

Precipitor™

Affinity Magnetic Precipitation System

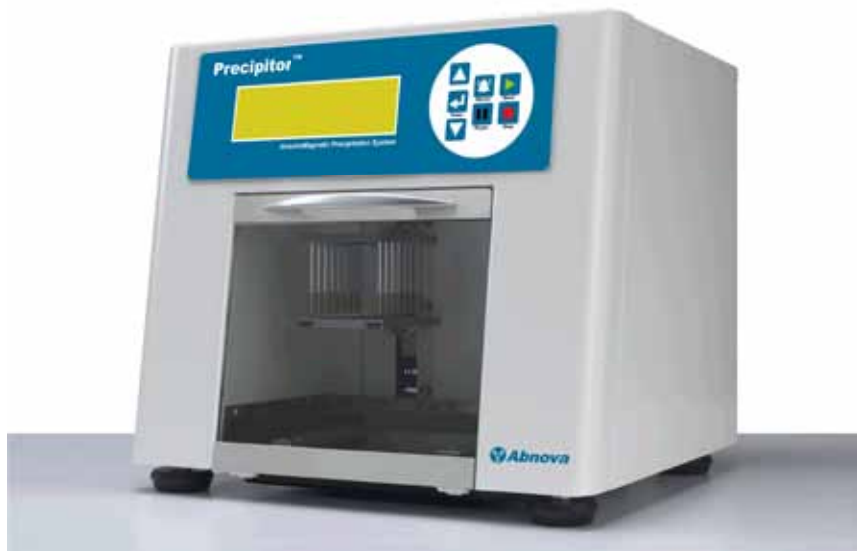


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Check List

Documents

- User manual
- Quality control checklist

Accessories

- USB to serial converter driver disc
- USB to RS-232 transmission line
- RS-232 to USB connection line
- Magnetic base

Consumables

- 2X 96 deep well plates
- 4X 8-channel strips

Safety Items



Caution!

Notice these tips below for avoiding electric shock or fire accidents.

1. Do not touch any plugs and electric switches with wet hands.
2. Turn off and unplug the machine before moving it.
3. Fasten robot before moving and delivering the machine.
4. Put the machine in a room with good ventilation. Keep more than five centimeters around the machine.
5. Hold the plug while you are pulling it out. Do not pull the electric wire directly.
6. Do not place electric wire on any subject with high temperature.
7. Do not look steadily at ultraviolet lamp while turning it on.
8. Disconnect the plug from the power source when the machine is not used.
9. Do not mend the machine by yourself. Make contact with our service center or agencies to deal with problems.

Warning

Please **remove the fixing plate inside the internal compartment before turning on the machine**. This plate was used to hold the magnetic rod set during shipping, and it has **to be REMOVED before turning on the power**. This is a very important step. If not, the instrument will experience malfunction and break.

1

Introduction

What is Precipitor™?

Abnova's Precipitor™ system is automated magnetic bead platform for high throughput precipitation and purification of proteins. Combining 96 deep well plate with affinity conjugated magnetic beads, Precipitor™ easily handles 16 different assays simultaneously by transferring beads from one well to the next for mixing, binding, washing, and elution reactions via the robotic action of parallel magnetic rods. It simplifies the routine yet labor intensive process, and addresses the needs of rigorous proteomic screening and biomarker discovery applications such as immunoprecipitation (IP, ChiP, RiP), recombinant protein purification, and protein-protein interaction. Precipitor™ delivers reproducible and consistent results by obviating the drawbacks of manual operation. Its integrated onscreen display allows easy change of parameters tailored to your experiment. Moreover, you can select from large scope of available antibodies reagents to accelerate your research!

How to perform?

The Precipitor™ uses magnetic rod to transfer magnetic beads from one to another well and strip to mix solution. By the moving up and down of strip to mix solution well, we can perform large scale immunoprecipitation or protein purification with this instrument. Besides, Precipitor™ could also get the clean nucleic acids after cells lysis, nucleic acids absorption, wash and elution.

Operation interface is simple.

