

Western Surgical

SYRINGE PUMP

OPERATION MANUAL

Read this Manual carefully before operation.



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Description

1. Applicable scope of the product

Syringe pump can be used in different kinds of infusion in which the running volume should be controlled. It is also suitable to be used in outpatient services, emergency treatments and wards.

2. Characteristics of product

Syringe pump adopts micro-computer techniques. It is equipped with many different alarm devices, so the infusion can be safe. It uses LCD screen, and a great amount of information can be showed in the screen. It is convenient to handle with. The pump can be used with all brands of disposable injectors. It also has the function of quickfeed and prime. Both AC&DC power can be used for operation, so it can be applied to all demands of rescue even if at outdoor or faraway areas.

The equipment is anti-splash IPX4 equipment; it is not portable equipment, and it is not AP type or APG type equipment. Mode of operation: operate continuously. The equipment belongs to class II BF type equipment. represents class II medical electrical equipment, and represents BF type medical electrical equipment.

3. Operation principles of product

The syringe pump is made up of a pump, the circuits which cause the computer to carry out the instructions in proper sequence, key buttons,



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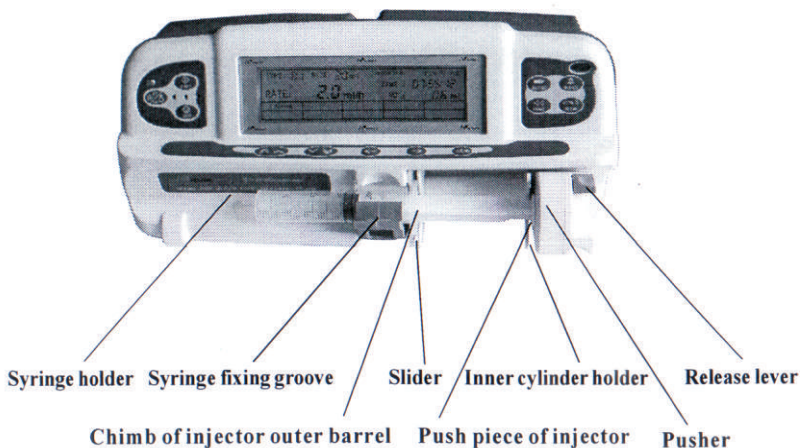
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LCD, sensors and some other things. The medical workers input the infusion references through key buttons. After the automatic working of the circuits, the number of pulses signals for rotation was figured out. The pulse signals makes stepper motor rotate. The rotation of the stepper motor is finished under the help of gear, hold in range and a silk bar. At the same time, the circuits will accept different signals through the sensor, to judge is the infusion situation is normal. Once something wrong is happening, there will be light alarm. At the same time, the infusion will be stopped automatically to assure the safety of the course.

