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321/2/3 Syringe Pump

# **User Manual**



# Introduction

Thank you for choosing 321/2/3 Syringe pump(“the device”). Please read and understand this manual thoroughly before use. Regular inspection and maintenance are also required to avoid possible danger or damage to patients.

## Safety Precautions

- (1) The device is not explosion-proof or portable.
- (2) The device should not be used when there are flammable anesthetic gas, oxygen or the mixture of oxygen and oxidize ammonia.
- (3) The device should only be operated by qualified medical personnel familiar with the device, and patients are not allowed to touch the device.
- (4) Use calibrated infusion sets with correct injection parameters to avoid damage to patients caused by overflow or underflow.
- (5) Suspension should be adopted as the prior safety measure once an anomaly is discovered.
- (6) During use, keep the device away from objects that can produce strong electromagnetic waves or noise to avoid malfunction, such as nuclear magnetic devices, microwave generators and radiation devices (e.g. X-ray machine and CT machine).
- (7) Keep the device away from high frequency surgical units to avoid malfunction. The device should be kept at least 25cm away from high frequency surgical units (e.g. tool carriers, cables, feeder board, etc.) and 1m from mobile phones.
- (8) Voltage higher than the indicated voltage on the label of the device should not be used, or damage or fire may be caused.
- (9) Batteries should not be put into fire or heated, or battery leakage, fire or even explosion may be caused.

(10) Outer coatings of batteries should not be removed, or explosion or dangerous chemical burns may be caused.

(11) When inserting or plugging AC power cord, tightly grasp the plug, and touching the AC power plug with a wet hand is prohibited.

(12) The device is not recommended to share a common socket with other electrical devices.

(13) Disassembly or modification of the device without authorization is prohibited.

(14) The device should be checked daily. If the device is left unused for a long time, it is recommended to check the functions of the device before reuse.

(15) If an anomaly or loss of function(s) is found, stop using it immediately and contact the supplier in a timely manner, or the manufacturer/supplier should not be held responsible for any loss, damage or injury caused.

(16) The display screen of the device should be monitored at any time and medicine in syringe bottle/bag and pipeline of syringe pipeline should be checked. During infusion, the alarm function of the device should not be solely relied on.

(17) Vibration, collision, direct sunlight and strong direct light should be avoided.

(18) Hot and wet air directly blown from a heater, electric stove or humidifier should be avoided.

(19) Avoid using the device in dusty, vibrating and wet environment and in chemical storage place.

(20) Suitable for a nominal capacity of 5, 10, 20, 30, 50ml syringe is recommended: Xingda, and other brands 5,10,20,30,50 ml syringe.

(21) The infusion tube is folded, filter or syringe needle is clogged, thrombi appear in needle and other reasons, which could result in infusion occlusion. The pressure of intravenous infusion tube will rise. In order to eliminate the errors, a

temporary phenomenon of excessive infusion may be caused.

In order to avoid the occurrence of this phenomenon, according to the following steps: stop syringe, open pump door, open pipe clamp, according to the occlusion reasons for processing (straighten out the syringe tube, open the adjustable clamp of infusion set, change a new syringe needle or infusion set), the need to ensure that the pressure in the infusion set has been released. Reinstall infusion set correctly, after confirming there is nothing wrong, you can restart infusion.

(22) If the external protective conductor in the installation or the integrity of the wiring in doubt, the device should be controlled by internal power supply to run.

# Chapter 1: Overview

## 1.1 The scope of products

The device is used by hospital for intravenous infusion of medicine into patients at a constant speed.

## 1.2 Product model

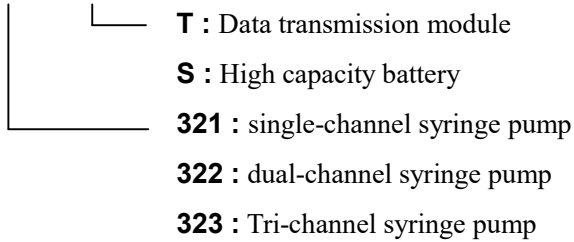
This series of syringe pump a total of 12 models, namely:

321, 321T, 321S, 321TS;

322, 322T, 322S, 322TS;

323, 323T, 323S, 323TS;

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**322**, is composed of two sets of 321 spliced combination.