There are five parts in operation interface: **Select Program Screen, Perform Temp Screen, Perform UV Lamp Screen, Perform Program Screen** and **Control Panel**. The control panel includes 7 buttons and uses LED light to indicate operator.

Heating System

The heating system can provide reagents with the best working temperatures.

All temperatures are programmed. In Perform Program Screen, "**PRESET**" is programming temperature and "**PRESENT**" is real temperature on stainless steel board.

The heating system is connected with the main power system. Switch off both of the main power and heating switch when you turn your machine off. If you are not going to start this function next time, please remember to turn it off.

There is a light on the heating switch and it will be lit up as the heating is functioning. Meanwhile, the temperature of stainless steel board will raise and please keep clear of the machine.

Precipitor™

Appearance of the Machine

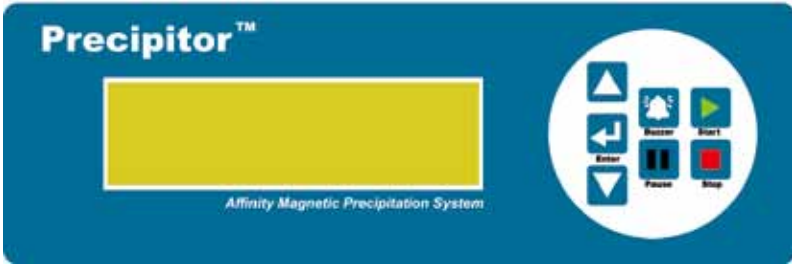
Front view



Back view



Control Panel

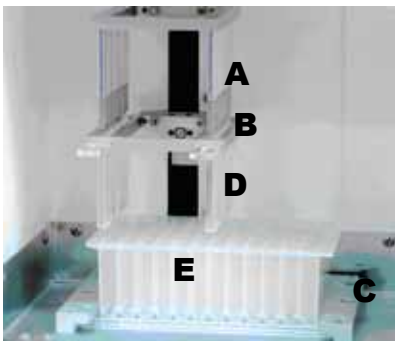


Switches and Electrical Inlet (voltage: 100~240V, fuse: 5A/250V)



- (A) Heating switch
- (B) Main power switch
- (C) USB port
- (D) Electrical inlet

Internal view



- (A) Magnetic rod frame
- (B) Strip rack frame
- (C) 96 deep well plate rack
- (D) 8-channel strip
- (E) 96 deep well plate

Introduction of the Control Panel



NOTE: LED light-up indicates users to press the button. Start bottom LED is green, and others are red.



Start: to initiate the program.



Stop: to terminate the program. It shows “STOP ?” at status row at the first time you press the button. Press the button again to confirm to stop the program. Then the robot will be back to the initiated site.



Buzzer: Press the button to turn buzzer-beater off.



Pause: It stops temporarily when you press the button. Press the button again to continue program, and the **End** time will be recalculated.



Move up: 1. Press the button to select the previous program or a number.
2. From **Perform Program Screen to Select Program Screen** .



Enter: Confirm the program or the number you select.




Move down: Press the button to select the next program or a number.

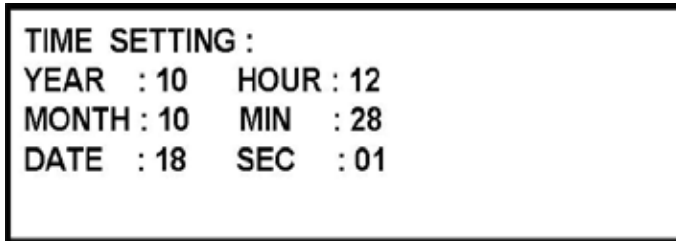
2







Introduction of LCD

I. Time Setting

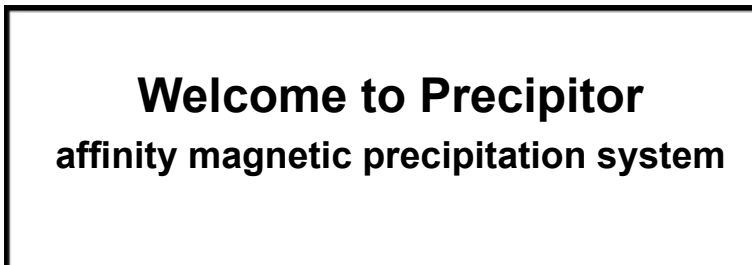
Turn on the machine after pressing the button . After 3 seconds, the screen will automatically show time setting as below.