4. Main configuration of product

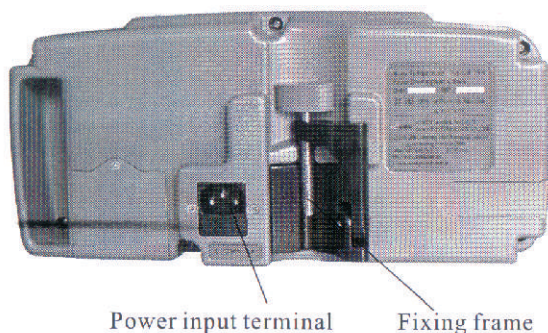


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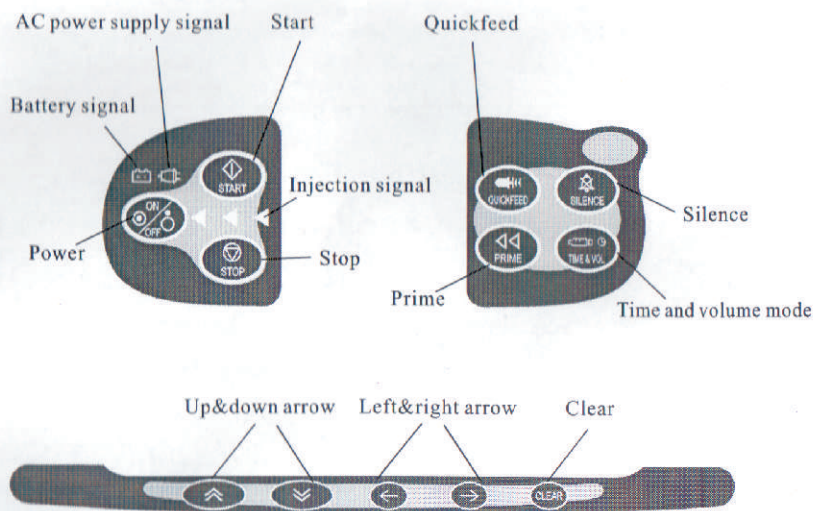
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5. Operation panel of product



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Product performances and Parameters

1. Working condition

- (1) Environment Temperature: $+5^{\circ}\text{C} \sim +40^{\circ}\text{C}$
- (2) Relative Humidity: $20\% \sim 90\%$
- (3) Power: AC: $85\text{V} \sim 260\text{V}$; Inner Power d.c 10.8V (2000mAh 1.2vX9 Nickel-hydrogen battery pack).
- (4) Frequency: $47\text{HZ} \sim 440\text{HZ}$
- (5) Atmospheric Pressure: $860\text{hPa} \sim 1060\text{hPa}$
- (6) Temperature for transportation and storage - $40^{\circ}\text{C} \sim +55^{\circ}\text{C}$;
Relative Humidity: $\leq 95\%$;
Atmospheric pressure: $500\text{hPa} \sim 1060\text{hPa}$

2. Basic parameters

- (1) Applicable Syringe: all brands of disposable syringe by volume of 10ml, 20ml, 30ml & 50ml.
- (2) Power Consumption: 20VA.
- (3) Flow Rate Option: $0.1 \sim 600\text{ml/h}$ in 0.1ml/h increments (50ml injector).
 $0.1 \sim 400\text{ml/h}$ in 0.1ml/h increments (30ml injector).
 $0.1 \sim 300\text{ml/h}$ in 0.1ml/h increments (20ml injector).
 $0.1 \sim 200\text{ml/h}$ in 0.1ml/h increments (10ml injector).
- (4) Infusion Accuracy: $\pm 3\%$ (flow speed: 5ML/h) .
- (5) Total Infusion Volume: $0.1 \sim 999.9\text{ml}$ in 0.1ml increments.



(6)Occlusion Pressure:Low:($40 \pm 15\text{kPa}$) Medium:($60 \pm 20\text{kPa}$)


High:($120 \pm 25\text{kPa}$)

The equipment running speed and blockage threshold value has a direct relation with the time needed for alarming. The lower the running speed, the longer the time needed for alarming; the higher the blockage threshold value, the longer the time needed for alarming. Refer to the following table for the limit values:

Flow speed Blockage threshold value	1mL/h	5mL/h
Low ($40 \pm 15\text{kPa}$)	1 h 50 min	19 min
High ($120 \pm 25\text{kPa}$)	4 h 30 min	54 min

(7)Alarm:Near empty,Empty,Occlusion,Remove,Low battery, Device disengaged, Motortrouble,Falling of the injector,AC power fail.

(8)Function:Time and volume mode,Indicating the remaining time Of injection,Automatic check injector specifications, KVO functions, Total indication of transfusion,Prime and Quicfeed function.

Press  key, and the pump will have a short self-inspection process. The flow speed of last time (the value set last time) will be displayed, and the input will be recovered to zero.








Operation guide









1. To install the syringe

- (1) Rotate syringe holder, and put the syringe, which is full of liquid and connected with the extension tube and scalp acupuncture, into the foundation.
- (2) The chimb of the outside syringe cylinder should be inserted into the syringe fixing groove.
- (3) Pinch the release lever, push the propellor to the Push piece of injector. The chimb of the inside syringe cylinder should be inserted into the inner cylinder holder.
- (4) Press the syringe with the syringe holder downwards, and fix the outside cylinder of the syringe. When the machine was on, the specification of the syringe will be Shown automatically.






