TANBEAD

Maelstrom Switch 8

User Manual

TAN Bead Nucleic Acid Extractor (Non-Sterile)

039.M17RU.E01 Rev V1.0

Contents

About Manual

The label on the instrument, User Manual, and other packaging material may contain following symbols:

REF	Catalog number		Temp limit
SN	Serial number		Keep dry
	Manufacturer		Keep away from sunlight
	The date of manufacture		Biologic risks
RUO	Research Use Only		
	Non-sterile		Humidity limit
	Biologic risks		Instructions for Use
	Hot surface, risk of burns		
	Caution		
	The WEEE symbol, indicating separate collection for WEEE-Waste of electrical and electronic equipment		

About Instrument

Warning

- Use a power cord that meets your country's standard. In case of any questions, contact your local distributor for assistance.
- Maelstrom Switch 8 operates within the voltage range from 100 Volts to 240 Volts.
- Do not use the instrument with a damaged power cord or a loose socket.
- To unplug, hold the power plug itself instead of pulling the power cord.
- Prior to performing the maintenance, make sure to unplug the power plug from the outlet.
- Do not pour any liquid on the instrument.
- Do not place any containers with liquid on the instrument. Doing so may cause a fire, an electric shock or malfunctions of the instrument.
- Do not touch the power plug or cord if there is a chance of lightning. Failure to observe this may cause electric shocks.
- If you hear a thunder or suspect an approaching lightning when in use, turn off the power switch and disconnect the power plug immediately. Failure to observe this may cause a fire or malfunctions.

About Instrument

Caution

- Never attempt to remodel the instrument without the permission from the manufacturer. Doing so may lead to a fire or an electric shock.

- Do not subject the instrument to any impacts and do not knock it. Doing so may cause malfunctions.

- Any repairs to the instrument must be performed by agencies authorized by Taiwan Advanced Nanotech Inc.

- Only use the original spare parts supplied by Taiwan Advanced Nanotech Inc on the instrument.

- If the equipment is used in a manner not specified by the manufacturer, the protection given by the instrument may be impaired or invalid.

- User and/or patient the need to report any serious incident that occurred in relation to the device to the manufacturer and to the competent authority of the Member State where the user and/or patient is established.

1. Introduction

About

Maelstrom Switch 8 is an automated nucleic acid platform designed for Flexible Applications. Specialized spin tips enable mixing efficiency of magnetic beads. With intuitive interface and compatible with most representative brands reagent kits. Maelstrom Switch 8 realized the full automation by transforming routine operations into a walk-away solution.

Operation Principle

Maelstrom Switch 8 applied with patented Whirl-Spin Stirring technology for transferring magnetic beads with spin tips and reagent kits. Program consisting with three major processes: isolation, purification and concentration.

Intended Purpose/Intended Use

The Maelstrom Switch 8 is classified as a general laboratory instrument designed to manipulate magnetic beads across various reagents from different application kits, performing tasks such as nucleic acid extraction, protein isolation, and cell sorting. This adaptability to different gearboxes and adjustable settings facilitates compatibility with magnetic bead-based reagent kits from leading brands.

Its efficient bead transfer capabilities enable a wide range of applications for subsequent qualitative, semi-quantitative, and quantitative PCR assays. With its fully automatic operation, it reduces human error, ensuring consistent experimental reproducibility.

1. Introduction

Environmental Requirements

To avoid shortening the lifespan of the instrument, use Maelstrom Switch 8 in a location that meets the following criteria:

- Choose a location with good air circulation.
- Place Maelstrom Switch 8 on the table that can bear at least 20 kg.
- Do not use Maelstrom Switch 8 in a location where is with huge temperature and humidity variability.
- Operate condition:
  Temperature: 10-40℃
  Relative humidity: 40-80%
- Storage and transport condition:
  Temperature: 5-50℃
  Relative humidity: 20-85%
- Maximum operate altitude:
  2000m

1. Introduction

Safety Instructions and Guidelines

- This device can be used with potentially biohazardous materials. Use appropriate personal protective equipment (gloves, safety goggles, lab coat, etc.) for handling and disposing of biohazardous materials.

- Under a normal condition, sound pressure level from Maelstrom Switch 8 does not exceed 80dB and does not cause a hazard. Please contact technical support for assistance in case of a higher sound pressure level.

- This device can be hazardous due to the use of chemical and biohazardous substances.

- Users should adhere to their institutional guidelines for the handling and disposal of all infectious substances used with this device.

- It is important to clean the device after every use. If samples or reagents have been spilled, clean the instrument immediately to avoid damage or contamination.

- This device is to use with the compatible spin tips. Using incompatible spin tips may cause poor extraction performance.

- Read this user manual completely prior to operating the device. Failure to read, understand, and follow the instructions in the manual may result in damage to the device, injury to laboratory and operating personnel or poor performance.

1. Introduction

Safety Requirements

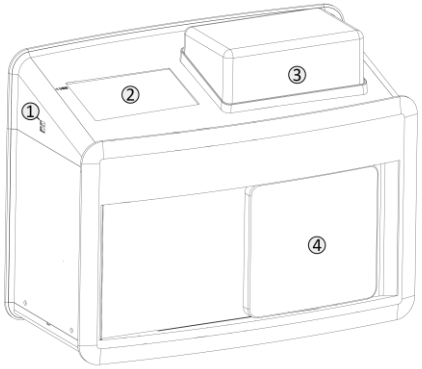
- The device has passed the tests and conformed to the standards of IEC 61010-1:2010+A1:2016 (Edition 3.1) and EN 6010-1:2010+A1:2019, "Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements".

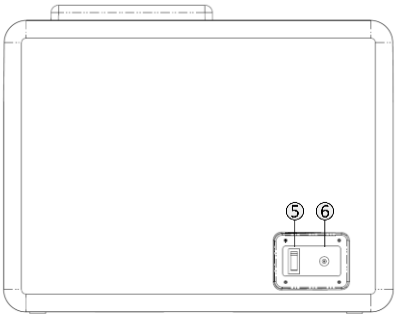
- The device has passed the tests and conformed to the standards of IEC 61010-2-101:2018 with IEC 61010-1:2010 + A1:2016 and EN 61010-2-101:2017 with EN 61010-1:2010 + A1:2019, "Safety requirements for electrical equipment for measurement, control and laboratory use - Part 2-101: Particular requirements for in vitro diagnostic (IVD) medical equipment".

EMC Requirements

- The device has passed the tests and conformed to the standards of IEC 61326-1:2020 / EN IEC 61326-1:2021 & IEC 61326-2-6:2020 / EN IEC 61326-2-6:2021, "Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-6: Particular requirements - In vitro diagnostic (IVD) medical equipment".

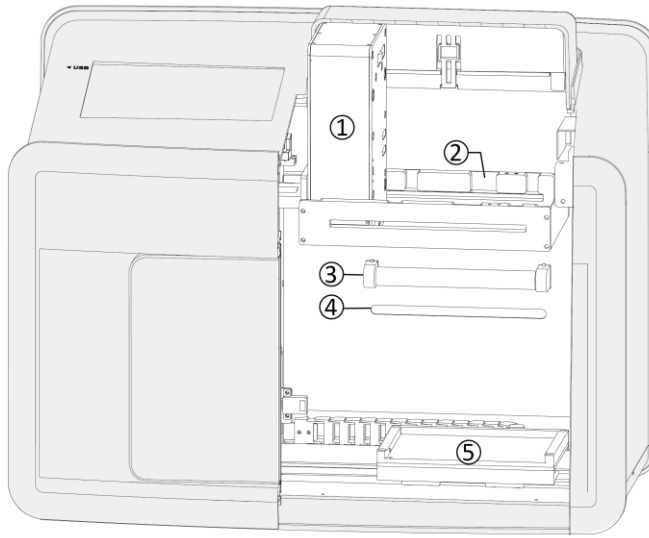
2. Instrument Overview





① USB port
② Touch screen
③ Top lid
④ Door lid
⑤ Power switch
⑥ DC Power inlet

2. Instrument Overview



① Fixed motor module

② Guide rail

③ UV light

④ LED light

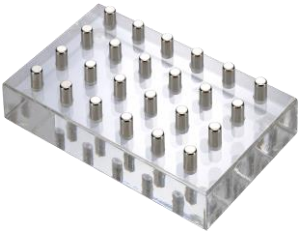
⑤ Loading position

2. Instrument Overview

Accessory

Following accessories may vary region-to-region.

