

LabTurbo

AIO AIO 24 SP-qPCR AUTOMATION SYSTEM

ALL IN ONE FOR FULLY AUTOMATED DNA/RNA EXTRACTION & QPCR

USER MANUAL

AIO2410 / AIO2420

2020-10-V02

www.labturbo.com



CE IVD



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REVISION

Version	Revision Date
02	October, 2020

PRODUCT NAME

LabTurbo AIO 24 SP-qPCR Automation System

PREFACE

1.1 Intended Use

LabTurbo AIO 24 SP-qPCR Automation System is a fully integrated system providing a non-stop automation of DNA / RNA extraction and qPCR. During qPCR program running, this system can perform the extraction at the same time. This system has four channels, which can increase the throughput of detection.

1.2 Purpose of this manual

This operation manual is written for laboratory personnel and researchers who conduct automated sampling, DNA/RNA extraction, PCR setup, and qPCR using LabTurbo 24 AIO SP-qPCR Automation System.

1.3 Simple workflow for using LabTurbo AIO SP-qPCR System

1. Turn on the machine, then click the **LabTurbo AIO** icon on the desktop to launch the system software.
2. Select the sample numbers and choose the program, then click “**Next**”.
3. Follow the worktable loading check instruction and make sure each consumable is placed correctly, then click “**Next**”
4. Close the safety door. Press “**Start**”.
5. When the program finishes, the Ct results will display on the monitor and can be exported.

PRINCIPLES OF MEASUREMENT

LabTurbo AIO SP-qPCR System originated from an automated membrane-based nucleic acid isolation system. LabTurbo AIO SP-qPCR System integrates the nucleic acid extraction, reaction setup, RT-qPCR, and Ct report procedure.

2.1 Sample Extraction

The purpose of sample preparation is to extract and concentrate nucleic acid, to make the target accessible for amplification. This process is accomplished by LabTurbo AIO, an automated sample preparation system designed to use membrane column vacuum technology for the purification of nucleic acids from samples.

2.2 Amplification

During the amplification/detection reaction on LabTurbo AIO, the target nucleic acids is amplified by the Polymerase in the presence of deoxynucleotide triphosphates (dNTPs) and magnesium. During each round of thermal cycling, amplification products dissociate to single strands at high temperature, allowing primer annealing and extension as the temperature is lowered. Exponential amplification of the target is achieved through repeated cycling between high and lower temperatures.

2.3 Detection

The presence of the target nucleic acids amplification products is detected during the extension/anneal step by measuring the fluorescence of the target nucleic acids probe that binds to the target during the extension/anneal step. The amplification cycle at which fluorescent signal is detected by LabTurbo AIO is inversely proportional to the log of the target nucleic acids concentration present in the original sample.

2.4 Result

A negative control, a low positive control, and a high positive control are included in each run to evaluate run validity. The lot specific values must be entered into the test order when a run is performed. Results obtained with this system must be interpreted in conjunction with other clinical or laboratory data.

SPECIFICATION

Product Name	LabTurbo AIO 24 SP-qPCR Automation System
Model	A2410 / A2420
Size & Weight	107 cm (W) X 66 cm (D) X 97 cm (H)/250 Kg
Input Voltage/ Frequency /Watt	110-120 (220-240)V/ 50-60Hz /1500 W
Pollution Degree	Pollution Degree 2
Altitude	Up to 2000 m
Operation Environment	20~30°C, 50 +/- 5% RH
Storage & Transportation Environment	15~45°C, 50 +/- 20% RH
Sound level data	56 dB

INSTALLATION

The LabTurbo AIO 24 SP-PCR Automation System is responsible for product packaging, unpacking, positioning and function confirmation by our technicians.

Users should not handle it by themselves.

SAFETY PRECAUTIONS

This manual contains information and warnings that must be followed by the user to ensure safe operation of the LabTurbo workstation and to maintain the instrument in a safe condition. Potential hazards that may harm the users or result in damage to the instrument are clearly stated at the appropriate places throughout this manual.

The following signs are used to warn the users against:



WARNING: Ignoring this symbol could be potentially lethal.



CAUTION: Ignoring this symbol may lead to physical injury and/or damage to the machine or hardware options.

3.1 Normal use



WARNING: Improper use of the LabTurbo system may cause personal injuries and/or damage to the instrument. The use of the machine should be under the instruction of trained technical staff. Qualified personnel should follow the manual to operate the device.



WARNING: It is mandatory that suitable protective equipment must be worn at all times when using the machine. The machine should be turned off when cleaning,

repairing, or lubricating.

 CAUTION: In case of emergency, push the Emergency Stop Button located on the front of the device to switch off the power.

 CAUTION: We strongly recommend the users to use accessories and disposables of LabTurbo 24 AIO SP-qPCR Automation System. Non-LabTurbo accessories and disposables may result in damages of the instrument.

 CAUTION: Please do not eat, drink, smoke, apply cosmetics, or handle contact lenses near the machine. Wash hands thoroughly after handling samples and reagents.

3.2 Equipment assembling, carrying, and positioning requirements

 CAUTION: LabTurbo 24 AIO SP-qPCR Automation System is a device manufactured and assembled in the certified factory. There are no special requirements for the installation of the device. While carrying the machine, make sure the passageways are clear of all obstructions. Instruction must be received prior to any lifting applied.

 CAUTION: The device should be placed and anchored securely on a sturdy pedestal or platform. Fix the robotic arm before moving the machine.

3.3 Ventilation requirement

 **CAUTION:** This device is equipped with a ventilation fan that allows the air to circulate and removes stale air. Therefore, no additional environmental measurements are required, but at least 15 cm of space must be left behind.

3.4 Additional equipment positioning requirements

 **WARNING:** The main power cord of the device is on the right side of the equipment. Be sure to keep the right side of the device at least 15 cm from the wall or other obstacles.

3.5 Explanation of safety marks on the equipment

All of the signs on the equipment are marked according to the standard of IEC/EN/UL 61010.

3.6 Biological safety

 **WARNING:** Assorted biological solutions and specimens from humans or animals should be treated as potentially infectious. The users must strictly follow waste disposal guidelines or consult the safety officer with regard to an appropriate method for disinfection.

 **WARNING:** Handle potentially-biohazardous samples with the greatest care and in accordance with the required safety regulations. Wear glove when operating the machine.

 **WARNING:** Used plastic wares, such as filtered tip and Eppendorf tubes, may have caustic chemicals or biohazardous reagents remained. Such waste and disposals must be properly collected and disposed in accordance with the local safety regulations.

3.7 Mechanical hazard

 **WARNING:** This machine has a safety door. Once the power of LabTurbo 24 AIO SP-qPCR Automation System is on, the user should not stretch into the workstation under any situations.

3.8 Heat hazard

 **WARNING:** The Thermoblock of LabTurbo 24 AIO SP-qPCR Automation System can heat up to 80 °C. Be aware of it when the heating step is undergoing. It is not allowed to use the Thermoblock with volatile or flammable liquids.

 **WARNING:** The maximum continuous operating time of the vacuum pump is 10 minutes to avoid overheating.

3.9 Electrical hazard

 **WARNING:** Modification to any electrical components (wires, cables, circuit boards, etc.) of LabTurbo 24 AIO SP-qPCR Automation System by unauthorized personnel is prohibited.

3.10 UV Light hazard



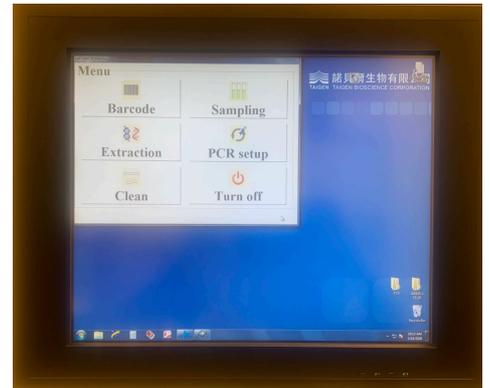
CAUTION: When using a UV lamp, do not open the door and need to wear goggles.

EXTERNAL FEATURE

The LabTurbo 24 AIO SP-qPCR Automation System is a fully integrated system providing a non-stop automation of nucleic acid extraction, PCR setup, qPCR to report with one-click in one compact, machinery box. The externals of the main workstation consist of several parts, including a built-in touch screen, a safety door, a power button, a side ports, four machine feet with wheels, a pump system, a waste bottle, and an emergency stop button.

