

Syringe Pump Instruction Manual

Model: BD-5000



ShenZhen Kang Brand Meditech Co., Ltd.

Please read the manual before using the product.

Please keep the manual for reference!



Instruction

Thank you for purchasing Model: BD-5000 syringe pump.

Please read the manual carefully before using the product.

Please keep the manual for reference.

| | |
|------------------------------------|--|
| Product name: | Syringe pump |
| Model: | Model BD-5000 |
| Product performance and structure: | Mainly composed of shell assembly, pump assembly, boards, battery and so on |
| Application scope: | It is used in hospitals where patients need to be given steady and continuous injection or precise medication. |
| Manufacturer: | Shenzhen Kang Brand Meditech Co., Ltd. |
| Registered address: | Floor 5A, Blk. A, Tempus Building, Qingshuihe 1st Street, Luohu District, Shenzhen, China |
| Manufacturer address: | Floor 5A, Blk. A, Tempus Building, Qingshuihe 1st Street, Luohu District, Shenzhen, China |
| Website: | www.brand-med.com |

Statement

All final explanation rights to the user manual belong to Shenzhen Kang Brand Meditech Co., Ltd.

Shenzhen Kang Brand Meditech Co., Ltd. has the right to revise the user manual without prior note. The revised contents will be shown in the new version.

Shenzhen Kang Brand Meditech Co., Ltd. will be responsible for the safety, reliability and performance of the product only if all of the following requirements are met:

- ◆ Assembly, expansion, reset, improvement and maintenance should be carried out by professionals recognized by Shenzhen Kang Brand Meditech company.
- ◆ All of the components used for maintenance and accessories and disposables compatible with the pump are supplied by Shenzhen Kang Brand Meditech company originally or recognized by Shenzhen Kang Brand Meditech company.
- ◆ Related electronic devices comply with the requirements of state standard and the user manual.
- ◆ Please operate the pumps according to the user manual.




Contents

| | |
|---|----|
| Chapter 1 Safety..... | 4 |
| 1.1 Safety Precautions..... | 4 |
| 1.1.1 Note..... | 4 |
| 1.1.2 Danger..... | 4 |
| 1.1.3 Warnings..... | 4 |
| Chapter 2 Product Introduction..... | 7 |
| 2.1 Product Structure and Composition..... | 7 |
| 2.2 Application Scope..... | 7 |
| 2.3 System Structures..... | 7 |
| Chapter 3 External Characteristics..... | 8 |
| 3.1 Front Panel Instruction..... | 8 |
| 3.2 Rear Panel Instruction..... | 10 |
| 3.3 Packing..... | 10 |
| 3.3.1 Product Label..... | 10 |
| 3.3.2 Label Marks and Significations..... | 10 |
| 3.3.3 Inside Content of a Standard Packing:..... | 12 |
| Chapter 4 Operation Guidelines..... | 13 |
| 4.1 Operation Flow Chart..... | 13 |
| 4.2 Basic Operation Steps..... | 14 |
| 4.3 Start the “BOLUS” Function..... | 19 |
| 4.4 Define the Syringe Brand..... | 20 |
| 4.5 Advanced Setting..... | 22 |
| 4.6 Mode Parameters Setting..... | 23 |
| 4.7 Parameters Setting in the “Stop” Status..... | 24 |
| 4.8 Check the Preset Volume and Timing during the Injection..... | 26 |
| 4.9 Check the Sensor Value..... | 26 |
| 4.10 Battery Charge..... | 27 |
| Chapter 5 Alarm and Solutions..... | 28 |
| 5.1 Common Alarms and Solutions..... | 28 |
| 5.2 Common Problems and Solutions..... | 30 |
| Chapter 6 Product Maintenance..... | 31 |
| 6.1 Cleaning and Disinfection..... | 31 |
| 6.2 Regular Maintenance..... | 31 |
| 6.3 Storage..... | 33 |
| Chapter 7 Electromagnetic Compatibility and Interference..... | 34 |
| Chapter 8 Product Specification..... | 35 |
| 8.1 Product Features..... | 35 |
| 8.2 Occlusion pressure, Maximum Alarm Time and BOLUS Volumes..... | 37 |
| 8.3 Infusion Accuracy Figure..... | 38 |
| Chapter 9 Advised Syringe and Extension Line..... | 40 |
| Chapter 10 Maintenance Service..... | 41 |

Chapter 1 Safety

1.1 Safety Precautions

This chapter contains the basic safety information which users have to pay attention to and comply with during using the syringe pump. The same, similar and other related information will be described in every chapter.

| | |
|---|---|
| Note: | It highlights important guideline information, which has something to do with this user manual and this syringe pump, or provide some extra information, such as detailed explanations, clues or reminders. |
|  Danger: | It points out urgent danger, which will lead to death, serious personal injury or property damage. |
|  Warning: | It points out potential danger or dangerous operation, which will cause death, serious personal injury or property damage. |
|  Caution: | It points out potential danger or dangerous operation, which will cause minor personal injury, product fault, damage or property damage. |

1.1.1 Note

- ◆ Please place the user manual near to the syringe pump for ease of reference.
- ◆ Please install the syringe pump in the place where it's easy to be observed, operated and maintained.
- ◆ The user manual gives a full introduction of the most complete specifications and functions. The syringe pump you bought may not have some configuration or function.
- ◆ The serial number of the syringe pump has been set when you buy them. Users cannot change it during usage.

1.1.2 Danger

- ◆ In the user manual, there is no related information about the danger class.

1.1.3 Warnings

- ◆ The syringe pump is used for clinical injection. It can only be used by professional clinical doctors, medical electrical experts or trained clinical doctors and nurses on specified occasions.
- ◆ Check the syringe pump and its accessories before use in order to confirm that they can work normally and safely.
- ◆ The syringe pump cannot be used in the circumstances where there are inflammable and explosive materials in order to avoid fire or explosion.

- ◆ The alarm limits should be set according to the real conditions of patients. The injection and monitor should not only depend on the voice alarm system, but also depend on the real clinical conditions of patients.
- ◆ The syringe pump doesn't have the function of checking abnormal rate. During injection, the left volume of the syringe should be checked regularly in order that the syringe pump injects the patient at the set rate.
- ◆ Under high pressure environment, such as hyperbaric oxygen therapy, pressure check function may not work.
- ◆ Please take care of the syringe pump and avoid drop, collision, or damage of intensive oscillation or mechanical force.
- ◆ Please check whether the blood vessel is protected or not before injection.
- ◆ The pressure in the syringe pipe will increase because of occlusion caused by pipe knot, filters condensation or tube. Clearing up the occlusion may cause too much liquid injected into patients. Proper measurements should be taken in order to avoid the above mentioned risk, such as stuck of the syringe pipe before clearing up the occlusion.
- ◆ This syringe pump should be used in the range of 65cm above or below the patients' heart.
- ◆ Avoid using the syringe pump during alarm.
- ◆ If another set injection system or assemblies is connected with the extension pipe to keep parallel injection, there might be a different result with the specification of this syringe pump.
- ◆ During using this syringe pump, the related components, connectors and disposables should comply with the state standard. For more information, please contact the distributors or manufacturers of the product.
- ◆ If the syringe does not meet the state standard, or the parameters setting of the syringe are not accurate, then the accuracy cannot be guaranteed. The error may be up to more than 40%.
- ◆ Disposables should be dealt with according to hospitals' rule.
- ◆ The electric defend type of the syringe pump is class II. Earthing terminal PE of class I cannot be used for protective earthing.
- ◆ The shell of the syringe pump cannot be opened. Or else there will be electric shock risk. Maintenance or upgrade of the syringe pump should be carried out by maintenance crews trained and authorized by our company.
- ◆ The package material should be dealt with according to the related rules or waste disposal system. Put them in the place that is out of the reach of young children.