Power cord



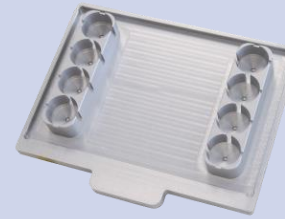
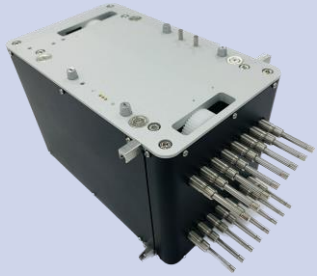
Magnetic separator

Power adapter

2. Instrument Overview

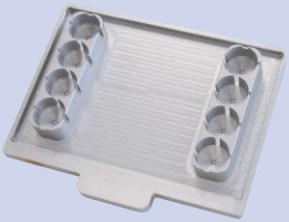
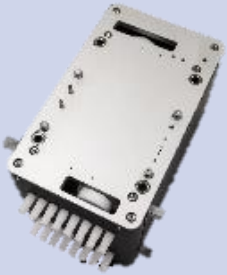
Compatible Gearbox Sets

(A) Open Platform model (Gray)

Gearbox	Heating Plate
CH 4 Gearbox Ø7.5(A) 	24 Heating Plate F 
CH 8 Gearbox Ø3.5(A) 	96 Heating Plate F 
CH16 Gearbox Ø3.5(A) 	

2. Instrument Overview

(B) TANBead Platform model (Red)

Gearbox	Heating Plate
CH 4 Gearbox Ø4.2(B) 	24 Heating Plate 
CH 8 Gearbox Ø2.2(B) 	96 Heating Plate 
CH16 Gearbox Ø2.2(B) 	

2. Instrument Overview

Consumables

Maelstrom Switch 8 uses specially designed for optimal processing. Used with provided or compatible spin tip assembled box and deep well plates is a must. If applied with other types of consumables may damage the instrument and compromise the warranty. Contact us (service@tanbead.com) for further assistance if consumables other than suggested were needed.

(A) Open Platform model (Gray)

24 Spin Tips (Ø7.5)
Assembled Box

96 Spin Tips (Ø3.5)
Assembled Box

24 Deep Well Plate, v-bottom F

96 Deep Well Plate, v-bottom F

2. Instrument Overview

(B) TANBead Platform model (Red)

Spin Tips LV

96 Deep Well Plate

24 Spin Tip LV Holder

16 Base B

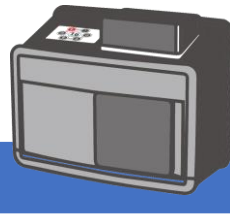
24 Deep Well Plate

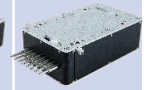
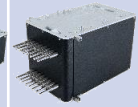
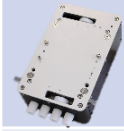
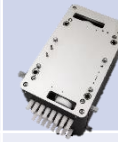
6 Tube B

24 Deep Well Plate LV Base

Spin Tips Assembled Box

3. Instrument Specification



Maelstrom Switch 8	SPECIFICATION					
Model	**Open Platform**			**TANBead Platform**		
Weight	N.W. 16.2 kg ; G.W. 23.0 kg					
Dimensions	Instrument: 524(W) x 265(D) x 412(H) mm Package: 638(W) x 426(D) x 568(H) mm					
Power Rating	I/P: AC 100~240V, 2.8A Max, 50/60Hz O/P: DC 24V, 8.3 A					
Spin Speed	500~3,000rpm					
Display	7” touch screen					
UV Light	UV-C					
Application Reagents	Open to leading brands based on magnetic beads			TANBead: pre-filled plate, pre-filled single tube, bottle format		
Program	Customized program or assisted from TANBead			TANBead Built-In Programs		
Channels	**CH 4**	**CH 8**	**CH16**	**CH 4**	**CH 8**	**CH16**
Gearbox						
Flux Per run	1~4	1~8	1~16	1~4	1~8	1~16
Rod Size	Ø7.5(A)	Ø3.5(A)		Ø4.2(B)	Ø2.2(B)	
Magnetic Force (Gauss)	5,400	4,700		4,700	3,900	
Sample Volume (uL)	100~5,000 Max. 1500 rpm	50~1,200		100~9,000	50~1,600	

4. Installation & Get Started

Please note that this instrument weight is around 20kg, it is highly recommended to have 2 individuals or above to handle when taking it out from the box and be sure to work safety.

Step 1: Install the System

Take out the instrument from the box, 2 or more individuals is highly recommended.

Step 2:

Remove the cushions around the instrument.

Step 3:

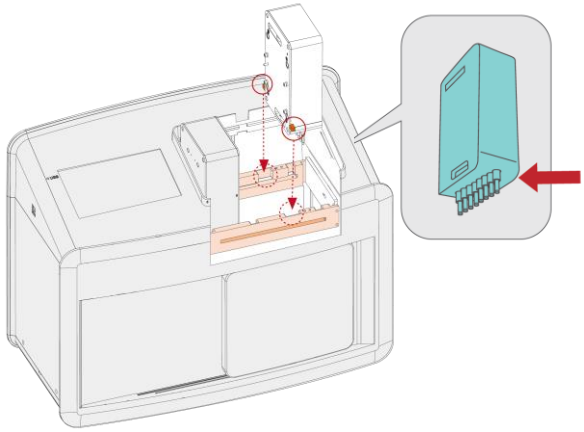
Place the instrument on a flat table that bears over 20 kilograms.

Step 4: Install Gearbox

Refer to the applying consumables to install the Gearbox module refer by following procedures.

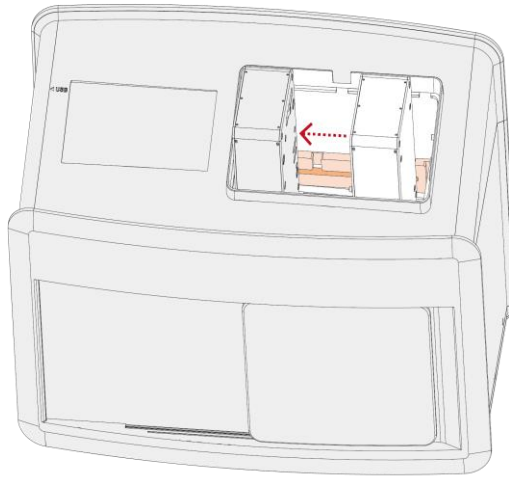
(A): Locate gearbox on guide rail

Do not "Power on" the instrument before install the gearbox. While manipulate the gearbox, please make sure the magnetic rods is safe from crushing to any parts.

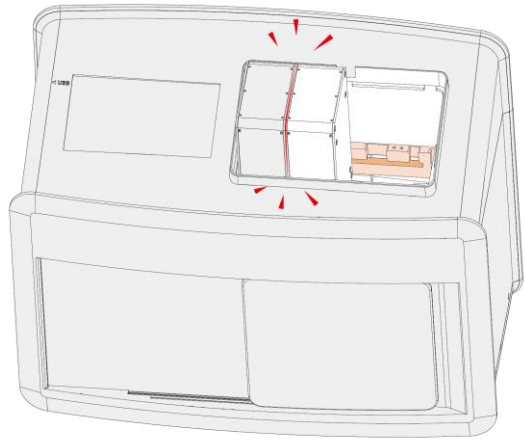


4. Installation & Get Started

(B) : Push gearbox to left side



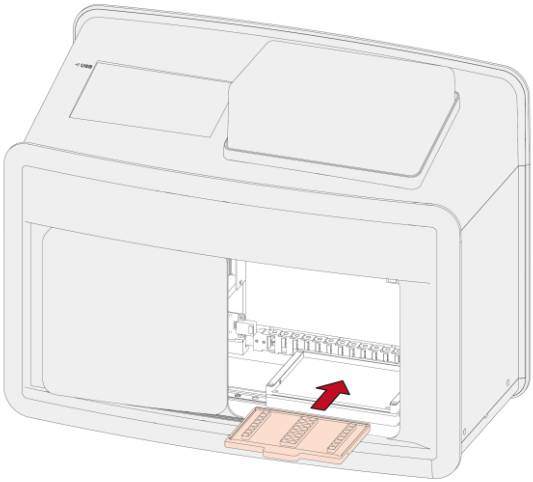
(C) : Make sure gearbox is attached firmly



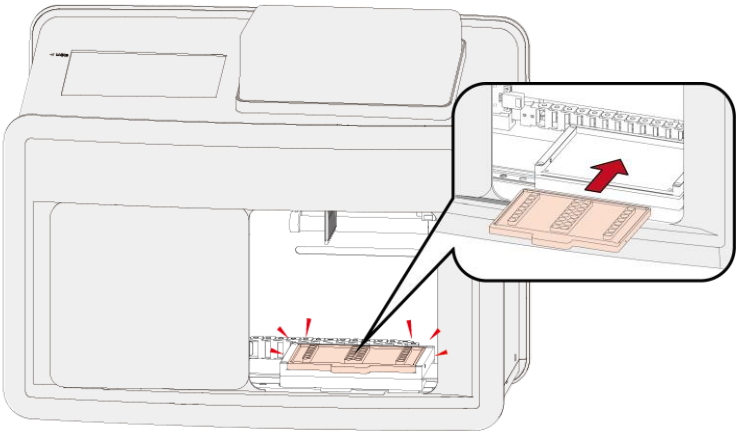
4. Installation & Get Started

(D) : Install the heating plate 96 or 24 wells accordingly

Keep heating plate horizontal during installation.

