

Western Surgical®

Syringe Pump

USER MANUAL WITH DRUG NAME



www.westernsurgical.in

Email : westernsurgical@gmail.com

Email : info@westernsurgical.in

Ph. : +91-281-2232871 / 2243159

Contents

I Introduction.....	1
1.1 Working principle and Intended use	1
1.2 Features.....	1
1.3 Specifications	2
1.4 Brand List of Syringe	3
1.5 Symbol Description	3
1.6 Appearance.....	4
II Installation.....	5
III Operation.....	5
3.1 Calibration.....	5
3.2 Purge.....	6
3.3 Voice volume:.....	6
3.4 Occlusion	7
3.5 Syringe brand	7
3.6 Working mode.....	7
3.7 Bolus	8
3.8 Clear.....	8
3.9 Restore Factory settings.....	9
3.10 KVO Rate settings	9
IV Alarms and Disposition	9
V Maintenances.....	11
VI Trouble shooting guidelines	12
VII Warranty.....	13

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I Introduction

1.1 Working principle and Intended use

Syringe Pump is a kind of certain rate and constant volume micro syringe pump. It through microprocessor's accurate control over precision stepper motor, produces horizontal movement thrust via mechanical driving devices to drive the piston rod of syringe. The syringe pump has sensors which can accurately control the injection rate of disposable syringe and the injection process.

The syringe pump is high-precision and intelligent. It is suitable for clinical treatment that needs long-time and high precision injection and supervision of injection process. It can be widely used in traditional intravenous, anesthetic, anticoagulant injection, chemotherapy for patients. It also applies to ICU and CCU etc.

1.2 Features

- Audible and visual alarm for occlusion, empty, near empty, low battery, end of infusion, syringe loose, wrong setting etc
- HD LCD Display, high capacity words, friendly user interface, dynamically display working status
- Compatible with 10ml, 20ml, 30ml, 50/60ml syringe of any brands
- Preset solution volume to greatly reduce the workload of nurses
- Three work modes: Rate mode, Time Volume mode, Dosage Weight mode
- Three levels of occlusion: high, medium and low
- Purge and Bolus function
- KVO (keep-vein-open) automatically opens as injection is completed, KVO rate is 0.1ml/h ~ 5ml/h
- Freely Stackable: freely stack one syringe pump onto another to provide multiple solutions, which have a wide range of clinical applications.
- Connecting Port for Nurse-Paging
- Power Source: AC100-240V, 50/60Hz; Internal Battery, DC11.1V car charge
- One-key operation makes setup easy and simple
- Syringe Plunger Grabble Detector, operable with one hand in a No-Germ Environment

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- Automatically record the settings for last injection
- Drug name can be added according to customer's request
- Syringe Brand is adjustable according to customer's request

1.3 Specifications

Rate:

50/60ml Syringe:	0.1ml/h ~ 999.9ml/h	(0.1ml/h step)
	1,000ml/h ~ 1,500ml/h	(1ml/h step)
30ml Syringe:	0.1ml/h ~ 900.0ml/h	(0.1ml/h step)
20ml Syringe:	0.1ml/h ~ 600.0ml/h	(0.1ml/h step)
10ml Syringe:	0.1ml/h ~ 300.0ml/h	(0.1ml/h step)

Flow Rate Accuracy: Within $\pm 3\%$ (after correct calibration)

Mechanical precision: Within $\pm 2\%$

Bolus Rate: 50/60ml Syringe: 1,200ml/h

30 ml Syringe: 720ml/h

20 ml Syringe: 480ml/h

10 ml Syringe: 240ml/h

Purge Rate: 50/60ml Syringe: 1,500ml/h

30ml Syringe: 900ml/h

20ml Syringe: 600ml/h

10ml Syringe: 300ml/h

Volume Limit: 0.1ml ~ 999.9ml

Total Injection Volume: 0.1ml ~ 9999.9ml (0.1ml step)

Occlusion: High: 800mmHg ± 200 mmHg (106.7 kPa ± 26.7 kPa)

Medium: 50/600mmHg ± 100 mmHg (66.7 kPa ± 13.3 kPa)

Low: 300mmHg ± 100 mmHg (40.7 kPa ± 13.3 kPa)

Alarms: Injection soon finish, end of injection, occlusion, improperly installation of syringe, wrong setting, low battery, syringe loose etc.