1.1.4 Cautions

- ◆ Please use the specified accessory as specification to ensure safety of patients.
- ◆ Connect the cable carefully to reduce the possibility of twisting and choking.

- ◆ Make sure the syringe piston fixed on the clutch correctly. Insert the protruding part of syringe in the groove.
- ◆ Please do not reuse disposable accessories to avoid hypofunction and cross-infection.
- ◆ To make sure the accuracy of flow rate and alarm function, please check if the specifications of this brand of syringe have been set previous.
- ◆ Please replace the injection components if they are used for more than 24 hours.
- ◆ Please deal with the used syringe and accessory in a correct way. Any question, please contact the distributor or manufacturer.
- ◆ The electromagnetism will interrupt the syringe pump system, so the machines which are used near to the pumps must meet the corresponding requirements of EMC. Because cell phone, X-ray or the MRI all generate magnetic field, they will interrupt the pumps.
- ◆ Please avoid the high temperature, place the pump in dry place away from sunlight.
- ◆ Avoid autoclaving and exposing the syringe pump to the chemical environment.
- ◆ When using the build-in battery to inject, please check whether it has enough electric quantity for injection. Please recharge the battery when necessary.
- ◆ Check if the frequency and current voltage are all right before connecting the power on.
- ◆ If the battery of low quantity has not been used for a long time (1 month), it will take a few minutes for the battery symbol appearing without low battery alarm after it being connected to AC power. If it still alarms for low battery after connected to the AC power for 5 minutes, there must be something wrong with the battery, please contact our after sales service agent.
- ◆ Use a piece of soft cloth drenched by warm water to clean the syringe pump.
- ◆ If the syringe pump is not working as the instruction manual described and the exact reasons are not known. Please stop using and contact our sales agency to describe the problems, offer the related information such as the syringes in using, injection volume preset, the flow rate, serials NO., the injected liquid and so on.
- ◆ If the infusion rate is higher than 1000ml/h, please use a bigger size infusion needle to ensure the infusion accuracy.

Chapter 2 Product Introduction

2.1 Product Structure and Composition

Syringe pump Model: BD-5000 is composed by main engine, build-in battery and so on

2.2 Application Scope

It is used in hospitals where patients need to be given steady and continuous injection or precise medication.

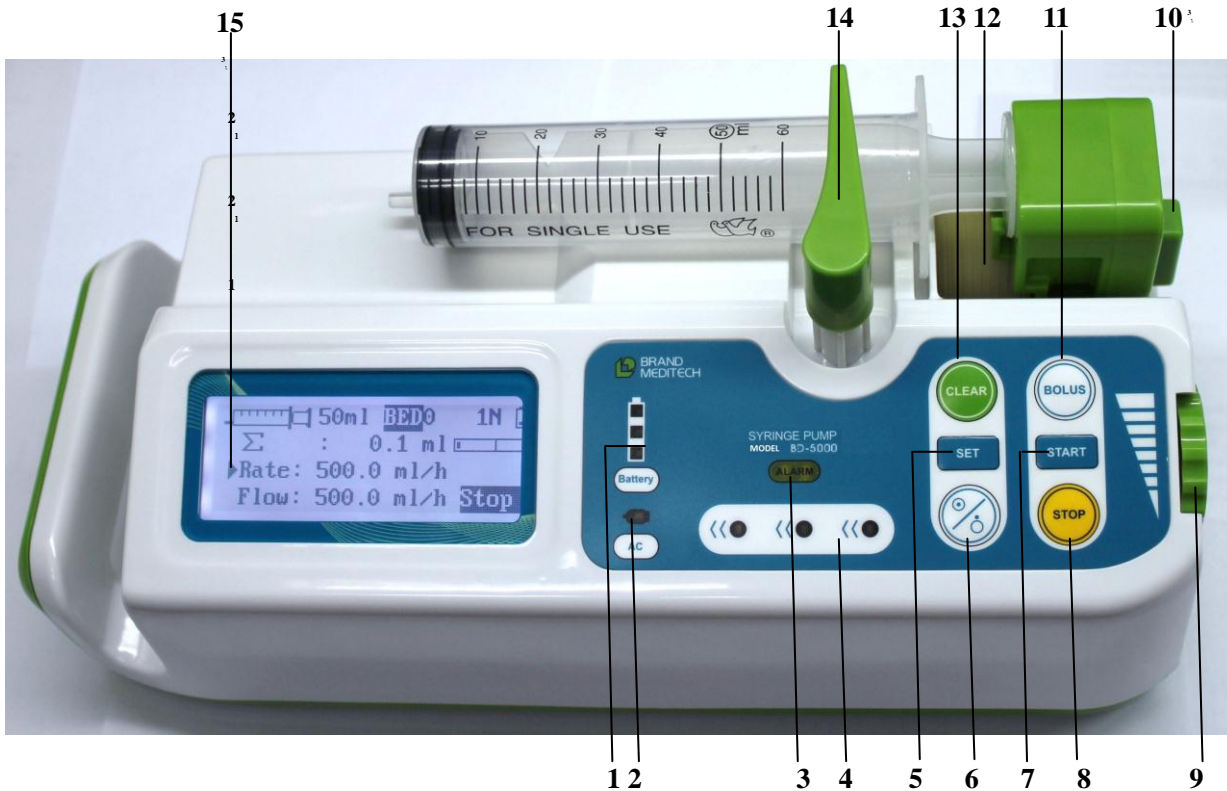
2.3 System Structures


Model: BD-5000 syringe pump contains the following components:

1. **The microcomputer system:** the “brain” of the whole system, giving intellectualized control and management over the whole system and processing the detected signals. The two single-chip Micro (SCM) systems are used for mutual backup copy and supervision. When one SCM goes wrong, the other one will give an immediate warning signal and cut the power of the host computer, which will then stop completely, thus ensuring patient’s safety.
2. **The pump device:** the “heart” of the whole system and the main driving force of the injection. Driven by a stepper motor, the lead screw pushes the injection piston forward.
3. **The inspection device:** various kinds of sensors, such as displacement sensor (detecting the liquid flow rate and volume), pressure sensor (detecting pipe occlusion), etc. They can give corresponding signals which will, after being magnified, be sent over to the computer for signal processing. Then the inspection device can operate correspondingly with the control instruction educed from the processing.
4. **The alarm device:** after the signal given by the sensor is processed by the microcomputer, an alarm control signal will be educed, which will be responded by the alarm device to arouse people’s attention for right treatment. There are mainly two kinds of alarms: photoelectric alarm (LBD) and sound alarm (loudspeaker and buzzer).
5. **The input and display device:** input part in charge of various injection parameters, such as injection volume and injection rate, etc. The display part is in charge of displaying various parameters and showing the current operation progress on the LCD.
6. **The built-in rechargeable battery component:** This component supplies electric power for the syringe pump when AC Power is disconnected or unavailable to ensure continuous use.