Time Setting Screen:



Press the buttons  or  to select the key-in position. Then, press the button  to confirm it. The way to select numbers is to press the buttons  or , and change the digits from 0 to 9. Finally, press the button  to confirm the number you select. The years are started from A.D.. Insert the last two digits. For example, insert 08 for 2008 A.D. on the screen. It's 24 hour system. Please restart the machine after setting the date and the time.

II. Opening Screen



These words will show up on the screen in five seconds after turning on the power system of the machine.



III. Select Program Screen

PROGRAM NAME :	CODE : 01
00 : DEMO	SEARCH : 99
01 : DNA-BWE	
02 : DNA-W4	
03 : RNA-BWE	
04 : DNASE-I	TEMP
05 : PROTEIN	UV LAMP

Program Name : The name of the program is no more than 15 characters.

Code : It display the last program number you used. You can pre-load 100 programs, code number from 00 to 99.

Search : Insert the number of the program to select the program directly.

The way to insert digits is to press the button  or . Select the digits from 0 to 9.

Then press the button  to confirm it.

TEMP : Press the button  or  to select the TEMP, then press the button



to enter the “**Perform Temp Screen**”.

UV Lamp : Press the button  or  to select the UV Lamp, then press the



button to enter the “**Perform UV Lamp Screen**”.

IV. Perform Temp Screen









TEMP :	PROGRAM
PRESENT : 45 °C	
PRESET : 45 °C	

PRESENT : Real working temperature. (°C)

PRESET : Set temperature of bottom stainless plate, RT~65. (°C)

PROGRAM : Return to the “Select Program Screen” after turning off Heater.

Introduction of TEMP

1. Press the button  or  to select key-in position and return to “Select Program Screen”. Then press the button  to confirm it.
2. **PRESET setting:** Press the button  or  to change the digits from 00 to 70, then press the button  to confirm it.
3. **Heater ON/OFF:** Press the button  to turn on or the button  to turn off heater.

V. Perform UV Lamp Screen

UV Lamp	Program
Set Period:00:01	
Start :10:23:44	
End :10:24:44	
Status: OFF	10:23:44

Set Period : Set working time of UV Lamp. (hh : mm)

Start : Start time of UV Lamp (hh : mm : ss)









End : End time of UV Lamp (hh : mm : ss)

Status : The present status of UV Lamp (ON or OFF)

Program : Return to the “Select Program Screen” after turning off UV Lamp.

NOTE : It shows current time in the right lower corner. Time is 24-hour format

Introduction of UV Lamp

1. Press the button  or  to select key-in position and return to “**Select Program Screen**”. Then press the button  to confirm it.
2. **Time setting**: Press the button  or  to change the digits from 0 to 9, then press the button  to confirm it.
3. **UV Lamp ON/OFF**: Press the button  to turn on or the button  to turn off UV Lamp.

VI. Perform Program Screen

PROGRAM NAME :	CODE : 01
00 : DEMO	SEARCH : 99
01 : DNA-BWE	
02 : DNA-W4	
03 : RNA-BWE	
04 : DNASE-I	TEMP
05 : PROTEIN	UV LAMP

PROGRAM : It shows the name of program.

PRESENT(°C) : Real working temperature. It shows “**NC**”, when there is no connection with thermal couple.

PRESET(°C) : Preset working temperature. It shows “**NA**”, when there is no preset input.

STATUS : It shows the machine being what kind of status.

END : The program is finished.

RUNNING : The program is progressing.

PAUSE : To make a short stop.

HOME : Go to the initial site.

STOP? : Do you want to stop program?

JOG : To move robot slowly.


LIMIT : The site of robot is out off the limited range.

SENSOR : It is fault to detect the initial site.