Power Source: AC 100V ~ 240V, 50/60Hz; Internal rechargeable Li battery,

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capacity≥1,600mAh, 4 hours internal battery backup

KVO rate: 0.1ml/h ~ 5ml/h

Fuse: F1AL/250/60V, 2pcs inside

Power Consumption: 30VA

IP Classification: IPX1

Equipment Classification: Class II, internal power supply, Type BF

Operating Condition: Ambient temperature: +5℃ ~ +40℃;

Relative humidity: 20 ~ 90%

Transport & Storage Condition: Ambient temperature: -30℃ ~ +55℃

Relative humidity: ≤95%

Dimension: 280mm (L) × 210mm (W) × 130mm (H)

Weight: 2.2kg (net weight)

Note:

Disposable syringe and extension tube sterilized by ethylene oxide that used with this product shall comply with the standards of *GB15810-2001* sterile hypodermic syringes for single use. Syringe or extension tubes which do not comply with the standards may lead to incorrect injection rate, drug residues, and other possible hazard.

1.4 Brand List of Syringe

No.	Syringe Brand	Abbreviation	No.	Syringe Brand	Abbreviation
01	Xinhua	X H	08	Kangjin	K J
02	Hongda	H D	09	Lele	L L
03	Linyang	L Y	10	Huafu	H F
04	Jerry	J R	11	Class A	
05	Hana Good	HNH	12	Class B	
06	Lujie	L J	13	Class C	
07	Suyun	S Y			

1.5 Symbol Description

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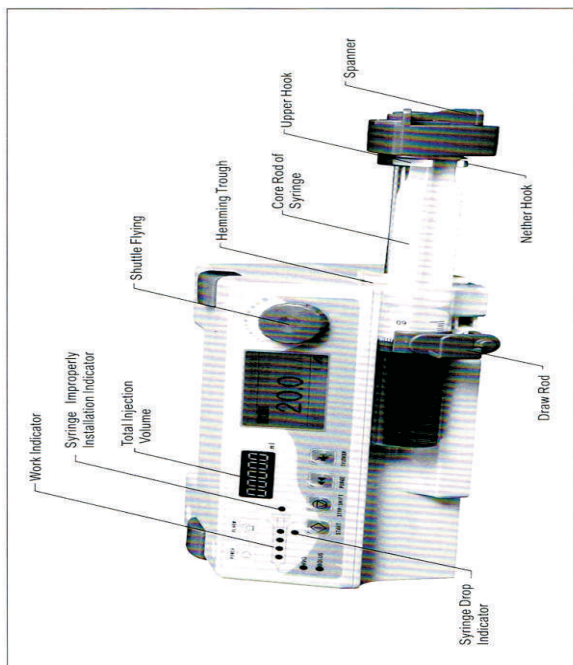
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Symbol	Description
	Type BF Applied Part
	Class II Double Insulated
IPX1	Drip Proof
	<p>Symbol for the electrical devices according to Directive 2002/96/EC.</p> <p>The device, accessories and the packaging have to be disposed correctly at the end of the usage. Please follow Local Ordinances or Regulations for disposal.</p>

1.6 Appearance



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II Installation

1. Pump installation: This product can neither be used as portable device, nor be placed on the sick bed during use. Users should place the syringe pump on the table or fix to the infusion support by tightening the screw handle. Before use make sure the syringe pump is firmly installed, and the infusion support is stable.
2. Connect AC power with the three-pin plug power core supplied with the product. And use the internal battery only in case of AC power failure. The AC power indicator will be ON when the AC power is used, and will black out when the internal battery is used.
3. Syringe installation: Fill the liquid medicine into the syringe and connect the syringe with extension tube and scalp needle first, pull out the draw rod and rotate it left, clench the spanner and move backward, place the syringe onto the pump, then rotate the rod right to clamp the syringe. Drop indicator will be ON for syringe loose. Make sure the hemming of the syringe is inserted into the hemming trough of the pump, and the end of the syringe core rod is well connected to the sensor that on the middle of the upper and nether hook. Otherwise, the syringe wrong installation indicator will be ON.
4. Syringe reinstallation: Please press "Stop" key before reinstallation the tube or syringe. Then follow above instruction to install it.

Note :

1. After the syringe is installed onto the syringe pump but before the needle is inserted into the patient, put the needle head vertically upright to prevent the liquid medicine from flowing out by itself.
2. Cleaning the extension tube is necessary. Manual handling is needed if cleaning the tube cannot be finished by purging at the single fault.
3. Parameter settings are all locked and can not be adjusted during injection. Users can reset the parameters only after stop the syringe pump.

III Operation

Operation is mostly by rotating and pressing "Shuttle Flying" key, sometimes by "Stop/Shift" key to move the cursor.

