Bioanalysis

MACHEREY-NAGEL

Nucleic acid purification system NucleoMag® X32



Operation manual

Contents

1. Safety warnings and guidelines 4
   1.1 Symbols explanation 5
   1.2 Important information for safe use 5
   1.3 Security 6
   1.4 Maintenance 9
   1.5 Transportation, storage, and installation requirements 9
   1.6 Warranty and liability 10
   1.7 CE marking 11
2. Introduction 12
   2.1 Application 12
   2.2 Features 13
   2.3 Service life 13
   2.4 Labels on the device and the box 14
3. Technical specifications 15
   3.1 Outline dimension 15
4. Basic operation instructions 16
   4.1 Structure 16
   4.2 Installation 18
   4.3 Kits installation 20
   4.4 Magnetic rod's tip installation 21
   4.5 Removing magnetic rod's tip 22
5. Operations 23
   5.1 Start-up interface and admin login password data 23
   5.2 Protocol run 23
   5.3 Protocol management 26
   5.4 General settings 30
6. Trouble shooting 36
   6.1 Trouble shootings 36
   6.2 Software error alarm list 36
7. Packing list 38
8. Acronyms 39
9. Manufacturer information 40

Thank you for purchasing the NucleoMag® X32 nucleic acid purification system. This manual describes the function and operation of the instrument. In order to use the instrument properly, please read this manual carefully before using. Keep this user manual for later use.

Opening check

Please check the Instrument and accessories according to the packing list when you first open the packing case. If anything wrong or missing, please contact the distributor or the manufacturer immediately.

Please keep the box and packaging material for this instrument. If service is required, the box will be needed to ship the instrument to the Service Department.

Read this manual carefully prior to operation.

1. Safety warnings and guidelines

The following symbols and markings appear in this user manual, on the NucleoMag® X32 device, and on the electronic type label of the instrument.

⚠ DANGER

Indicates an imminent or potential hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

Indicates an imminent or potentially hazardous situation which, if not avoided, could result in death, serious injury or damage of the equipment.

⚠ CAUTION

Indicates a potentially hazardous situation, which if not avoided, may result in minor or moderate injury. Indicates risk of injury to the user, risk of damage to the instrument and other equipment or loss of function of performance.

NOTICE

Marks a hint or important information that is important for optimal operation of the NucleoMag® X32 system. Information that clarifies the test and require special attention.

1.1 Symbols explanation

	**Electronic waste** This product is electronic waste and should not be disposed of with regular household trash. Please recycle or dispose of electronic waste properly to protect the environment and conserve resources
	Manufacturer
	Distributor
	Importer
	**CE marking** for European Conformity.
I / O	Power ON / Power OFF
	Risk of electric shock
	Biohazard risk.
	Hot surface, risk of burns.
	Optical radiation
	Caution
	Serial number of the device
	Identification USB interface

1.2 Important information for safe use

Users should have a clear understanding of how to use this instrument before operation. Please read this manual carefully prior to operation.

⚠ WARNING

Any improper operation may cause injuries or electric shock.
Please read the manual carefully and operate safely according to the guidelines.

⚠ CAUTION

This instrument is designed for use in a laboratory environment. The device must be operated by skilled laboratory personnel with appropriate training.
For scientific purposes only. Not applicable for clinical testing!

1.3 Security

The operation, maintenance and repair of the instrument should comply with the basic guidelines and warnings below. Incorrect operation or maintenance will have effect on using life, performance, and safety features of the instrument.

NOTICE

The instrument is a normal indoor instrument which conforms to class I of GB 4793.1 standard.

NOTICE

Please read this manual and safety instructions carefully before operation. The device must be used by experienced personnel with appropriate training. Improper use may cause personal injuries or damage to the instrument. Follow standard safety requirements prevailing in the user's country.

⚠ CAUTION

The operator should not repair the instrument to avoid any injury or out of warranty. If service is required, please contact our company or your local distributor for repair. Instrument servicing must only be performed by authorized specialists.

⚠ CAUTION

Before powering on, please make sure the voltage of the power supply is consistent with the required voltage. Never switch on the device before removing the transport locks. Make sure the rated load of the power outlet is not less than required by the instrument. If the power cord is damaged, replace it with the same type and specification power cord. Do not cover anything on the cord when using. Do not place the cord where people are moving. Hold the plug part when inserting and unplugging the power cord gently and make sure the plug completely inserts to the jack.

⚠ WARNING

⚠ The temperature of the heating block surfaces might be hot, please do not touch it during the operation! Contact may cause burns.

NOTICE

The instrument should be kept in an area with low humidity, minimal dust, away from wet areas and direct sunlight. The room should be well-ventilated, no corrosive gas or strong magnetic field interference, away from heating, furnaces and other heat sources.
The vents on this instrument are designed for ventilation. Do not cover them to avoid overheating. To ensure proper ventilation, ensure airflow around and under the unit. When many instruments are used at the same time, the distance between each instrument should be more than 10 cm.

NOTICE

Power off when not in use. If the instrument will not be used for a long period of time, cover it with a cloth or plastic to protect it from dust after it has cooled to room temperature.

⚠ CAUTION

In the following cases, immediately disconnect the power cord from the socket and contact your local distributor or professional maintenance personnel:

- Liquid enters into the instrument.
- Instrument was rained or watered.
- Abnormal operation: such as abnormal sound or smell.
- Instrument dropping or outer shell damaged.
- The function has obviously changed.

⚠ CAUTION

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.
Do not use or place the NucleoMag® X32 in close proximity of sources of strong electromagnetic radiation to avoid interference with proper operation.
The NucleoMag® X32 fulfils the emissions and immunity requirements in EN61326.

⚠ DANGER

⚠ Risk of electric shock. Make sure that the power cord or other components of the device are not damaged. Check the suitability of the power source for the equipment. To service, shut off the equipment and disconnect the power. Never operate the instrument from a power outlet that has no ground connection.

NOTICE



This product is electronic waste and should not be disposed of with regular household trash. Please recycle or dispose of electronic waste properly to protect the environment and conserve resources.

⚠ WARNING

The NucleoMag® X32 weighs approximately 30 kg 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. Apply appropriate lifting methods.

DANGER

Potentially lethal voltages inside the NucleoMag® X32. Do not open the housing of the NucleoMag® X32 device. The housing protects operators and ensures proper operation of the unit. Removing the housing will lead to malfunction of the unit. Do not work on internal parts of the unit. Non-compliance will invalidate any warranty claim.
Do not touch live components with wet hands! Only use the instrument within specified power conditions. Ensure that power outlet has a protective conductor (earth/ground).

DANGER

 Biohazard risk.
Biological samples processed with the NucleoMag® X32 can be potentially infectious. Dispose all used plates, disposable gloves, syringes, disposable tips, and other consumables as biohazardous waste. Follow laboratory and country-specific procedures for the disposal of biohazardous or radioactive waste. Refer to local regulations for the disposal of infectious material. Decontamination should be performed in accordance with normal laboratory procedures. Any decontamination instructions provided with the reagents used should be followed.

DANGER

 Hazardous chemicals!
Some chemicals used in extraction kits may be hazardous. For detailed information, please read the safety data sheet of the corresponding extraction kit. We strongly recommend always wearing personal protection such as googles, gloves and a lab coat. Avoid spilling chemicals onto or into the NucleoMag® X32.