4.1 Built-in touch screen

The sensitive built-in touch screen is on the top front of the machine. This control panel equips with Windows user interface. Once the panel is turned on, the LabTurbo program will be activated, and users can select the desired protocol to start. An included stylus is the accessory of the touch panel.



USB SPEC : USB2.0 , 5V/0.5A

4.2 Safety door

The main workstation of LabTurbo 24 AIO SP-qPCR Automation System has a safety door to form a closed cabinet. This protects users from being exposed to any risks or dangers when the machine is up and running. It also isolates the worktable from the external environment, reducing the possibility of contamination. If the safety door is opened while the machine is functioning, the machine will pause.



4.3 Power

The red power switch is on the front of the workstation. Press the red button to turn on the workstation and directly enter the LabTurbo program. To turn off the system, exit the LabTurbo program and then press the power button directly.



4.4 Automatic reagent feeder

Four automatic reagent feeders are located on the inner side of the safety door. They are the buffer supply for the buffer tanks on the worktable. The buffer from the left to the right is DLL/VLL, CCEB, EtOH and LW1.

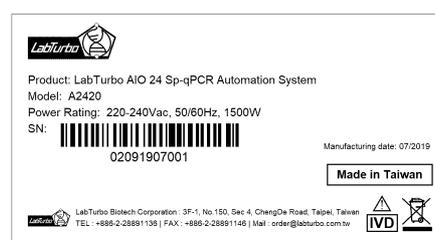


Note : Buffer label may vary from actual condition

Note : All four reagents must be used within the shelf life.

4.5 Label

The label consists of the product name, model, and power rating. The serial number with the barcode and the manufacturing date of the product are also included.



The product serial number is marked as follows :

□□※※◎◎ * * ○○○

□□Voltage code : 01 : 110V , 02 : 220V

※※Backup code

◎◎The last two digit of C.E. when assembling :

* * Month of assembling date: 01-12

○○○Assembling serial number

4.6 Side panel

The side panel is located on the front/back façade of the machine. It contains the following:

A. **LAN Control** is for Internet connection or the remote control.

B. **110/220Vac** and **ON/OFF** are the main power switch and the power cord socket.

Power source : 110/220Vac, Branch circuit : 20A

Note : This product must be grounded and use the supplied Power Cord.

Note : This switch is a Disconnect device. Turn it to OFF to turn off the main power.



4.7 Machine feet with wheels

There are wheels attached on the machine feet with height adjustment function. Manage the level of the workstation by adjusting the height of the machine feet. Wheels are only for short distance movement of the machine on the table instead of transporting on the ground.



4.8 Emergency Stop Button

This button is used for emergency situation. Push the button to cut the machine power off.

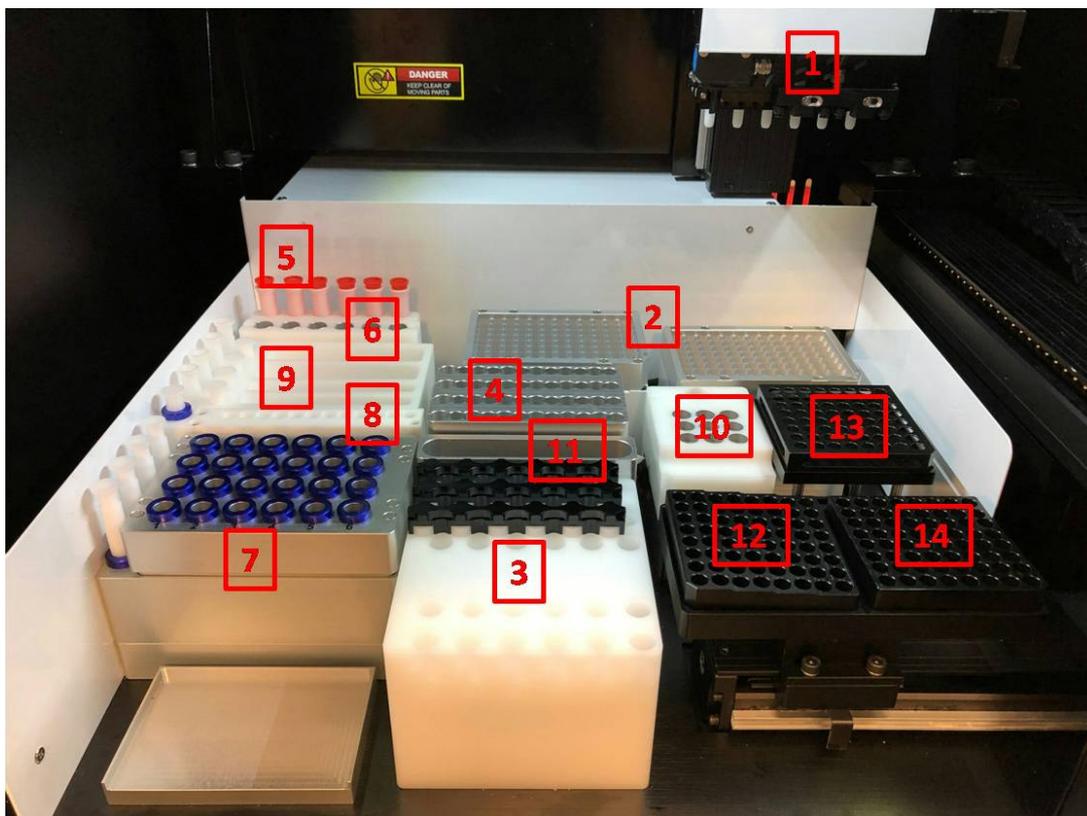


4.9 Waste system

The waste system includes a **Waste bottle** and a **Trash can**. The waste bottle is for major waste collection during binding, washing, and cleaning steps with liquid level detection function.



WORKTABLE UNITS



(1)Robotic arm (2)96-well Tip rack (3)Binding-washing vacuum manifold (4) Sample lysis thermoblock (5)Plug tube rack (6)HCCEB tube rack (7)Elution vacuum manifold (8)Reuse tip rack (9) Buffer tank (10)Proteinase K tube rack and PCR component rack (11)Tip disposal vent (12)8-strip PCR tube rack (13)8-strip PCR tube cover rack (14) 8-strip PCR tube cap rack

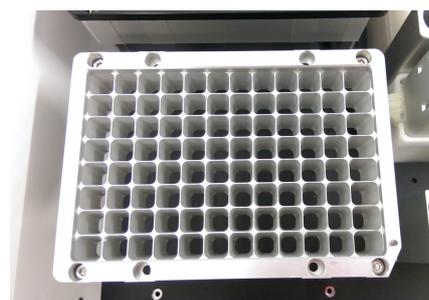
5.1 Robotic arm

Robotic arm includes six channel pipettes and ultrasonic sensor. Pipettes are equipped with 6 syringes and has adjustable tip spacing (9 mm and 18 mm), suitable for liquid transfer between micro-centrifuge tubes and PCR tubes. The working volume of the pipette is 5 - 1000 μL . The ultrasonic fluid sensor detects any clogged membrane and checks buffer is enough for the extraction.



5.2 96 well Tip rack

Two 96-well tip racks are for 96-well plate tips, which can be 1100 μL tip for extraction and PCR setup. The metal pin on the lower right of the rack top is a fool-proof design for mounting the tip plates.



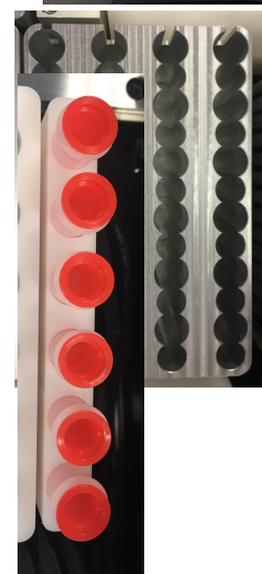
5.3 Binding-washing vacuum manifold

Both binding and washing steps are performed here. This is the unit for applying spin column adapters, spin columns, and vacuum plugs.



5.4 Sample lysis thermoblock

The Sample lysis thermoblock is the 24 - well block for sample lysis and drying column. It can heat up to 80°C for heat incubation.



