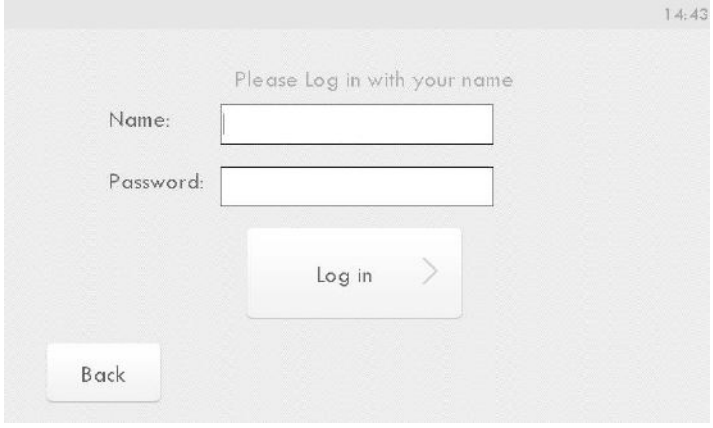


The profile list view is shown, when finishing the sign up account.



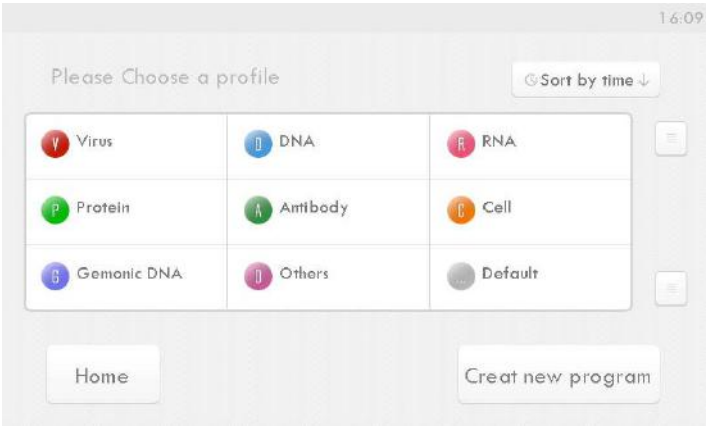
Log In:

Once registered the account, the user can log in the original account directly.

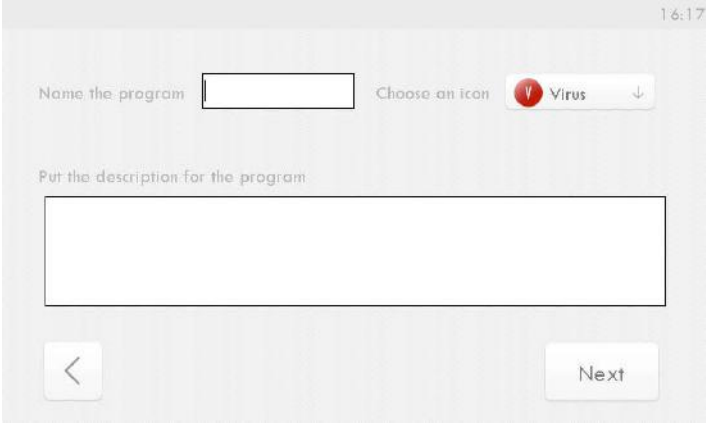


Create New Program:

After log in, there is a key. Create new program shown in bottom of touch screen.