2. Illustration and direction for keystokes

- (1)  Power switch--press this key to start the pump, keep it presses to stop the pump.
- (2)  Infusion key--press this key to infuse. When it is working, three green signals will keep moving from right to left. When pause, the signal lights will be off.
- (3)  Stop key--press once to stop infusing. Three orange lights for signal.
- (4)  Silence key--press this key to silence.
- (5)  Quickfeed key--press this key to start quickfeed function.



- (6)  Prime key--press this key to start the prime function.
- (7)  Time and volume key--press this key to get system in time and volume mode.
- (8)  Up & down arrow key--press this key to increase and decrease display value.
- (9)  Left & right arrow key--press this key to choose data that need alteration.
- (10)  Clear key--press this key to clear value of injected volume.
- (11)  Battery signal--light on when using inner power supply. Light flashing when charging.
- (12)  AC power supply signal--light on when using AC power.
- (13)  Displaying on LCD screen remaining time of injection.

3. Guide of quick start

- (1) Press  key to start the pump.
- (2) To install the syringe.
- (3) To make sure there is no problem with the syringe.
- (4) Flow Rate Option--Press  key and  key to change the flow rate.
- (5) Press  key to start the prime function.
- (6) Connect the pump with the patient.
- (7) Press  key to start infusing.

4. To start the pump










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- (1) To connect the pump with AC power. Press  key, the pump will make an automatic examination. During the course, the buzzer will produce a sound. Then it begins to examine if the screen works well.
- (2) To install the syringe.
- (3) To make sure there is no problem with the syringe installed. Check if the brand of syringe is in accordance with that shown in the display screen. If not, enter setting screen to choose correct type of syringe.
- (4) Flow Rate Option--Press   key and   key to change the flow rate.
- (5) Press  key to start the prime function.
- (6) Connect the pump with the patient.
- (7) Press  key to start infusing. On the screen will be the volume which has been infused. Three green signal lights will keep moving from right to left. The moving rate is related to the infusion rate. It indicates that the pump is on work.

5. Quickfeed

- (1) Under transfusion status, continuously press the key for two times, and do not release the key when the key is pressed for the second time (if the key is released, the flow speed display will return to the original set value), and fast injection can be performed. During the period of fast injection, the screen will display the transfusion amount of the fast injection. In the meantime, the total transfusion amount is also displayed.



(2) The flow speed of fast injection of 50ml-injector is 600ml/h, and that of 30ml-injector is 400ml/h, that of 20ml-injector is 300ml/h, and that of 10ml-injector is 200ml/h.

(3) When the proper volume has been reached, unloosen  key. There will be an alarm if the total volume has been reached or a needle cylinder has been filled. At the same time, the pump will turn to KVO interface.

Note: During quick feed pressure alarm limit is temporarily increased to maximum.

6. Prime

When the system is in " waiting " state, continuously press the key for Two times, and do not release the key when the key is pressed for the second time, then bubble exhaust operation can be performed. During the priming procedure, injection is still necessary but it will not be counted as part of the total volume. The flow speed of bubble exhaust of 50ml-injector is 600ml, that of 30ml-injector is 400ml, that of 20ml-injector is 300ml, and that of 10ml-injector is 200ml.

Note: During prime pressure alarm limit is temporarily increased to maximum.

7. Clear up the infusion volume

This option is to clear up the infusion volume on show.



When not in the infusion interface, press **CLEAR** key to clear up the total volume infused in the normal infusion interface.

8. Time and volume mode

Flow rate Time setting zone Volume setting zone

TYPE:	SIZE:	PRESSURE:		
RATE:	000.0	ml/h	TIME:	00:00:00
			VOL:	0000.0 ml

This option is to figure out the infusion speed after a total infusion volume and time has been done.

- (1) Press **TIME/VOL** key to enter time and volume mode when the system is in "waiting" state.
- (2) Press **▲** **▼** and **←** **→** key to set infusion volume and time needed.
- (3) Press **CLEAR** key to confirm after setting process is finished. Press **SILENCE** Key to cancel setting.