TEMP MAX : Real temperature is higher than over-temperature protection. (80°C)


TEMP ALM : It can not be reached preset temperature in a reasonable period. (30min)

NOTE : (1) If it shows **LIMIT** or **SENSOR**, it means the machine is out of order. And

buzzer will keep on ringing. Press the button  to stop the buzzer. Turn

the power system off, and notify our service center to deal with problem.

(2) If it shows **TEMP MAX** or **TEMP ALM**, it means heating system is out of order. And

buzzer will keep on ringing. Press the button  to stop the buzzer. Turn heating switch off, and notify our service center to deal with problem.

VOLUME : The buffer volume in the well (μl)

MIXING : The working time of strip(minute)

COLLECT : The working time of magnetic rod(second)

VAPOR : The time for waiting reaction or alcohol vaporization (mm:ss)

START : Start time of program(hh:mm:ss)

END : End time of program(hh:mm:ss)

NOTE : It shows current time in the right upper corner. Time is 24-hour format.

VII. Introduction of control panel

How to select a program

1. Press the buttons of  or  to select the program. Please refer to the picture below.




PROGRAM NAME :	CODE : 01
00 : DEMO	SEARCH : 99
01 : DNA-BWE	
02 : DNA-W4	
03 : RNA-BWE	
04 : DNASE-I	TEMP
05 : PROTEIN	UV LAMP

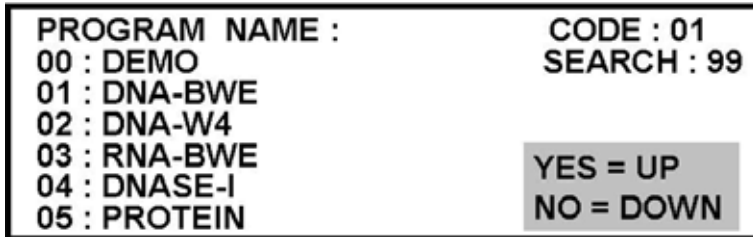
Continue pressing the button  . It will change to the next program.



2. Input the number of the program at **SEARCH** position, and it will show the program directly.


PROGRAM NAME :	CODE : 01
00 : DEMO	SEARCH : 99
01 : DNA-BWE	
02 : DNA-W4	
03 : RNA-BWE	
04 : DNASE-I	TEMP
05 : PROTEIN	UV LAMP

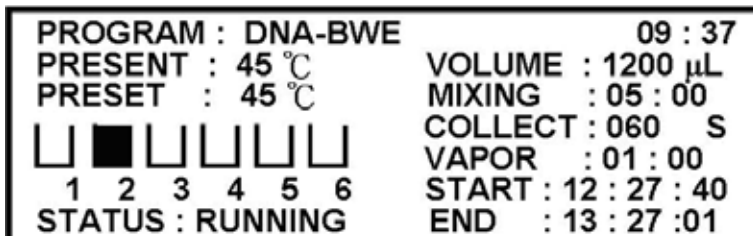
How to start the program

- After selecting the program, press the button . And it will show message in the right lower corner as **YES=UP** and **NO=Down**. Please press the buttons of  or  to confirm the program. Please refer to the picture as below:



- Press the button  to run the selection program, and then go to “Perform Program Screen”. Press the button  to return to “Select Program Screen”.


- After entering “Perform Program Screen”, press the button  to execute the program.




NOTE: Confirm two things below before you start the program.


- Did you put 96 deep well plate toward outside by bevel and push it to the bottom of plate rack?
- Did you put 8-channel strip to the bottom of strip rack?

How to PAUSE


1. If you press the button  in the process of executing program, the execution will be paused immediately. The robot will stop working and move back to the top. Meanwhile, other buttons will be unworkable.


NOTE: In **Collect** step, the robot can not be stopped immediately. It will pause after finishing the collect action. And the magnetic rod and strip will move back to the top together.


2. Press the button  again will continue running the program.

NOTE: If you press the button  in this stage, the program will be stopped and finished. The robot will go back to the initial site.


How to STOP


1. Press the button  in the process of executing program, the execution will be stopped immediately. The robot will stop working immediately and it shows "STOP?" at status row.