3.1 Calibration

Please do Calibration as any brand syringe (10ml, 20ml, 30ml and 50/60ml) is being used for the first time. The calibration will allow the syringe pump to measure the

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parameters of that syringe and save them automatically. It is not needed to calibrate again when the same brand of syringe is used later. When a different brand of syringe is used with same capacity, it is recommended to calibrate again so as to ensure the accuracy.

Pull the syringe (empty or filled with medicine) to the position of the largest scale (e.g. pull the 50/60ml syringe to the scale of 50/60ml) at shutdown. Install the syringe properly. Press "Start" key and hold on, turn on the power switch at the back of the pump and the display is shown as Figure 1, the password is 012.0. Press "Stop/Shift" key to move the cursor and rotate "Shuttle Flying" key to input the password. Press "Shuttle Flying" key to enter into the custom screen. Rotate "Shuttle Flying" key to select Class A, B, C. And press "Shuttle Flying" key, then "Inject" is displayed on the screen. Press "Shuttle Flying" key again to calibrate the syringe. The calibration will be finished automatically after a few minutes. The parameters of the syringe used for calibration will be saved into the syringe pump automatically. And display comes to main screen, as Figure 2.

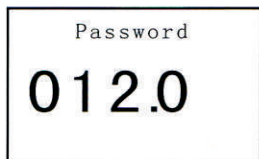


Figure 1

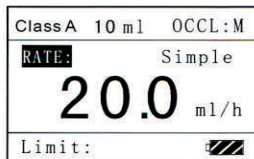


Figure 2

3.2 Purge

Press "Purge" key twice, hold on for the second time until liquid medicine appears at the tip of the needle. The liquid medicine during purging is not included into the total injection volume.

Note:

Make sure remove all the bubbles in the syringe and extension tube before injection. Otherwise, there may be dangers.

3.3 Voice volume:

Turn on the power switch, the pump will give out alarm "AC power has been pulled out" to remind you if the pump is not connected with AC power.

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OK	
Volume:
Occlusion:	Middle
Syringe:	X H
Modes:	Simple

Figure 3

OK	
Volume
Occlusion:	Middle
Syringe:	X H
Modes:	Simple

Figure 4

Press “Stop/Shift” key and hold on, simultaneously press “Shuttle Flying” key, screen comes into as Figure 3. Rotate the “Shuttle Flying” key, move the cursor to “Volume”, then “Volume” icon darkens as Figure 4. Press the “Shuttle Flying” key and the cursor is blinking, then you can rotate the “Shuttle Flying” key to adjust voice volume. Press “Shuttle Flying” key and it comes into another parameters’ setting.

3.4 Occlusion

Rotate the “Shuttle Flying” key and move the cursor to “Occlusion” to select occlusion level: High, Medium, Low.

3.5 Syringe brand

Rotate the “Shuttle Flying” key and move the cursor to “Syringe” to select syringe brand. There are totally 10 brands syringe recommended. Other brand syringe also can be used after calibration.

3.6 Working mode

Operation is the same as above. There are three working modes: simple, Vol/T, Vol/W. After finish setting parameters, rotate the “Shuttle Flying” key and move the cursor to “OK” as Figure 3, press the “Shuttle Flying” key to save the setting and display comes into the main screen.

3.6.1 Simple mode: At the main screen as Figure 2, press “Shuttle Flying” key and the rate darken as Figure 5, rotate “Shuttle Flying” key to adjust it. Users also can press “Stop/Shift” key to move the cursor. Press “Start” key to start work.

Follow the same instruction to set the Limit volume.

X H	10 ml	OCCL:M
RATE:	Simple	
020.0	ml/h	
Limit:	■■■■	

Figure 5

X H	10 ml	OCCL:M
RATE:	Vol/T	
018.0	ml/h	
Limit:	■■■■	

Figure 6

Setting	■■■■
Time	0100 min
Volume	030.0 ml
Rate:	18.0 ml/h

Figure 7

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3.6.2 Vol/T (Time and Volume) Mode: At the main screen as Figure 6, press “Shuttle Flying” key and the screen will show as Figure 7. Users can set the Time and Volume, the rate will be calculated automatically. Press “OK” to save the setting. At the main screen as Figure 6, Rotate “Shuttle Flying” key and move the cursor to “Limit”, users can preset limit volume by “Shuttle Flying” key and “Stop/Shift” key.

3.6.3 Vol/W (Dosage and Weight Mode): There are three units of drug: mg, ug and ng.

At the main screen as Figure 8, press “Shuttle Flying” key, display comes into as Figure 9, users can adjust the drugs(medicine amount), drug units(mg, ug and ng), patient weight, liquid volume and dosage by rotating/pressing “Shuttle Flying” key and “Stop/Shift” key, the rate will be calculated automatically. Press “OK” to save the setting.