5.5 Plug tube rack

The plug tube rack is to accommodate six plug tubes.

5.6 HCCEB tube rack

The 2.0 mL 6-strip tube is placed in the rack with hot column clean elution buffer inside.



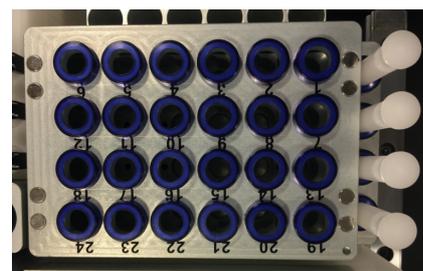
5.7 Primary tube rack

Different types of blood tube can be used in here. The machine can transfer the sample in a primary tube to LabTurbo 6-Strip sample tube.



5.8 Elution vacuum manifold

This unit is for 24 product elution. Four airlocks located on the left side of the elution block are used to control each elution row. A plastic handrail with magnets comes with the metal cover of the elution block for convenient handling of the cover.



5.9 Reuse tip rack

Reusable tips for wash buffer and ethanol are placed on the reuse tip rack.



5.10 Buffer tank

Four buffer tanks are for lysis buffer, EtOH, washing buffer, and elution buffer. All buffer tanks are connected to automatic reagent system.

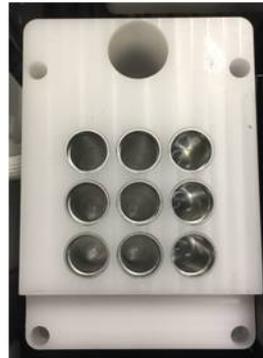


Note : EtOH and LW1 are up to 7 – 75 mL

5.11 Proteinase K tube rack and PCR component rack

The rack is for screw-capped tube of enzyme proteinase K, PCR master mix, primer, H₂O and PCR standard. Note : every component should be load into 2 mL screw tube.

Note : Reagents must be used within the shelf life.



5.12 Tip disposal vent

The tip disposal vent is the place for disposal of tips and consumables.



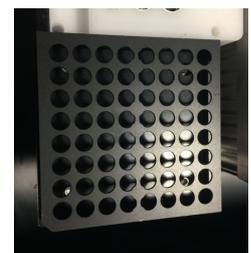
5.13 8-strip PCR tube rack

This plate is a place for 8-strip PCR tube. This palte will move to PCR reaction chamber during PCR reaction.



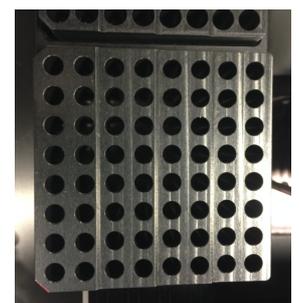
5.14 8-strip PCR tube cover rack

This cover will transfer from its original site to PCR plate during PCR setup.



5.15 8-strip PCR tube cap rack

This plate is a place for 8-strip PCR tube cap.



ACCESORIES

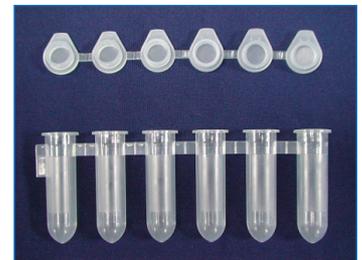
6.1 Elution tube

1.5 mL eppendorfs are placed on the **Elution vacuum manifold** for elution product collection.



6.2 Sample tube

6-strip sample tubes are placed on the **Sample lysis thermoblock**. The 6-strip caps can be used for sample preservation in the 6-strip tubes.



6.3 Column set

The column set consists of spin columns and 6-strip spin column adapters, which is placed on the **Binding-washing vacuum manifold** for genomic DNA/RNA and viral DNA/RNA extractions.



6.4 Plug tube combination

Six orange plug tubes are analogical to the column set and are mounted on the **Binding-washing vacuum manifold** to secure vacuum pressure during vacuum application.



6.5 PCR tube and PCR tube cap

Unique 8-strip PCR tube should be used within LabTurbo AIO SP-qPCR System. During the program, the machine will cover the tube with the 8-strip cap automatically.



6.6 2.0 mL screw-capped tube

Every component for qPCR should be load into 2.0 mL screw-capped tubes. The machine will transfer the buffer systematically.



SOFTWARE INTERFACE AND OPERATION

Main menu

After machine startup, click the LabTurbo 24 AIO icon on the desktop to launch the main menu page. The main menu includes the options of all LabTurbo functions.

Users can easily select the desired function to start the operation.

Barcode: for reagent barcode tracking and documentation.

Sampling: for transferring sample from primary tubes to 6-strip sample tubes.

Extraction: for nucleic acid extraction and qPCR procedure.

PCR setup: for PCR setup, or sample transferring.

Clean: for machine maintenance and UV sterilization.

Turn off: for turning off the machine.



7.1 Barcode(Barcode reader should be bought from the user)

1. For reagent valid period recording, select Barcode.
2. Please scan the barcode on **reagent bottle first** and then scan the barcode on the associated buffer reservoir. Once they are matched, the screen will display the color and position to help users recognize the correct reagent reservoir. It also records the **refilling date, reagent lot number, kit lot number and extraction kit expiration date**. Repeat the steps to refill all buffers for extraction.



LabTurbo_48 Compact

Barcode Reading

Input the Bottle Barcode: Keyboard

DLL	LTL	CCEB	ETOH	LW1	PK
11/15/2013	11/15/2013	11/15/2013	11/15/2013	11/15/2013	10/24/2013
485136263444	487020031201	483355111101	482111011203	481136263604	486 not in use

Kit Lot No: 48074011412
Exp.-Date(MM/YYYY): 12/2015

New **Save** **Back**

LabTurbo_48 Compact

Barcode Reading

Input the Bottle Barcode: Keyboard

DLL	LTL	CCEB	ETOH	LW1	PK
11/15/2013	11/15/2013	11/15/2013	11/15/2013	12/18/2013	10/24/2013
485136263444	487020031201	483355111101	482111011203	481139287686	486 not in use

Kit Lot No: 48074011412
Exp.-Date(MM/YYYY): 12/2015

New **Save** **Back**

3. The

reagent barcode information is automatically saved in the system. To obtain an independent reagent barcode documentation file, please select **Save** to export the data as **txt file**.

LabTurbo_48 Compact

Barcode Reading

Choose your extraction protocol:

- LGD3-In500-E100-V7.0E
- fff HV-LGD3-In500-E100-V7.0E.pro
- HV-LGD3-In500-E100-V7.0E.pro
- HV-LVN1-In600-E60-V6.9E.pro
- LGD3-In500-E100-V7.0E.pro
- Sampling-SD-220ul.pro
- test HV-LGD3-In500-E100-V7.0E.pro
- test WS-LGD1-In220-E100-V7.4E.pro
- W5-LGD1-In220-E100-V7.4E.pro
- XXX-LGD3-In300-E100-V7.0E.pro
- yyuh LGD3-In500-E100-V7.0E.pro

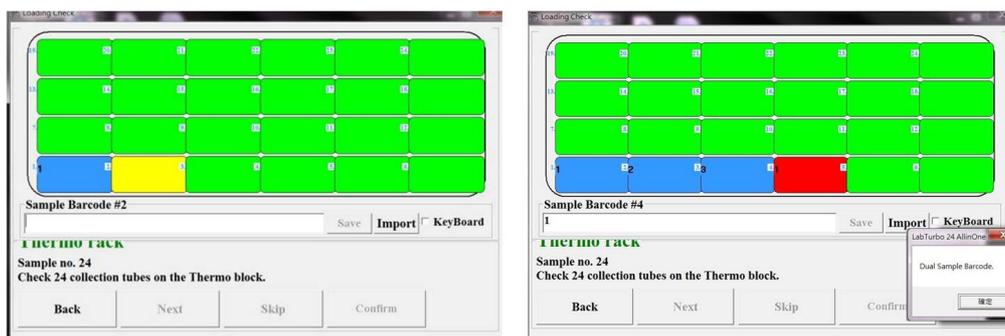
Save in: c: [XP Embe...]

