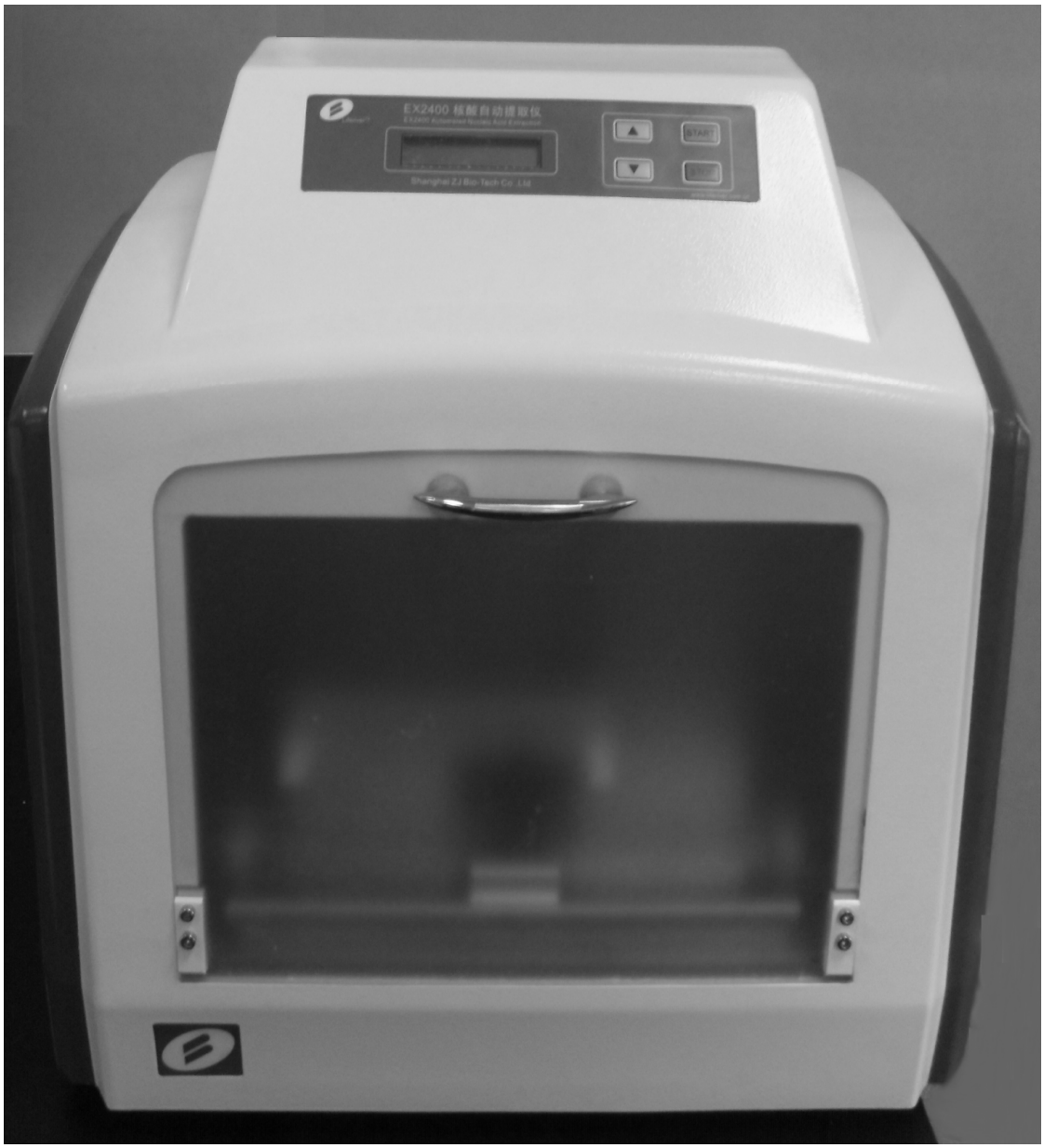
# Liferiver™ Automatic Nucleic Acid Extraction system EX2400

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## 1 Brief introduction of the system

1.1 Main application

EX2400 nucleic acid automatic extraction system adapts advanced magnetic bead isolation technique. Combined with magnetic bead isolation kit, it can extract high-purity nucleic acid from varieties of sample, such as whole blood, serum, plasma, feces, milk and cells. The instrument structure is well-designed and easy to operate. It is time-saving, labor-economizing, providing high-efficiency and excellent consistency results. EX2400 is specially applied for nucleic acid extraction in genome research, molecular biology research and clinical genetic testing.