DANGER

 UV sterilization lamp
The instrument has a UV sterilization device inside. Please follow safety precautions when using the UV lamp.
When the UV lamp is lit, do not look directly with the naked eye, do not let the ultraviolet radiation directly on the skin. Always keep the door closed when using the UV-light. Do not use UV irradiation when the door or glass of the door is damaged.

WARNING

High speed movable parts
The device is equipped with parts moving at high speed. If mechanical injuries occur or the device gets out of control, immediately press the power switch on the back of the device in time to cut off the power supply and contact the manufacturer for further instructions.

1.4 Maintenance

Use internal UV lamp to initiate the sterilization process when decontamination is needed.

The instrument should be cleaned regularly. Switch off the NucleoMag® X32 instrument by moving the power switch of the chassis into the off position (“0”) and removing the power plug. Remove all consumables and sample materials. If any stain on the surface of the instrument, wipe it with soft cloth damp with cleansing cream. Clean the entire interior and exterior surfaces of the instrument with a cloth dampened in warm, mild detergent solution (e.g. sodium dodecyl sulfate), alcohol, or soap solution. Do not use cleaning agents containing alcohol to clean the instrument door. If any surfaces are contaminated with biohazardous material, a mild sterilizing solution should be used. Please follow local decontamination regulations and only use approved disinfectants.

⚠ CAUTION

When cleaning, be careful not to touch or break the magnetic rods to avoid damaging the instrument.

⚠ CAUTION

Do not use flammable detergents or solvents to clean the unit. Do not spray solutions directly into the device. Do not use bleach, concentrated acids, alkaline solutions, or concentrated alcohols!

⚠ CAUTION

Refrain from using alcohol such as methyl, ethyl, isopropanol, or acetone when cleaning the acrylic instrument door glass. Cleaning in this manner will lead to microfractures and cloudiness of the instrument door!

For further assistance or information regarding the maintenance of the instrument, please contact the manufacturer or distributor.

1.5 Transportation, storage, and installation requirements

Ambient temperature: -20 °C – 55 °C

Relative humidity: ≤ 70 % at room temperature (15 – 25 °C)

Altitude / atmosphere pressure range: Up to 2000 m / 500 – 1060 hpa

Pollution degree: 2 according to IEC 60665-1

Locate it in a well-ventilated room and away from corrosive gas, explosive atmosphere, direct UV light atmosphere, dust, conductive pollution, and large temperature fluctuations. The NucleoMag® X32 is for indoor use only.

⚠ CAUTION

Do not stack the device!

If the device must be moved or transported, please observe the following measures to ensure safe transport.

- Carry out cleaning and decontamination of the device and as described below. Include a decontamination certificate when shipping the instrument to your distributor.
- Each instrument must be returned with a completed and signed decontamination form. No instrument, under any circumstance, can be accepted if it is found to be a biological, toxic, or radioactive hazard.
- The NucleoMag® X32 is delivered with transport locks. Refit the transport locks to secure the magnetic rod holder and the tip comb holder. Make sure that all moving parts are securely locked. Never ship any items with unsecured material inside.
- Close the chamber door and fix it with suitable adhesive tape.
- Carefully place the instrument upside up back; always use the original packaging material with foam inserts that was used for delivery.

1.6 Warranty and liability

The NucleoMag® X32 device is guaranteed to be completely functional without defective parts or materials. The warranty for this device is 24 months from date of purchase. Warranty is limited to the repair of defective parts or – at our discretion – the delivery of a faultless replacement unit. The warranty period of 24 months shall not be affected by any warranty claim. There is no right of withdrawal. Further claims are excluded. These include in particular all claims for damages resulting from consequential or indirect damage. In addition, our general terms and conditions of sale and delivery apply in the currently valid version that can be accessed online.

The original invoice serves as proof and must be presented when making a claim. In case of improper handling and / or maintenance of the device, the warranty expires. It does not cover defects that are due to a power supply other than the external power supply included in the delivery. For the warranty to be effective, the product must have been purchased either directly from MACHEREY-NAGEL or from authorized distributors. We're not liable for any damages whatsoever arising out of the use or inability to use this product.

We reserve the right to change the products or services at any time without prior notices as part of continuous incorporate technological developments. Although this manual has been prepared with every precaution to ensure accuracy, we assume no liability for any errors or omissions, nor for any damages resulting from the application or use of this information.

Consumables are not included in the warranty.

1.7 CE marking

CE

The CE marking declares that the product complies with the following European Community harmonisation legislation:

- European Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS 2)
- European Directive 2012/19/EU on waste electrical and electronic equipment (WEEE)
- European Directive 2014/30/EU on the harmonization of the laws of the member states relating to electromagnetic compatibility (EMC)
- European Directive 2014/35/EU of electrical equipment designed for use with certain voltage limits (LVD)
- BS EN 61010-1:2010+A1:2019
- BS EN 61010-2-010:2014
- BS EN 61010-2-081:2015
- EN 61010-1:2010+A1:2019
- EN IEC 61010-2-010:2020
- EN IEC 61010-2-081:2020
- EN IEC 61326-1:2013
- EN 55011:2016+A1:2017

2. Introduction

The NucleoMag® X32 is an automated platform for magnetic bead-based DNA/RNA extraction with a minimal benchtop footprint. Capable of processing up to 32 samples at one time, the stand-alone instrument is easy to set up, program, and operate. Mixing, magnetic bead transfer, washing, and elution steps are performed automatically, saving valuable hands-on time.

2.1 Application

This instrument is suitable for the extraction and purification of nucleic acids (DNA/RNA) from biological specimens such as animals, human or plant tissue, FFPE samples, blood and body fluid samples, food and feed samples, water, feces, forensic, or soil samples.

Verified scripts and protocols for MACHEREY-NAGEL's magnetic bead-based DNA/RNA extraction kits are included in the scope of delivery. These protocols have been developed and biologically verified by MACHEREY-NAGEL's automation specialists, ensuring an easy and worry-free implementation of this automation solution in your lab. For further information about the protocols, please contact MACHEREY-NAGEL or its local distributor:

MACHEREY-NAGEL Customer Service Center
E-Mail: support@mn-net.com
Tel.: +49 24 21 969-333

The instrument is not intended for *in-vitro* diagnostic use.

2.2 Features

Besides efficient and reliable nucleic acid purification, the NucleoMag® X32 automation device has several features that allow easy, intuitive and safe operation of the device:

- **7-inch color touch screen**: The touchscreen control panel of the NucleoMag® X32 allows for quick selection of stored protocols and instrument control
- **Open software system**: The NucleoMag® X32 is an open platform allowing the modification of any protocol parameters (e.g. volume, temperature, mixing and magnetic separation conditions)
- **Heating and cooling function**: Realizes lysis heating and elution heating.
- **Automation benefits**: Automating repetitive work processes can positively influence your work in many ways. Benefit from consistent, on-time output, reproducibility, standardization, and increased hands-off time!
- **Minimal footprint**: At just 417 × 410 × 426 mm, the NucleoMag® X32 has a minimal footprint and fits on almost any lab bench.
- **Self-sterilization**: An ultraviolet sterilization lamp (UVC) inside the processing chamber provides effective elimination of most bacterial, viral and stray genomic DNA contaminants. This additional safeguard reduces the possibility of contamination and downstream amplification of unwanted targets.
- **Stability running**: Low noise during working and with no vibration.
- **Safe and reliable:** Full automatic nucleic acid extraction processing with disposable consumables which increases hands-off time and minimizes interaction with potentially hazardous reagents
- **Fast extraction**: Process up to 32 samples within 20 to 60 min (processing time depends on type of extraction reagent and the complexity of the program)
- **High quality consumable:** qualified materials and processes which guarantee high yield and low loss of magnetic beads.