**323**, is composed of three sets of 321 spliced combination.



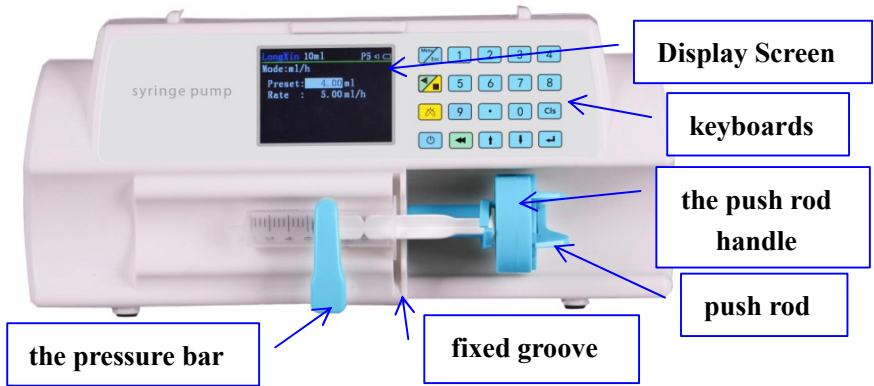
**322**



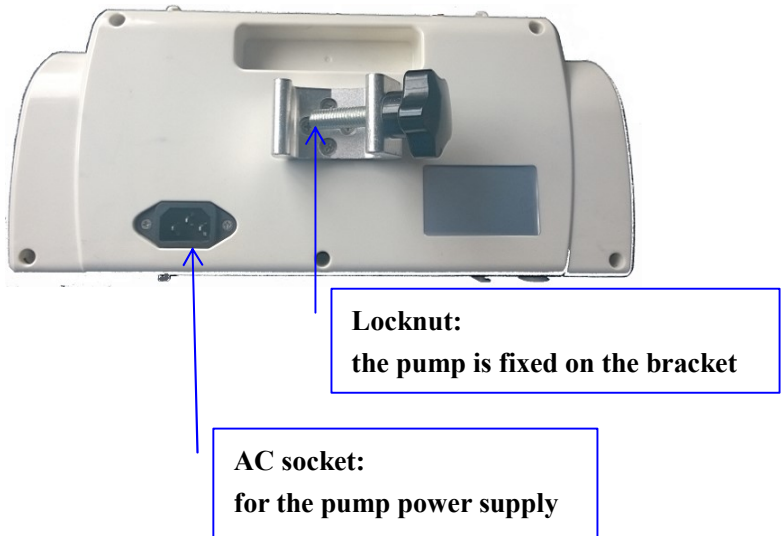
**323**

### 1.3 Name and function of components

#### 1.3.1 Front view



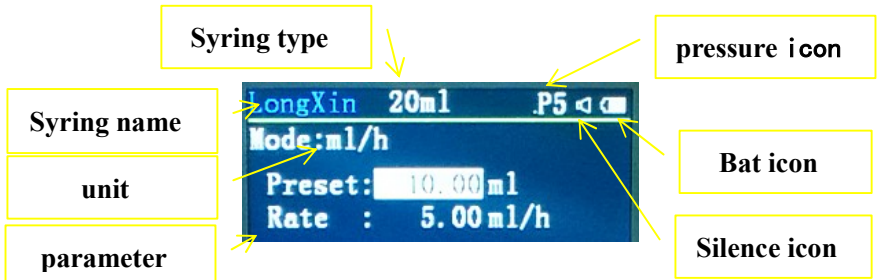
#### 1.3.2 Back



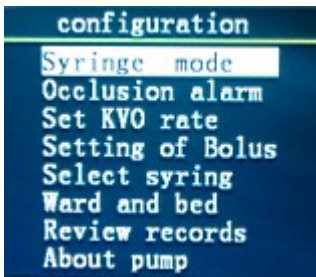
### 1.3.3 Function keys



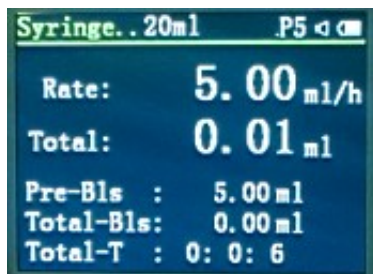
### 1.4 LCD



(When standy,set the parameter)



configuration of the pump



syringing

# Chapter 2: Technical parameters

## 2.1 product specification

Power:  $\leq 20\text{VA}$

Display: Dot-matrix color LCD screen

Power: AC100~240V, 50/60Hz(Recommended don't share a socket with other electric equipment, can use household power outlet)

Battery: NIMH rechargeable battery, 12V/800mAh

Security Classification: Electrical class I, with an internal power supply, CF type, IPX4.