1.2 Main performance parameter and specification

| | |
|---|---|
| Model | EX 2400 |
| Sample volume | 20-200ul |
| Sample quantity | 24units/time |
| Sample handling time | 20-40min |
| Magnetic bead collection efficiency | ≥99% |
| 96 well plate | 2 |
| Magnetic Bar | 24 |
| Cap (single-use) | 2 strips (12 holes/strip) |
| Keypad/Monitor | Start/Stop/ direction keys/LCD |
| Boundary dimension (L*W*H) | 45*38*43cm |
| Net weight | 20KG |
| Operation condition | Room temperature |

1.3 Operating principle

Using magnetic bead isolation technique, EX2400 system can extract the whole nucleic acid from the sample by the collect, release, divert of the magnetic bead.

See the main step in the process of nucleic acid extraction:

1) Adsorption: Add magnetic bead into sample lyses solution, vibrate and blend adequately, the released nucleic acid is adsorbed in the specific encrusting substance of the surface of the magnetic bead.
2) Washing: Collect and transfer the magnetic bead in the first procedure into washing buffer, wash repeatedly to eliminate the impurity.
3) Elution: Transfer the magnetic bead elution buffer, after vibrating and blending adequately, target nucleic acid will drop from the surface of the magnetic bead and dissolve into the elution buffer.

## 2. Instrument installation

2.1 Installation conditions

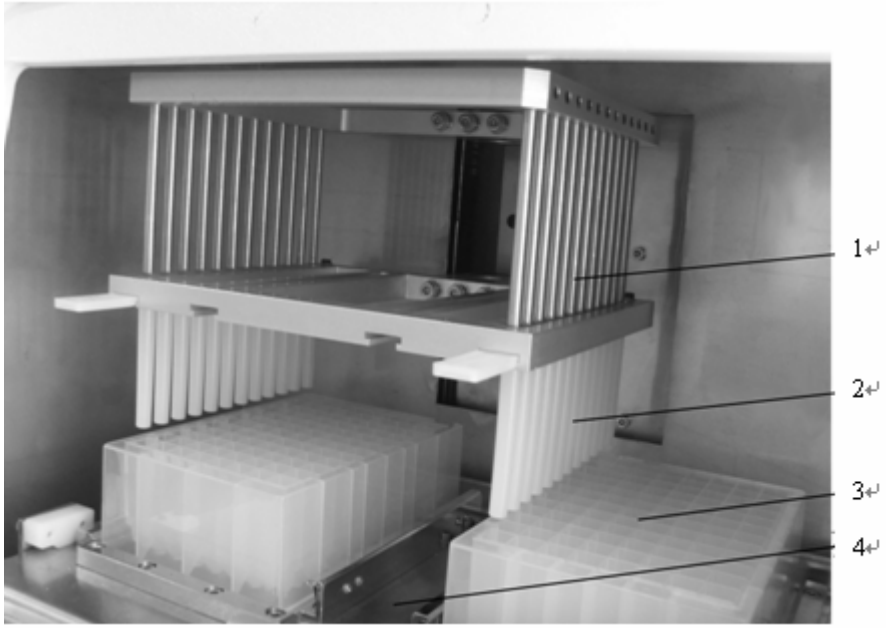
2.1.1 Place the instrument in the dry, dustless, vibration less place. Avoid the moisture and direct sunshine. Assure the instrument is placed on the stable worktable.

2.1.2 To keep the instrument working placidly, it is suggested to use the 220V±22V AC power source voltage stabilizer in where the voltage fluctuation fiercely.

2.1.3 Keep the operating temperature at 10-40℃ and the relative humidity under 85%.

2.2 Installation and usage
Install the instrument and connect the power behind it.

## 3. Instrument structure




**1. Magnetic bar**
**2. Magnetic Cap**
**3. 96 well plate**
**4. 96 well plate transport shelf**

## 4. Instrument operation

4.1 Function description of the instrument panel


Function key: “Start”, “Stop”
“Start”: Start to run the selected program
“Stop”: Press one time to pause the program, push twice to stop the program
Direction key: Forward or backward circulation, choose replaced program
LCD: Displaying the selected program name, program running Real time action name and the run time.

4.2 Operation procedure
4.2.1 Instrument start
Connection power: Make sure the power is off when connect the power cord with

power socket. Then turn it on.