2.3 Service life

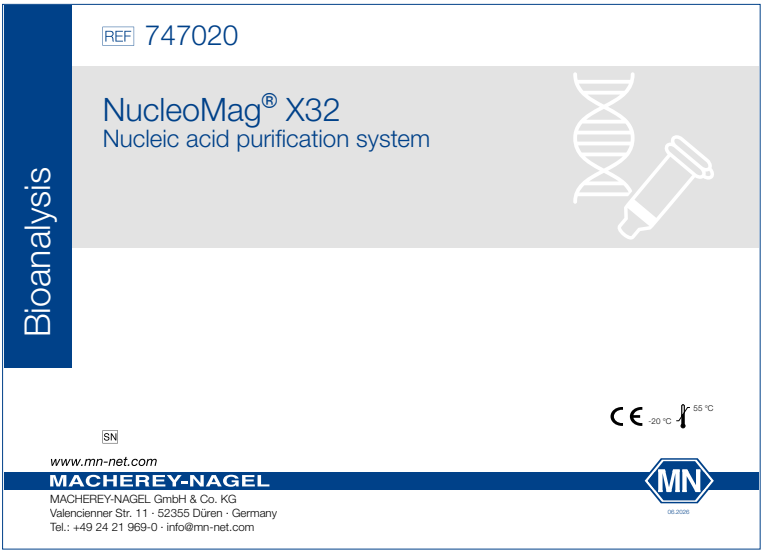
Service life of the instrument is five years.

For production date, please see the label on back of the instrument

2.4 Labels on the device and the box



Pic 1: Exemplary type plate label



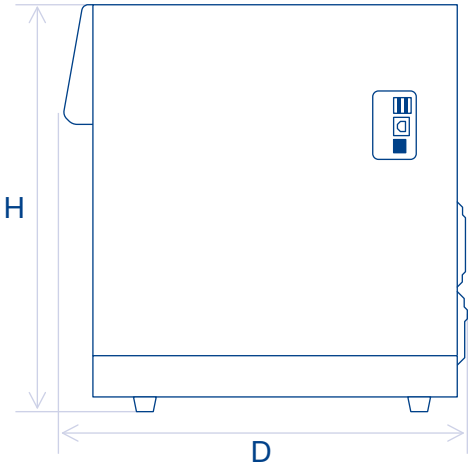
Pic 2: Exemplary carton label

3. Technical specifications

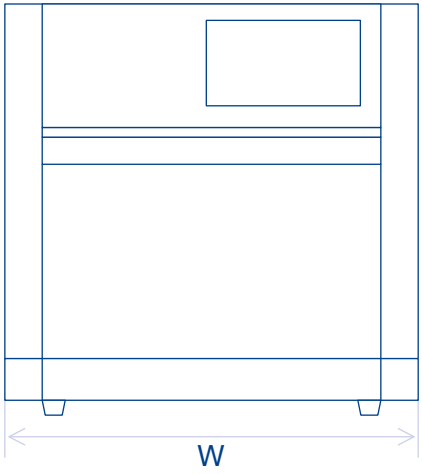
Environmental temperature	10 °C – 35 °C
Transportation temperature	-20 °C – 55 °C
Relative humidity	≤ 70 %
Model	NucleoMag® X32
Principle	Magnetic particle method
Throughput	1 to 32 samples
Processing volume	50 – 1000 µL
Lysis temperature	Ambient temperature, 37 °C – 120 °C
Elution temperature	Ambient temperature, 37 °C – 120 °C
Heating time	Ambient temperature, 37 °C – 120 °C ≤ 4 minutes
Cooling time	100 °C to 40 °C in ≤ 4 minutes
Temp. Accuracy	≤ ± 0.5 °C
Temperature uniformity	At 100 °C, ± 3 °C
Shaking	1 – 10 gears can be set
Operation	7 inch touch screen
Internal protocols	Store up to 500 protocols
Instrument port	2 USB (two A type), 1 USB (B type), 1 LAN port
Contamination control	Internal UV lamp, purification filter system
Input Voltage	AC100 – 240V, 50Hz/60Hz, 350W
Dimensions (W×D×H)	417 mm×410 mm×426 mm
Weight	30 kg

3.1 Outline dimension

Side view



Front view



Outline dimension (W×D×H)

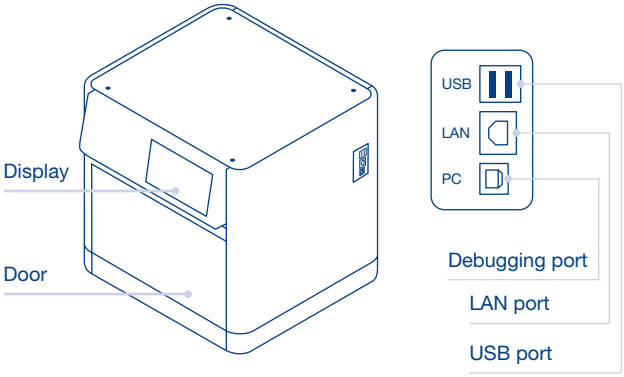
NucleoMag® X32: 417 mm × 410 mm × 426 mm

4. Basic operation instructions

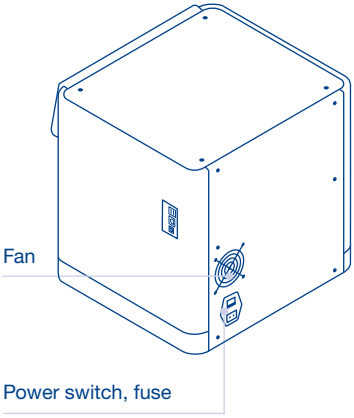
This chapter mainly introduces structures, as well as preparations before starting up. Please read this chapter carefully before using.

4.1 Structure

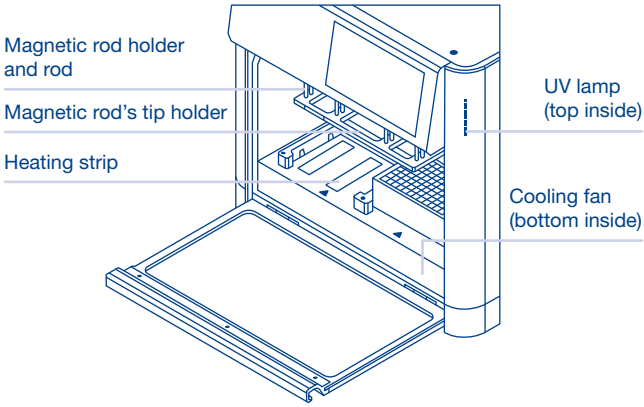
4.1.1 Front



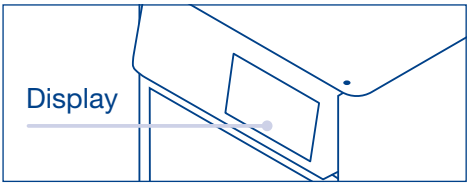
4.1.2 Back



4.1.3 Test area



4.1.4 Operation panel

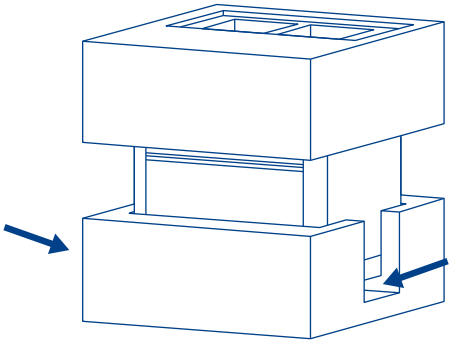


Display: 7 inch touch screen user interface.