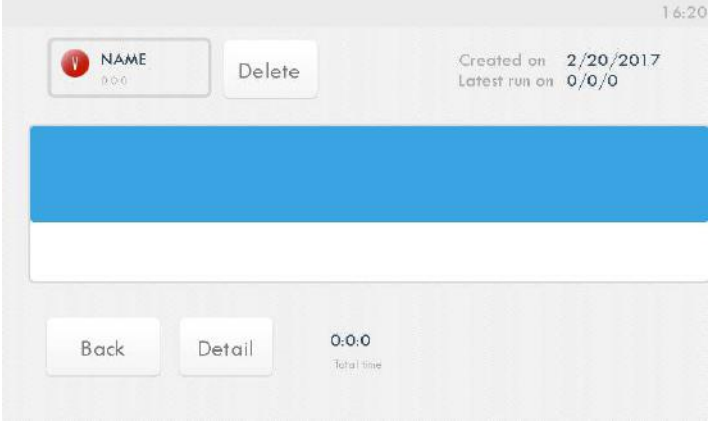


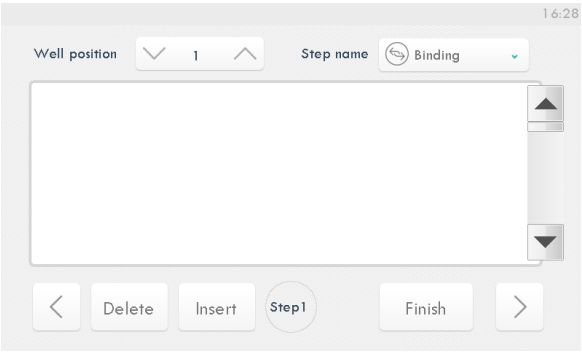
Press “Create new program” to continue, user can set the name, icon and short description of program, and then press “Next”.



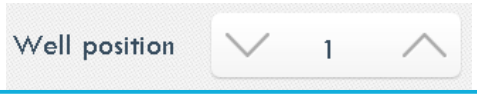
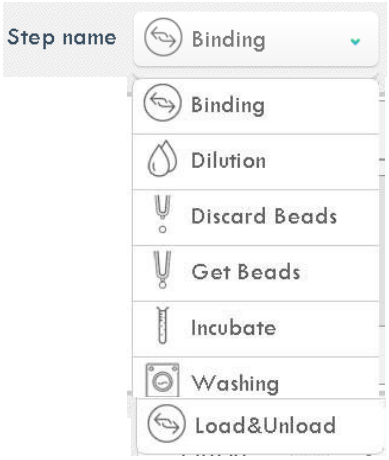
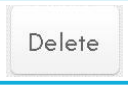
Detail of Program:

This view is shown about all of the detail of the program, such as steps, time, well.
Press “Detail” to set up the program.
Press “Delete” to delete the program.
Press “Back” to return the previous menu.