Instrument self-check: when the instrument is turned on, it will start a automatic self-check before it is ready to use.

4.2.2 Operation procedure

4.2.2.1 Sample pretreatment

Different kinds of sample should be pretreated according to the user manual in the RNA isolation kits.

4.2.2.2

1) Program the system according to the user manual in the RNA isolation kits. Place the pending sample, washing buffer and elution buffer in the 96 well plate according to the designed order.
2) Start the instrument, raising the magnetic bar and cap, pull out the 96 well plate transport shelf.
3) Place the 96 well plate on the transport shelf carefully to the proper place (well A should on the left).
4) Insert the cap into the groove, push slightly, and “Click” sound shows the cap inserted completely.
5) Close the front cover to avoid the environmental contamination.
6) Choose proper program according to the manual, press “Start” to run the instrument
7) After the program finishing, take out the 96 well plate and cap, collect the eluted nucleic acid solution immediately, then shift into the tube for the following experiment. Otherwise, the results should be stored at 4 ℃ briefly or -20 ℃ for a long time.

4.2.3 Power off

Press the “I/O” switch in the lower right corner of the instrument back, close the nucleic acid automatic extraction instrument. Dispose the 96 well plate and cap as biologic dangerous reject in time; Use the mull or towel which dipped de-ionized water, detergent or suds to clean the transport shelf and the instrument surface, if there has epidemical materials in the transport shelf, sterilize with 75% alcohol or other disinfectant.

4.3 Application example

4.3.1 RNA purification

Use the EX2400 nucleic acid automatic extraction system and RNA separation and purification kit to separate and purify the RNA. Cell and tissue cultured in vitro and total RNA can all be used as raw materials. Purified RNA can be used in downstream experiment, for example, RT-RCR.

Operation steps: see 4.2.2. Choose the “RNA Virus ”program and then press “Start” to start the program.

Attention: Specific operation step see the kit instruction.

4.3.2 Whole blood genome DNA purification

Whole blood genome DNA separation kits combination with EX2400 nucleic acid automatic extraction system can separate and purify the Whole genome DNA

automatically. Purified genome DNA can be used in a variety of molecular biology experiment, including PCR and Restriction End nuclease Reaction.
Operation steps: see 4.2.2. Choose the "g DNA Blood"program and then press "Start" to start the program.
Attention: Specific operation step see the kit instruction.
4.3.3 Virus DNA purification.
EX2400 nucleic acid automatic extraction system combination with the virus DNA purification kit can separate and purify the total DNA. The sample can derive from the cultured and tissue. Obtained high quality DNA can be applied in PCR reaction etc.
Attention: See the detailed procedure in the kit manual

**5. Instrument maintenance, fault resolution and considerations**

5.1 Periodical preventative maintenance

- Keep the instrument from dust and liquid pollution. When finished the operation, operator should turn on the inside UV light to disinfect
- Clean the instrument regularly to maintain a good exterior. Use the mild cleanser, like 75% ethanol, to wash the screen, keyboard and plastic cover. Don't use the corrosive cleanser to destroy the glossiness of the paint.
- When the surface of the instrument is contaminated by bacteria, we suggest to use dry cloth to wipe first and UV disinfect later. If the contamination is bio-hazardous materials, operator should listerize it with temper sterilizing solution, like Pasteurized liquid.
- No high-pressure sterilization should be taken to either part of the instrument.

5.2 How to clean well plate transport shelf

- Try to keep the transfer shelf clean without being polluted by the dust or dirt. At least once a week to clean the shelf using soft cloth dipped with cleanser or ethanol.

5.3 How to clean magnetic bars

- Using soft cloth dipped with cleanser or ethanol to clean the bars.

5.4 Sterilization Procedure

If the sample is bio-hazardous materials, the following sterilization procedure or other related method is highly promoted.