4.2 Installation

4.2.1 Taking out the instrument

Take the instrument out of the packing case, and carry it at the lower left and right sides. Two persons are recommended to carry it. Remove the tape from the edge of the cabin door and open it. Keep original packaging.



4.2.2 Removing the transport lock

⚠ CAUTION

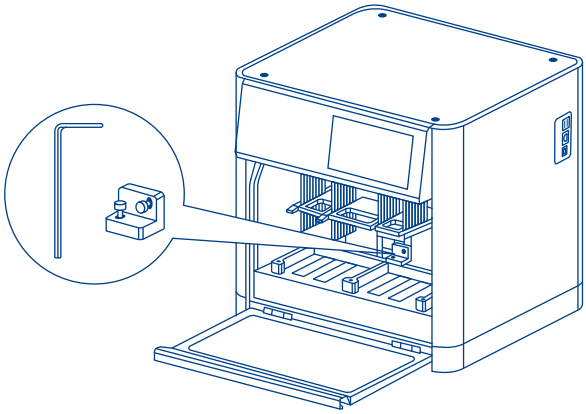
Do NOT power the instrument on prior to removing the transport lock.

⚠ CAUTION

In the process of dismantling, please be careful not to collide with magnetic rods, otherwise it will damage the magnetic rod!

Remove the instrument from the packing case. Place the instrument on a clean level surface. We recommend moving the instrument by two people, taking proper precautions to avoid injury. Installation site should be free of strong magnetic fields, direct UV light, moisture, or dust. Remove the tape around the cabin door, open the door.

Remove the two loose screws with an Allen wrench (3 mm) as shown in the figure below and remove the red transport fixing block to release the moving parts.



Store the transport lock in a safe location. Only move or transport the NucleoMag® X32 device with installed transport lock.

4.2.3 Refitting the transport lock

⚠ CAUTION

In the process of refitting the transport lock, please be careful not to collide with magnetic rods, otherwise it will damage the magnetic rod!

⚠ CAUTION

Always ensure to refit the transport locks before moving or transporting the NucleoMag® X32 instrument. Do NOT re-power the instrument prior removing the transport lock.

In order to move or transport the NucleoMag® X32 device, please always ensure to refit the transport lock to avoid any damage to the moveable parts of the instrument.

To refit the transport lock of the magnetic rods, follow these steps:

1) Remove all consumables (tip combs and 96-deep-well plates) from the instrument.
2) Click “Settings” in the operation menu and select “Instrument”.
3) Click “Cali.Zero” and select “Release”.
4) The magnetic rod arm is now released from the electrical lock and can be moved freely. Move the arm carefully into the position that allows inserting the transport lock screws.
5) Insert the transport lock holder and screws into their respective position (see above) and carefully tighten the screws.
6) Switch off the instrument using the main power switch positioned on the bottom left of the back side of the NucleoMag® X32 device. The device is switched off when the main power switch is in position “0”.
7) Unplug the instrument.

4.2.4 Power connection

⚠ WARNING

Do NOT power the instrument on prior to removing the transport lock.

⚠ CAUTION

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 connect from ungrounded power sockets.

Ensure that the power switch is set to position “0” before connecting the power supply cables. Connect one end of power supply cable to the instrument socket and the other to power (AC100 – 240V), then turn on the power switch (position “I”).

The main power switch is positioned on the bottom left of the back side of the NucleoMag® X32 device. Never operate your instrument from a power outlet that has no ground connection. Always switch off and unplug the instrument after usage, for transportation, in case of emergencies occurring during operation, before servicing or cleaning.



Position “I”: Power ON

Position “0”: Power OFF

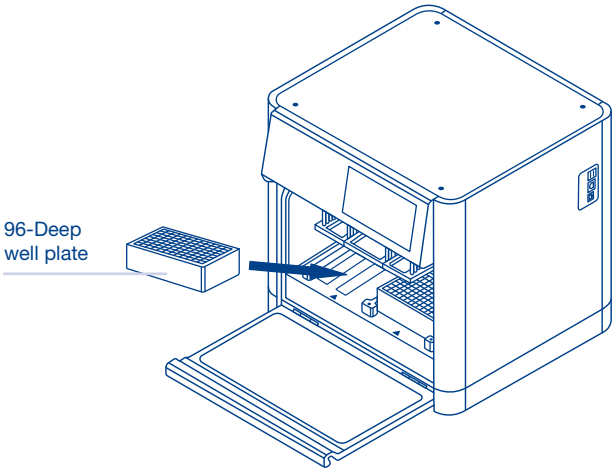
4.3 Kits installation

Prepare the samples and plates according to the protocol information for the corresponding purification kit. Open the cabin door and place the 96-deep-well plate with the sample in the locating slot according to the arrow as shown in the figure below. To avoid the wrong sequence of reagents, pay attention to the orientation of the 96-deep well plate; Well position A1 should be on the upper left side.

Use only suitable 96 deep-well plates approved for the NucleoMag® X32. The 96 deep-well plates are single use items. After use, dispose deep-well plates as biohazardous waste according to local regulations.

NOTICE

Use only suitable 96 deep-well plates approved for the NucleoMag® X32.



4.4 Magnetic rod's tip installation

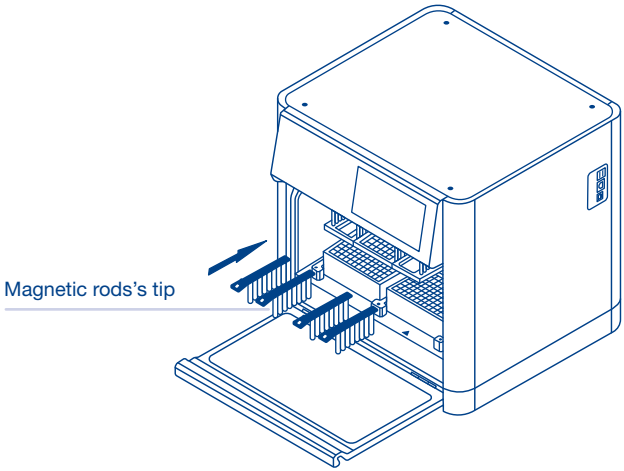
Insert the magnetic rod's tip completely on the mounting groove according to the arrow. The needed quantity depends on the amount of samples used for extraction and the kit setup. Ensure the tip combs are fully inserted as it may damage the magnetic rods if installation is incorrect. Never operate the NucleoMag® X32 without the magnetic rods being covered with the tip combs.

The tip combs are single use items. After use, dispose tip combs as biohazardous waste according to local regulations.

After the 96 deep-well plates and tip combs are in inserted correctly, close the door.