Chapter 3 External Characteristics

3.1 Front Panel Instruction



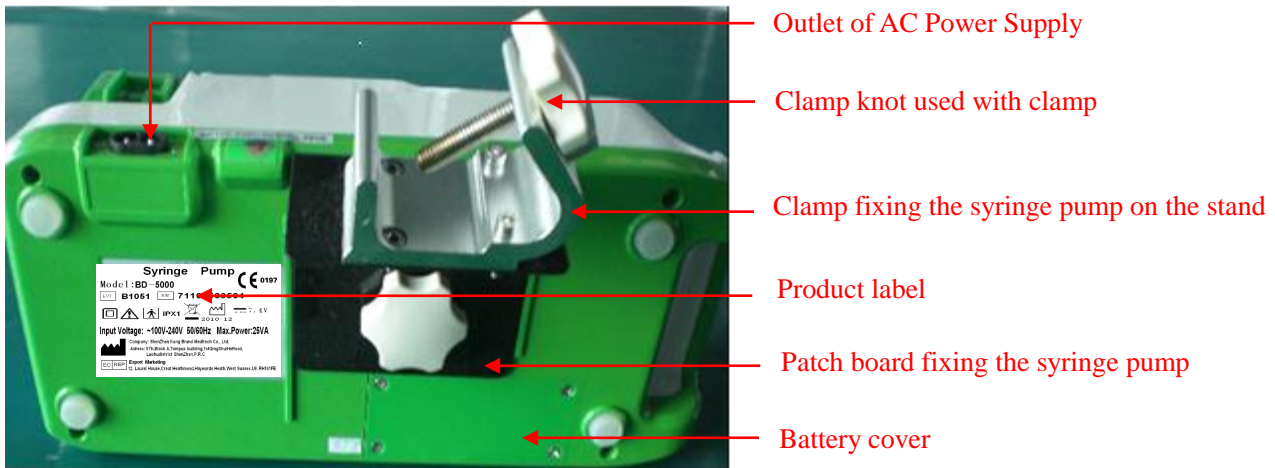
| No. | Description | Function |
|-----|---|--|
| 1 | Battery Capacity Indicator Light | It is flashing when being charged. |
| 2 | AC Power Indicator Light | AC indicator light is on when the pump is connected to the AC power |
| 3 | Alarm Indicator Light | It is flashing when there are alarm signals. |
| 4 | Working Indicator Light | The three lights flash alternately from right to left during the operation of the pump. |
| 5 | SET Key | In the “Stop” interface, press the key to enter or quit the “Mode Parameters Setting” interface. |
| 6 |  Key | Turn on: Press the key for about 3-5 seconds. Turn off: Press the key for about 3-5 seconds. Night vision: Press this key once longer to open or close the night vision after turning on the pump. |
| 7 | START Key | Press the key to start injection after installing the syringe properly and setting all parameters. |

| | | |
|----|-------------------|---|
| 8 | STOP Key | Press it to stop injection and clear the alarms. |
| 9 | Knob | It is used to adjust the parameters and the move cursor. Press the knob to clear the alarm for 2 minutes and save the value. |
| 10 | Clutch Button | Keep pressing the button to move the piston freely. When we unfasten the button, the clutch will gear, and can only be moved by the engine. |
| 11 | BOLUS Key | Keep pressing this key during injection, the machine will inject at the maximum rate. Release this key; the pump will go back to its original rate. In the settings interface, press “BOLUS” to lock or unlock the syringes parameters. The pump will be locked when it is turned on, and the parameter cannot be steted in this condition. |
| 12 | Piston | Use the piston to push the piston of the syringe. |
| 13 | CLEAR Key | In the “Stop” interface, press the key to clear the accumulated volume. In the “Menu Parameters Settings” interface, press the “STOP” key in the “unlock” status to eliminate all the syringes’ parameters. In this case, the syringe cannot be identified, and we have to reset the syringes parameters. |
| 14 | Compression Strut | It is used to fix the syringe. |
| 15 | Cursor | When ► is flashing on the screen, it means the value can be changed at this time. No cursor displays when the pump is running. |

Note:

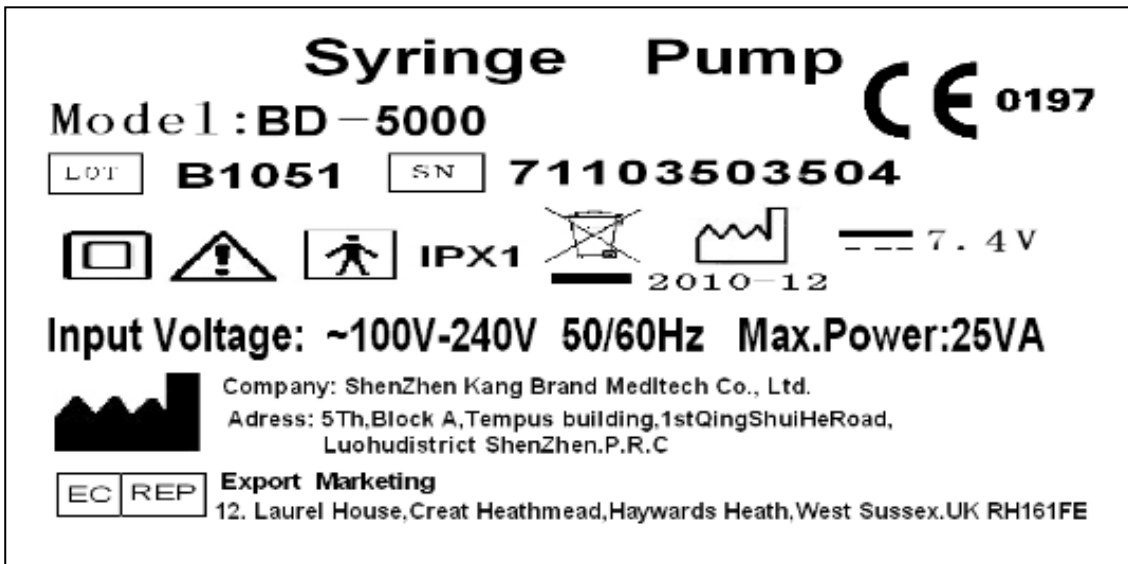
| | |
|-------------------|---|
| SET+ CLEAR | In the “Stop” interface, press the two keys together to enter or quit the “Menu Parameters Setting” interface. |
| SET+STOP | In the “Run” or “Stop” interface, “Mode Parameters Setting” interfaces, and “Menu Parameters Setting” interface, press the two keys together to enter or quit the “Sensor Value” interface. |

3.2 Rear Panel Instruction
















3.3 Packing

3.3.1 Product Label (pasted on the back shell of pump)



3.3.2 Label Marks and Significations

| Mark | Description |
|------|--------------------------|
| LOT | Batch No. |
| SN | Serial No. |
| ⚠ | Caution, warning, danger |
| ◻ | Class II Equipment |
| 🧑 | Type BF Applied Part |

| | |
|---|--|
| <h1 style="text-align: center;">IPX1</h1> | <p>Out Shell Protection Class</p> |
|  | <p>Deal with in pollution-free method</p> |
|  | <p>Production date</p> |
|  | <p>Manufacturer</p> |
|  | <p>Alternating Current</p> |
|  | <p>Direct Current</p> |
|  | <p>Reach the Standard of 93/42/EEC</p> |
|  | <p>Power Switch</p> |
|  | <p>Non Ionization Radiation</p> |
|  | <p>Step Increment</p> |
|  | <p>Caution of Rain during Transportation</p> |
|  | <p>Fragile, Handle with Care during Transportation</p> |
|  | <p>Up during Transportation</p> |
|  | <p>Maximum 5 same Products above</p> |