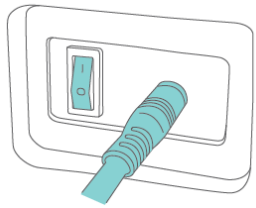


The heating plate surface may be hot during operation and change. Use caution to avoid risk of burns.



4. Installation & Get Started

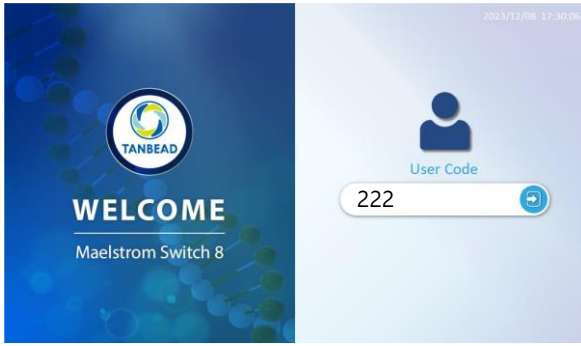
- **Step 5: Apply Power Cord**
- Apply with the power cord and adapter. Please note that this instrument is compatible with AC 100-240V power only. Using wrong power source will lead to malfunction or damage.



- **Step 6: Power On**
- Power on the instrument and it will perform initialization.

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 damage if it comes in close contact with a strong magnetic field.

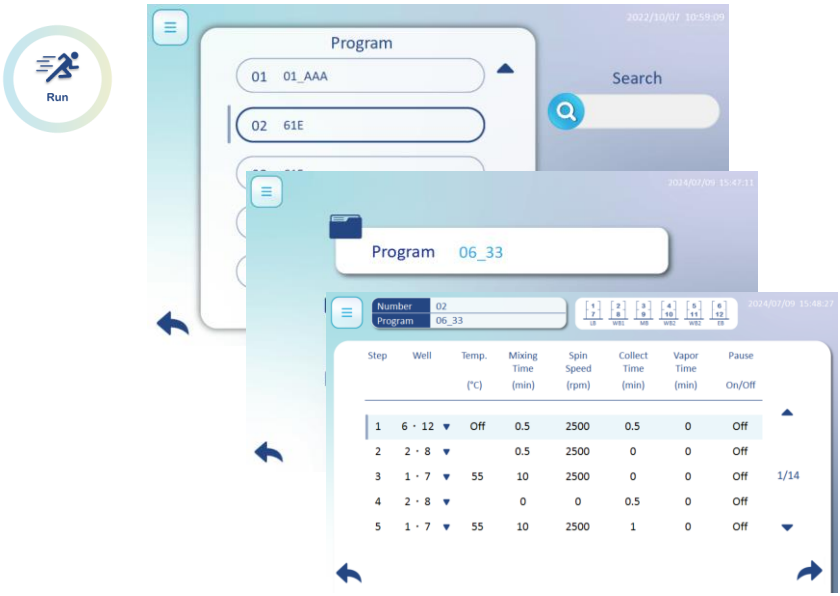
- **Step 7: Enter user code**
- Refer to next section for software operation to "Log-in" the system with "222" user code after the system start up.



4. Installation & Get Started

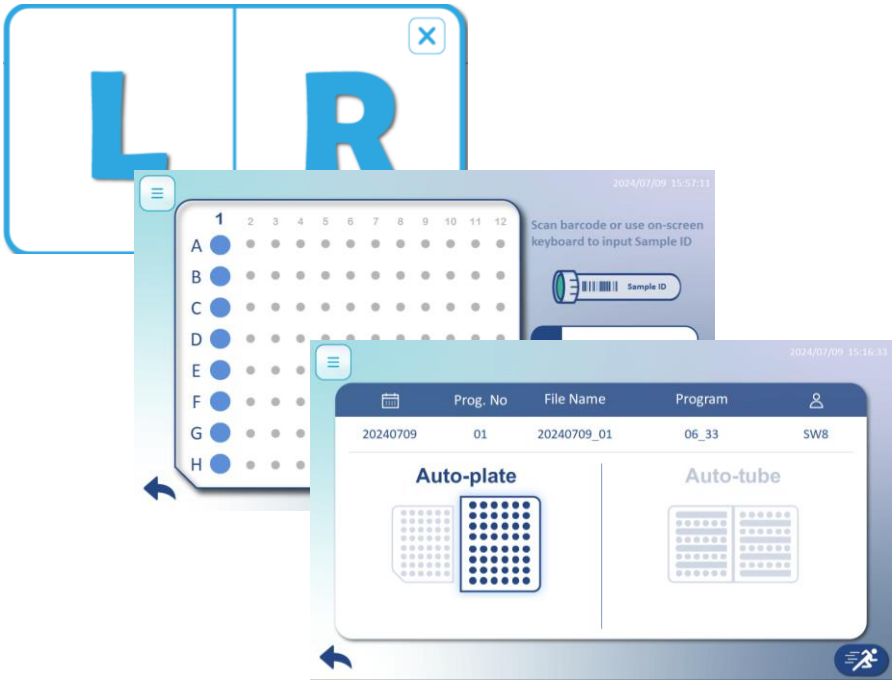
- **Step 8:** Edit Program
- Refer to **section 5.** to "Edit" the protocols for your reaction kits.

- **Step 9: Run Program**
- Tap on "Run" and select present program to Run the extraction. And press on " " to proceed.

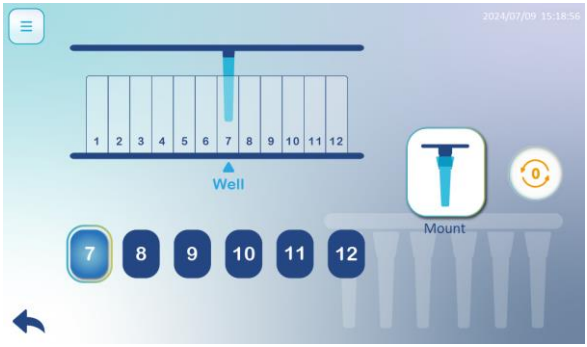


4. Installation & Get Started

- Select with "L" for left part of plate or "R" for the right. And press on " " to proceed. Refer to the container type to choose "Auto-plate" or "Auto-Tube" and click on " " to Start the run.

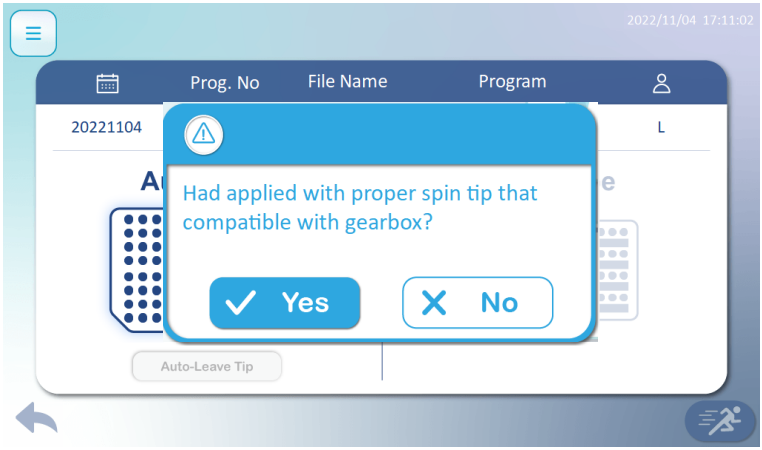


- Applied with spin tip assemble box and tap on "Mount" to pick up tip on selected lane.

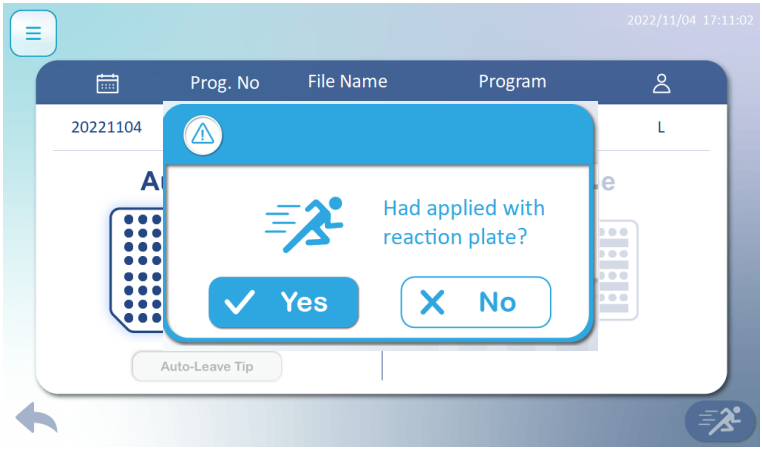


4. Installation & Get Started

- As the warning window pops, make sure to applied with correct spin tip assemble box onto the heating plate. And Press on “Yes” to pick up the tip. “ No” to return previous page.