Kit Lot No: 48074011412
Exp.-Date(MM/YYYY): 12/2015

New **Save** **Back**

7.2 Sampling

1. Select Sampling to transfer samples from primary tubes to sample lysis thermoblock.
2. Select “Sensor Detection” for using ultrasonic to detect the liquid level of primary tubes and aspirate the sample with top-down motions. Select “Equal Level” for aspirating the sample from the fixed level of each tube. Username or adapter name can be keyed in by using keyboard or barcode scanning.
3. Put primary tubes in the machine and select the input sample number and protocol, then click **Next**.
4. A loading check window will pop up. Follow the instruction on the window to set up the worktable. For sample barcode documentation function, click “Barcode”.
5. Use the barcode reader to scan the barcode on each primary tube. The barcode will be automatically entered and show on the screen. Follow the highlight in **yellow** to scan the barcode on the associated primary tube. Once barcode is entered, it will be marked in **blue**. If a duplicated barcode is keyed in, it will be marked in **red**. To modify the barcode data, select the barcode to be modified and key in the correct barcode.



6. Once all barcodes are keyed in, select **save** to export a txt documentation file of the barcode, and then select **confirm** to continue to the next step. (To redo the barcode input step, select **New** to refresh the barcode input sheet and key in all barcodes again). Check the box in front of **keyboard** to manually key in sample barcode.
7. Close the safety door. Click start.

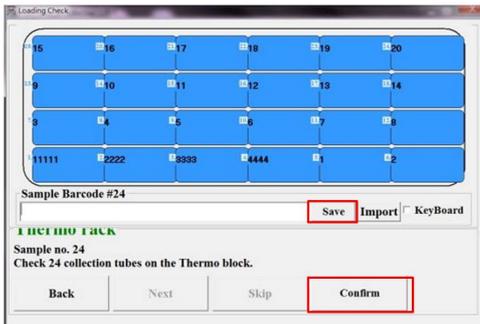
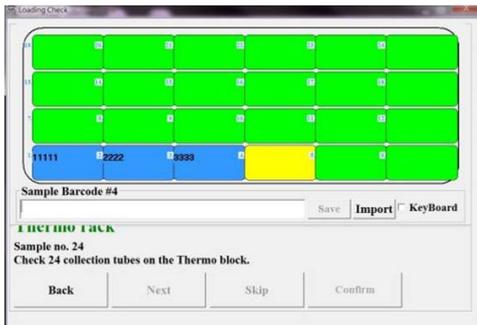
8. After the sampling function is finished, the system message will pop up. Open the safety door to check if all the samples are transferred to 6-strip sample tubes and take out the primary tube rack. Go back to the main menu to start extraction procedure.

7.3 Extraction

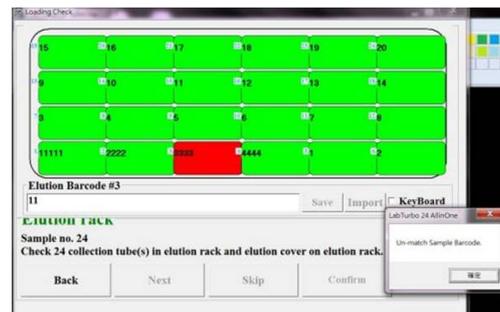
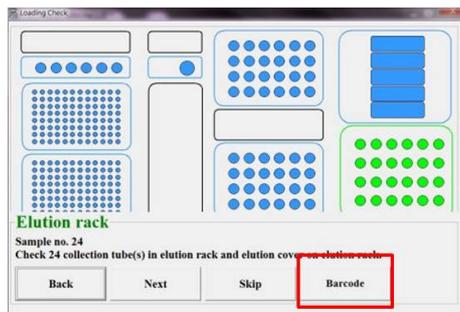
LabTurbo 24 AIO SP-qPCR Automation System includes two parts: extraction and qPCR. Therefore, the two processes are included in the same program. There are two programs in this machine: “qPCR-COVID19-IC-N-1.5-LVX40-In0.5-E60-QS” and “qPCR-COVID19-IC-N-1.5-LVX40-In0.5-E60-QS”.

1. For the program start, select “**Extraction**”.
2. Select the sample numbers and the protocol. Then click “**Next**”.
3. A loading check window will pop up. Follow the arrow at each step to check correct worktable setup. For recording barcodes of sample and/or elution tubes, please follow **step A and B**.
 - A. For sample barcode recording, please select “barcode” before tapping the sample tube section on the screen. The barcode input sheet will display. Follow the highlight in **yellow** to scan the associated barcode on each sample tube. Once a barcode is keyed in, it will be marked in **blue**. If a duplicated barcode is keyed in, it will be marked in **red**. To modify the barcode data, select the barcode to be modified and key in the correct barcode. Once all barcodes are keyed in, select **save** to export a txt documentation file of the barcode, and then select **confirm** to continue to the next step. (To redo the barcode input step, select **New** to refresh the barcode input sheet and key in all barcodes again). Check the box in front of **keyboard** to manually key in sample barcode.

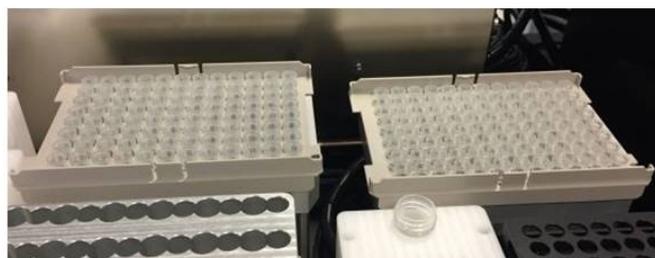
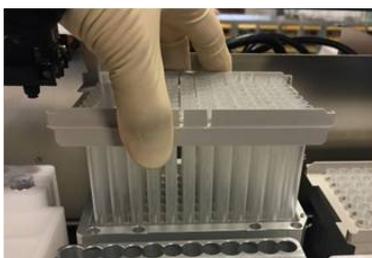




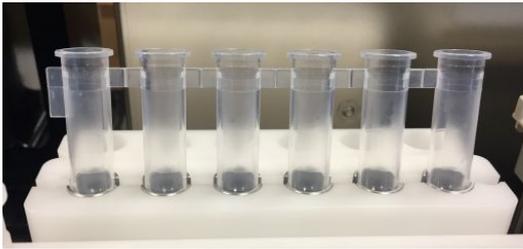
B. For elution tube barcode recording, please select “barcode” before tapping the elution tube section on the screen. The barcode input sheet will display. Follow the highlight in the **yellow** to scan the associated barcode on each elution tube. Once a barcode is keyed in and matched, it will be marked in **blue**. To modify the barcode, select the barcode to be modified and key in the correct barcode.



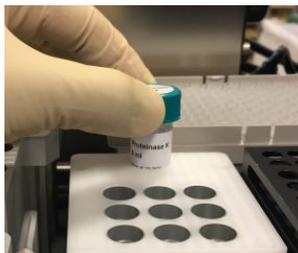
4. Remove all tips left from the last run. Put two new full 96-well tips (**1100 μL**) on **Tip rack 1**, and **Tip rack 2**.



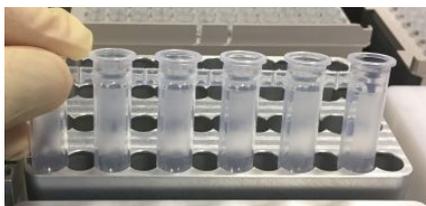
5. Place a 6-strip 2.0 mL sample tube on **HCCEB tube rack**.



6. Remove the cap of the proteinase K vial and put it in the **Proteinase K rack**.



7. Carefully place 6-strip 2.0 mL sample tubes (**with samples**) on the **Sample lysis thermoblock** one by one.



8. Place new column sets on the wells of **Binding-washing vacuum manifold**.



9. Put eppendorfs into the rack of **Elution vacuum manifold**.



10. Place the PCR Tubes and the caps sequentially.

Note: No matter what number is chosen, the completely PCR tube and cap should be used. Separated ones are not allowed.