Press the button  again to confirm terminating the program and the robot will go back to the initial site. If you don't want to terminate the program, press

the button  to continue running the program.

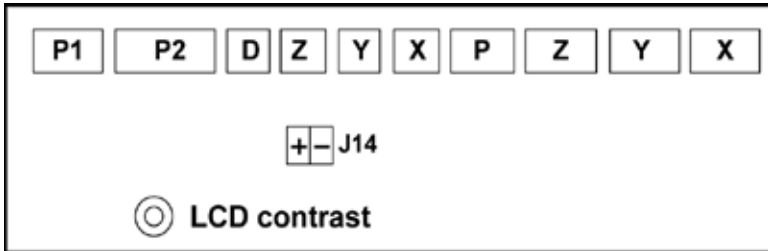
NOTE: In **Collect** step, the robot can not be stopped immediately. It will stop after finishing the collect action. And the magnetic rod and strip will move back to the top together.

2.  the same as emergency button.

3. Another function of  button is to move the robot back to the initial site.

3

The picture of wiring at the back of controller



White 4PIN outlet connecting to stepping motor

White 2PIN outlet connecting to DC 24V

Black 3PIN outlet (X, Y, Z) connecting to 3-axis zero sensor

Black 3PIN outlet (D) connecting to emergency door

⊙ It means variable electric resistance.

Green 2PIN outlet (J14) connecting to thermocouple

P1 : 9PIN outlet is the usage of transmitting program.

P2 : 26PIN outlet connecting to UV lamp, heater and cooler.

LCD contrast : tune the contrast of LCD

4

I/O Chart

Input	6 points	Output	4 points
X01	X-axis zero sensor	Y01	UV lamp
X02	Strip zero sensor	Y02	Buzzer
X03	Rod zero sensor	Y03	Cool
X04	Safety door sensor	Y04	Heat
X05	Reserve		
X06	Reserve		



Troubleshooting guide

Problems	Suggestions
It displays nothing on the screen.	<p>Did you turn on the power system already?</p> <p>Did the plug connect with the power system?</p> <p>Measure the voltage of outlet.</p>
Noises from the machine.	<p>Check the strip to see if it has been pushed into the bottom of strip rack.</p> <p>Check the plate to see if it has been pushed into the bottom of plate rack.</p> <p>Contact service center: 886-2-87511888.</p>
<p>The action of the magnetic rod frame doesn't work normally.</p> <p>It doesn't move down or move up.</p>	<p>Please make sure the fixing plate is removed before turning on the power.</p> <p>Press the button "Stop" to terminate the program. Then, press the button "Stop" again to let the robot move back to the initial site.</p> <p>Run DEMO program without 96 deep well plate. Check the magnetic rod frame to see if it still is abnormal.</p> <p>Contact service center: 886-2-87511888.</p>
<p>The function of heating is abnormal.</p> <p>The temperature doesn't increase.</p>	<p>Check the heating switch to see if it has been turned on.</p> <p>Contact service center: 886-2-87511888.</p>
Stain on the magnetic rod.	<p>Be sure to put a clean strip on the strip rack whenever you operate it. Avoid to be stained by the remaining reagents in the 96 deep well plate.</p> <p>Use clean and moisten cotton cloth or wet tissues to wipe it out carefully. Do not use any solvent or cleanser to clean it.</p>
The magnetic rod comes off the magnetic rod frame.	Contact service center: 886-2-87511888.

6

Specification

Product Name	Precipitor™
Width(cm)	33
Height(cm)	31
Length(cm)	35
Weight(Kg)	16
Power (V)	100-240
Current (A)	max. 2
Operating temperature (°C)	RT-65
Humidity Range (%)	<80



Program import / export

1. Accessory

- 1.1 AutoMag.rar file (**AutoMag 2.0**)
- 1.2 USB to serial converter driver disc
- 1.3 USB to RS-232 transmission line
- 1.4 RS-232 to USB connection line

2. Install AutoMag software

- 2.1 Copy AutoMag.rar to your computer and extract it.
- 2.2 If you don't have any software for extraction, please contact your dealer to obtain AutoMag file.
- 2.3 You can run AutoMag software by executing the **AutoMag** in file.
- 2.4 Key in password to start the software. The original password is "0". You could rebuild another set of new password, but no more than 6 Arabic numerals.