NOTICE

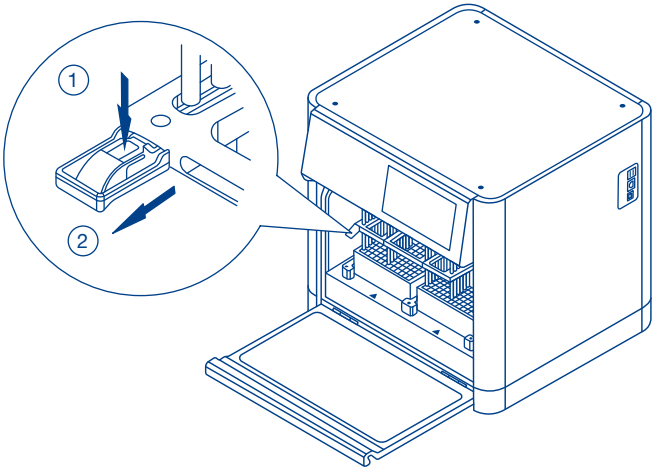
Use only suitable tip combs approved for the NucleoMag® X32.



4.5 Removing magnetic rod's tip

After you have finished a program run, first remove the tip combs, then remove the 96 deep-well plates from the NucleoMag® X32 device.

Press the button on the magnetic rod's tip according to arrow ① , meanwhile, pull out it along the direction of the arrow ②.



5. Operations

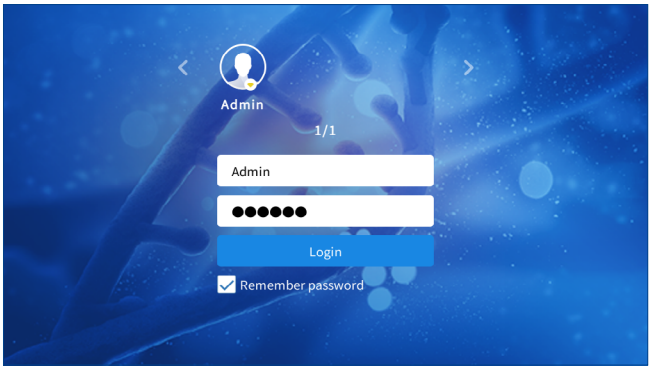
5.1 Start-up interface and admin login password data

Turn on the instrument and screen will display the start-up interface, after self-checking complete, below login interface is displayed, enter your account and password to log in.

The default user login credentials are the following:

User: Admin

Password: 123456



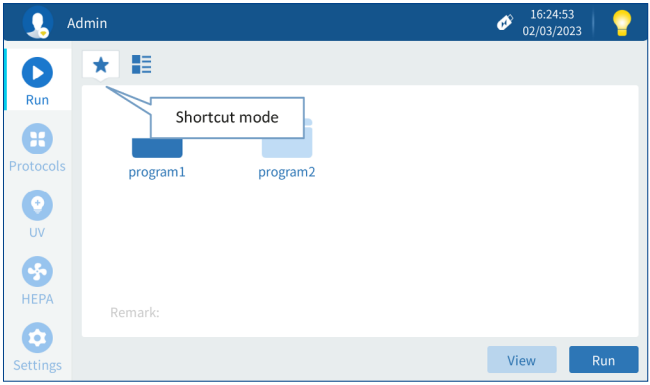
5.2 Protocol run

5.2.1 Shortcut mode

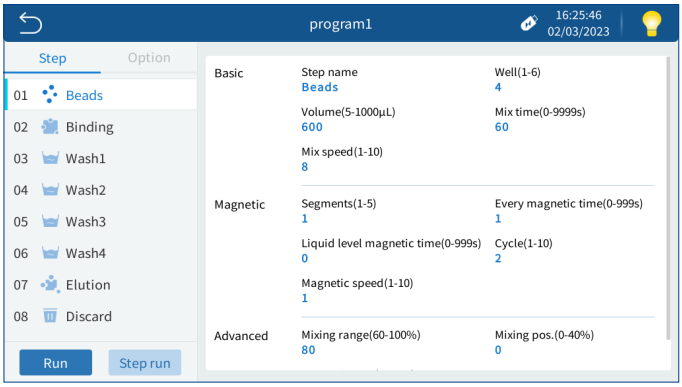
After successful login, the shortcut mode screen is displayed, or it can manually switch to the list mode screen.

NOTICE

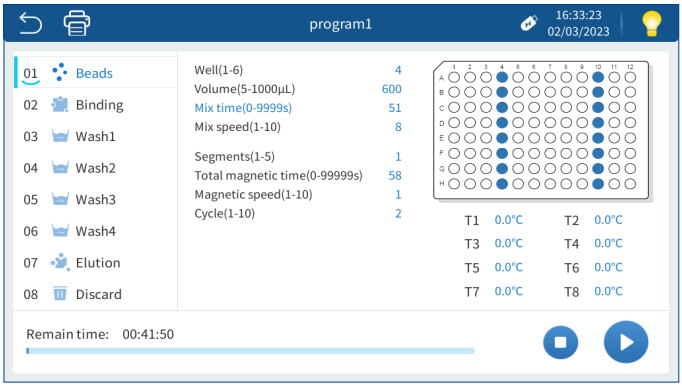
A maximum of 8 protocols can be displayed in shortcut mode.



Under the shortcut mode, select the protocol needed and click “View”. This will open the protocol view interface displaying information of protocol parameters of the individual steps. Clicking “Run” will run the protocol; clicking “Step run” will start the protocol from the selected step.



Clicking “Run” will select protocol under shortcut mode interface and run the protocol.



Left side displays information about the current running step. When the protocol runs to a certain well, the well corresponding to the figure on the right is highlighted. The current temperature value is displayed below for the wells with heating or cooling function. The process bar below shows the remaining time of the protocol.

Click “Pause/Continue” to interrupt and continue the operation of the protocol.

Clicking “Stop” pauses the protocol. In the pop-up menu you can either choose “Cancel” to continue the run, or “Confirm” to cancel the protocol run. After clicking “Confirm”, the protocol runs back to original position. After canceling a protocol run, you can run the same protocol again by clicking “Run again” or chose “Back” to return to the upper-level menu.

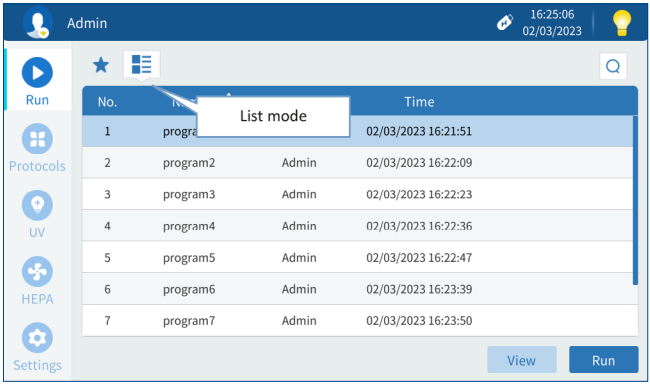
NOTICE

If the cabin door is opened during the operation of the protocol, the operation will be paused and a prompt „Please close the door“ will pop up. After the instrument cabin door is closed again, the instrument will continue to operate.

NOTICE

We recommend to ensure the NucleoMag® X32 operates properly before starting a sample extraction procedure. We recommend to perform a test run using a protocol with plastics but without reagents to verify proper instrument operation before using real samples.

5.2.2 List mode



Click on the top left: The protocol running list mode window is displayed.