11. Place the qPCR reagents into the designated position of the rack.

a. qPCR-COVID19-IC-N-1.5-LVX40-In0.5-E60-QS



1 : Tube I
2 : Tube III
8 : PC
9 : NC

b. qPCR-COVID19-IC-N-1.5-LVX40-In0.5-E60-QS

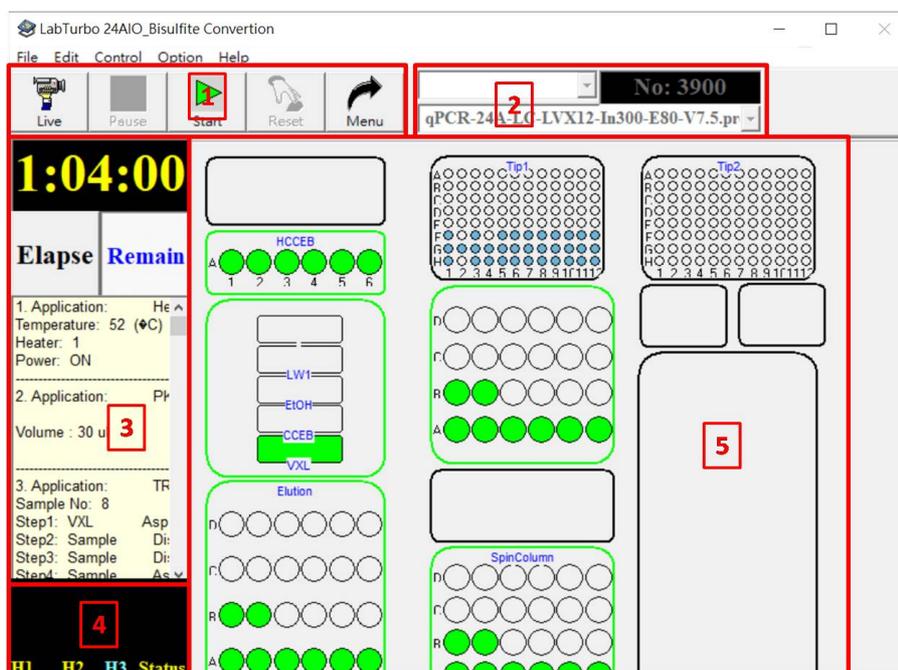


1 : Tube I

12. Once each worktable unit is checked and confirmed, ensure enough reagent in the bottles and empty the trash can, then click **Next**.

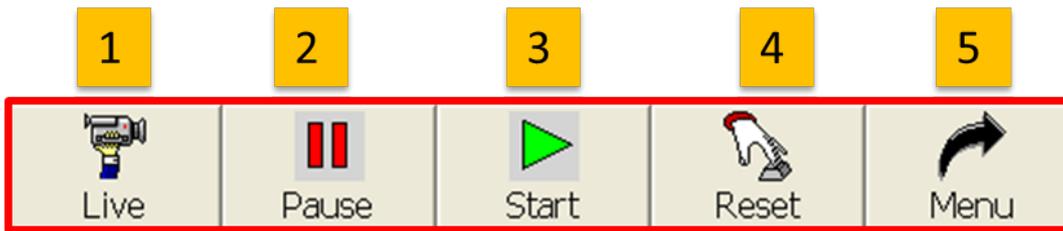


13. Close the safety door. Press start.
14. After the program completes, the system message will pop up. Open the safety door and take the elution tube and the PCR products out from the worktable.
15. Data analysis.

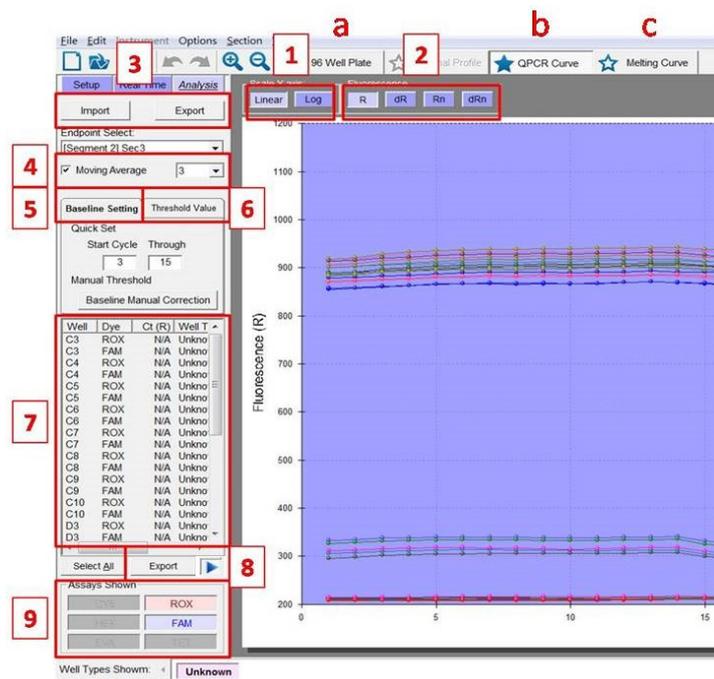


The following is the general control panel of LabTurbo 24 AIO SP-qPCR Automation System:

1. The **Main Toolbar** contains several shortcut buttons for convenient operation of the machine.
2. The **Protocol Window** indicates the selected protocol for the procedure.
3. The **Timer** shows elapsed time or remaining time (count-down). It also indicates the total and current steps of the protocol.
4. The **Monitor** indicates the current heater temperature and vacuum pressure of the machine.
5. The **Platform Configuration** mirrors the worktable to the machine. The green icons indicate the operating units at the current step.



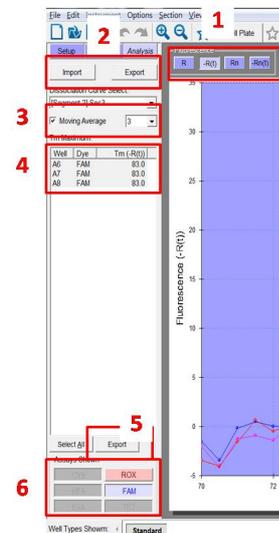
1. **Live:** Click this button to initiate the camera to show the real-time view of the worktable.
2. **Pause:** Click this button to pause the machine (same as opening the safety door).
3. **Start:** Click this button to start the procedure.
4. **Reset:** Click this button to reset the machine and move the robotic arm to original position.
5. **Menu:** Click this button to go back to the main menu.



- a. 96 well plate: unknown Ct value displayed.
- b. qPCR curve:
 1. qPCR curve data display: Linear / Log.
 2. Fluorescence: Date including R/dR/Rn/dRn options.
 3. Import & Export: Import and export qPCR final result.
 4. Moving Average: Default=3.
 5. Baseline Setting: Adjust qPCR curve baseline.

- a. Quick Set: Change the curve baseline correspond with every selected well to start cycle and ending cycle.
 - b. Baseline manual correction: Adjust curve baseline individual.
6. Threshold value: Ct value & threshold setting.
- a. Auto-search range upper and lower: Searching for threshold value interval, increasing upper limit or decreasing lower limit will expand the range of the interval.
 - b. Manual threshold: Adjust every dye's threshold value, with new Ct value.
 - c. Threshold bar: To change threshold bar to different threshold position for Ct value adjustment placed the cursor on the threshold.
7. qPCR data report: Report including dye 、 Ct value 、 well type and threshold on every well. Press the button at the right hand side of the “Export” to enlarge data report.
8. qPCR data report export: Press” Export” to export qPCR final report.
9. Assays shown: With one dye or multiple dyes.
- c. Melting curve:

1. Fluorescence: Date including R/dR/Rn/dRn options.
2. Import & Export: Import and export melting curve result.
3. Moving Average: Default=3.
4. Tm Maximum: melting curve peak.
5. Tm Maximum data report export: Export Tm maximum.
6. Assays Shown: With one dye or multiple dyes.



7.4 PCR Setup

1. For PCR preparation, select **PCR Setup**.

2. Template Only : Transfer template from elution to PCR rack/tube.

Master Mix Only : Transfer Master Mix from M1/M2 to PCR rack/tube.

Master Mix + Template : Transfer Master Mix from M1/M2 to PCR rack first, then transfer template from elution to PCR rack/tube.

Note : Comp. > Master Mix + Template is not provided on LabTurbo 24 AIO.