3. Transmit AutoMag program

- 3.1 RS-232 transmission line can be connected to the RS232 port of PC. The preset port is COM1
- 3.2 For portable computer without RS-232 port, you should connect RS232 transmission line to USB connection line then connect to USB port. Please install USB to serial converter driver.

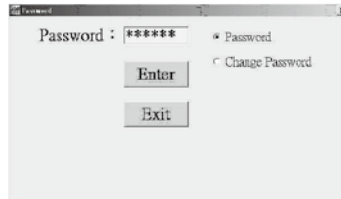
If your computer is using the latest operating system, you can download new USB to Serial converter driver form www.prolific.com.tw.

NOTE: Before using the AutoMag program, change the communication port firstly. The used USB port can be checked in **control/system/device manage/port**.

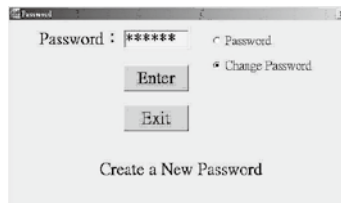
8

AutoMag software

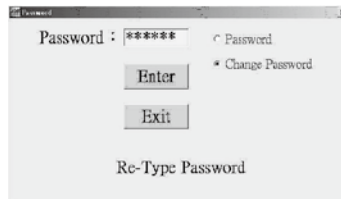
1-1 key in your password
(6 digits at most)




1-2 change your password



1-3 confirm your password



1-4 Protocol Edit window:



Step	Well	Mixing (M)	Collect (S)	Rod	Mixing Speed	Volume	Pause	Vapor (M)
01	2	1	50	CN	Medium	800	OFF	0
02	1	10	50	CN	Medium	500	OFF	0
03	2	3	50	CN	Medium	800	OFF	0
04	3	2	50	CN	Medium	800	OFF	0
05	4	2	50	CN	Medium	800	OFF	10
06	6	10	80	CN	Medium	150	OFF	0
07	4	1	0	OFF	Medium	800	OFF	0
08	0	0	0	OFF	Medium	0	OFF	0
09								
10								
11								
12								
13								
14								

2. Instruction of keys

- File:** New- open a new file
- Open- open an old file
- Save- Save a file
- End- close the file

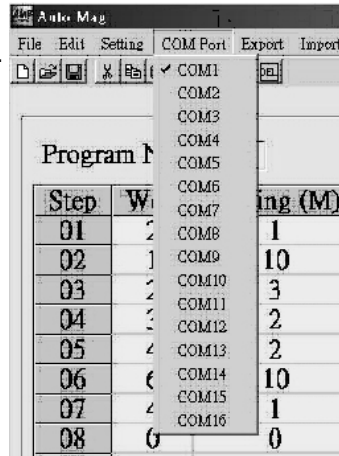


- Edit:** Cut
- Copy
- Paste
- Move up
- Move down
- Insert
- Delete



COM Port:

- Choose a COM port. There 16 COM ports.
- COM1 is a preset port.
- Reset a new COM port. The program can record it so that you won't have to set it again when using it.

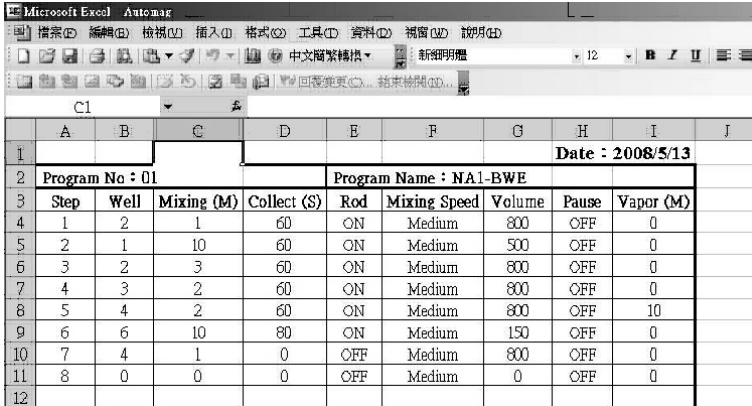


NOTE: The used USB port can be checked in control/system/device manage/port.