9. KVO function

KVO is the abbreviation of keep vein open.

After the intended transfusion amount is completed, the alarm indicator lamp will start flashing. The liquid crystal display will alternatively display KVO speed 0.5ml/h and the original set flow speed. In the meantime, there will be alarm sound. At this time, the pump comes into KVO speed(0.5ml/h).

10. Setting






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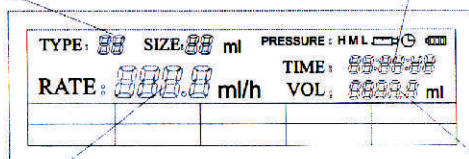
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When the system is in "Close" state. Press simultaneously  and  To enter the screen of parameter setting.

Setting numbers will change successively every time you press .

Setting number

Parameter setting zone 1



Parameter setting zone 2



Parameter setting zone 3


Setting number--number of the set program being operated currently

Parameter setting zone--parameter display zone needs adjustment.

10.1 Set the syringe type

Setting number:01

Syringe type is displayed in "parameter setting zone 2". Press  

Key to choose number of corresponding syringe type. Displayed data is related to the number of syringe types internally decided already with maximum of 20. Press  key to confirm after a choice is made.

Select the injector produced by different injector manufacturers in table 1, and press the key for confirmation after the injector is selected.

Table 1 List for the recommended connecting devices

Serial No.	01	02	03	04	05	06	07	08	09	10	11	12
Manufaturers	Yu sheng	Kang tai	Long de	Shen bao	Shua ngge	Xin hua	Wei gao Jie rui	Su yun	Kang de lai	Long xin	Hong da	Kang kang



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10.2 Occlusion pressure setting

Setting number:02

Alarm pressure is displayed in parameter setting zone 1 . Press   Key to choose corresponding scope of alarm pressure (high, middle, low). Press  key to confirm after a choice is made.




10.3 Set alarm tune

Setting number:03

Alarm volume is displayed in parameter setting zone 2 . Press   Key to choose corresponding alarm volume. Press  key to confirm after a choice is made.




10.4 Set device disengaged time

Setting number:04

Device disengaged time is displayed in parameter setting zone 2 . Press   key to choose corresponding device disengaged time(0-9minutes). Press  key to confirm after a choice is made.
The presumed time for this option is 2 minutes.

10.5 Set the time of near empty

Setting number:05





The time of near empty is displayed in " parameter setting zone 2 " . Press   key to choose corresponding time of near empty (0-9minutes). Press  key to confirm after a choice is made.





The presumed time for this option is 1 minutes.

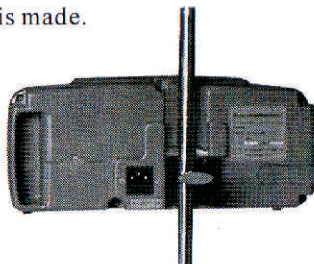
10.6 Set the total infusion volume

Setting number:06

Total infusion volume is displayed in " parameter setting zone 3 ".It is used to set the maximal infusion volume.After maximal infusion volume is reached at KVO rate to continue. Press   key to choose positions that need alteration. Press   key to change values.

Press  key to confirm after alteration is made.

Press  key to quit setting screen.





11. Set the pump

Set the knob of the support structure.

And fix the pump in on the infusion stand.

12. Alarm

The alarm system is made up of a sound alarm and a light alarm.The elated information can be seen through the LCD.

- (1) Press  key to set silence at first. It lasts no more than 2 minutes.And then check the related alarm information on the screen.
- (2) If infusion stops, find the reason and press  key to resume.