3. Two kinds of Master Mix could be used on LabTurbo 24 AIO. Select the PCR tube format for 8 strip tubes.

4. Choose sample number 、 master mix volume 、 template volume. Select sample number first. Maximal sample number is 24.

5. Select Master Mix volume. Maximal Master Mix volume is 30 uL.

	Sample No.	Master Mix	Template Vol.
Master Mix 1	24	15 uL	10 uL
Master Mix 2	0	10 uL	0 uL
Master Mix 3	0	12 uL	8 uL
Master Mix 4	0	15 uL	8 uL
		17 uL	
		18 uL	
		20 uL	
		25 uL	
		30 uL	

6. Select template volume. Maximal template volume is 30 uL. Minimal template volume is 2 uL.

	Sample No.	Master Mix	Template Vol.
Master Mix 1	24	15 uL	10 uL
Master Mix 2	0	0 uL	3 uL
Master Mix 3	0	12 uL	5 uL
Master Mix 4	0	12 uL	8 uL
			10 uL
			15 uL
			20 uL
			25 uL
			30 uL

7. Follow the loading check to fill up **Tip rack 1** with 1100 µL tips and place PCR tubes on PCR tube rack.

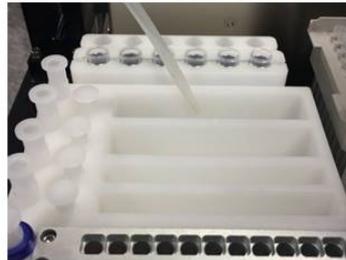
8. The required volumes of master mix and template are indicated on the loading check page. Apply enough master mix in 2.0 mL screw tube and put it on the master mix rack. Ensure that the 6-strip sample tubes are placed on the associated positions on the elution rack.

9. Close the safety door and press **Start**.
10. When the operation completes, the System message will pop up.

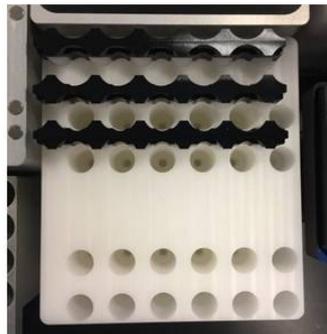
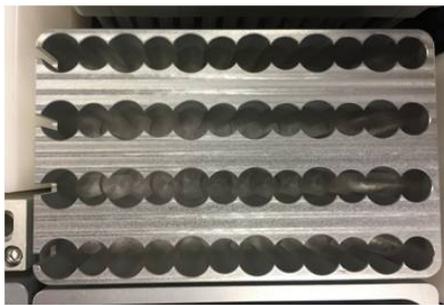
7.5 Clean

Vacuum and thermoblock clean

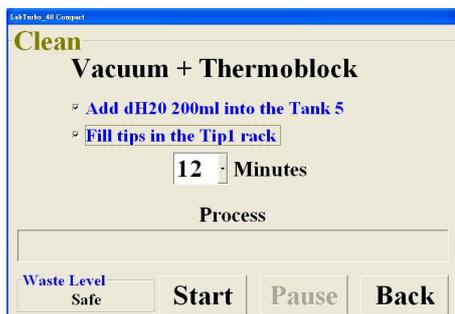
1. Select “Vacuum/Thermoblock”
2. Place one 1100 uL 96-well tips on **Tip rack 1** and add 200 mL ddH₂O in **Tank 4**.



3. Empty the **Thermoblock** and **Binding-washing vacuum manifold**.

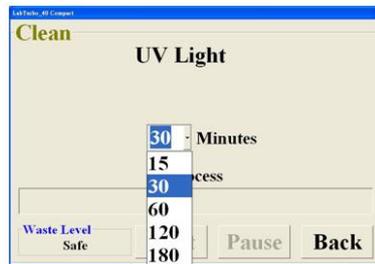
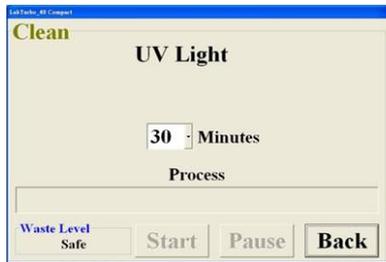


4. Follow and check the instructions and click **Start**.



UV light clean

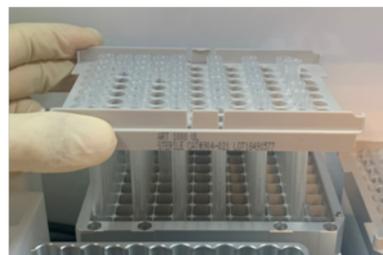
1. Select “UV light”.
2. Choose the UV light duration and click **Start**.



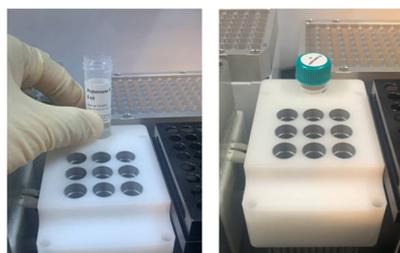
MAINTENANCE

8.1 Daily clean and maintenance

1. Collect all the tips left on the **Tip racks** for the next run.



2. Take out the **Proteinase K** vial and tighten the cap.



3. Wash the **Elution Cover** with tap water and air dry or wipe and dry with tissue paper. (**Do not** put in “Oven” or “autoclave” to dry)



4. Check the level of the trash can.

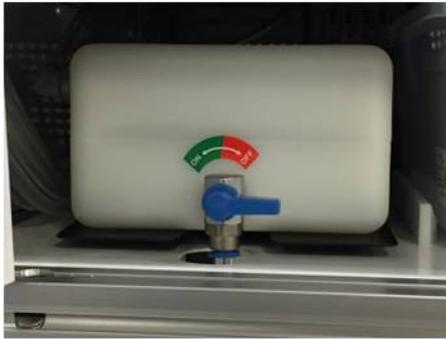


5. Check the waste level in the **Waste Bottle** and drain out the waste.



8.2 Weekly clean and maintenance

1. Check the level of waste bottle and trash can.



8.3 Monthly clean and maintenance

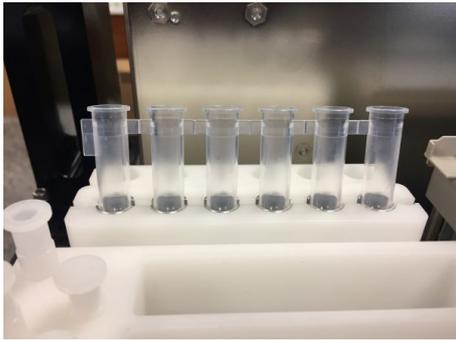
1. Clean each side of machine by using hand towel with water.



2. Check the level of waste bottle and trash can.



3. Replace 6-strip tubes in HCCEB rack with a new one.



4. Choose “clean” and select “Vacuum + thermoblock”. Add 200 mL distill water into Tank 4. Place one 96-well tip on Tip 1 rack.’
5. Wash **Vacuum plug sets** with tap water and air dry or wipe and dry with tissue paper. **Make sure to put three Vacuum plug set back to the original positions.**



TROUBLE SHOOTING

“DAO connection error, software run the Demo Version”

This message indicates that the controller fails to connect to computer. Please turn off the LabTurbo 24 AIO SP-qPCR Automation System. After all are turned off, switch the main power off and on once, and then turn on the machine. If this message remains, please contact our customer service.



“XY/ZW/T/Heater1/Heater2 connect error, checking the RS232USB connection”

This message indicates that the controller does not connect to computer. Please turn off the LabTurbo 24 AIO SP-qPCR Automation System. After all are turned off, switch the main power off and on once, and then turn on the machine again. If this message remains, please contact our customer service.



“Kit has been stored over one year”

This message could show up during the startup of the LabTurbo program if the current extraction kit is expired. The extraction kit can be stored for one year and expiration date is shown on the top of extraction kit. Please replace the kit with a new one, and scan the barcode on the new extraction kit under the “Barcode” page.