Net weight: about 1.6Kg. (Type 321)

Package measurement: 37 (W) \* 24 (H) \* 21 (D) cm .(Type 321)

Enclosure: ABS plastic

## 2.2 Technical specification

The product name: Syringe pump

Model: See the product nameplate

Applicable syringe: Suitable for a nominal capacity of 5, 10, 20 ,30, 50ml syringe is recommended: Xingda, and other brands 5,10,20,30,50 ml syringe.

Syringe unit: ml/h, ml/min, mg/h, ug/h, mg/min, ug/min, mg/kg/h, mg/kg/min, ug/kg/h, ug/kg/min.

The maximum flow rate range:

5ml syringe: within 1.0~200.00 ml/h (set or calculated values)

10ml syringe: within 1.0~300.00ml/h (set or calculated values)

20ml syringe: within 1.0~400.00ml/h (set or calculated values)

30ml syringe: within 1.0~600.00ml/h (set or calculated values)

50ml syringe: within 1.0~1200.00ml/h (set or calculated values)

Predetermined amount (amount of solution): within (0.01~9999.99)ml

### **The function parameters of Bolus**

The preset value of Bolus: within (0.01~9999.99) ml

The flow rate of Bolus: within (1.0~1200.00)ml/h.(Depending on the syringe nominal capacity varies)

KVO flow rate setting range: within (1.00~5.00)ml/h

The accuracy of syringe flow rate: using the recommend syringe to test which had been calibrated and flow rate accuracy should be better than  $\pm 2\%$ .

Occlusion alarm pressure:In the rage of 20kPa to 140kPa, 8-speed sensitivity can be adjusted.

Sound and light alarm: Low battery alarm, battery failure alarm, battery high temperature alarm, mains missing tips ,mains power tips, injection pipe blockage alarm, push rod fall off alarm, the pressure bar abnormal alarm, forgotten operation of the alarm, motor running abnormal alarm, the drug running out alarm, the injection will finish alarm, injection is completed alarm, the microprocessor abnormal alarm.

Operational equipment: continuous operation

Charging time: standby charge, about 10 hours to fully charge

Discharge time: When the battery is full of capacity, infusion at the speed of 25ml/h will last for more than three hours.

Life span: five years

## **2.3 Work Environment**

Operating temperature:  $+5^{\circ}\text{C} \sim +40^{\circ}\text{C}$

Relative humidity: 20% to 95%

Atmospheric pressure: 70KPa ~ 106Kpa

## 2.4 The applicable flow unit

ml/h:	ml/h
ml/min:	ml/min
mg/h:	mg/h
ug/h:	ug/h
mg/min:	mg/min
ug/min:	ug/min
mg/kg/h:	mg/kg/h
mg/kg/min:	mg/kg/min
ug/kg/h:	ug/kg/h
ug/kg/min:	ug/kg/min

## 2.5 Conversion method of flow unit

The syringe pump is automatically converts to other units ml/h units and ml/h for the injection unit, when the injection volume reaches the preset capacity, the injection is over. Each conversion method as follows:

- (1) ml / min: flow rate = amount of solution ÷ (time ÷ 60).
- (2) mg / h: flow rate = (amount of solution \* dose) ÷ dose.
- (3) ug / h: flow rate = (amount of solution \* dose) ÷ dose.
- (4) mg / min: flow rate = (amount of solution \* dosage \* 60) ÷ dose.
- (5) ug / min: flow rate = (amount of solution \* dosage \* 60) ÷ dose.
- (6) mg / kg / h: flow rate = (amount of solution \* dosage \* weight) ÷ dose.
- (7) mg / kg / min: flow rate = (amount of solution \* dosage \* weight \* 60) ÷ dose.
- (8) ug / kg / h: flow rate = (amount of solution \* dosage \* weight) ÷ dose.
- (9) ug / kg / min: flow rate = (amount of solution \* dosage \* weight \* 60) ÷ dose.