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Information On Screen	Reason For Alarm
Near Empty	The alarm signal begins to flash a minute before empty. And " Near empty " will be on display on the liquid screen. At the same time, constant alarm can be heard.
Empty	When the liquid in the injector is less than 0.5ml(for 10ml, 20ml and 30ml injector) or 1.5ml(for 50ml injector), the alarm signal begins to flash constantly. " Empty " will be on display on the liquid screen, and constant alarm can be heard. At the same time, the pump will be in state of KVO automatically.
Occlusion	When the infusion system is occluded and out of the limit of occlusion pressure($40\text{kpa} \pm 15\text{kpa}$ for low, $60\text{kpa} \pm 20\text{kpa}$ for middle, $120\text{kpa} \pm 25\text{kpa}$ for high), the alarm light begins to flash, and " Occlusion " will be on display on screen. At the same time, constant alarm can be heard.
Remove	If the propeller button was pushed owing to the carelessness during the infusion, the alarm signal begins to flash. " Remove " will be on screen. At the same time, constant alarm can be heard.
Low Battery	When the battery is under undervoltage status, the pump will send discontinuous sound and there will be continuous light alarm. At this time, the pump still can work for above 30min at the speed of 5ml/h. When the electric quantity of battery is to be used up, the pump will stop working at least 3min before the electric quantity is used up, and continuous sound and light alarm will be sent.
Device Disengaged	During the awaiting time, ten minutes after the last operation, the alarm signal begins to flash. " Device disengaged " will be on screen. At the same time, constant alarm can be heard. Any button can be pushed to stop the alarm.
Ac Power Fail	When the power is disconnected with AC, the inside battery can work automatically. At the same time, the alarm signal begins to flash. " AC power fail " will be on screen. At the same, constant alarm can be heard.
Falling Of The Injector	When the injector is falling during infusion, the alarm signal begins to flash. " Falling of the injector " will be on screen. At the same, constant alarm can be heard.
Motor Breakdown	When the machine is broken down, the alarm signal begins to flash. " Motor breakdown " will be on screen. At the same, constant alarm can be heard.



Contraindication

Contraindication: Try to avoid infuse the liquid medicine with accurate infusion amount (error, $<1\%$), such as narcotic drug.

Notice

1. To prevent air from entering the body of patient and other risks caused by injections, the equipment must be operated and used by medical personnel.
2. When the power is in the state of low battery, the AC power should be connected immediately. Otherwise the battery can not be recharged for use.
3. The remaining liquid in the extension pipe will affect the total infusion volume.
4. If the drag hook of pusher is broken, it shall be replaced timely, or the residual solution in the injector will flow into the body of patient due to siphon, which will hurt patients due to overdose.
5. The disabled battery should be placed in the specific place to avoid environment pollution.
6. When injector is selected, please select the injector and extension tube with screw, or patients may be injured due to pulling of pipe.
7. The precision error of injector will affect the output precision of pump. When the precision of pump is tested, the pump injector with high precision shall be selected.



8. After the injector is installed correctly and all parameters are set, if the pump can not be started after the transfusion key is pressed, and the specification on display is 00, then the equipment is not compatible with the injector of this brand and this specification. Please use the **injectors of other specifications or brands**.

9. After the fast injection key is pressed, observe if the flow speed returns to the original set value. If not, then stop the machine, or the pump will push in high speed, which will bring danger to patients.

10. The pump shall be installed or fixed reliably according to the requirements in figures, and it shall not be placed on the flat slab without rail, so as to avoid the slide of pump due to pulling management, bringing danger to patients.

11. When the flow speed of pump is tested, the selected injector shall be used.

12. The possible maximum transmission capacity under single fault status is 0.02ml.

Alarm Operation

1. Medical electrical knife, mobile phone or other tools producing frequency will interfere the normal operation of the instrument, so avoid using them near the instrument.

2. It is forbidden to demount or renovate the equipment, or there may be electric shock or injury accident.

3. Read this Manual carefully before operation, Inspect various alarms



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and functions of the instrument. Patients may suffer from the harm caused by overdose due to the operation that is not performed according to requirements.

4.The disposable injectors produced by the manufacturers in the instruction book shall be selected, or the operation of pump will not be smooth and the transfusion precision will be reduced. However, for the designated injectors, we only recognize the external structure and dimensions, and the index in biochemistry, physics and measurement shall be tested and recognized by relevant supervision departments.