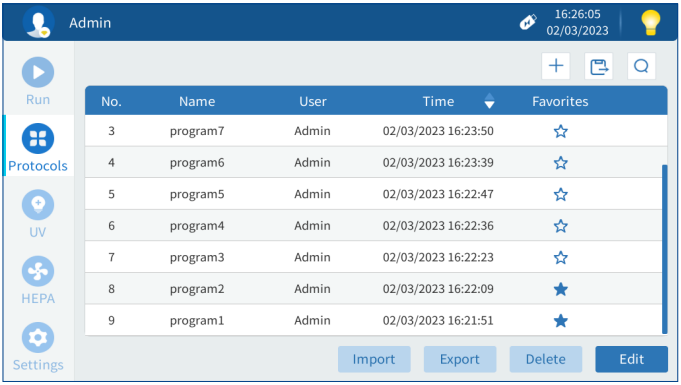
All protocols are displayed in list mode. To search for a protocol in the list, move the scroll bar on the right, or click top right corner to search. View and run functions are the same as with the shortcut mode interface.

NOTICE

Protocols for MACHEREY-NAGEL's magnetic bead-based NucleoMag® DNA/RNA extraction kits are preinstalled on the device or can be requested directly from MACHEREY-NAGEL or it's distributors. Detailed protocol information with description of procedure steps, loading schemes, and required consumables are available for all MACHEREY-NAGEL scripts.

5.3 Protocol management

Click “Protocol” to enter protocol management.

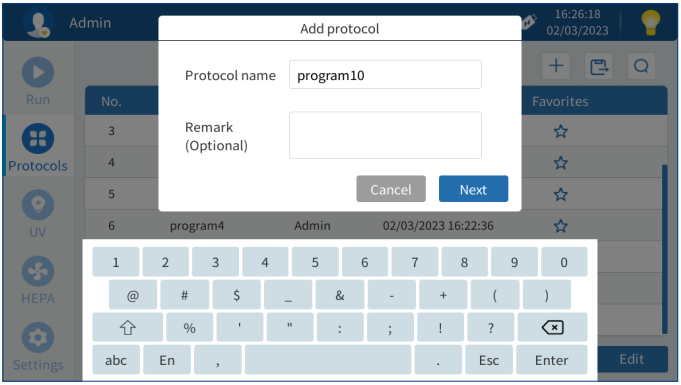


5.3.1 Shortcut operation

Click ☆ of the corresponding protocol under Favorites column. ★ in dark color means that the protocol will appear in the shortcuts list. ☆ in light color means that this protocol is not listed in the shortcuts list.

5.3.2 New protocol

Click + under the “Protocol” interface to create a new protocol. Enter a protocol name in the first step. Please ensure that the protocol name is unique to the system.



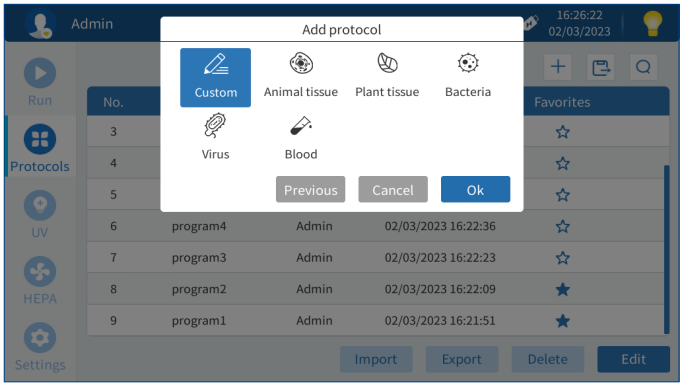
In the second step, a type of default protocol settings can be selected (a total of 6 default types can be chosen: custom, animal tissue, plant tissue, bacteria, virus, and blood). The custom protocols are blank protocols for further modifications/adaptions. The other five categories are default protocols that contain specified step parameters. Select the protocol type as shown below.

NOTICE

We recommend to use the protocols preinstalled on the NucleoMag® X32 device when working with MACHEREY-NAGEL’s NucleoMag® kits.

NOTICE

Common users have no permission to add programs.



5.3.3 Editing protocols

Edit protocols as shown in the figure below. Click + to add protocol steps, click 🗑 to delete protocol steps, click ↓ or ↑ to adjust the sequence of protocol steps. Set the following parameters and options based on site requirements (please see tables below for details).

Basic: Including step name, well, volume, mix time, mix speed, temperature setting.

Magnetic: Including segment, every magnetic time, liquid level magnetic time, cycle, magnetic speed.

Advanced: Including mixing range, mixing position, magnetic position.

Options: Including heating, cooling and drying options.

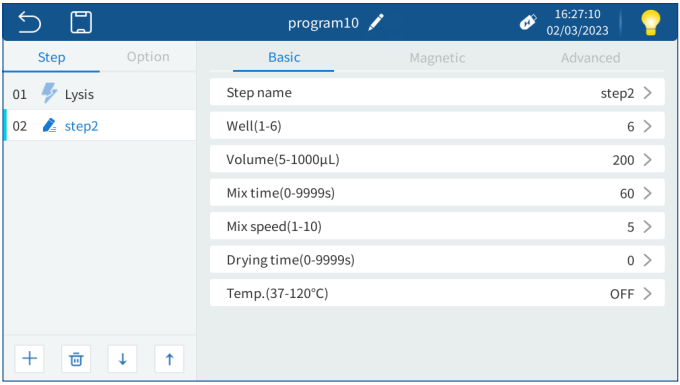
After all settings are defined, click top left 💾, Save the currently edited protocol.

NOTICE

Common users have no protocol editing permission.

NOTICE

Parameters can be adjusted for “Basic”, “Magnetic”, and “Advanced” settings (please see tables below for details).



NOTICE

In the “General” parameter settings interface, the temperature can only be adjusted if position 1/7 or 6/12 is selected; these are the locations of the heating block and typically correspond to lysis and elution steps. Therefore, when other wells are selected, there is no „temperature“ parameter in the general parameters of the corresponding steps.

The functions of each icon shown in the protocol edit interface are described in the table below. Click + to add a new protocol step. Select from the pop-up interface whether you want to insert a preset step or custom parameters.

Icon	Function
	Save the currently edited protocol
+	Add step
	Delete selected step
↓	Scroll down the selected step
↑	Move the selected step up

5.3.4 Parameter settings legend

Basic parameter settings	Definition
Step name	Defines the name of the step. Default steps cannot be renamed.
Well (1 – 6)	Defines the position within the plate. The well corresponds to columns of the plate (well 1 = column 1).
Volume	Defines the total volume of the corresponding position (5 – 1000 µL). All mixing and collection steps are automatically set relative to the volume.

Basic parameter settings	Definition
Mix time	Defines the mixing time (0 – 9999 sec).
Mix speed	Defines the mixing speed between a range of 1 – 10.
Temperature	Defines the temperature of the heating strip in the range of 37 – 120 °C. Can be only defined for well 1 or 6. Default temperature setting is “Off”.
Drying time	Determines drying time in the range 0 – 9999 sec. Can be only defined for wells 2 to 5.
Magnetic parameter settings	Definition
Segments	Subdivides the total volumes in equal segments (1 – 5). E.g. a larger number of segments maximizes the collection of magnetic beads to the magnetic rods.
Every magnetic time	Defines the magnetic time (0 – 999 sec) for each individual segment.
Liquid level magnetic time	Defines the magnetic time (0 – 999 sec) at the liquid level after bead collection when magnetic rods & tip combs are above the liquid surface level to prevent loss of beads due to breaking the surface tension.
Cycle	Number of repetitions (1 – 10) of the of defined magnetic parameters.
Magnetic speed	Defines the movement speed (1 – 10) of the bead collection cycles via the magnetic rods through the liquid.
Advanced parameter settings	Definition
Mixing range	Defines the mixing range (60 – 100 %) from the bottom to the top in respect to the total liquid volume of the well. The recommended default setting is 80 %.It defines the amplitude or top position during mixing.
Mixing pos.	Defines the starting position (0 – 40 %) of the mixing from the bottom to the top in respect to the total liquid volume of the well. The default setting is 0 %.It defines the lowest position during mixing, a 10 % bottom tolerance is recommended.
Magnetic pos.	Defines the magnet start position (0 – 40 %) in respect to the bottom of the plate. The default setting is 0 %.It defines the lowest position for bead collection.