## **Chapter 3: Operation**

### **3.1 Operation note**

- (1) The mains supply is the normal working power supply of the equipment, the internal battery use only for emergency of mains power abnormal failure.
- (2) If often use the built-in battery as a power supply, after about 100 charge/discharge cycle, the built-in battery performance will be serious decline, you need to contact manufacturer to replace the built-in battery.
- (2) For the first time or re-use of long-term storage of this equipment, the battery should be fully charged before used.
- (3) It is recommended to use the syringe of equipment built-in brand.
- (4) If you need to use the syringe is not recommended brand, first you must set correctly the parameters of the syringe, or it will has plenty of injection velocity and flow rate deviation
- (5) Must be correct and reasonable set up clogging alarm gear, to avoid damage to patients caused by too much infusion pressure.
- (6) This equipment must be inset firmly on the infusion bracket, and placed on smooth desktop and mesa, avoid falling cause damage to equipment.
- (7) When the device is abnormal, or suspected abnormalities, must stop using the equipment, and contact the manufacturer's service personnel.

## 3.2 Operating procedures

### 3.2.1 Start injection process:

connected AC power to the pump, press the "pwr key" to Boot



Choose the right injection unit (injection mode)



Select the correct syringe brand



Correct and reasonable setting clogging alarm gears



Correct and reasonable setting KVO flow rate



correct and reasonable setting Bolus parameter (if necessary)



Correct and reasonable settings parameters for each injection



Embed the syringe that has been installed infusion lines and remove air



Detection check the above parameters, set, syringe brand and press the "run key"  
to syringe after the type is proper

### 3.2.2 Stop injecting:

During the KVO, syringe, Bolus, syringing can be stopped by pressing "stop key"  
(Press the "stop button" to exit alarm function alarm)



The right to take out, and deal with the patient's injection pipeline

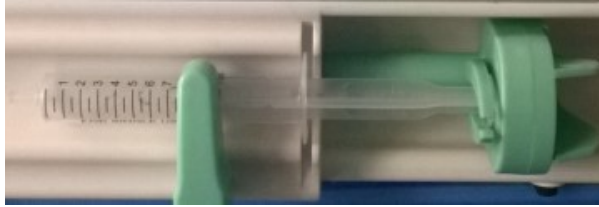


Take out and deal with injector



Press "pwr key" off, remove the power line

### 3.3 Embed syringe



- a, The syringe scale should outward.
- b, The pressure bar need make the syringe compressed and make it close to the wall of the injection pump.
- c, Syringe edge embedded the fixed groove steady and close to the left.
- d, Push rod's pawl cling to push handle of the syringe.
- e, Push rod close to the push handle of the syringe.

### 3.4 user-defined syringe

Enter the "select needle tubing brand" menu



Select the brand which one is to be set, such as: "a brand" or "brand two", or "brand three" ,then press "Enter" to enter



Correct input the syringe scale has been measured, check and make sure it's correct then press "Enter" confirm key to confirm and exit

### 3.5 Fast row (cleaning) function

#### Special attention :

- (1) This function cannot be used for injection of liquids, only for discharge the air fast in the syringe and pipe.
- (2) During this function, the pressure abnormal, push rod fall off and other alarm function will be blocked, and won't produce alarm.

#### The flow rate of fast row (cleaning) functions:

5ml syringe: 150 ml/h	10ml syringe: 220ml/h
20ml syringe: 330ml/h	30ml syringe: 540ml/h
50ml syringe: 800ml/h	

## **3.6 BOLUS Function**

### **3.6.1 Set BOLUS Function Parameters**

In normal injection, according to the“ fast row key” Bolus function parameters can be set, at this time is still in the process of normal injection.

**Note:** Bolus parameters also can be set in the "Set Bolus parameters" menu, and reserve.

### **3.6.2 Abandon set Bolus function parameter settings**

During the Bolus infusion, the Bolus infusion function can be stopped by pressing“exit”and shift to normal injection process in progress.