3.3.3 Inside Content of a Standard Packing:

- | | | |
|---------------------|---|---|
| a) Syringe Pump | × | 1 |
| b) Power Cord | × | 1 |
| c) User Manual | × | 1 |
| d) Pole Clamp | × | 1 |
| e) Certification | × | 1 |
| f) Maintenance Card | × | 1 |

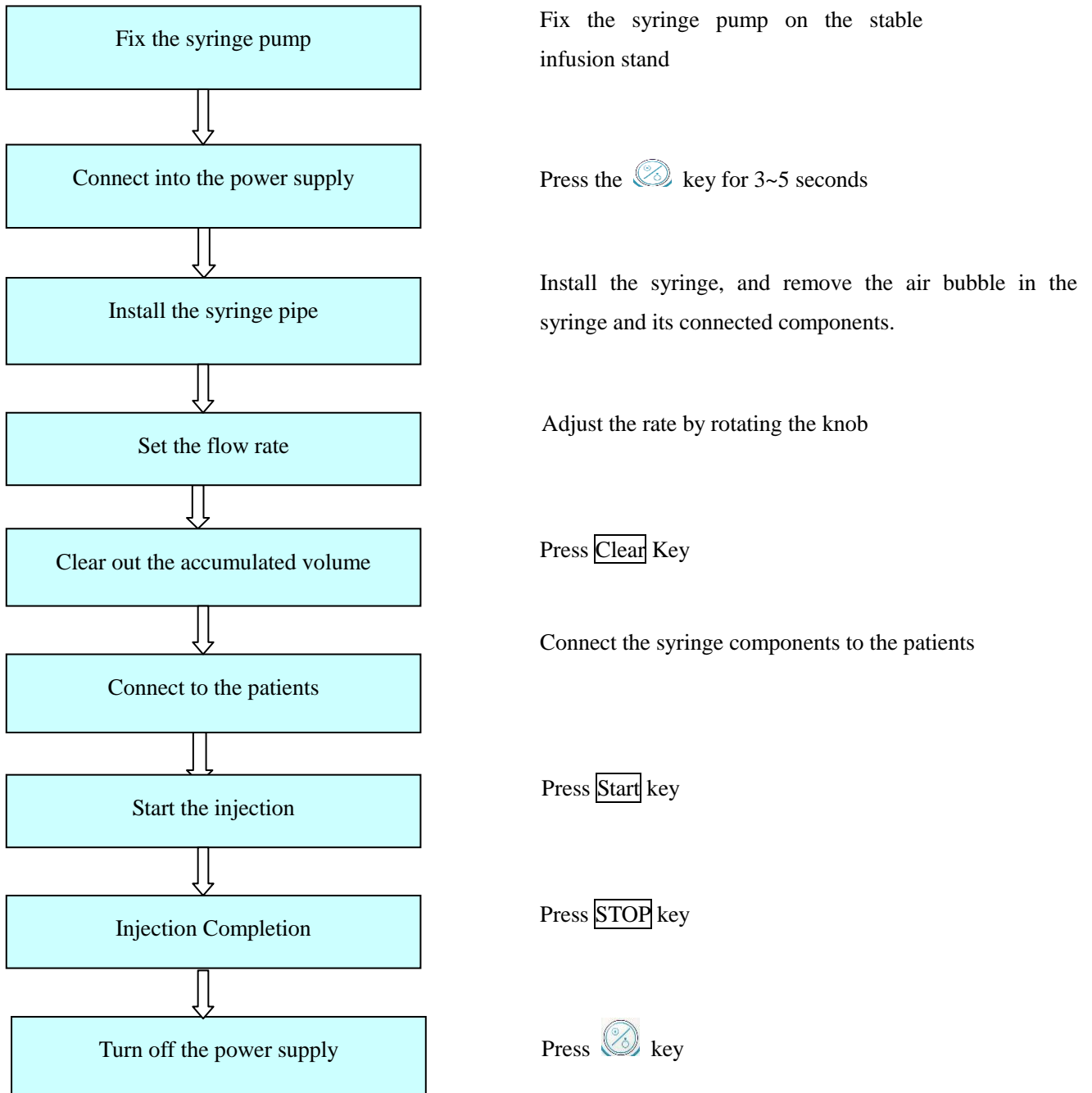


Caution:

Please contact your Area Agent when components are found missing.

Chapter 4 Operation Guidelines

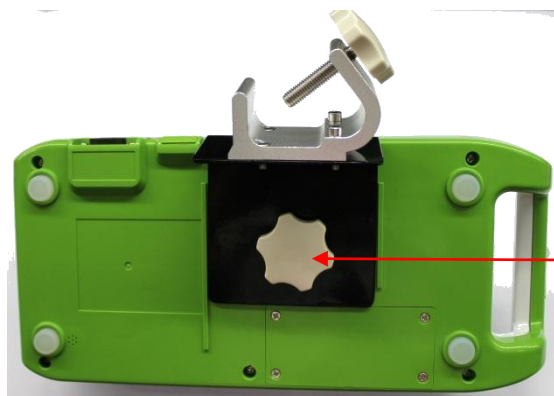
4.1 Operation Flow Chart



4.2 Basic Operation Steps

Step 1: Fix the syringe pump

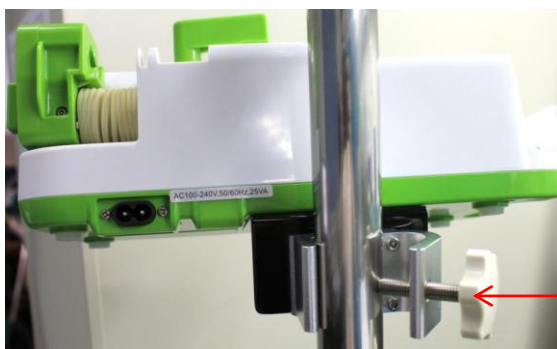
1. The syringe pump should be used in a horizontal position.. Make sure the screw aims at the central thread hole of the under shell, and then rotate the screw to fix the anchorage clip on the syringe pump as shown in Figure 4.



Rotate the screw to fix the anchorage clip after the screw aims at the central thread hold

Figure 4

2. Check the stability of the IV stand. Rotate the other screw on the anchorage clip to make sure the syringe fixed on the IV stand as shown in Figure 5.



Rotate the screw and fix the pump on the IV stand.

Figure 5



Warning:

- Power supply should be 100-240V, 50/60 Hz.
- Please use the attached power cord.

Step 2: Connect the power

Insert the power cord into the power supply as shown in Figure 6

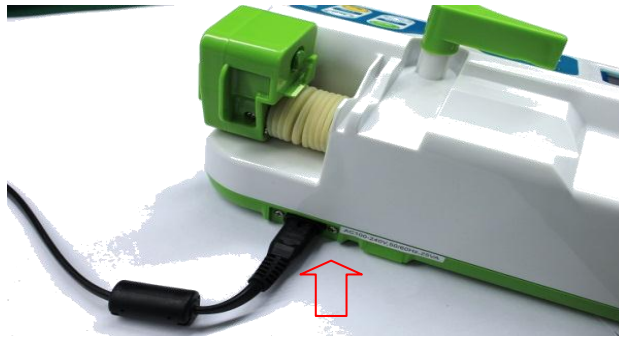



Figure 6

Step 3: Power on

Keep pressing the  key for 2 seconds, and then release it as shown in Figure 7. The LCD will display company Logo, company name, software version, machine ID, etc. in sequence.