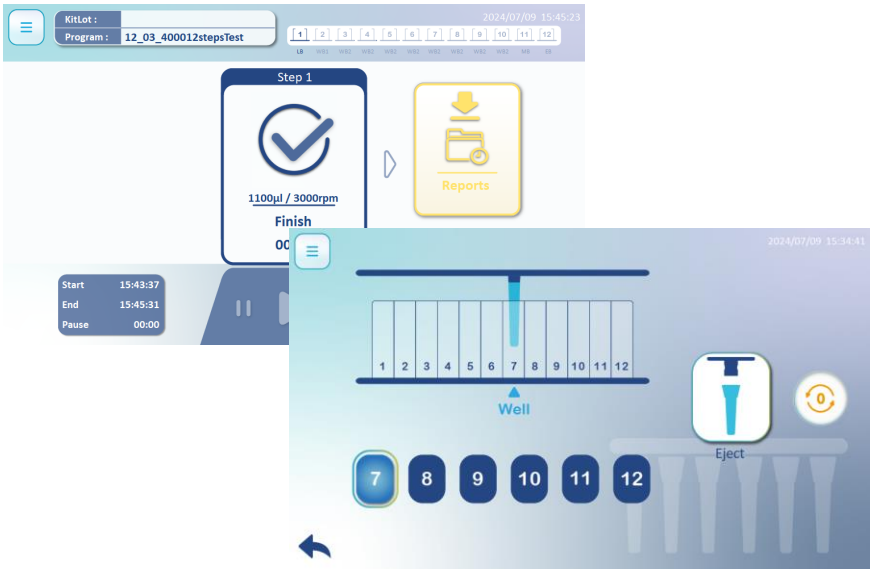
- After pick up the spin tip, warning window pops up again. Make sure to replace with prepared reaction plate into the chamber. Click on “Yes” to proceed.



4. Installation & Get Started

- After heating up, the program will begin automatically.

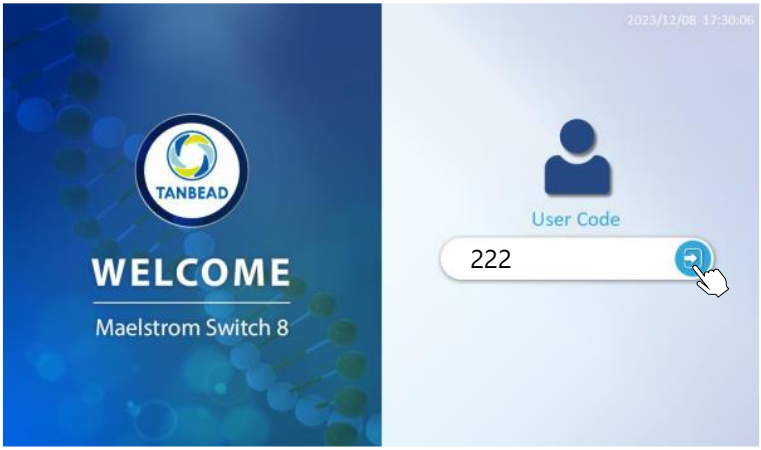
- After the program finished, press on "**Report**" to review the procedures. As close the report, request window pops. Select desire lane to "**Eject**" the spin tip before return to main menu.



5. Software Applications

Start

After power on the instrument, it takes seconds for system ready.



Please input a User Code 222 to access the system. In case of forgotten password, contact distributor or Taiwan Advanced Nanotech Inc. for assistance.

5. Software Applications

- After entering the home page, system will detect the type of gearboxes and display with different interface accordingly as followed. Also, the function of each icon will be different.

CH 4 Gearbox ø 7.5(A) for 4 channels gearbox

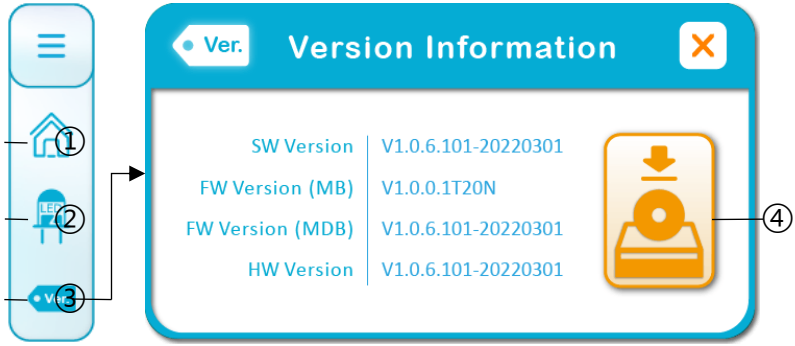
CH 8 Gearbox ø 3.5(A) for 8 channels gearbox

CH16 Gearbox ø 3.5(A) for 16 channels gearbox

5. Software Applications

General commends:

Press Toolbar to use following function.



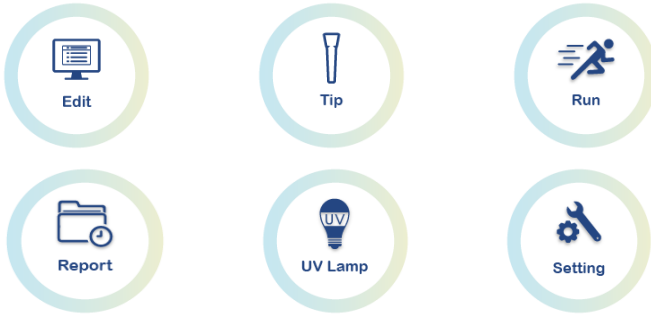
① Back to Home Screen
② Turn on/off LED
③ Get the version information
④ Update software and firmware

5. Software Applications

"Home Screen" on the Maelstrom Switch 8 is used for following functions. While applying with different gearboxes, display will be different accordingly.

Home Screen (CH 8 Gearbox as Example)

① Change User
② Current Temperature
③ Current Gearbox type



- **Edit:** Edit protocols.
- **Tip :** Eject tip(s).
- **Run :** Enter to "Run" a protocol.
- **Reports :** Management of history data.
- **UV lamp :** Switch the UV lamp on/off.
- **Setting:** Adjust the parameter of the transfer platform.

5. Software Applications

Edit: Edit protocols.

Tap to enter the "Edit" function to manipulate the programs or create own protocols for relative reagent kits. In case of applying different gearboxes, programs should be created individually.

Notice: As saved with 12 step/6 step programs, program name will be recognized and renamed as "12_" or "6_". For example: As enter program name with "6T2" in 6 step program and saved, the program name will be renamed as "06_6T2".

① **Program:** List of all programs.
② **Edit:** Enter the selected program number to modify the protocols.
③ **Copy:** Copy the selected program number to desire program number.
④ **Delete:** Tap to delete selected program number
⑤ **Import/Export:** manipulate the programs through USB drives.

5. Software Applications

Edit: Edit the running protocols.

Edit: Edit protocols.

CH 8 Gearbox as example for instruction:

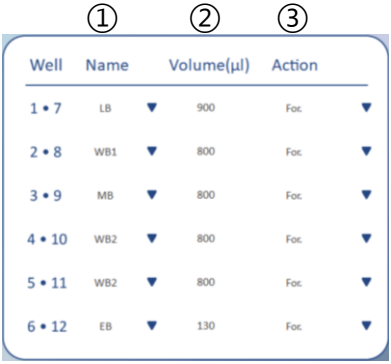
① **Number:** Program number for saving
② **Program:** Name of the protocol.
③ **Heating:** Activate the pre-heating function with setting temperature.
④ **Protocols:** Preview of the protocols.
⑤ **"Previous"** to go back or **"Next"** steps to detail protocol setting.

5. Software Applications

Edit: Edit the running protocols.

Edit: Edit protocols.

Preview of protocols

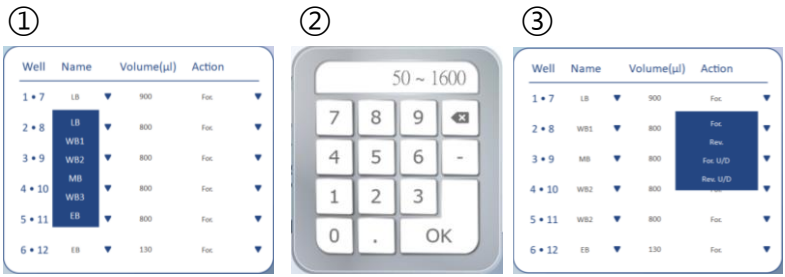


Preview of the protocols and enter with related settings.