Export: Export the program from a computer to a machine.


Import: Import the program from a machine to a computer.


Excel: Transfer the program data to Excel. Use Excel software to print the program data.





Date : 2008/5/13									
Program No : 01				Program Name : NA1-BWE					
Step	Well	Mixing (M)	Collect (S)	Rod	Mixing Speed	Volume	Pause	Vapor (M)	
1	2	1	60	ON	Medium	800	OFF	0	
5	2	1	10	60	ON	Medium	500	OFF	0
6	3	2	3	60	ON	Medium	800	OFF	0
7	4	3	2	60	ON	Medium	800	OFF	0
8	5	4	2	60	ON	Medium	800	OFF	10
9	6	6	10	80	ON	Medium	150	OFF	0
10	7	4	1	0	OFF	Medium	800	OFF	0
11	8	0	0	0	OFF	Medium	0	OFF	0

3. Instruction of the usage and the function of icons in the software


3.1 Open a new file 

3.2 Open an old file 

3.3 Save a file 

3.4 Cut 

When you select a certain row, you could cut off a whole row of data. However, if you highlight a certain cell, all you could cut is the data in the field length that you mark.


3.5 Copy 


Select a certain row, click  to copy a whole row.

However, if you highlight a certain row, you could copy all the data in the field length.


3.6 Paste 

After the actions mentioned above, move to the position that you are going to paste.


Click  to paste a whole row of data on the right position.

3.7 Move up 

Move up a whole row of data.

3.8 Move down 

Move down a whole row of data.

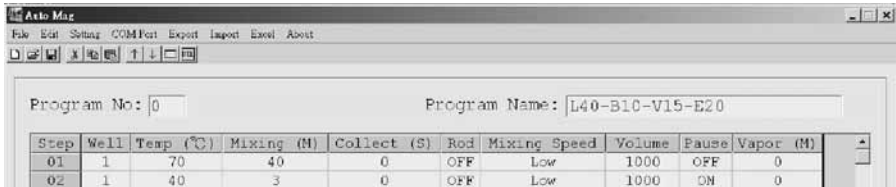
3.9 Insert 

Insert a row of blank space.

3.10 Delete 

You could delete a whole row of data when you select a certain row. However, if you highlight a certain cell, all you could delete is the data in the field length.

4. Introduction of program parameters



4.1 Introduction of the names

Program No: You could set 100 programs at most; it could be from 00–99.

Use serial numbers as the names of files when you store files.

Program Name: 15 characters at most. Only letters of the alphabet and Arabic numerals.

Step: You could set 40 steps at most in a program; it could be from 01–40.

NOTE: It represent the end of program if input “0” or none in Well parameter.

Well: The maximum working well is 6 wells per program. Please refer to the picture of 96 deep well plate. The first group is from column #1 to #6; the second group is from column #7 to #12.

	1	2	3	4	5	6	7	8	9	10	11	12
A												
B												
C												
D												
E												
F												
G												
H												

Temp (°C): working temperature of bottom stainless plate

Input numeral from RT to 65. The unit is °C. If you input “100”, it will show “NA” to turn off heating system.

Mixing (M): working time of strip

The time that you use strip to mix solution is based on minutes.
99 minutes is the maximum.

Collect (S): working time of magnetic rod

The time that you use magnetic rod to collect magnetic beads is based on seconds. 999 seconds is the maximum.

NOTE: It takes 30 seconds to move the magnetic rod reaching the lowest position. Therefore, do not set collect time less than 30 seconds.

Rod: Used magnetic rod or not.

Key in “1” means OFF; key in “2” means ON.

OFF: Magnetic rods stay.

ON: Magnetic rods move down to collect magnetic beads.

Mixing Speed: the mixing speed of strip. There are four kinds of speed in the program. Use them to control mixing speed.