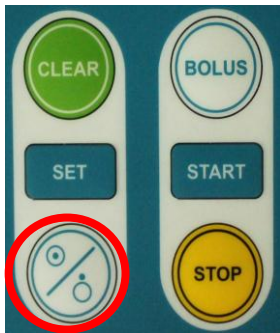


Figure 7



Figure 8

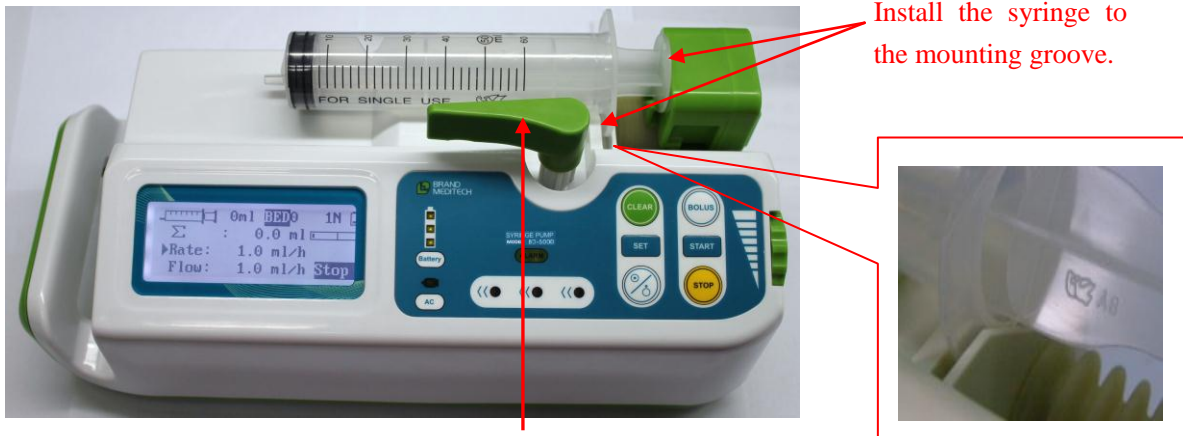
Note:

- If the power indicator is lighting means that the device connects into the AC power supply correctly.
- When you turn the syringe pump on, please check the alarm light and sound are work or not.
- The battery can be charged only in the condition that the syringe pump is turned on and connects into AC power supply.

Step 4: Install the syringe

- 1 Pull the compression strut of the syringe up to its top and then turn it 90 °leftward, and then let it go as shown in Figure 9.
- 2 Press clutch button to pull its piston to the suitable place, and then put the syringe filled with liquid in its installation mounting groove properly.

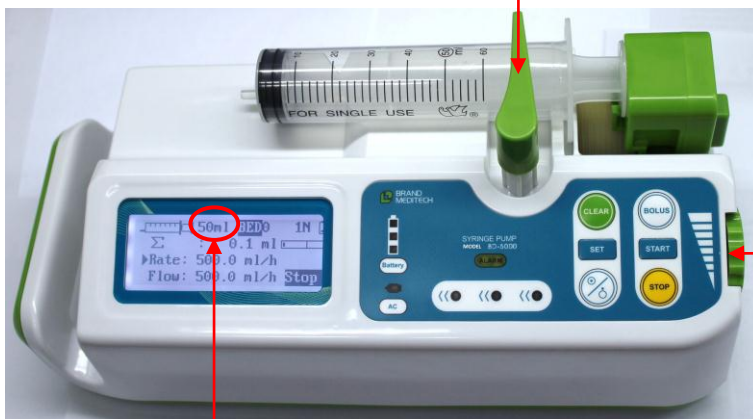
- Turn the compression strut rightward, compress it onto the syringe. The indicator light corresponding with the type of this syringe will be on as shown in Figure 10.



Pull the compression strut of the syringe up to its top and then turn it 90° leftward.

Figure 9

The compression strut of the pump touches syringe tightly



Show the syringe size

Rotate the knob to select injection rate

Figure 10



Warning:

- Please make sure that there is no air bubble in the syringe pipe.



Caution:

- The edge of the syringe pipe have to be placed into the mounting groove.

Step 5: Select the injection mode or Set the injection rate

- Press the **STOP** key to make sure the syringe pump is in the “Stop” status.

- 2 Press the **SET** key to enter into the interface of “Mode Parameters Setting”. Choose the corresponding injection mode and set the relevant parameters and then press **SET** again, as shown in Figure 11, to return to the “Stop” interface.
- 3 If you don't want to set mode parameters, you can choose to use the default rate mode and adjust the speed directly in the “Stop” interface. Rotate the knob until the cursor points to “Injection Rate”, and then press the knob to select the parameter. Rotate the knob to adjust the parameter value until it meets the requirement, and press the knob again to save the value as shown in Figure 12.



Figure 11

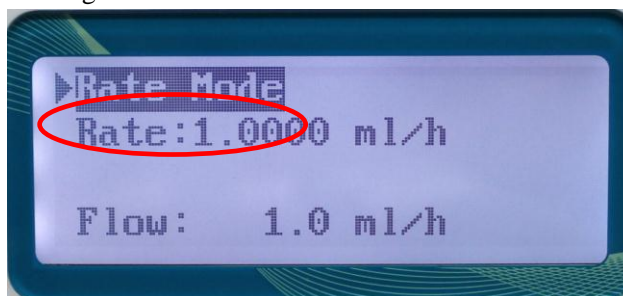


Figure 12

Note:

- After setting the parameters, press the knob leftward to save the setting.

Step 6: Eliminate the accumulated volume

- 1 Make sure the syringe pump is in the “Stop” interface
- 2 Press the **CLEAR** key once as shown in Figure 13, and the accumulated volume will become ‘0’ and begin to be calculated anew.

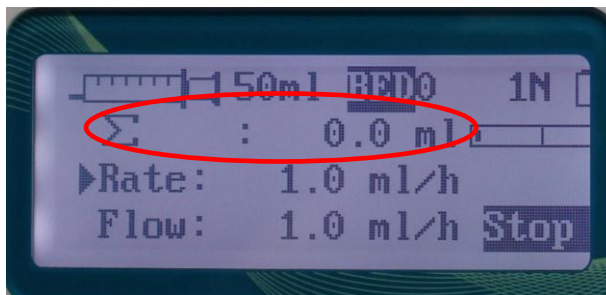


Figure 13

Step 7: Start the injection

- 1 After all parameters needed are set well and the syringe is properly installed, you can start the injection. Please make sure the syringe installation and the parameters setting are correct, and the LCD displays the right syringe.

2 As shown in Figure 14, press the **START** key to start the injection, and the signal of “Injection” will flash in the lower right of the screen corner.