① **Name:** Tap to select the buffer name of each steps.

② **Volume:** Tap to enter the volume of each sample wells.

③ **Action:** Tap to select different spinning mode with "Reverse", "Forward", "Reverse with up and down mixing", and "Forward with up and down mixing".



5. Software Applications

Edit: Edit protocols.

Edit: Edit protocols.

Detail protocol setting:

Preview of the protocols and tap on displayed digits to enter with related settings as followed. Tap on "Delete" to delete the steps, "**Copy**" for multiplied the steps, and "**Save**" to store the setting of the program.

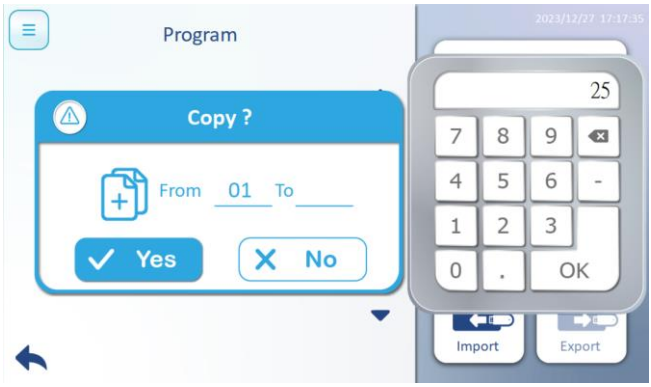
Notice: As editing the protocols, Make sure not to leave magnetic beads and eject spin tips in the same well.

① **Step:** The order of the gearbox's motion.
② **Well:** Processing well of each step.(May different by gearbox types.)
③ **Temp.:** Heating On/Off and temperature setting of the step.
④ **Mixing Time:** mixing time length setting of the step
⑤ **Spin Speed:** speed setting of the stirring
⑥ **Collect Time:** time setting for magnetic rod to collect the beads
⑦ **Vapor Time:** time setting for the evaporation of collected beads
⑧ **Pause:** ON or OFF the pause function to temperately stop the procedure.

5. Software Applications

Edit: Edit protocols.

Copy: Copy the selected program number to the desired position.



Delete: Delete the selected program number.

Import/Export: Programs can be imported or exported into CSV format through a USB drive. File format is shown as below.

	A	B	C	D	E	F	G	H
1	Temp1	Temp2						
2	40	40						
3								
4	Well	Name	Volume	Action	Mixing	Collect		
5	1	LB	900	Rev. U/D	Low	Low		
6	2	WB1	800	For.	Low	Low		
7	3	WB2	800	For.	Low	Low		
8	4	WB2	800	For.	Low	Low		
9	5	MB	800	For.	Low	Low		
10	6	EB	150	For.	Low	Low		
11								
12								
13	Step	Well	Temp	Mix_time	Mix_spee	Collect_ti	Vapor_tin	Pause
14	1	5		0	3000	0.1	0	Off
15	2	1	65	6	3000	0.5	0	Off
16	3	2		0.5	3000	0.1	0	Off
17	4	3		1	3000	0.2	0	Off
18	5	4		0.5	3000	0.2	7	Off
19	6	6	45	3	3000	0.5	0	Off
20	7	3		0.1	3000	0	0	Off

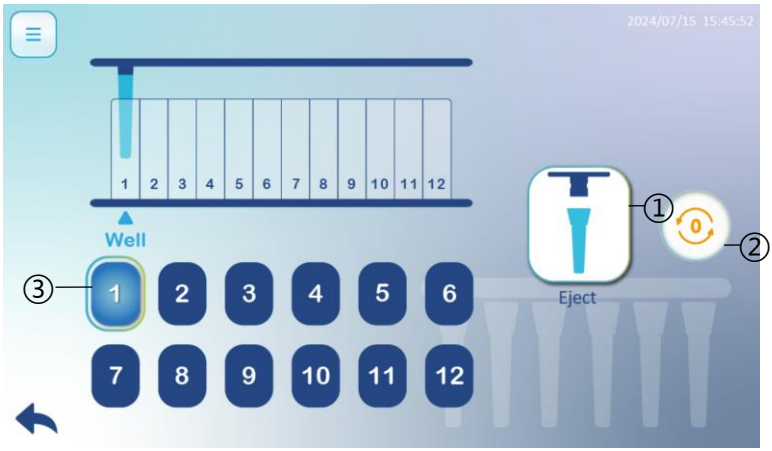
5. Software Applications

Eject Tip(s)

Display different by the gearbox usage as below, but the function icon will be the same. While eject the spin tip, preferable to apply with empty reaction plate.

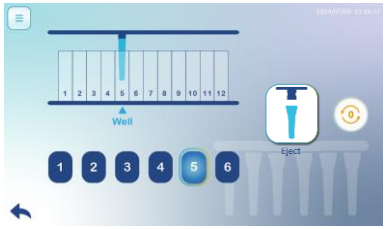
Please use correct consumables that is compatible with the installed gearbox.

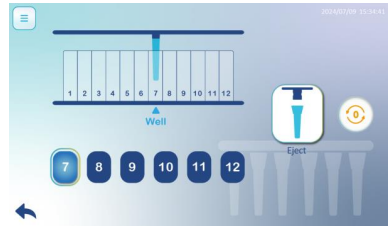
CH 8 Gearbox



Caution: Before a run,

① Eject Tip : Press the icon to leave tips.
② Origin: Press the icon to initialize instrument.
③ Well : Tap the icon 1~12. to leave tips in different positions.





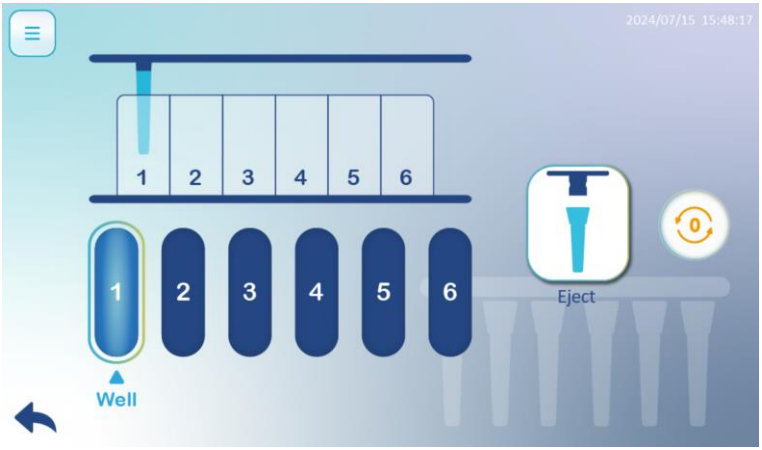
5. Software Applications

Eject Tip(s)

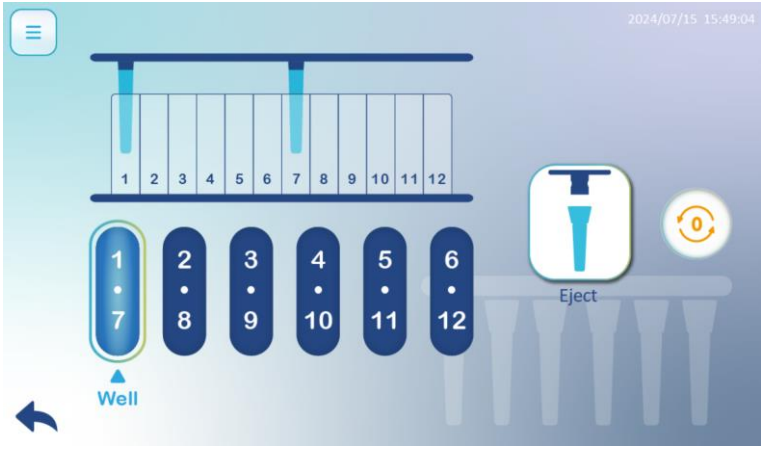
ENGLISH

Please use correct consumables that is compatible with the installed gearbox.