**Note:** When you set the Bolus parameters of "Set Bolus Parameters" menu, it will exit to the previous menu and not transferred to the normal injection process.

### **3.6.3 Start Bolus Function**

Confirm the settings of Bolus parameters are all correct,press “fast row key” to start BOLUS function, so as to start Bolus infusion.

### **3.6.4 Stop Bolus Function**

During the Bolus infusion, the Bolus infusion function can be exited and shift to normal injection and continued to normal injection just now by pressing“fast row key”.

### **3.6.5 Stop Bolus injection function and into standby**

During the Bolus infusion, the Bolus infusion function can be exited and the syringe pump into stop injection and standby mode by pressing“stop key”.

### **3.6.6 BOLUS Function Ends**

There are two situations will automatically end function of Bolus injection:

(1) In the function of Bolus injection process, after reaching Bolus preset volume, it will exit the Bolus injection function, and shift to normal injection and continued to normal injection just now.

(2) In the function of Bolus injection process,if reach total preset volume, the function will exit Bolus injection, and transferred KVO function and alarm until the medical staffs to disposal.

### **3.7 Alarm and abnormal prompt**

The syringe pump has a variety of alarm, and abnormal prompts, priority can be divided into:

**High priority:** Battery high temperature alarm.

**Medium priority:** push rod fall off alarm, the pressure bar abnormal alarm, motor running abnormal alarm.

**Low priority:** Forgotten operate of the alarm, the injection pipe blockage alarm, the drug running out alarm, the injection will finish alarm, injection is completed alarm, low battery alarm.

**Abnormal Tip:** battery failure, mains missing, mains power.

**Special treatment:** the microprocessor abnormal.

# Chapter 4: Maintenance

## 4.1 Daily maintenance

EOG sterilization; ultrasonic sterilization.

You can use a soft cloth soaked in diluted neutral detergent and wring it, wipe the cabinet, push rod, the pressure, display screen, keypad film, backseat lock device, and to make it dried fully.

**Note:** Please do not use corrosive diluents or organic liquid (such as alcohol) for cleaning.

## 4.2 Battery

(1) When the equipment is stored long-term and not use, you can not remove the battery and should be charged once a month, it can be charged to 80% of the full charge .

(2) The mains supply is the normal working power supply of the equipment, the internal battery use only for emergency of mains power abnormal failure.

(3) If often use the built-in battery as a power supply, after about 100 charge/discharge cycle, the built-in battery performance will be serious decline, you need to contact manufacturer to replace the built-in battery.

(4) For the first time or re-use of long-term storage of this equipment, the battery should be fully charged before used.

**Note:** The device mains powered, the battery is use only for emergency use during power failure, the normal life of the battery is 18 months; otherwise, the battery life is three months. Suggest you to change new battery in advance.

## 4.3 Periodic inspection, maintenance

Users should by professional maintenance staff every six months for once maintenance operations are as follows :

(1) Visual inspection.

(2) syringe accuracy inspection.

(3) Alarm function tests.

(4) Whether the external power supply of the injection pump is in the required range.

(5) Built-in battery performance and security check.

#### **4.4 Transportation and storage**

Ambient temperature:  $-20^{\circ}\text{C}\sim 55^{\circ}\text{C}$ ;

Relative humidity: 10% to 95%;

Atmospheric pressure: 70KPa ~ 106KPa.

In the following circumstances is prohibited:

(1) Sun / direct sunlight.

(2) The place was blowing directly by fans, air conditioners, electric, heating, humidifiers and other cold damp, hot and wet air.

(3) There is the place of the chemicals warehouse or harmful gas.

(4) There is the place of water seepage, splash, too much dust or too many vibration.

(5) The floor is uneven. Vibration, collision, direct sunlight and strong direct light should be avoided.

## **Chapter 5: Nuisanceless disposal, recycling**

Please according to local laws and regulations deal with the dispose of the useless battery and electronic appliances, recycling as much as possible. Don't take waste as house refuse dispose.

### **The appendix**

#### **Statement on the User's Guide and manufacturer's resistance to electromagnetic interference**

Please refer to the manufacturer for the related chapters of registered type test report.

#### **Trumpet-shaped curve, start curve**

Please refer to the manufacturer for the related chapters of registered type test report.