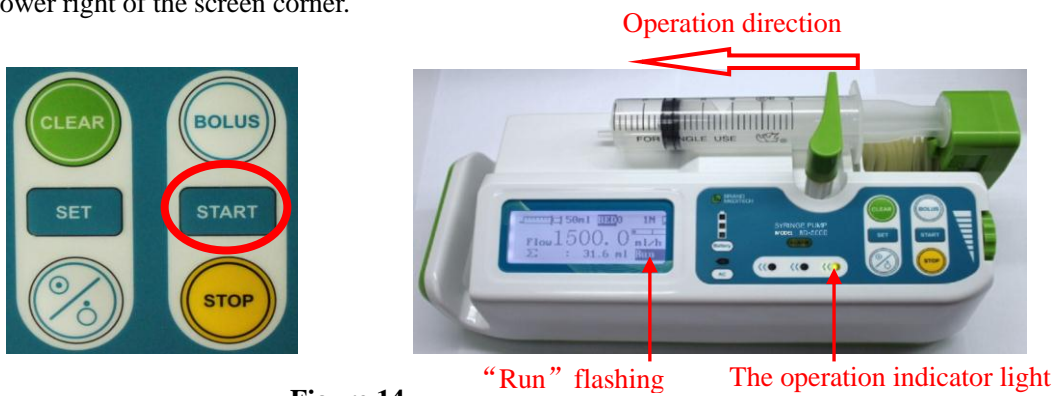


Figure 14

Note:

- If it is not necessary to accumulate the former volume, please press the **Clear** key to clear it before start the injection.
- The accumulated volume only can be checked during running, and eliminate the accumulation volume after stopping the injection.
- If the working indicator light is flash fast, it indicates a rapid flow rate.

Step 8: Injection completion

1 When the syringe is about to be empty, the **NEAR** indicator light will be on, accompanied with an alarm sound and the signal of “Near” displayed on the screen to alert the user.

2 As shown in Figure 15, when the syringe becomes empty, the injection will stop. The alarm indicator light will be on, accompanied with an alarm sound and the signal of “Over” displayed on the screen to alert the user.

Under this circumstance, press the **STOP** key as shown in Figure 16, the alarm will stop with the alarm indicator light off, the signal of “Over” on the LCD will disappear and the alarm sound will stop.

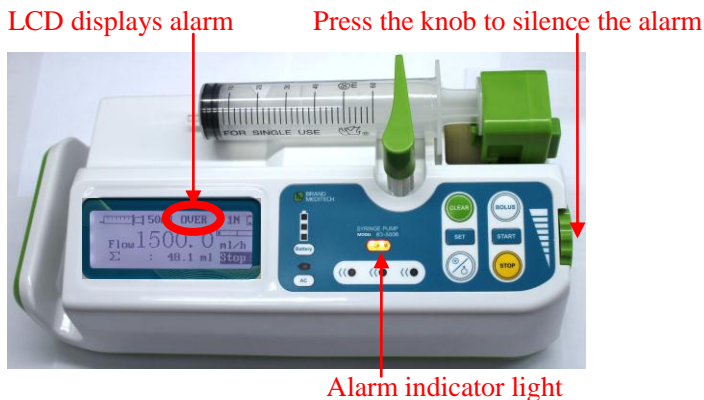


Figure 15

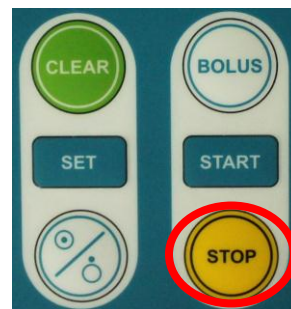


Figure 16

Note:

- Press the knob to silence the alarm for 2 minutes.

Step 9: Turn off the power

As shown in Figure17, keep pressing the **POWER** key for 3~5 seconds until you hear three rings to turn off the power.

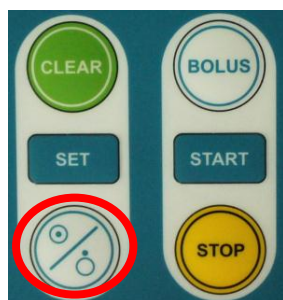


Figure 17



Figure 18

4.3 Start the “BOLUS” Function

During injection, press the **BOLUS** key to start the “BOLUS” function to accelerate the injection. Keep pressing the **BOLUS** key as shown in Figure 18, the pump will begin to inject at the maximum rate, and the signal of “Bolus” will flash in the lower right of the screen corner. An alarm will be heard when every 0.5 ml liquid is injected at the maximum rate. Release the BOLUS key, then the pump will inject at the original rate.

Note:

- The Bolus function does not affect any alarm function.
- The bolus rate depends on the syringe size, as shown in Table 1.
- The bolus volume will add to accumulated volume if it is during working.

Table 1

| Syringe | The maximum rate |
|---------|------------------|
| 5 ml | 100 ml/h |
| 10 ml | 200 ml/h |
| 20 ml | 400 ml/h |
| 30 ml | 400~600 ml/h |
| 50 ml | 400~1500 ml/h |

4.4 Define the Syringe Brand



Warnings:

- The default setting is made as “Double Dove” brand syringe pipe. If users find that the syringe pipe cannot be designed and the accuracy is not accurate, please set the syringe pipe as the following methods.
- The bolus volume will add to accumulated volume if it is during working.

Step 1 Measure the length of the syringe pipe

- 1) Pull the piston of the syringe pipe to the end as shown in Figure 19.
- 2) Measure the length of the syringe pipe by the scale in the fast operation manual as shown in Figure 20 (the unit is mm), and write down the length value. The accuracy of the length makes the injection accurate.

Pull the piston of the syringe pipe to the end (0ml position).



Figure 19

The measuring marks of different syringe pumps should be all measured from “0ml” (Example: this is 50ml mark).

The mark, here we can get the length.

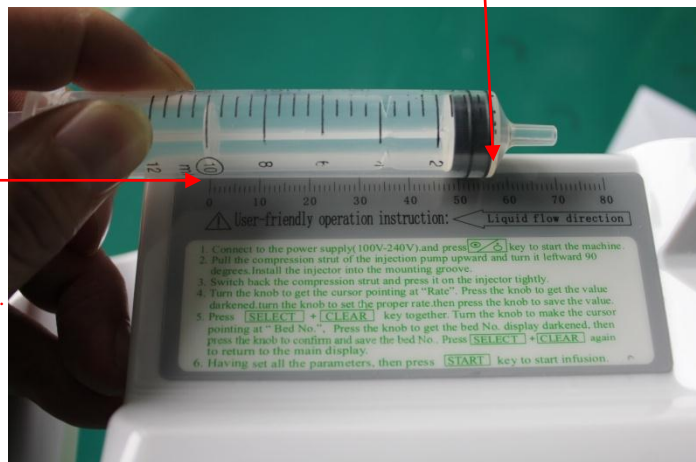


Figure 20

Note:

The measuring marks of different syringe pumps should be all measured from “0ml”. The length of the 50ml syringe should be measured from the “0 ml” scale mark to the “50 ml” mark; the 20ml syringe from “0 ml” to the “20ml” mark and the 10 ml syringe from “0ml” to the “10 ml” mark.

Step 2 Install the syringe

Install the syringe on the pump. Make sure the piston of the syringe is pushed to the end, and the compression bar clings to the syringe properly.