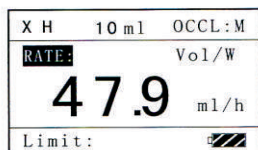


Figure 8

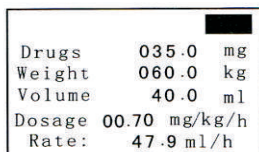


Figure 9

Note:

1. To ensure safety during injection, users should check all parameters one by one after setting. If the parameters exceed specified range, the syringe pump will give alarm “Wrong setting” to remind users to reset.
2. The syringe pump can automatically record last settings of injection. No further setting is needed for the same parameters injection.

3.7 Bolus

When the pump is under normal working condition, press “Purge” (Bolus) key twice, hold on for the second time, then the pump comes into Bolus mode. Release the key and the pump will continue work at the preset speed. The liquid medicine during Bolus is automatically added into the total injection volume.

3.8 Clear

Simultaneously press “Stop/Shift” key and “Silencer” key, the total injection volume shown on the digital display screen is cleared to zero.

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3.9 Restore Factory settings

Press “Start” key and hold on, turn on the power switch and the display is shown as Figure 1, the password is 120.0. Press “Stop/Shift” key to move the cursor and rotate “Shuttle Flying” key to input the password. Press “Shuttle Flying” key to restore factory settings, and display come into main screen.

3.10 KVO Rate settings

Press “Start” key and hold on, turn on the power switch and the display is shown as Figure 1, the password is 010.0.

IV Alarms and Disposition

The syringe pump will trigger audible and visual alarm when the alarm happens. Please deal with alarms immediately. The causes and how to get out of them are given below.

Injection begins — Syringe pump will give alarm *“Injection begins”* when injection begins.

Near empty — Syringe pump will give alarm *“Please note injection soon finishes”* to remind user that the syringe is near to empty. Clear the sound of alarm by “Silencer” key.

Empty — Syringe pump will give alarm *“Injection finishes”* and switch to KVO (1ml/h) automatically when the syringe is empty. Clear the sound of alarm by “Silencer” key, or press “Stop/Shift” key to return to the main screen.

End of infusion — Syringe pump will give alarm *“Injection of limited amount finishes”* and switch to KVO (1ml/h) automatically when the preset limiting volume is finished. Clear the sound of alarm by “Silencer” key, or press “Stop/Shift” key to return to the main screen.

Note: If users do not preset limiting volume, it means the injection volume is the whole liquid in the syringe.

Occlusion — When *“Injection is blocked”* alarm occurs, the pump will stop working automatically. Users should check the extension tube, the needle head etc. to clear the alarms. Clear the sound of alarm by “Silencer” key, or press “Stop/Shift” key to return to the main screen.

Note: Alarm threshold and triggering time:

Low($40.7\text{kPa} \pm 13.3\text{kPa}$), Medium($66.7\text{kPa} \pm 13.3\text{kPa}$), High($106.7\text{kPa} \pm 26.7\text{kPa}$). Alarm triggering time is as below table when syringe pump work at medium speed (5ml/h) and the lowest speed (0.1 ml/h). Users should select proper occlusion

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pressure level after occlusion fault clearing. The maximum injection pressure is 180kPa at working condition.

Rate (ml/h)	Occlusion level	Occlusion (mmHg)	Triggering time
5	Low	300	<0h10min47sec
5	Medium	500	<0h16min55sec
5	High	800	<0h23min43sec
0.1	Low	300	<0h57min49sec
0.1	Medium	500	<1h24min29sec
0.1	High	800	<1h41min17sec

Note: When the syringe pump work at speed of 5ml/h, the pill dosage is not exceeding 1ml when occlusion pressure selected is low, and not exceeding 2ml when occlusion pressure selected is high.

Syringe loose — Syringe pump stops working and give alarm *"Syringe falls off"* when the syringe loose. And the Drop indicator will be ON. Clear the sound of alarm by "Silencer" key, or press "Stop/Shift" key to return to the main screen.

Syringe improper installation — Syringe pump stops working and give alarm *"Syringe is improperly installed"* if the end of the syringe is not well connected to the sensor that on the middle of the up hook and down hook. And the Syringe wrong installation indicator will be ON. Clear the sound of alarm by "Silencer" key, or press "Stop/Shift" key to return to the main screen.