- Prepare the sterilizing solution
- Take out the 96 well plate and magnetic cap, sterilized and abandoned. Clean up the plate transfer shelf.
- Wipe and listerize the surface of the instrument using 75% ethanol
- Pack the instrument into a big plastic bag with the lid open.
- Put the soft cloth dipped with sterilizing solution in the bag. Make sure the cloth dose not contact the instrument.
- Close down the plastic bag, lay aside for at least 24 hours.
- Take the instrument out, and wash again with mild cleanser

Note: cleanser—10% formaldehyde or 75% ethanol or 4% glutaraldehyde

5.5 Guideline of the fault resolution

- When the instrument is turned on, the system will start to self-check. When the check is ok, the magnetic bars and caps should stay in the standby place and the LCD screen shows the current program. If the check failed, the instrument will auto alarm, sound like “didi...”
- Solution for the possible fault

| Fault | Possible cause | Solution |
|---|---|---|
| The lead rail can not move | The magnetic cap is not raised | Press the “Stop” button and restart the machine. |
| The magnetic cap place in the wrong place | The place of the cap is not consistent with the signal of the inside sensor | Check whether there is any block to affect the up-and-down movement of the magnetic cap;<br>Check whether the cap is totally inserted into the groove |
| The magnetic cap move overtime | The cap does not get the sensor in the supposed time | Check whether there is any block |
| The lead rail in wrong place | The lead rail is not consistent with the inside sensor signal | Check whether there is any block |
| The lead rail move overtime | The lead rail does not get the sensor in the supposed time | Check whether there is any block |
| The magnetic bar in the wrong place | The magnetic bar place is not consistent with the signal of the inside magnetic bar sensor | Check whether there is any block |
| The magnetic bar move overtime | The magnetic bar dose not get to the inside sensor in the supposed time | Check whether there is any block |
| “kata” noise | The micro-well plate is not fixed | Refix the plate. Make sure the plate is totally inserted into the groove |
| The fixed parameters disappear | The fixed parameters of the instrument lost | Ask the technician for help |

5.6 Notes

- Before using this instrument, the operator should read carefully the manual and do exactly according to the procedure
- When shift the 96 well plate to the transfer shelf, please be carefully and avoid the liquid spill out to pollute.
- Make sure the 96 well plate in the right direction. “A→H” on the plate should be on the outside of the shelf. “A” on the left, and “H” on the right. Put the 96 well plate tight with the shelf without being crooked. Otherwise, the efficiency of the magnetic beads transfer will be limited.

- When put on the magnetic cap, put the cap inside until hear “click” to assure the cap is totally inserted into the groove
- Every time before putting on or taking off the 96 well plate, the operator should be sure that the magnetic cap and bars are up raised and separated totally.

**Attachment A --FAQ solution**

Q1. Will the magnetism of the bar die down? If yes, how long will the magnetism last? Can the magnetic bar be replaced?

A1. The magnetic bars of EX2400 system is made by stable material. The magnetic field will not weaken. If something unexpected made it necessary to replace the bar, we can also replace it. For example, if the bar is mechanically destroyed, we can offer the replacing service by maintenance technicians.

Q2. How strong is the magnetic field? Will it affect those sensitive machines?

A2. The magnetic field is mainly around the tip of the magnetic bars. It is limited and will not affect the circumambient machines.

Q3. What if I forgot to put on the cap and cause the magnetic beads absorb on the surface of the bars?

A3. You can use the soft cloth or soft paper dipped with mild detergent, soap or ethanol to wipe the magnetic bars.

Q4. What should I do if the magnetic beads are left in the sample wells?

A4. The following steps will not be affected if only a few beads remain in the wells. If the sample is too sticky for the magnetic bars to absorb totally the beads, you can first dilute the sample and check whether the sample can be homogenate or dissolved.

**Attachment B—the extraction sample**

Using Liferiver™ Automatic Nucleic Acid Extraction System EX2400 with RNA Isolation Kit to extract the Foot-and-Mouth Disease Virus (FMDV) RNA from the PBS dissolved stool sample.

1) Add the reagents into the 96 well plate according to the RNA Isolation Kit manual

   Compared with the following table:

| Well | Reagents and volume |
|---|---|
| A | binding buffer 600ul; sample 200ul; magnetic beads 200ul |
| B | Washing Buffer A 600ul |
| C | Washing Buffer W 600ul |
| D | Washing Buffer W 600ul |
| E | Elution Buffer 100ul |

2) Turn on the instrument. Pull out the 96 well plate transport shelf after the magnetic bars and the caps move to the right place.
3) Place the 96 well plate carefully on the shelf (well A should on the left), and put

back the shelf.

4) Insert the magnetic cap into the groove, then push inside, until hear “click”
5) Close the front cover to avoid the environmental contamination.
6) Choose “RNA Virus” program according to the manual, press “Start” to run the instrument.
7) After the program finishing, take out the 96 well plate and cap, collect the eluted nucleic acid solution immediately, then shift into the tube for the following experiment. Otherwise, the results should be stored at 4 ℃ briefly or -20 ℃ for a long time.

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