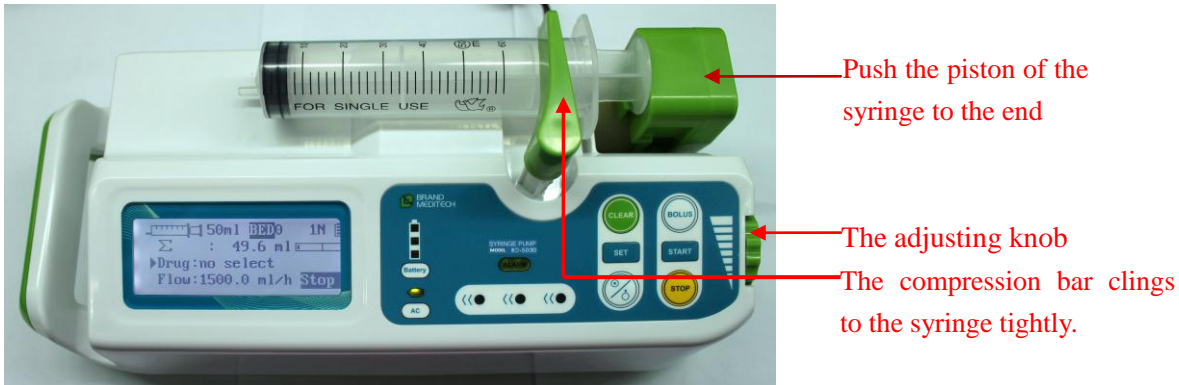


Figure 21

Note:

In order to assure the accuracy, the syringe pipe has to be put into the slot of the syringe pump.

Step 3 Set the parameters of the syringe

1) In the “Stop” status, press the **SET** key and the **CLEAR** key together to enter the “Menu Parameter Setting” interface as shown in Figure 22.

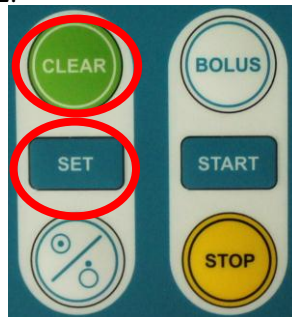


Figure 22

2) After entering the “Menu Parameters Setting” interface, the parameters of the syringe are in the “Lock” status and they can not be set as shown in Figure 23. Press the **BOLUS** key to unlock the pump and set the parameters (the value is the length measured in the first step) as shown in Figure 24. Press the knob to save the value and lock the parameters of the syringe.

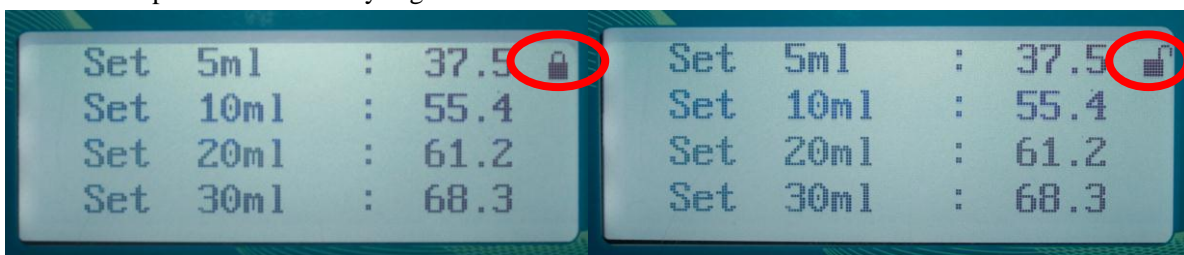


Figure 23

Figure 24

Note:

- The syringe parameters are in the “Lock” status by default when the pump is on and the parameters only can be set in the “Unlock” status.
- The “Lock” and “Unlock” function can only be effective to parameters of the 5 types of syringes.
- Press the knob leftward to save the setting. Or else the setting cannot be saved.

3) Parameters setting for 5ml syringes: In the “Menu Parameters Setting” interface, rotate the knob until the cursor points to the parameter of “5ml Syringe”. Press the knob to select this parameter and rotate the knob to change the value into the length of the syringe value measured in step 1. Finally, press the knob to save the value.

4) Parameters setting for syringes of 10ml, 20ml, 30ml and 50ml are similar to the setting of 5ml syringes. Select syringes of 10ml, 20ml, 30ml and 50ml respectively. Repeat the operation from step 1 and step 2. After entering the “Menu Parameters Setting” interface, rotate the knob until the cursor point to “10ml Syringe”, “20ml Syringe”, “30ml Syringe” and “50ml Syringe” respectively. Pressing the knob to select the parameter, and rotate the knob to change the value of the corresponding parameter into the lengths measured in step 1. Finally, press the knob again to save the value and lock all the settings.

4.5 Advanced Setting

Press the **CLEAR** key and the **SET** key together to enter into the “Menu Parameters Setting” interface, press the **CLEAR** key and the **SET** key again to return to the former interface. Please refer to Figure 25.

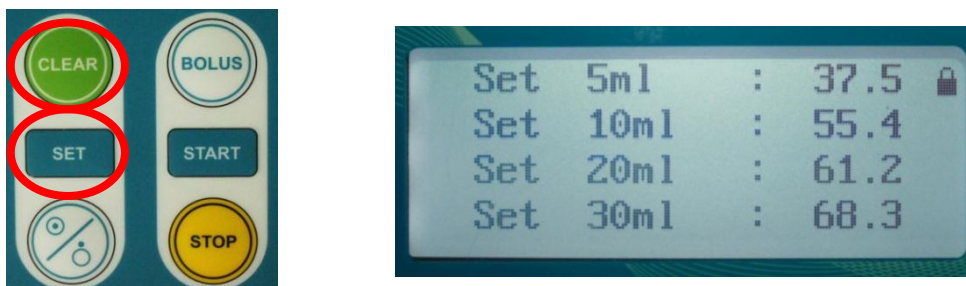


Figure 25

Advanced parameters setting value please refer to table 2.

| Table 2 | | |
|--------------------------|-----------------|---|
| Setting | Reference value | Remark |
| 5ml syringe | 37.5 | This is for “Double Dove” brand syringe reference value For setting please refer to ‘Define the Syringe Brand’. |
| 10ml syringe | 55.4 | |
| 20ml syringe | 61.2 | |
| 30ml syringe | 68.3 | |
| 50ml syringe | 75.7 | |
| Standard Occlusion value | 0.1 Mpa | Range is 0.04~0.16Mpa, the occlusion alarm’s sensitivity depends on this value, the lower the value is, the more sensitive the alarm is. |
| KVO rate | 0.1 | Range is 0.1~5.0, default is 0.1, select “off” is turn off KVO function |
| ID setting | xxxx | This value is serials number for supervisor to identify every unit. This ID can be from 0~9999999 |
| Bed No. | xx | This can be identified by the supervisor system which is being used with the syringe pump, can be setted from 0~999. It is in the first line of the main menu shown as “BED xxx” when there is no alarm. When it is alarming, no bed number will be shown in the screen. |
| Chinese/English | English | Chinese and English version can be selected |

Note: • The parameters can be saved for 10 years if it is saved after the pump being turned off.

4.6 Mode Parameters Setting

In the “Stop” status, press the **SET** key to enter the “Mode Parameters Setting” interface. Rotate the adjusting knob until the cursor points to the parameter to be set, and then press the knob to select the parameter. Rotate the knob again to adjust the value of the parameter, and then press the knob again to save value.

Show [rate mode] , [time mode] , [body weight mode] by turns with adjusting the knob.