CH 4 Gearbox



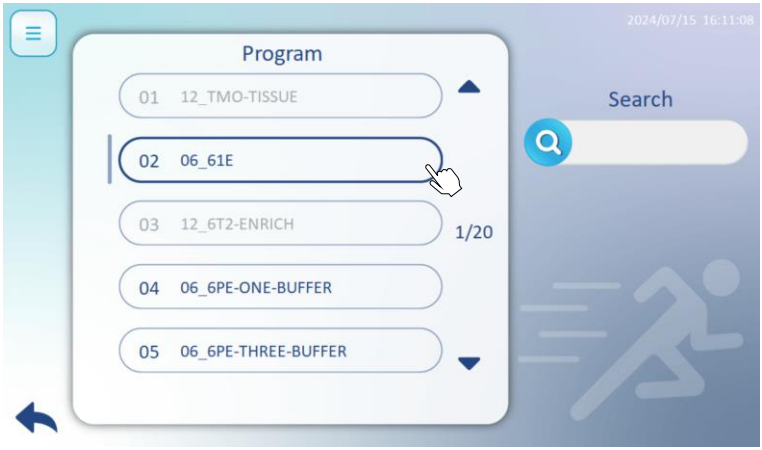
CH16 Gearbox



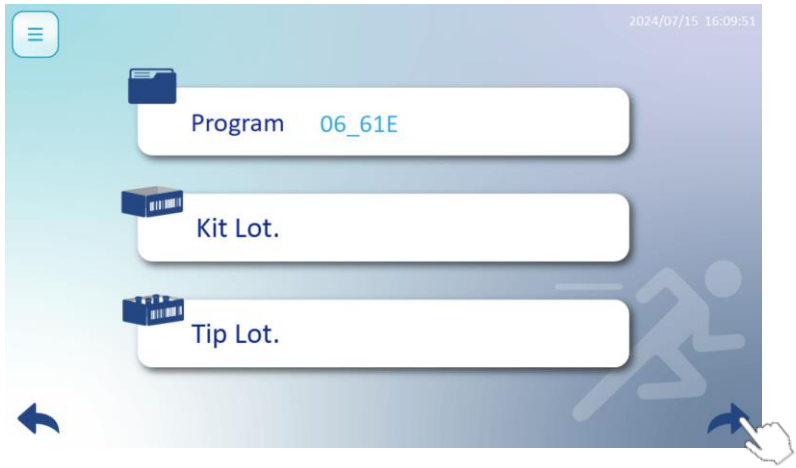
5. Software Applications

Run a protocol

Choose "**Run**" icon to start to run the protocols.



Switch 8 has an impressively large store of 100 programs. Choose program that in line with your reagent kit. Type in key words in search box to look for programs if needed. Number indicated with "06_" or "12_" refer to different types of program with 06 step program or 12 step program.

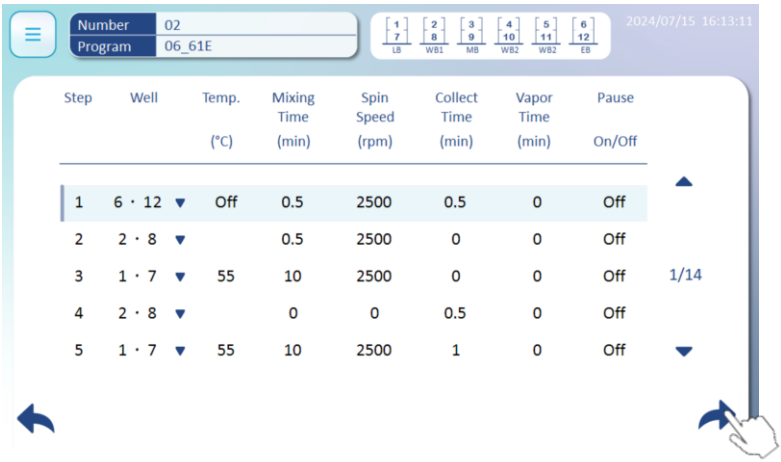


Type in kit lot and Tip lot numbers for further tracking. Press arrow to proceed next page.

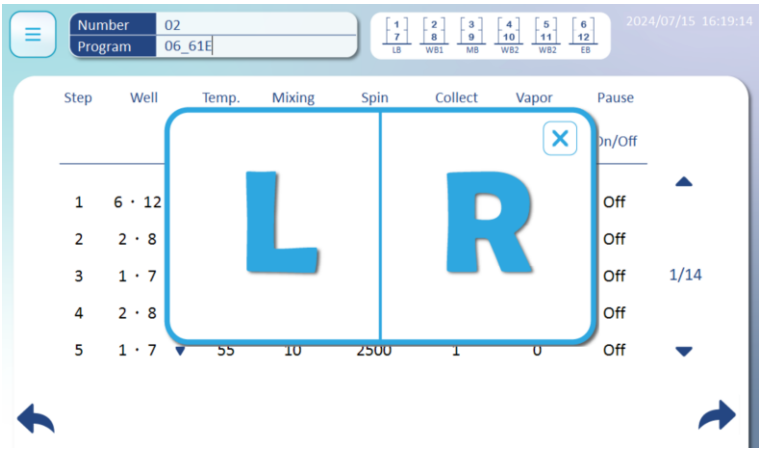
5. Software Applications

Run a protocol

Review with the setting program by scrolling up or down. And press on " " to proceed.



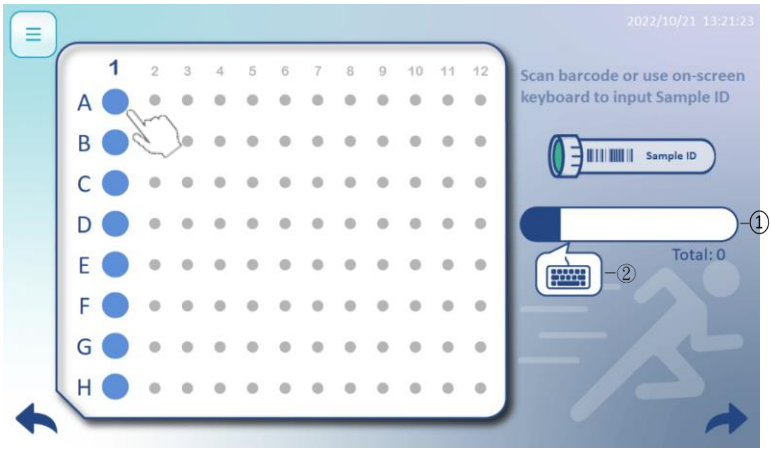
For **CH8 Gearbox with 6 steps program**, user can choose to run with "Left" or "Right" region of the deep well plate. But other types of gearbox or 12 steps program don't.



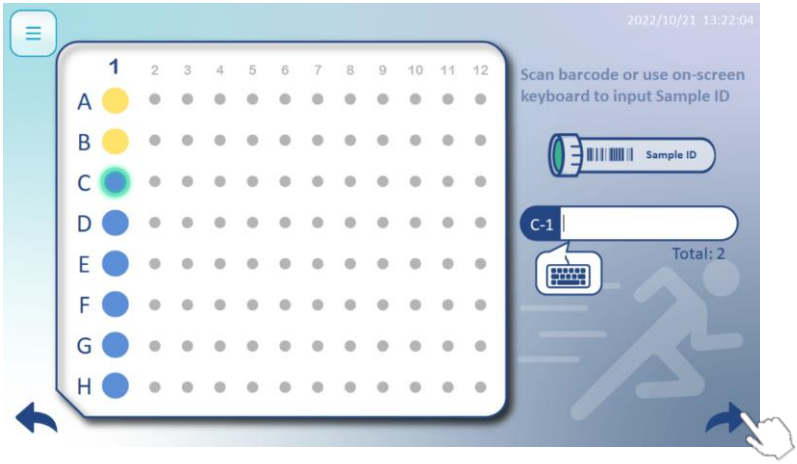
Choose a region "Left" or "Right" to run a protocol. Choose "Left" means to process from Lane 1 to Lane 6, and "Right" means from Lane 7 to Lane 12.

5. Software Applications

Run a protocol



Press a circle(A1~H1) to input sample ID by using 1-D barcode ①barcode or ②manual type in.



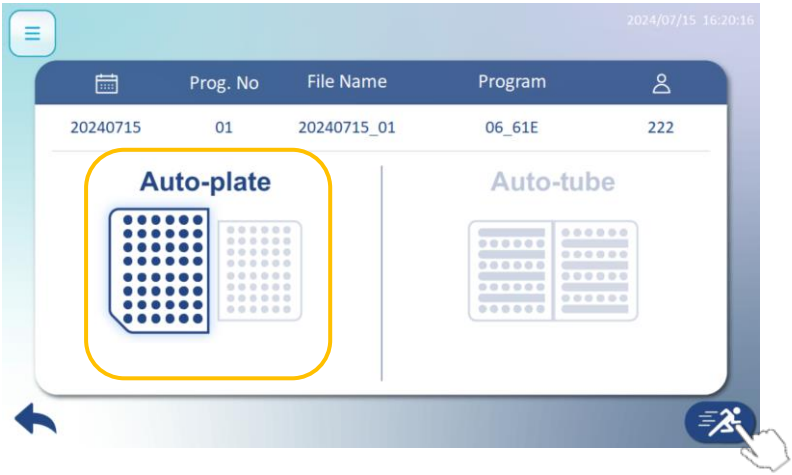
A circle turns yellow when inputs sample ID successfully. Then it moves to next sample ID automatically. E.g. A1→B1, B1→C1 etc. Press arrow to proceed next page.