LabTurbo_48 Compact

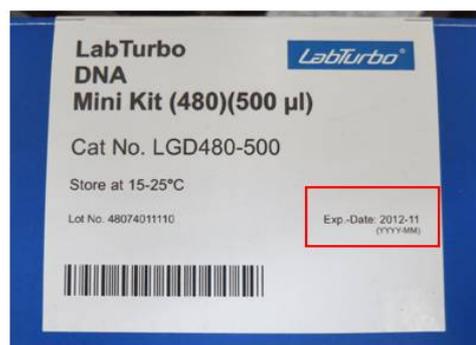
Barcode Reading

Input the Bottle Barcode: Keyboard

DLL	LTL	CCEB	ETOH	LW1	PK
11/15/2013	11/15/2013	11/15/2013	11/15/2013	11/15/2013	10/24/2013
485136263444	487020031201	483335111101	482111011203	481136263604	486 not in use

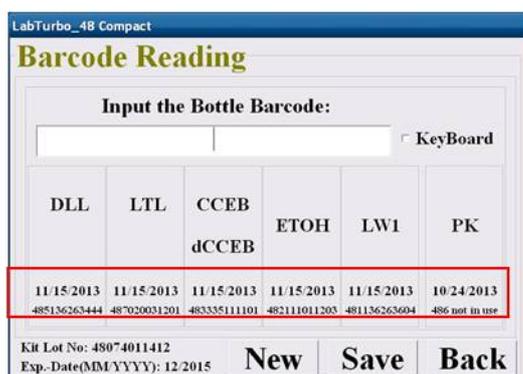
Kit Lot No: 48074011412
Exp.-Date(MM/YYYY): 12/2015

New Save Back



“XXX buffer has been stored over three months”

This message could show up during the startup of the LabTurbo program if one or more buffer in the **Reservoirs** is stored over three months. Select **OK** to continue. Please refer to section 6.1 to replace the expired buffer with a new one. XXX represents LW1, CCEB, DLL, Proteinase K, etc.



“Close the door”

This message indicates that the door is opened. Check the sensor on the right side of the door and make sure the door is closed. Please close the door and start the procedure again. If this message remains, turn off the computer, switch the main power off and on, and then restart the computer.



“Windows error (CCD connection failed), turn off the main power and restart the system”

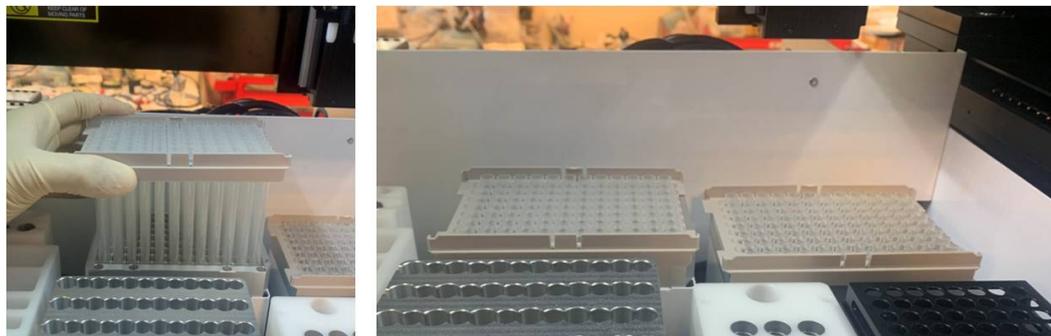
This system message indicates that the CCD camera is not successfully recognized by the system computer through the USB interface. Please turn off the software and restart the computer to let the computer recognize the CCD camera.

“Wrong plug tube setup”

This message may show at the beginning of the extraction. Check if the six plug tube combinations are at the original positions. If the plug tube combinations are set up correctly, click **Cancel** and the machine will continue the extraction procedure.

“Please fill Tip 1/ Tip 2 Rack and install it correctly”

This message indicates that there are missing tips in one or more tip racks. Please open the door and fill up the tip racks. After refill, close the door and select “OK”. Remember to install all two tip racks for each run of extraction.



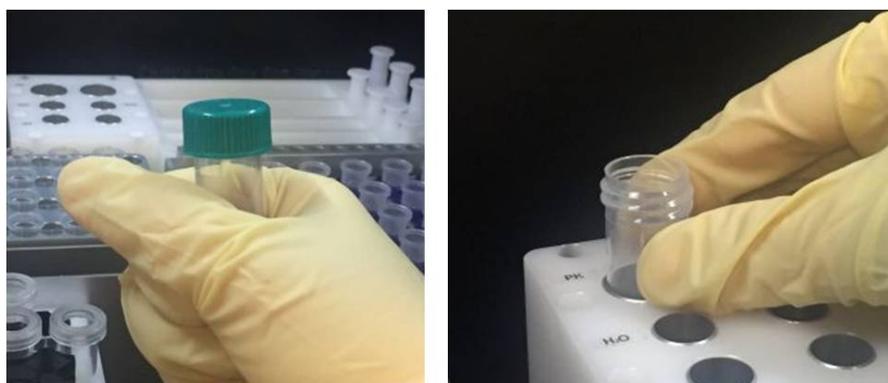
“Please add XXX buffer XX mL into the buffer tank X”

This message indicates that the amount of a buffer is not enough in its **Reservoir**. Please open the door to refill the buffer over the refill line. After refilling, close the door and select **OK**. XXX represents LW1/CCEB/DLL/Proteinase K, etc.



“Open the cap of proteinase K”

This message indicates that the cap of proteinase K vial is not opened. Please remove the cap of proteinase K vial, put it back onto the rack, and then close the door to start the procedure.



“Please add PK XX uL into the enzyme bottle”

This message indicates the amount of Proteinase K is not enough. Take out the Proteinase K vial and replenish it. Put the vial back and close the door, then select **OK** to resume the procedure.

“Please add LW1 XX mL into the buffer tank”

This message indicates that the amount of buffer is not enough in the reservoir. Please open the door to refill reagent over the refill line. After refilling, close the door and select “OK”.

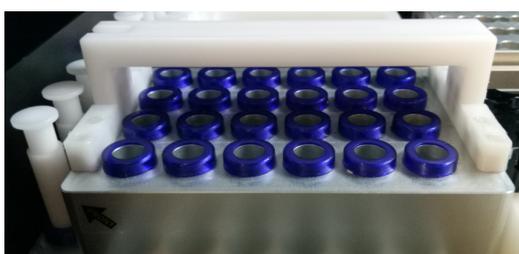
“Missing elution cover, put it on elution manifold correctly”

This message indicates that the elution cover is missing. Put the elution cover back correctly then click “OK” to resume the procedure.



“Take off carrier of Elution cover”

This message indicates that the handrail for elution cover was not removed. Remove the carrier from elution cover then click “OK” to resume the procedure.



“Elution cover on wrong direction, put it on elution manifold correctly ”

This message indicates that the Elution cover is placed in the opposite direction. The “Front” label should be placed toward the user.



“Remove the excessive column/SC-adaptor or Plugset at sample#”

This message indicates that the worktable setup at **Vacuum manifold** is incorrect. Take the worktable setup of 6 samples as an example : an additional column set is misplaced at position 7(left picture). Only 6 column sets should be placed at **Vacuum manifold** (right picture). “#” represents the sample position at **Vacuum manifold**, or 7 in the aforementioned example.



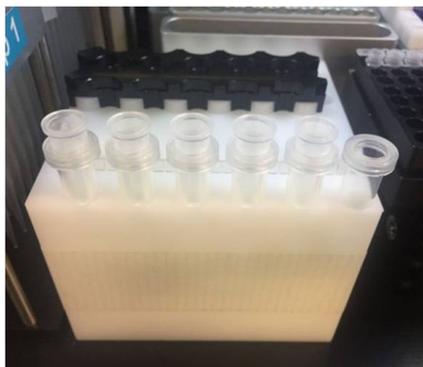
This message also indicates the **Plugset** is at the incorrect position. For example, six plugsets are set at the incorrect positions on the left picture. Please refer to the **Monthly clean and maintenance** section (section 7.3) for the plugset setup instruction.



“Add absent Column on the vacuum manifold”

This message indicates that worktable setup at **Vacuum manifold** is incorrect. Take the worktable setup for 6 samples as an example : a column is missing at position 6 (left picture). 6 column sets should be placed on **Vacuum manifold** (right picture).

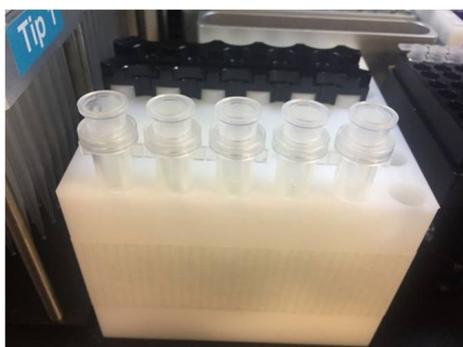
“#” represents the sample position at **Vacuum manifold**, or 6 in the aforementioned example.