Wrong setting — Syringe pump stops working and give alarm *"Wrong setting"* to remind users to reset if the parameter setting exceed specified range.

AC power disconnected — Syringe pump give alarm *"AC Power has been pulled out"* when turn on the power switch without connecting to AC power, or disconnect to AC power when working.

Low battery — When the battery voltage is low, the battery cursor on the screen will blink intermittently and the syringe pump will give alarm *"Low battery, please connect external power"* intermittently. Press "Silencer" to clear the sound of alarm. The syringe pump can still work for 30min at speed of 5ml/h and will stop working automatically at least 3 minutes in advance of power off. The pump will continue work only after connect to AC power.

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V Maintenances

- Please use the syringe recommended by us or after correct calibration to ensure precision.
- Keep the pump dry, clean it by wet rag with cleanser. Do not wash it by organic solvent, such as benzene and butanone.
- The instrument should be away from vibrations, dust, corrosive or explosive atmosphere, extreme temperature or excessive humidity & all large electrical appliances etc.
- Do not install any other control equipment on the same injection tube during working. Otherwise, there might be dangers.
- The force to the injection tube should not exceed 5N. Otherwise, there might be dangers.
- Please contact qualified service engineer for replacing the fuses when the fuses is broken.
- The performance of this product has no relation to gravity.
- Only professional and trained people can repair the product. Please contact manufacturer to replace the silkscreen or key if there is something wrong with them.
- Please change the upper and nether hook if they are distorted or broken. Otherwise, siphonage will happen. The balance medicine in the syringe will flow into the body of the patient by itself, overdoses may cause suffer to the patient.
- Make sure the hemming of the syringe is inserted into the hemming trough of the pump. Otherwise it may cause harm to patient by no medicine output or overdoses because of siphonage.
- Please conduct Charge-discharge inspection for the battery once per month. Please timely connect to AC power when low battery alarm occurs. Please use AC power as often as possible as the internal battery is charged at the same time.
- The charge-discharge time of battery is about 500 times, discharge time is more than 4hours (charging 6-8hours at power off), it will be a little different affected by environment etc. Battery replacement should by operated by qualified person.
- The infusion pump must ground as other equipments.

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- Please stop working and contact manufacturer if the pump is fault during working. The maximum injection volume is 1ml at the single fault condition.
- Environmental protection: When the life of the instrument (including spare parts, such as batteries) expires, please handle them according to environmental regulations.

VI Trouble shooting guidelines

Faults	Possible Causes	Possible Remedies
NO response or black after turn on the power switch or missing words during setting	1. Low battery 2. Fuse melt 3. LCD display breakage 4. System halted	1. Check the connection of AC power; 2. Reboot the pump after shutdown; 3. Contact Authorized service agent; 4. Restore factory setting.
Low battery alarm after turn on the power	1. Battery is not timely charged after use; 2. Pump is idle for too long;	Charge the battery at shutdown
	1. improperly use the battery 2. Out of battery life	Replace battery
The pole can not be moved smoothly	There is medicine that stick to the main mobile pole of the pump	Wipe it by alcohol
Injection rate is inaccurate	1. Not use the syringe that recommended by us 2. Syringe is not after correct calibration	Calibrate the syringe
	The hemming of the syringe is not inserted into the hemming trough of the syringe.	Reinstall the syringe

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There is blood back when infusion begins	1. Not start the pump after needle head is inserted into patient 2. Not eliminate mechanical interval	1. Start the Syringe Pump 2. Press "Purge" key to push the blood into the vein
Other faults		Restore factory settings

VII Warranty

- Warranty for the syringe pump is two years from the date of purchase. We only charge repair expenses that not caused by product quality.
- Warranty for the battery is half a year from the date of purchase.
- Considering the life of components and safety, medical devices should not be used longer than 7 years. Expired products should be discarded according to corresponding regulations.

Date of Installation	Installed By
Model No.	Serial No.
Warranty Period	
Name of Doctor & Address :	

Customer Sign. With Stamps

**Marketed By: Western Surgical
Sign. With Stamps**

No Claim Warranty :

1) Any Defect Throughtout Power Supply

2) Any Physical Damage

3) Under Warranty Standby Unit Not Provide

4) Under Warranty When Company Send Parts or Machine we Imidiat send to Buyer.

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“Happy Home”, 2nd Floor, 23, Karanpara,
B/h. S.T. Bus Stand, Kanak Road,
Rajkot-360 001. Ph. : 0281-2232871/2243159
Mo. : 98250 69069 - 98250 45997
Email : westernsurgical@gmail.com
Email : info@westernsurgical.in

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