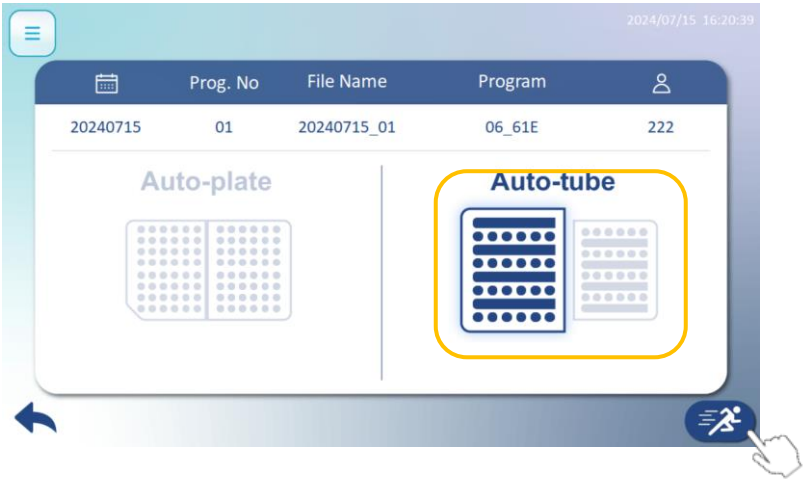
5. Software Applications

Run a protocol

ENGLISH

According to the applying plate format, choose "**Auto-Plate**" or "**Auto-Tube**" to proceed.

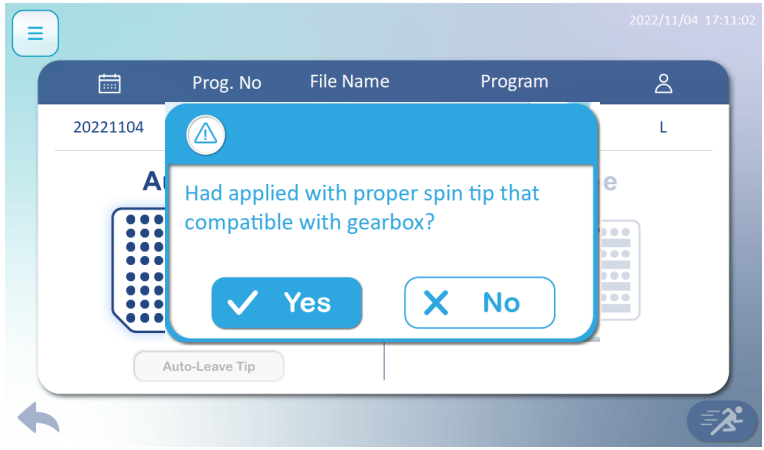




Please check above information is correct such as Date, Program No., File Name etc. Press " " icon to execute the program. Or press on " " to back to previous page.

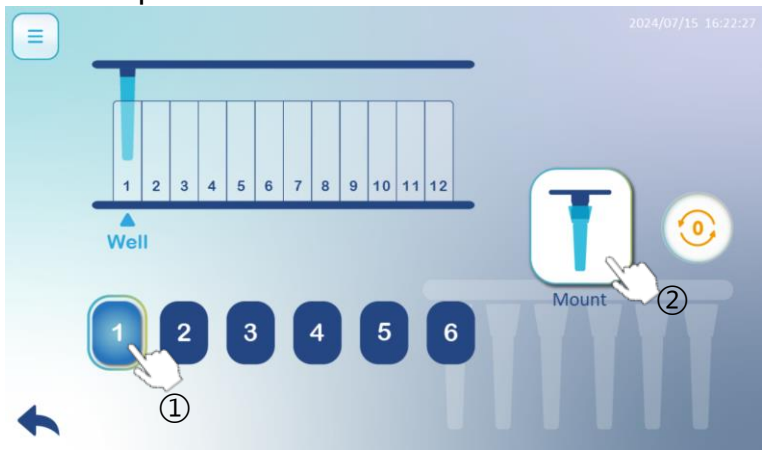
5. Software Applications

Run a protocol



After press on "  ", warning windows pops. Make sure to apply with correct spin tip assemble box into the system and click on "Yes" to proceed. "No" to back to previous page.

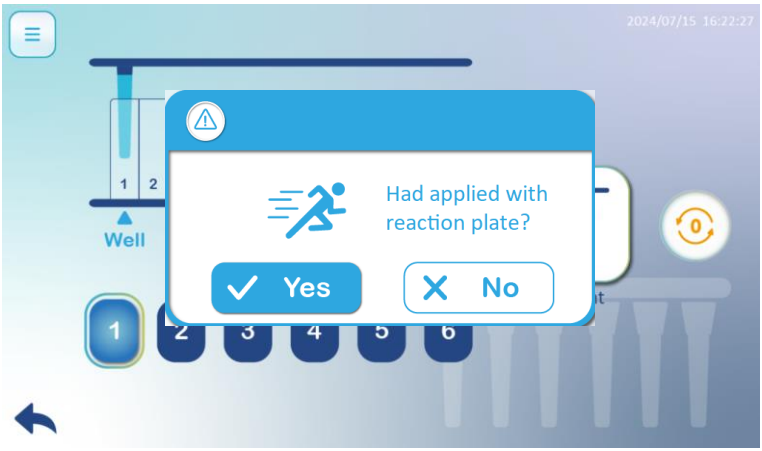
Mount Tip



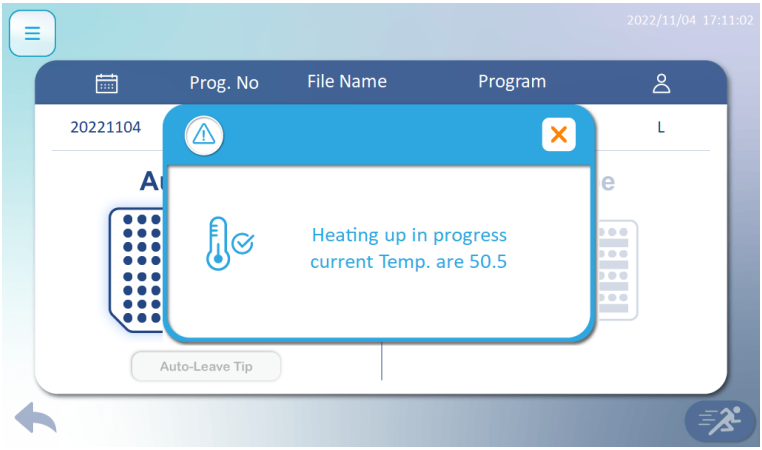
Please apply with spin tip assemble box onto the heating plate inside the SW8. ① Select desire lane and ② press on "Mount" to pick up spin tips.

5. Software Applications

Run a protocol



After picking up the spin tips, make sure to replace the spin tip assemble box with prepared reaction plate. Click on “Yes” to proceed or “No” if the plate is not ready.



Program will start when the temperature reaches the set value.

5. Software Applications

Run a protocol

Running Status:

Realize following symbols is highly recommended. It helps you acknowledge protocol status.

① Current Step
② Start Time, Estimated Time, Pause Time
③ PV refers to the actual temperature. SV is really the set value.

Pause : Pause a protocol that is in progress

Resume : Continue a pause protocol

Stop : Stop a protocol that is in progress

5. Software Applications

Run a protocol

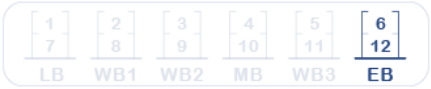
Mix :This step is to mix beads and reagents

Collection : This step is used for collecting the magnetic beads from the wells of the plate, press Pause or Stop. Maelstrom Switch8 is not action immediately until finish collection.

Vapor : This step dries the magnetic beads above a well or tube.

Completion : Buzzer rings up after a protocol finished.

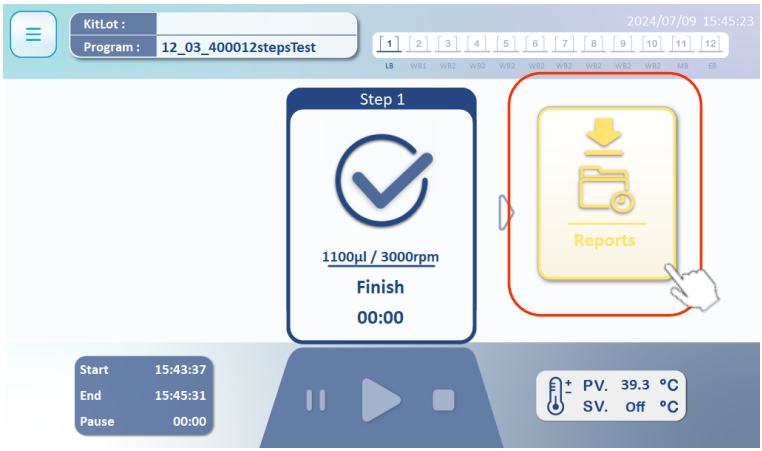
Pause : Pause a protocol



Well 1 to 12, number of well and name of buffer varies from kits to kits.