“Add absent Column/SC-adaptor on the vacuum manifold”

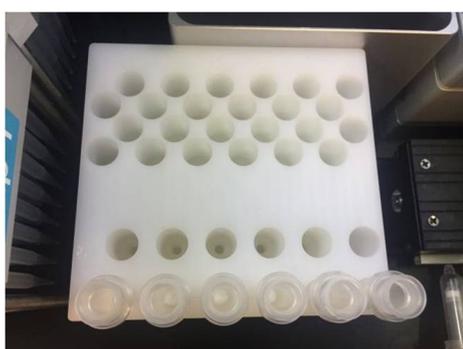
This message indicates that worktable setup at **Vacuum manifold** is incorrect. Take the worktable setup of 6 samples as an example : a column set is missing at position 6 (left picture). 6 column sets should be placed on **Vacuum manifold** (right picture).

“#” represents the sample position at **Vacuum manifold**, or 6 in the aforementioned example.



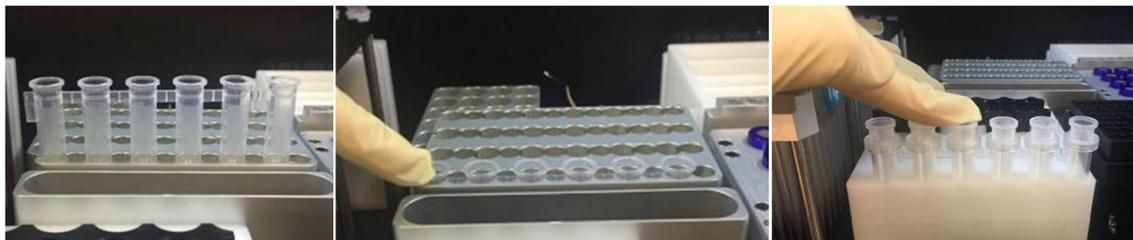
“Plug set miss, install plug set at wash-vacuum block correctly”

This message indicates that the plug set is not at correct position (left picture). Put the plug set at correct position on vacuum manifold. Please refer to the **Monthly clean and maintenance** section (section 7.3) for the plug set setup instruction.



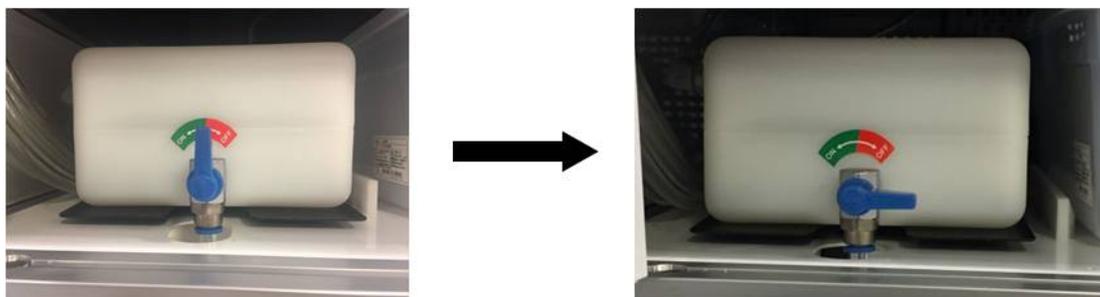
“Check the Target Bottom”

This message indicates that the columns, sample tubes, or elution cover are not set properly. Please open the door and press the column sets or the sample tubes all the way to the bottom to set them in right positions.



“Low vacuum pressure, switch off the waste bottle and try again”

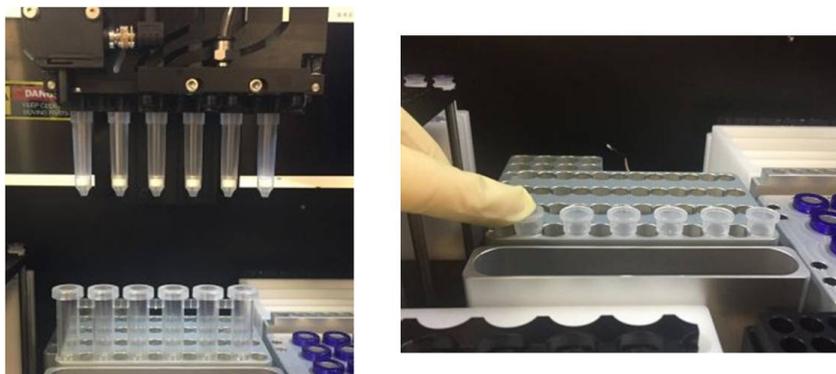
Open the door of waste system and switch off the waste bottle.



“Remove the dropping Column Adaptor and then click Continue”

This message indicates that SC-adaptors fall on the worktable.

1. If the worktable is shown as the picture below (the robotic arm still holds the column), please remove the SC-adaptor from worktable and put the columns into the dry spots manually. Close the door and click **continue**.



2. If the worktable is shown as the picture below (the robotic arm has already transferred the columns to the dry spots). Please remove the SC-adaptor from worktable and click **continue**.



“Clean the waste bin”

Check and clean the **Tip disposal** vent at worktable and the **Trash can**.



“Low elu-vacuum, check all air plug in correct position”

1. Check the air plugs of the elution manifold. Press down the air plugs to the correct position.



2. Close the door and click **Yes**.
3. If this message remains, please click **No**.
4. Another message will show up : **“Spin down all column instead of vacuum”**.
Open the door, take out all the columns, and use a centrifuge for elution.
5. Close the door and click **OK** to finish the extraction procedure.

“Low elu-vacuum, try again”

1. Open the door and make sure there are no missing columns on the Elution cover.
2. Close the door and click **Yes** to continue.
3. If this message remains, please click **No**.
4. Another message will show up : **“Take row No:X columns out and used spin**

down to elution". "X" represents the row numbers of elution cover. The row number could be No : 1~4. Open the door, take out the columns, and use a centrifuge for elution.

5. Close the door and click **OK** to continue.

“Run Time error”

This message indicates that the system is overloaded and the program will terminate to prevent machine from doing anything wrong.

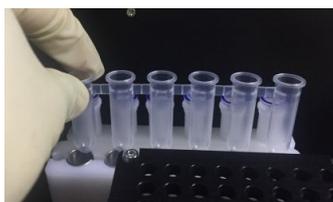
Once this message pops up, please record the current step first. This is very important because once “ok” is clicked, the program will terminate automatically. To finish the whole procedure, users can manually recover the worktable, restart the program, and then continue from the terminated step to complete the extraction.

The worktable should be recovered manually to the original status as the following steps:

1. Clean all remaining 6-strip sample tube, column set, and elution tube on the worktable.



2. Replace a new 6-strip tube on HCCEB rack.



3. Restore all the **Plug sets** and put them back to the original positions.

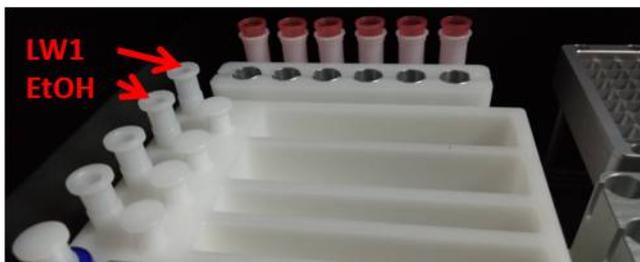


4. Put **Plug tubes** back to the **Plug tube rack**.

“Vending plug aging, replace a new vending plug at EtOH/LW1 position”

This message will pop up after the extraction is completed. User could not perform the next run of extraction or sampling function until a new vending plug is replaced.

1. Check the number on the top of vending plug. Prepare a new vending plug.



2. Pull out the old vending plug and replace another new vending plug immediately.
Caution : Reagent will flow into the reagent tank when the vending plug is pulled.
3. Push the new vending plug to the bottom. Turn off LabTurbo software and turn on again for the next run of extraction.



“X or Z or Y-Axis position error”

Please contact our customer service for more information and support.

LabTurbo Biotech Corporation

3F-1, No. 150, Sec. 4, Chengde Rd., Shilin Dist., Taipei City 111,
Taiwan

Phone: 886-2-28891136

Fax: 886-2-28891146

Website : www.labturbo.com

Email : order@labturbo.com