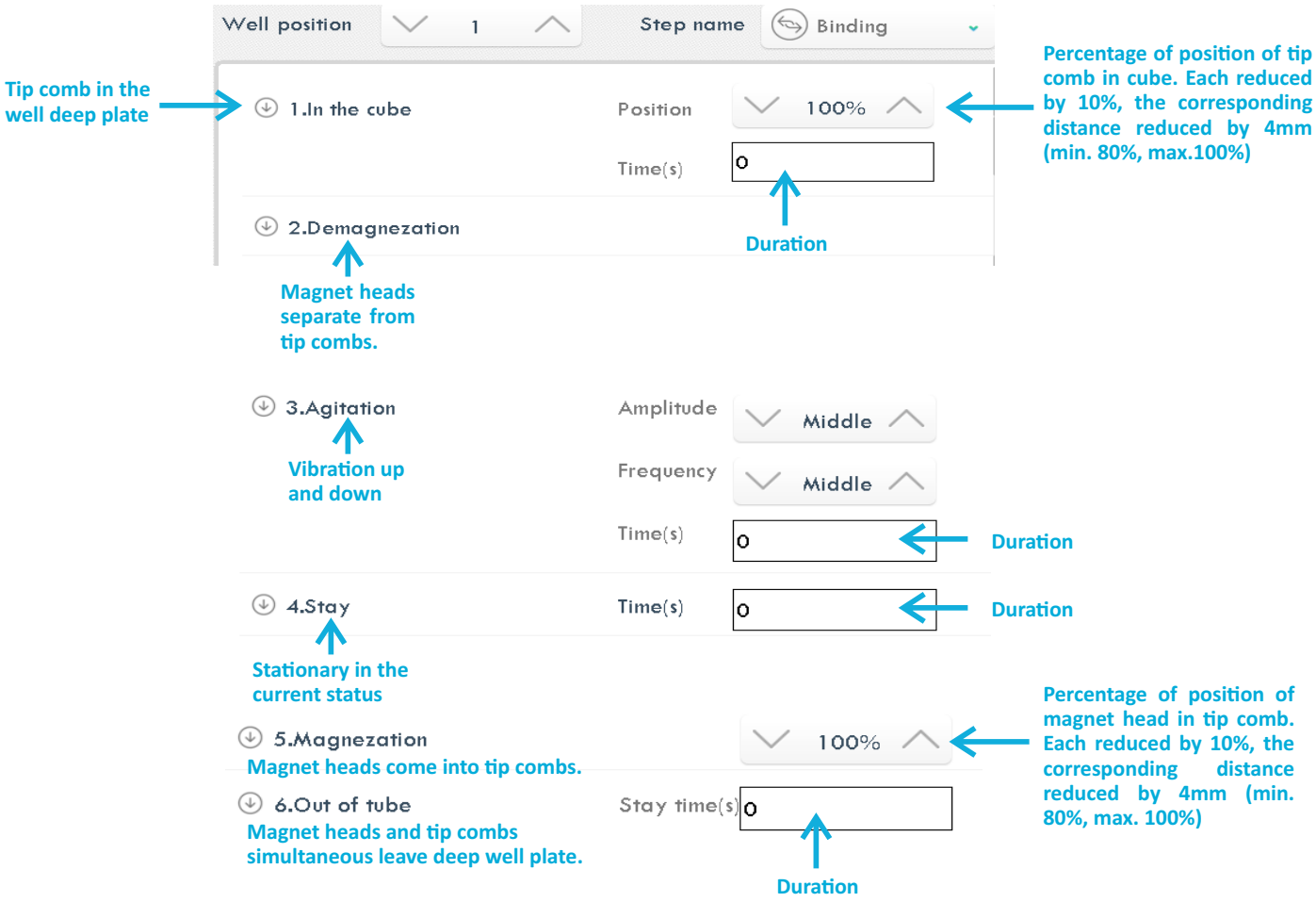


The users can set up and choose the relevant parameters in this view, the meaning of every key as follows:

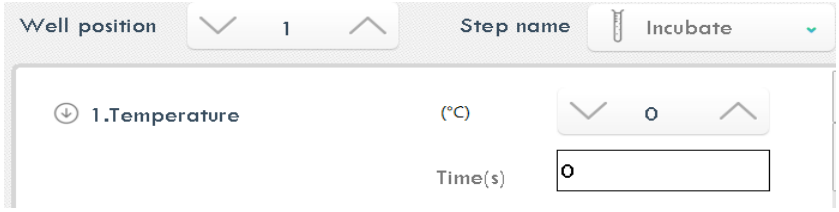
Key	Meaning
	The current set of step is working in plate station 1.
	Set the function of current step.
	The first step must be chosen Load, and the last step must be chosen Unload, otherwise the program will not be finished.
	Back to the previous step.
	Go to the next step.
	Delete the current step.
	Insert a new step prior to the current step.
	Finish the program.
	Current step.

Function Details:

User can definite function for each step and there are six optional function in Nucle@i. there are several sub-steps in each function. For example, choose the Binding function, user can see following table and set up relevant parameters.

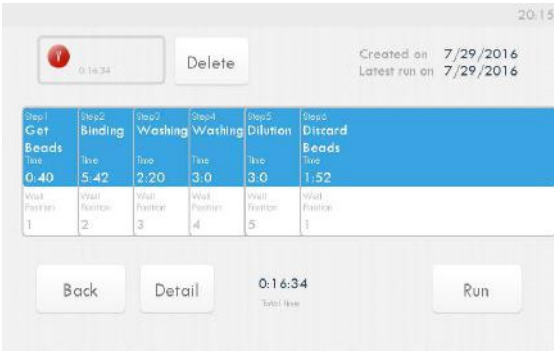


After finishing function Binding, press ">" to next step. The other function setting up are similar to the function Binding, except Dilution and incubation which include temperature setting.