5. Software Applications

Run a protocol



As the program finished, press "**Report**" to review the result.

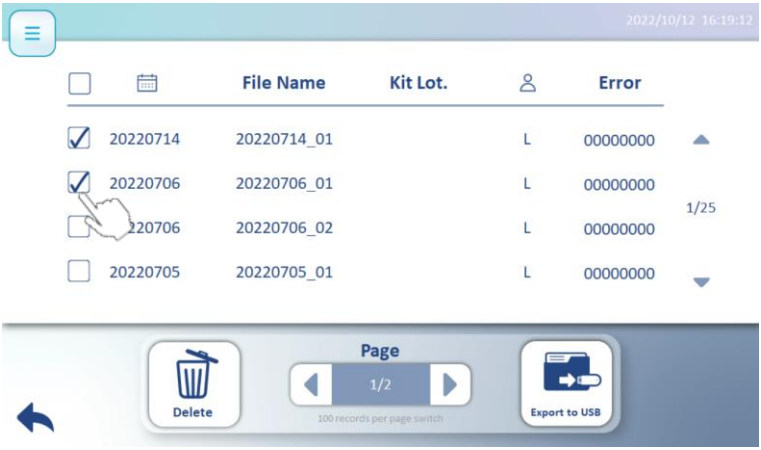
Spin tip should be ejected to finish the whole procedures. Select desire lane to eject the spin tip other than the lane with magnetic bead.

Notice:
Do not leave magnetic beads and eject spin tips in the same lane.

5. Software Applications

Reports : Manage history data.

Please press the square(s) to delete data or export data to USB.



ENGLISH

5. Software Applications

UV lamp : Switch the UV lamp on/off.

Set UV light, then press the light bulb to start.

Please close the door before turn on the UV light, running time is recommended over 5 minutes.

5. Software Applications

Setting: Basic Parameters can be set through setting function, including User management, Language, and Time.

① **User Management:** Operator authority can be set through this function.
② **Language:** To change the UI language format
③ **Time:** change of the time setting for the instrument.

5. Software Applications

12 Step Program

As applied with CH 8 Gearbox, there have special program allowed users to edit with freely process within 12 lanes on the reaction plate, called "**12 step program**". As enter the "Edit" section (refer to Page. 30), on the program list there will have two types of programs allows user to manipulate.

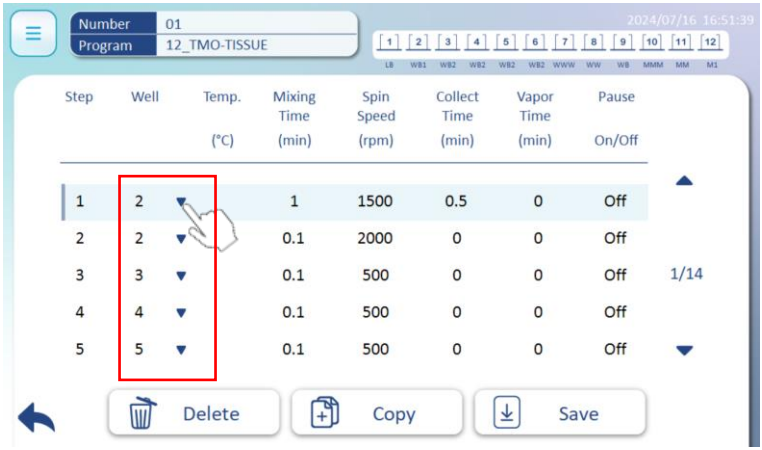
① 12_ : refer to 12 step program
② 06_ : refer to 6 step program

As edit with 12 step program, shows as following left figure.

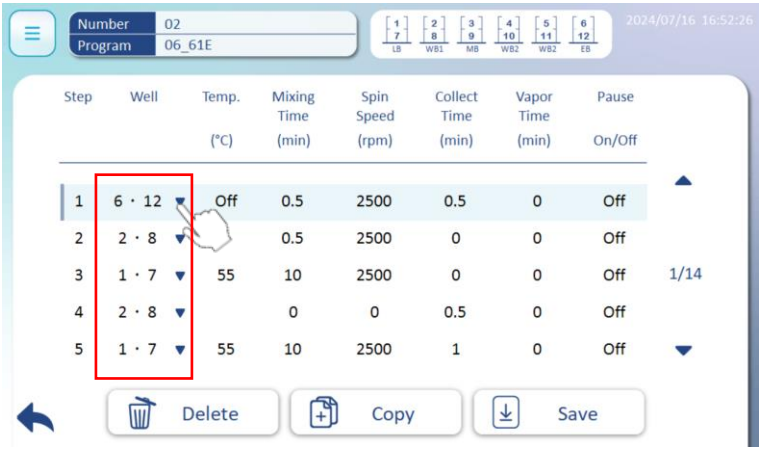
5. Software Applications

After enter the editing interface, in 12 step program (A), the "Well" lane can be chosen freely from lane 1 to 12. However, in 06 step program (B), lane 1 and 7 was bonded, and so as 2 and 8, 3 and 9...etc.

(A) 12 Steps Program



(B) 06 Steps Program



As saved with 12 step/6 step programs, program name will be recognized and renamed with "12_" or "6_" at the front. For example: As enter program name with "6T2" in 6 step program and saved, the program name will be renamed as "06_6T2".

6. Technical Support

In case of any questions, please try to contact our authorized distributor nearest to you. Taiwan Advance Nanotech Inc. provides post-sale services call number at +886-3-3167568 or via email: service@tanbead.com for assistance.

Please provide this instrument serial number when you talk to our technician, that will solve the problems efficiently and answer your questions more precisely.

7. Cleaning and Maintenance

- Clean the device after every use. When users detect samples or reagents have been spilled, clean the device immediately to avoid damage or contamination.
- Wear gloves and appropriate personal protective equipment. If the device is used with biohazardous materials, dispose of any cleaning materials used in accordance with your institutional guidelines.
- The device may go through a run with the magnetic rods unprotected. If this happens, the magnetic rod needs to be cleaned immediately.
- To clean the magnetic rods, wipe with a soft cloth dampened with pure water. Do not use alcohol solvent.
- If the magnetic rods cannot be cleaned, please contact TANBead (service@tanbead.com) for technical assistance.

8. Disposal

The decision whether to dispose of a potentially contaminated medical device is usually made by the owner in consultation with appropriate federal, state, and local authorities. In determining which medical devices should be discarded, the owner must assess each product's current condition and potential safety risks.

9. Patent

Patent List	
USA	US09616398B2
EU	EP2937136
Canada	CA2862946
Japan	JP6151735B2
Korea	KR101696517B1
China	CN104971638B
Taiwan	TWI526245B
WIPO	WO2016127292

10. About Manufacturer

- **Manufacturer**：Taiwan Advanced Nanotech Inc.
- **Legal Manufacturer**：6F., No. 188, Wenhe Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C)
- **Production Site**：4F., No. 188, Wenhe Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C)
- **Manufacturer Tel**： +886-3-3167568

11. TANBead Instrument Warranty Policy

This warranty sheet covers the Nucleic Acid Extractors manufactured by Taiwan Advanced Nanotech Inc. (Hereinafter referred to as TANBead).

TANBead warrants that under normal use conditions, this product will not have any material or manufacturing defects for one year from the date of purchase. If any defect is found within the warranty period, TANBead will repair or replace the product free of charge.

This warranty policy does not apply to the following situations:

•The product is damaged due to improper use, operation, storage, maintenance, abuse, or transportation of the products.
•The product is damaged due to accident, disaster, natural phenomenon, or other force majeure factors.
•The product is modified, disassembled, reassembled, or repaired by unauthorized personnel.
•The product exceeds its expiration date or is not used according to the instructions.
•Damage or loss caused by factors beyond TANBead's control, such as sample quality, experimental conditions, or user error.

To obtain the service of this warranty policy, you must register with TANBead website when purchasing the product and contact us in time when you find a defect.

To claim the warranty, please contact our customer service department with the following information:

•Proof of purchase (invoice, receipt, etc.)
•Product name (model) and serial number
•Description of the problem and evidence of defect or malfunction (photos, test results, etc.)

We will provide you with instructions on how to return the products. Please do not return the products without our authorization. TANBead will bear the shipping cost of returning the product, but not any other expenses or losses.

This warranty policy is your only remedy and replaces any other express or implied warranties or conditions. In no event shall TANBead be liable for any indirect, special, incidental, or consequential damages, including but not limited to loss of profits, business interruption, data loss or other commercial losses.

We appreciate your business and hope that you are satisfied with our products. If you have any questions or concerns, please feel free to contact us at any time. Thank you for choosing TANBead! If you have any questions about our warranty services, please email to service@tanbead.com

To register your TANBead instrument for more technical support and services, please sign up an official membership of TANBead.