Key in “1” means the **highest** speed.

Key in “2” means the **medium** speed.

Key in “3” means the **slow** speed.

Key in “4” means the **slowest** speed.

Volume: the volume of solution in well

Input numeral from 0 to 1200. The unit is μl .

The working range of strip will be accord to the volume high.

NOTE: It is recommended to use solution volume no more than 1000µl.
It may cause cross contaminations over the volume of 1000µl.


Pause: short stop after finishing the step

Key in “1” means OFF; key in “2” means ON.

ON : It will stop after finishing this step.

OFF : It will not stop after finishing this step.

NOTE: When you pause, the robot will remain the same action and move to the top and the buzzer will ringing at the same time.

Stop buzzer: Please press the button  to stop buzz.

Stop pause: Press the button  to continue the program.

Vapor (M): The time to waiting reaction or alcohol vaporization.

After finishing this step, it will stop to wait reaction or alcohol vaporization.

Input numeral from 0 to 99. The unit is **minute**.

99 minutes is the maximum.

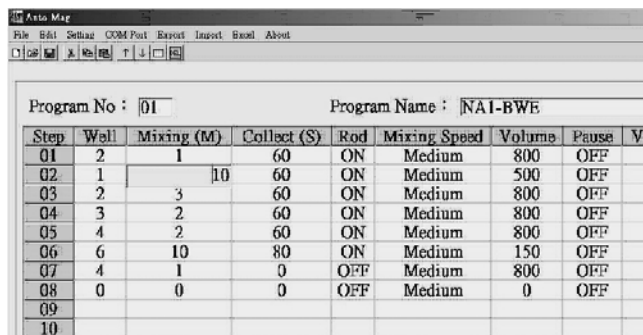
NOTE: It is recommended to set the time more than 5 minutes for vapor alcohol.

5. When you use the AutoMag software, please pay attention to the matter below

5.1 You could use the mouse or the keyboard to move the cursor.

a. If you use the mouse, you could move the cursor to the place that you edit, and then click left key of mouse.

b. If you use the keyboard, you could move the cursor to the place that you edit, and then click “Enter”.



The screenshot shows the AutoMag software interface. At the top, there is a menu bar with options: File, Edit, Settings, COM Port, Export, Import, Reset, About. Below the menu bar is a toolbar with various icons. The main window displays the following information:

Program No : 01 Program Name : NA1-BWF

Step	Well	Mixing (M)	Collect (S)	Rod	Mixing Speed	Volume	Pause	Ve
01	2	1	60	ON	Medium	800	OFF	
02	1	10	60	ON	Medium	500	OFF	
03	2	3	60	ON	Medium	800	OFF	
04	3	2	60	ON	Medium	800	OFF	
05	4	2	60	ON	Medium	800	OFF	
06	6	10	80	ON	Medium	150	OFF	
07	4	1	0	OFF	Medium	800	OFF	
08	0	0	0	OFF	Medium	0	OFF	
09								
10								

5.2 Key in “**Well Number**” first then you can key in other parameters for step setting.

5.3 Key in every “**STEP**” serially, you couldn’t skip any of them.

5.4 If digits in the blue check are over the required number, please press the key “**Backspace**” to delete the digits.

5.5 When program-setting is done, press the key “**Enter**” to make confirm. If you want to cancel it, press the key “**Esc**”. After pressing the key “**Enter**”, the blue check will disappear, and it will appear a check with dotted lines. You could move the dotted-line check to the next place that you want to edit and press the key “**Enter**” to edit again.

5.6 Transmit program

If you want to transmit the program from a computer to a machine, please save the program first, and then key in the number of the program that you are going to transmit. After that, click “**Export**”. If it is transmitted normally, a word “**Success**” will appear in the lower left corner.

If it is transmitted incorrectly, a word “**Fault**” will appear; if you see “**File:#.xgp Not Find.**”, it means that the program hasn’t been saved.

Before you transmit the program, please switch on the power system of the machine.

You could transmit more than one programs simultaneously at the same time.

Click “**Import**” to transmit one program from a machine to a computer according to your key in number of the program.

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