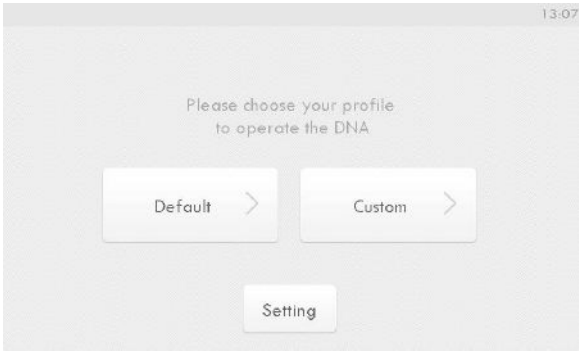
Users can set the heating temperature and duration.
Note: Temperature range: +10°C to +100°C

Press “Finish” to finish the program setting, and back to view of detail program. Users can press “Detail” to modify the steps or press “Run” to run the program.

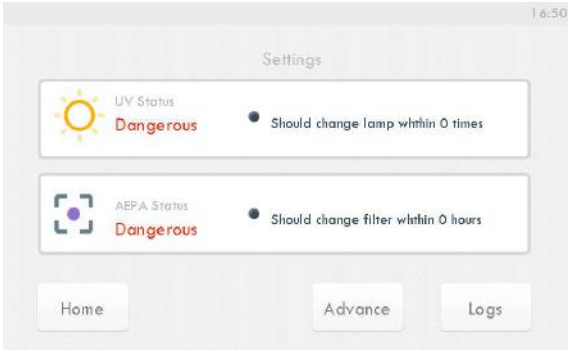


Settings:

Users can choose “Settings” to set up the parameters of the Nucle@i instrument in the view of homepage.

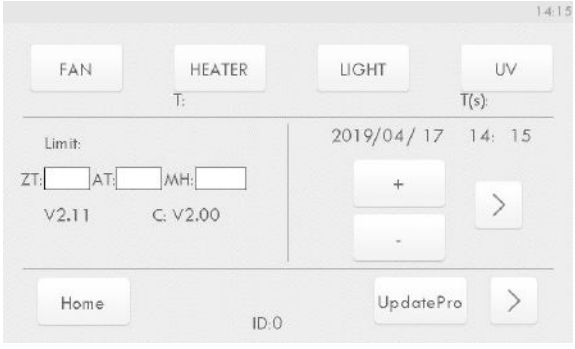


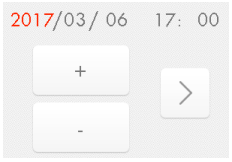
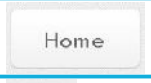
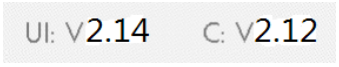
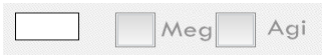
After entering the view of setting, and HEPA filter, which can remind the users to replace and HEPA filter.



Advance:

Users can press “Advance” to the view of setup.



Key	Setting Option
	Press to open the FAN, then press again to close.
	Press to open the HEATER, then press again to close. Users also can see the current temperature.
	Press to open the LIGHT, then press again to close.
	Press to set up the day and date.
	Back to the homepage.
	The function is only open to the manufacturing engineers.
	The view shows versions of UI and Mainboard, and two version must be equivalent.
	Special magnetization option. Users must be affirmed by manufacturer, if users want to use this function.

How to Start:

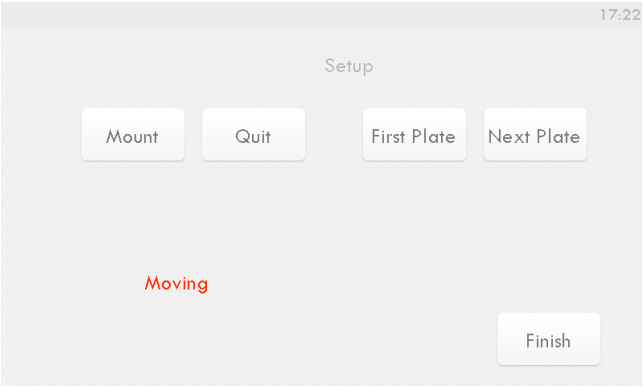
To Start the Instrument:

1. Load the plates and tip comb. After setting up the profile, user can set up plate. Press “Setup” to the view of setting up plate.