5.3.5 Option Settings

	Option	Definition
Heating setup	Heating type	Defines the heating type (Heating sync or preheating)
	Elution with heating in advance	Preheats the defined wells
	Elution well heating advanced steps (1 – 5)	Defines the step of initiation of preheating for the elution.

	Option	Definition
Cooling setup	Cooling fan	Activates the cooling fan. The default setting is off.
	Cooling type	Defines cooling type (Cooling sync or the precooling)
Drying setup	Drying fan	Activates a fan during the dyring step. The default setting is off.
	Air drying Pos.	After bead collection, the tip combs will pause at a specified position above the liquid surface level. The default drying position is 42 mm (e.g. above the 96 deep-well plate)

Always click “Save” to save the current step setting parameters

5.3.6 Other functions in protocol management interface

The program management interface also provides the following functions:

Icon	Function
	Search protocol
	Save as protocol
	Batch export protocol
	Batch import protocol
	Batch delete protocol

NOTICE

Common users only have permission to search protocol function.

5.4 General settings

Click “Settings” to enter the settings interface, as shown in figure below.

NOTICE

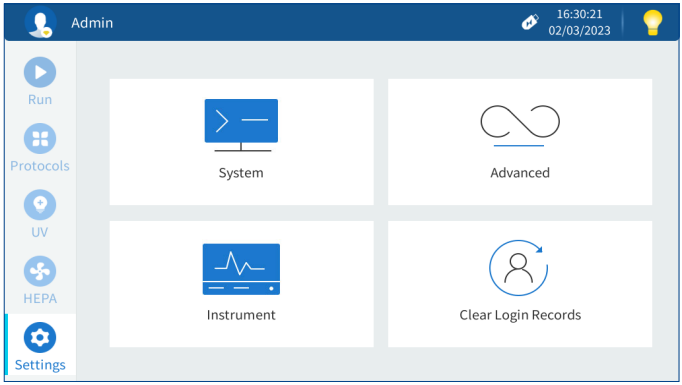
Please note, that different accounts have different setting permissions.

Admin account has permissions to set System, Advanced, Instrument, Clear Login Records.

Advanced account have permissions to set System.

Common user have permissions to set System.

The following operations exemplary show the Admin account settings:



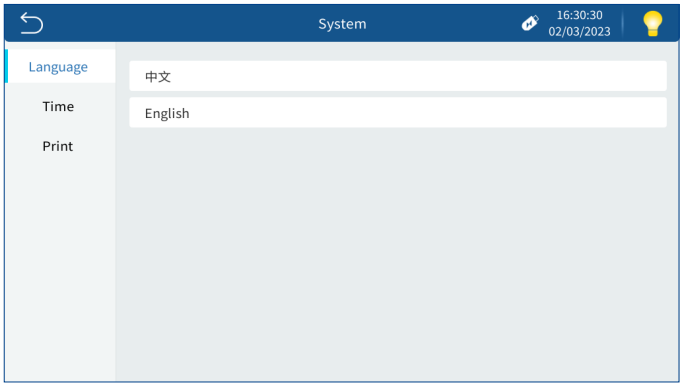
5.4.1 System settings

Click “System” to enter system settings interface, allowing to change the settings of Language, Time, Print.

Language: Currently, Chinese/English is supported.

Time: Used for setting instrument time.

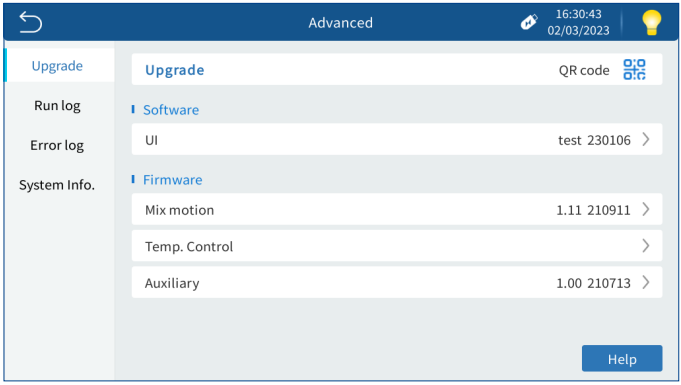
Print: Used to set whether to print automatically, and the template to print.



5.4.2 Advanced settings

Click “Advanced” to enter advanced settings interface, including “Upgrade”, “Run log”, “System log” etc,.

The “Upgrade” contains the current software/firmware version information. It can be clicked to enter and upgrade the software/firmware version through the U disk. The “Run log” contains the run log generated after the protocol runs, which can be exported through the U disk.



5.4.3 Instrument settings

Click “Instrument” to enter instrument settings, including “Motion”, “Reagent”, “Cali. TL”, “Cali. TH”, “Cali. Zero”, “Cali.dis.”, “Heat well”, “PN number” settings.

Motion: Used to set the motion parameters.

Cali. TL: Used for temperature calibration of heating strip at 40 °C.

Cali. TH: Used for temperature calibration of heating strip at 100 °C.

Cali. Zero: For accurate calibration of running well position.

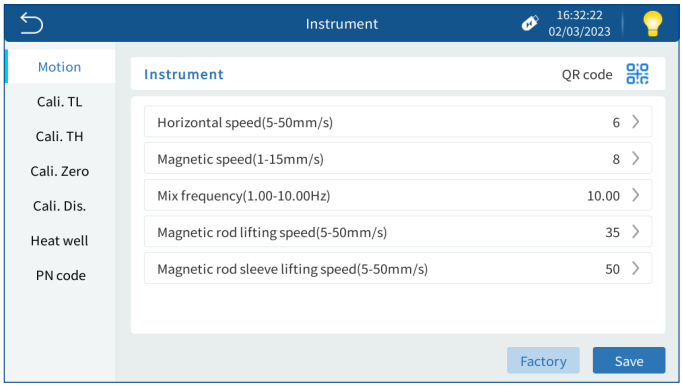
Cali. Dis.: For accurate calibration of left and right distance.

Heat well: Used to set the heating well position.

PN code: Used to set the PN number.

NOTICE

All instruments have been set up before delivery, so users do not need to set up again. When the instrument is faulty and needs to be repaired and adjusted, the relevant settings should be carried out by professional personnel.



5.4.4 Clear login records

Admin account click “Clear Login Records” to clear the login record of the current account.

NOTICE

Do not clear the Login records of the Admin account.

5.4.5 UV sterilization

Click “UV” to enter UV sterilizer interface. The main function is to open and close the ultraviolet sterilization.

Click “sterilization time” to open the dialog box for setting the sterilization time, which can be modified by the adding and subtracting buttons. The sterilization time is displayed in hh:mm; the maximum value is 23:59. Make sure that the front door of the instrument is securely closed and start the sterilization process.