Maintenance, cleaning and disinfection

1. Maintenance

- (1) It is suggested that the equipment shall be inspected and maintained for at least once a year.
- (2) It is suggested that after the product is used, clean it with 75% alcohol or 0.1% benzalkonium bromide for sterilization. Before it is cleaned, the power supply of the syringe pump must be cut off.
- (3) Don t put the pump into the liquid. Otherwise, the pump will short circuit.
- (4) For stored product, functional inspection shall be performed for the syringe pump for once/three months, so as to ensure that the battery is under full status.



(5) If the product is broken down, please contact with the agent or the service center immediately. We will try our best to solve it. And the product must be checked and repaired by the mechanics we authorize. The authorized units will be provided with the related drawings and spare parts. In one year, we will be responsible for any cost for repair.

(6) Under the conditions that regulations on storage, transportation and use are complied with, the guarantee period is two years since the purchase date (based on invoice).

2. Storage conditions and methods

Syringe pump should be stored in a relative humidity of not more than 95 percent, non-corrosive gases, a well-ventilated indoor environment cleaning.

3. Charging

(1) The inner battery automatically charges AC operation.

(2) Before the first use of the product, it shall be charged for continuous 24 hours under off status, and then the pump can operate for above 3.5 hours under the flow speed of 5ml/h (the speed stipulated by GB9706.27-2005 standard).

(3) The battery shall be taken out if the syringe pump is not used for a long term. Before use, charging and discharging inspection shall be performed for the battery, so as to avoid the situation that the built-in battery can not work under power off status.



(4) When charging, if the surface temperature of the battery box is found too high (higher than 45°C), then it indicates that the battery or charger have a fault. Cut off the power supply immediately, and send it to our company for repair.

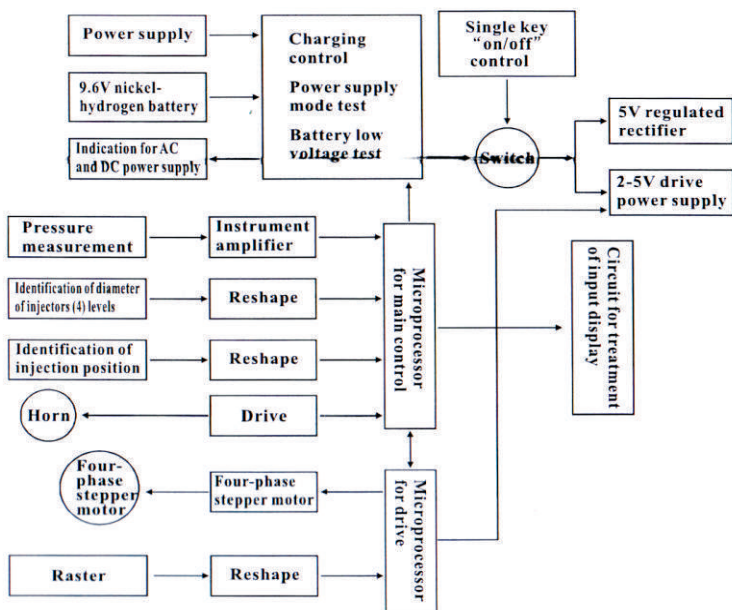
(5) The battery is of nickel-hydrogen battery, so it can only be used for some time and should be changed from time to time. When the battery is being changed, the power should be cut off. Use a screwdriver to the two different leads. The red one is positive and the black one is negative.

4. Changing the blown fuse

If the blown fuse needs changing, just open the box in the foundation of the pump. The specification of the blown fuse: T 250V 0.2A ($\phi 5 \times 20$).



Electrical schematic diagram of Syringe pump



Packing list

- A syringe pump
- A pump travel
- A power lead
- An operation manual
- An acceptance certificate
- A "three guarantees" card



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Three-guarantees card

Name	Syringe Pump		
Type		No.	
Purchasing unit			
Contact telephone			
Address			
After-service record			
Fault record		Damage cause	

- Our company will be responsible for repair expenses caused by non-artificial faults within one years from the date of sale .



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