2. Load the plates in the order that the protocol requests. Place the A1 well of the plate so that it is in the upper right corner. The first A1 row is consequently always in the inner circle. Press “First Plate” to make the first plate station to loading plate position, and then place the first plate. Press “Next Plate” to load the others plate.

3. Combining the tip comb and the first deep well plate, and then press “Mount” to set up the tip comb, after the first plate returns to the loading plate position. The tip comb can be placed automatically onto a Nucle@i.

4. The instrument also functions with either one plate or up to eight plates depending on the amount of steps. Only one tip comb is placed onto the first plate station per run . Confirm the plate loading by pressing “Finish”.



5. Set up or choose the program. Ensure the front door closed, and then run the program.
Note: The program will be pause when the front door is open.

Shutdown:

1. Switch the Nucle@i off by pressing the power switch on the back panel of the instrument into the OFF position. It is recommended to shut down the instrument for the night and weekends.

   Warning: Remove any plates or tip combs still in the instrument. Dispose of all microplates and tip combs as biohazardous waste.

2. Wipe the platform surface and the adjacent instrument surface with a soft cloth or tissue paper moistened with distilled water, a mild detergent (SDS, sodium dodecyl sulfate) or soap solution.

3. If you have spilled infectious agents on the plateform, disinfect it with 70% ethanol or another disinfectant.

Emergency Situations:

If an abnormal situation occurs during operation, such as fluids spilling inside the instrument, follow the steps below:

1. Switch OFF the instrument.
2. Unplug the instrument immediately from the power supply.
3. Carry out appropriate corrective measures. However, do not disassemble the instrument.
4. If the corrective measures taken do not help, contact authorized technical service or your local manufacturing representative.

Maintenance

Regular and Preventive Maintenance:

- For reliable daily operation, keep the instrument free of dust and liquid spills.
- Do not use abrasive cleaning agents, because they are likely to damage the paint finish. It is recommended that you clean the case of the instrument periodically to maintain its good appearance. A soft cloth dampened with a warm, mild detergent solution will be sufficient.
- It is recommended that you clean the case of the instrument periodically to maintain its good appearance. A soft cloth dampened with a warm, mild detergent solution will be sufficient.
- Clean the outside surfaces of the instrument and the turntable with clean low-pressure compressed air or a cloth dampened with water or a mild detergent when necessary.
- Although the Nucle@i is constructed from high-quality materials, you must immediately wipe away spilled saline solutions, solvents, acids or alkaline solutions from outer surfaces to prevent damage.
  Caution: Painted surfaces can be cleaned with most laboratory detergents. Dilute the cleaning agent as recommended by the manufacturer. Do not expose the surfaces to concentrated acids or concentrated alcohols for prolonged periods of time as they may cause damage.
- Clean the display areas with a mild laboratory detergent. The keypad has a wipe-clean surface.
- Plastic covers and surfaces can be cleaned with a mild laboratory detergent or alcohol.
  Warning: If any surfaces are contaminated with biohazardous material, a mild sterilizing solution should be used.
  Caution: Do not autoclave any part of this instrument.

Cleaning the Plateform:

Keep the plateform surface clean to prevent dust and dirt from entering the instrument. Clean the turntable surface at least once a week using a soft cloth or tissue paper soaked in a mild detergent solution (SDS), soap solution or alcohol.

If you have spilled infectious agents on the turntable, clean it with a cloth dampened with water, mild bleach or a mild detergent.

Cleaning the Magnetic Rods:

If required, wipe the magnetic rods using a soft cloth or tissue paper soaked in a mild detergent solution (SDS), soap solution or alcohol.

Caution: The Nucle@i should not be kept close to magnetic tapes, computer discs or other magnetic storage systems, such as credit cards, as they can be damaged by the strong magnetic field of the Nucle@i heads. Do not hold the Nucle@i heads close to a PC display, since this may cause damage to the display. Do not use metal tools when handling Nucle@i heads. Be careful not to break the magnets while cleaning.