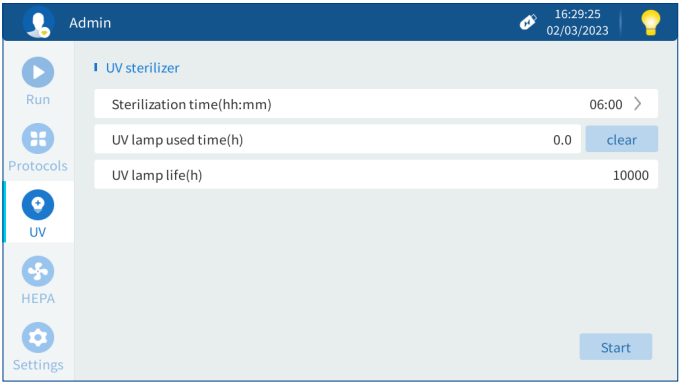
The sterilization time will be accumulated to the UV lamp total time. When the remaining UV lamp service life is down to 100 hours, a pop-up notice to replace the UV lamp is displayed every 10 hours. The UV lamp life setting and one-click reset function can only be viewed on the admin account interface. If the door of the instrument is opened during the sterilization process, the UV lamp will be automatically turned off and sterilization will be suspended. Close the instrument door to continue the sterilization process.

NOTICE

The NucleoMag® X32 door must be closed to operate the UV lamp. Do not perform UV-sterilization if the door is not properly closed. When the UV lamp is lit, do not look directly with the naked eye, do not let the ultraviolet radiation directly on the skin.

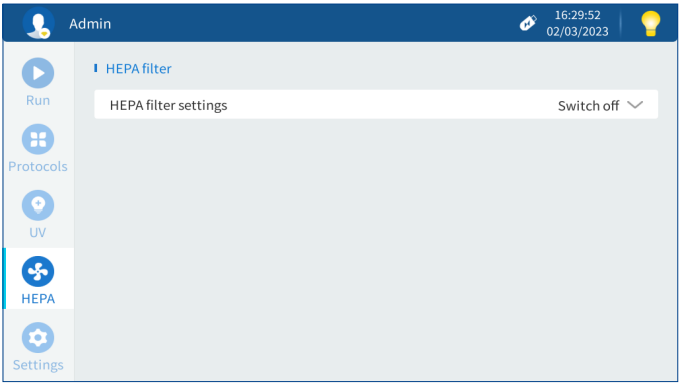
NOTICE

Do not touch the UV lamp by hand, which will damage or reduce the serving live of the UV lamp.



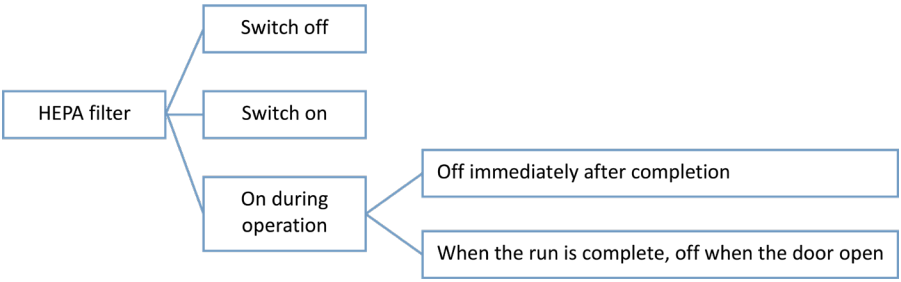
5.4.6 HEPA filter

Click “HEPA” to enter the HEPA filter interface. The main function is to control whether the exhaust fan is turned on or off.



HEPA filter include three options: “Switch off”, “Switch on” and “On during running”.

When HEPA filter is set to “Switch off” (default setting), the exhaust fan will stay off at any time; When set to “Switch on”, the exhaust fan will be in an always on state while the instrument is turned on; When set to “On during operation”, the exhaust fan is controlled by the operation of the protocol. The specific situation is shown in the figure below:



5.4.7 Replacing the UV lamp and air filter

Please contact the technical support for replacement of UV lamp and/or air filter.

6. Trouble shooting

6.1 Trouble shootings

No.	Symptom	Causes analysis	Method
1	No display visible	Power not connected	Check power connection
		Switch failure	Replace switch
		Fuse failure	Replace fuse (250V 8A 5 × 20)
		Others	Contact distributor or manufacturer
2	No UV light	UV light failure	Contact distributor or manufacturer to replace the UV lamp
3	No light	Light failure	Contact distributor or manufacturer to replace the light tube
4	Instrument does not stop automatically after opening the door.	Sensor failure	Contact distributor or manufacturer
5	High variance between actual and displayed temperature	Sensor failure	
6	No heating for heating strip	Sensor failure	
		Heater failure	
7	Instrument does not run	Controller failure	
		Motor failure	
8	Abnormal sound during working	Guide rail installed incorrect	
		Motor failure	
		Synchronous belt abrasion	

6.2 Software error alarm list

No.	Trouble	Error	Remark
1	overtemperature in temperature sensor T1~T8.	E1011, E1021, E1031, E1041, E1051, E1061, E1071, E1081	Temperature control board alarm information
2	opened circuit in temperature sensor T1~T8.	E1015, E1025, E1035, E1045, E1055, E1065, E1075, E1085	
3	short circuit in temperature sensor T1~T8.	E1016, E1026, E1036, E1046, E1056, E1066, E1076, E1086	

No.	Trouble	Error	Remark	
4	overtemperature pre-warning.	E0119	Level motor	Nucleic acid board alarm information
5	overtemperature.	E0129		
6	short circuit in motor.	E0117		
7	failed to return zero.	E0413		
8	failed to leave zero.	E0423		
9	steps lost.	E0114		
10	drive alarm.	E0116		
11	overtemperature pre-warning.	E0139	Magnet rod motor	
12	overtemperature.	E0149		
13	short circuit in motor.	E0127		
14	failed to return zero.	E0425		
15	failed to leave zero.	E0445		
16	steps lost.	E0124		
17	drive alarm.	E0126		
18	overtemperature pre-warning.	E0159	Magnet rod sleeve motor	
19	overtemperature.	E0169		
20	short circuit in motor.	E0137		
21	failed to return zero.	E0435		
22	failed to leave zero.	E0455		
23	steps lost.	E0134		
24	drive alarm.	E0136		
25	memory is damaged.	E0713		
26	setting parameter error.	E0723		
27	memory is uninitialized.	E0733		
28	factory parameter is not saved.	E0743		
29	motor data error.	E0753		
30	Nucleic acid board CAN communication error.	E0805	Main board alarm information	
31	Temperature control board CAN communication error.	E1805		
32	Auxiliary board CAN communication error.	E2805		

7. Packing list

No.	Name	Unit	Quantity
1	Nucleic acid purification system NucleoMag® X32	pcs	1
2	Power Cord	pcs	1
3	Quick start guide	pcs	1
4	Operation manual	pcs	1
5	Packing list	pcs	1
6	Performance Test Statement	pcs	1
7	U disk for upgrading software and transferring programs	pcs	1
8	Inner hexagon spanner 3 mm	pcs	1
9	Certificate	pcs	1

8. Acronyms

The following abbreviations and units of measurement may appear in the user manual listed above.

A	Ampere
AC	Alternating Current
V	Volt
Hz	Hertz
W	Watt
USB	Universal Serial Bus
SD	Safety Digital Code
kg	Kilogram
mm	Millimeter
µL	Microliter
hPa	Hectopascal
sec	Second
°C	Degree Centigrade
CV	Concentration difference between wells
TAB	Tabulator key
RUN	Run
STOP	Stop

9. Manufacturer information



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