Warning: This product contains very strong permanent magnets. People wearing a pacemaker or metallic prostheses should not use this product. A pacemaker or prostheses may be affected or damaged if it comes in close contact with a strong magnetic field.

Disposal of Materials:

Follow laboratory and country-specific procedures for the disposal of biohazardous or radioactive waste. Refer to local regulations for the disposal of infectious material.

Warning: The samples can be potentially infectious. Dispose of all used disposable plates, strips and tip combs, disposable gloves, syringes, disposable tips, and so on as biohazardous waste.

Decontamination Procedure:

If you have spilled infectious agents, carry out the decontamination procedure.

Warning: The decontamination procedure should be performed by authorized trained personnel in a well-ventilated room wearing disposable gloves, protective glasses and clothing.

Perform decontamination in accordance with normal laboratory procedures. Any decontamination instructions provided with the reagents used should be followed.

It is strongly recommended to perform the complete decontamination procedure before relocating the instrument from one laboratory to another or before sending it to service.

Example of decontaminants:

- Ethanol 70%
- Virkon™ solution 1–3%
- Glutaraldehyde solution 4%
- Chloramine T
- Microcide SQ™ 1:64
- Decon™ 90 min. 4%

Warning: The decontamination procedure should be performed by authorized trained personnel wearing disposable gloves, protective glasses and clothing in a well-ventilated room.

1. Wear disposable gloves to protect yourself.
2. Prepare the decontaminant: 200 ml 4% glutaraldehyde solution (or another agent recommended by your safety officer).
3. Empty the turntable.
4. Switch OFF the power and disconnect the mains supply cable.
5. Disinfect the outside of the instrument using a cloth dampened with 70% ethanol.
6. Place the instrument in a large plastic bag. Ensure that the front lid is open.
7. Place a cloth soaked in the prepared solution into the bag. Ensure that the cloth does not come into contact with the instrument.
8. Seal the bag and leave the instrument in the bag for at least 24 hours.
9. Remove the instrument from the bag.
10. Clean the instrument using a mild detergent.
11. Remove any stains with 70% ethanol.
12. After performing this decontamination procedure, enclose a signed and dated Certificate of Decontamination inside the transport package and attached to the outside of the package.

Packing for Service:

To pack for service, follow the guidelines presented below.

Caution: It is important that the instrument is thoroughly decontaminated before it is removed from the laboratory or any servicing is performed on it.

When you ship the instrument for service, remember to:

- Inform about the use of hazardous materials.
- Decontaminate the instrument beforehand.
- Install the transport protected blocks.
- Pack the instrument according to the enclosed packing instructions.
- Use the original packaging to ensure that no damage will occur to the instrument during shipping. Any damage will incur additional labor charges.

Service Contracts:

It is recommended to maintain and service the instrument regularly every 12 months on a contract basis by the manufacturer's trained service engineers. This ensures that the product is properly maintained and gives trouble-free service. Contact the manufacturer technical service department for more details.

Disposal of the Instrument:

If the Nucle@i has to be disposed of, follow the guidelines below.

Warning: Decontaminate the instrument before disposal.

Follow laboratory and country-specific procedures for biohazardous or radioactive waste disposal. Dispose of the instrument according to the legislation stipulated by the local authorities concerning take-back of electronic equipment and waste. The procedures vary by country.

Pollution degree: 2
Method of disposal: Electronic waste
Contaminated waste
(Infectious waste)

Regarding the original packaging and packing materials, use the recycling operators known to you.

Technical Specifications

General Specifications:

General specifications	
Overall dimensions – instrument – transport package	 *ca.* 685 mm (W) x 600 mm (D) x 390 mm (H) 810 mm (W) x 760 mm (D) x 610 mm (H)
– transport package with Shovel plate Weight	720 mm (W) x 1170 mm (D) x 940 mm (H) 28.3" (W) x 40.1" (D) x 37.0" (H)
– instrument	*ca.* 25 kg [55 lbs.]
– transport package with Shovel plate	*ca.* 75 kg [165 lbs.]
Operating conditions (indoor use)	+5°C to +40°C; maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C Indoor use only
Transportation conditions	-40°C to +70°C, packed in transport packaging
Storage conditions	-25°C to +50°C, packed in transport packaging
Mains power supply	100–240 Vac, 50/60 Hz, nominal Automatic voltage detection
Power consumption	96 VA max.; 10 VA standby
Heat dissipation	328 BTU max.
Internal memory	Space for ca. 500 protocols
Protocol import	Using PC or USB memory device
Computer interface	USB
Robot compatibility	No
Normal use	10 runs/day, 250 days/year, with 40 min protocols having a medium speed setting, RT

Performance Specifications:

Performance specifications	
Processing volume	20–1000 µl (8 DW plate, 96-pin magnet head)
Capacity (samples per run) Up to	
Collection efficiency of the particles (indoor use)	≥ 95%, Microtiter deep well 96 plate, neutral wash buffer containing detergent, 2.8 µm particles, 3 collections, RT
Magnetic particle size	*ca.* > 1 µm
Magnet rods	96 , irreplace the Nucle@i head
Plates per deck	8
Plate types (disposable)	Microtiter deep well 96 plate (20–1000 µl*)
Tip combs (polypropylene – disposable)	one frame for eight Microtiter deep well 96 plate
Heating temperature - Heating block	From +10°C to 75°C, instrument in RT
Heating block accuracy	± 1°C, up to +75°C, instrument in RT
Keypad / Display	LCD 5" 480 x 800 pixel color display

Safety Specifications:

This section describes the safety specifications for the Nucle@i instrument.

Nucle@i the following markings:
+15 VDC / 6 A
CE mark

Nucle@i conforms to the following requirements:
2006/95/EC (Low Voltage Directive)
2004/108/EC (Electromagnetic Compatibility Directive, EMC)
FCC Part 15, Subpart B/Class B (July 2004)
2012/19/EC (Waste of Electrical and Electronic Equipment)
2006/42/EC (Machinery Directive)

The safety specifications are also met under the following environmental conditions in addition to or in excess of those stated in the operating conditions:	
Altitude	Up to 2000 m
Temperature	+5°C to +40°C
Humidity	Maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C
Mains supply fluctuations	± 10% from nominal
Installation category (overvoltage category)	II according to IEC 60664-1 (see **Note** 1)
Pollution degree	2 according to IEC 60664-1 (see **Note** 2)

Note:

1) The installation category (overvoltage category) defines the level of transient overvoltage which the instrument is designed to withstand safely. It depends on the nature of the electricity supply and its overvoltage protection means. For example, in CAT II which is the category used for instruments in installations supplied from a supply comparable to public mains, such as hospital and research laboratories and most industrial laboratories, the expected transient overvoltage is 2500 V for a 230 V supply and 1500 V for a 120 V supply.

2) The pollution degree describes the amount of conductive pollution present in the operating environment. Pollution degree 2 assumes that normally only nonconductive pollution, such as dust, occurs with the exception of occasional conductivity caused by condensation.

Ordering Information:

Cat#	Item	Size
VT9100	COVID-19 Viral RNA Extraction Kit (MagicMag Magnetic Beads)	100 preps 1000 preps
COVID19MKIT	The Complete COVID-19 Extraction and Detection Kit (magnetic beads)	100 Rxns
MAD-01	96-well magnetic separation device (for Magnetic Beads)	1 UNIT
MAD-02	Micro-centrifuge magnetic separation device (for Magnetic Beads)	1 UNIT
Z006670-0001	96-well, 2ml Deep Well Plate for magnetic separation device	1 UNIT
Z007770-0001	2 96-well, 2ml Deep Well Plate, Sterile, DNase/Rnase Free, used for NA-01/NA-02	2 UNIT
Z007771-0001	2 96-well, Elution Plate, Sterile , DNase/Rnase Free, used for NA-01/NA-02	2 UNIT
Z007772-0001	2 96-well disposable tips, Sterile, DNase/Rnase Free, used for NA-01/NA-02	2 UNIT