Figure 26

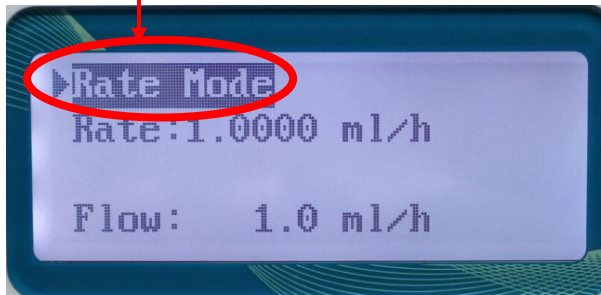


Figure 27

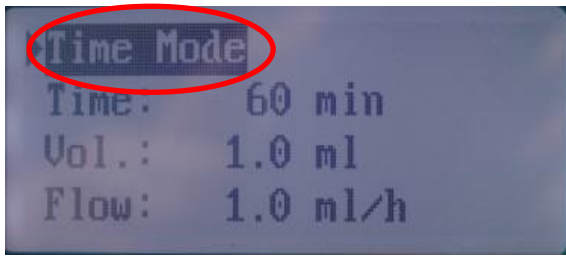


Figure 28

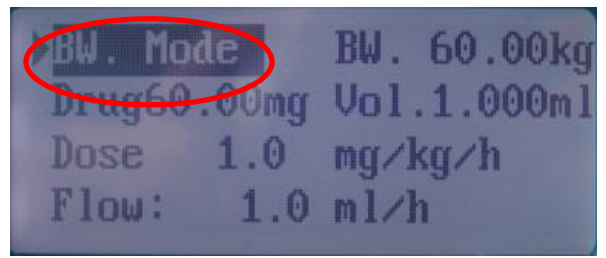


Figure 29

The parameter varies with different modes. The parameters to be set in each injection mode are as shown in Table 3.1

Table 3

| Injection Mode | Parameters | Remarks |
|----------------|-----------------------------|---------------------------------------|
| Rate Mode | Rate | Represented by “1” on the main screen |
| Time Mode | Time | Represented by “2” on the main screen |
| | Fluid Volume | |
| Weight Mode | Weight | Represented by “3” on the main screen |
| | Drug | |
| | Fluid Volume | |
| | Dose (mg/kg/h or ug/kg/min) | |

Note:

- The “Flow” displayed in the interface is calculated automatically, and cannot be set.
- The flow formula in body weight mode:

$$\text{Flow} = \text{dose} \times \text{weight} \times \text{volume} / \text{drug} \quad (\text{mg/kg/h})$$

$$\text{Flow} = 60 \times \text{dose} \times \text{body weight} \times \text{volume} / \text{drug} \times 1000 \quad (\text{ug/kg/min})$$

4.7 Parameters Setting in the “Stop” Status

In the “Stop” status, rotate the adjusting knob to display the parameters that are adjustable as shown in Table 4.

Rotate the adjusting knob until the cursor points to the parameter to be set, and then press adjusting knob to select this parameter. Rotate the knob to adjust to value, and then press the knob again to save the value as shown in Figure 30.

In the “Stop” status, rotate the knob to display the adjustable parameters Bed No.

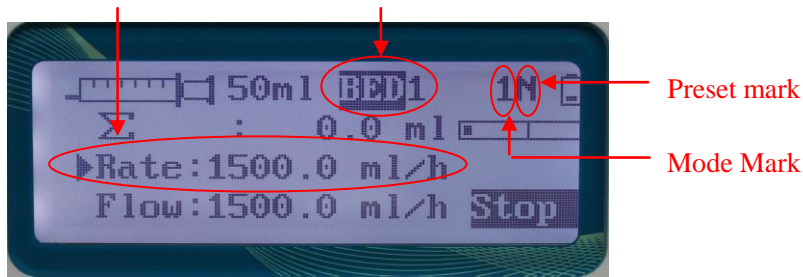


Figure 30

Table 4

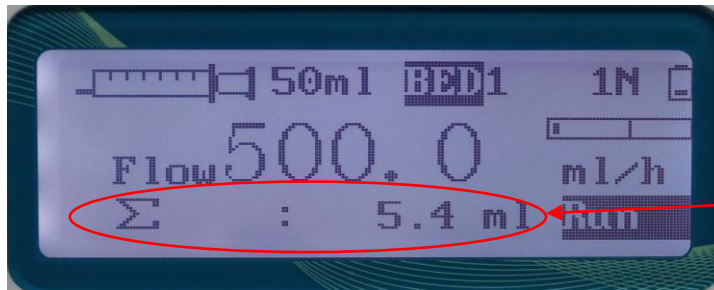
| Parameter | Explanation | Remarks |
|---------------|--|---|
| Rate | Its unit varies with different modes. | It does not be displayed in time mode, in which the time will be displayed |
| Preset Volume | ‘0’ stands for “off”, and the preset volume function will be on when it is not ‘0’. | Both cannot be set under the time mode. When both are on, the first finished preset value will be displayed. When the first preset is closed, and the second preset will be on. |
| Timing | Timing function will be off when both “ Hour” and “Minute” parameters are set to “0” | |
| Drug | Two kinds of drugs: penicillin, vancomycin. | |
| Bolus Rate | The bolus rate of 5ml, 10ml, and 20ml syringes are 100ml/h, 200ml/h and 400ml/h respectively; the bolus rate of 30ml and 50ml syringes are 400-600ml/h and 400-1500ml/h. | (Saved after shutdown) |

Notes:

- The parameter can be saved for 10 years if it is saved after the pump being turned off.
- After setting the “preset volume”, the preset mark is “P”; after setting the “timing”, the preset mark is “T”; after setting the “Preset Volume” and the “Timing”, the first finished preset will be displayed. If the first preset is finished, after pressing the **STOP** key, the value of the first preset will turn to ‘0’ and the second preset will be displayed on the screen. When both the “Preset Volume” and the “Timing” are ‘0’ (function closed), the preset mark is “N”. In the weight mode, the rate is calculated into the flow rate by some parameters, such as kg, weight etc.

4.8 Check the Preset Volume and Timing during the Injection

During injection, rotate the adjusting knob anticlockwise to check the preset volume, timing, drug, and bolus flow rate in the place where the accumulated volume is displayed. After five seconds, the accumulated volume will be displayed again. In the weight mode, the total amount of the drug (mg) can also be checked as shown in Figure 31.



Preset volume, time, drug, bolus, accumulated volume place

Figure 31

Note:

- Items not being set shows as 0 or NO SELECTE.
- It shows the accumulated volume automatically after stopping rotating the knob for 5 seconds.

4.9 Check the Sensor Value

As shown in Figure 32, in the interface of “Run”, “Stop”, “Mode Parameter Setting” and “Menu Parameter Setting”, press the **SET** and **STOP** key together to enter the “Sensor Value” interface to check the potentiometer value, short potentiometer value, pressure sensor value and battery capacity value. Press the **SET** and the **STOP** key together again to return to the original interface.

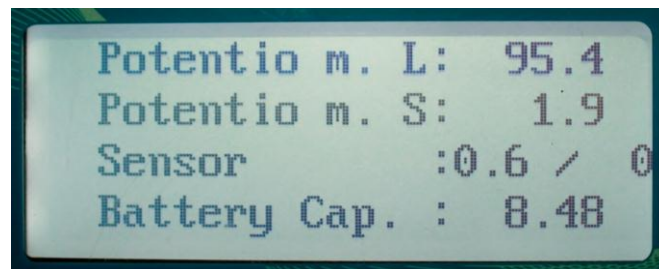


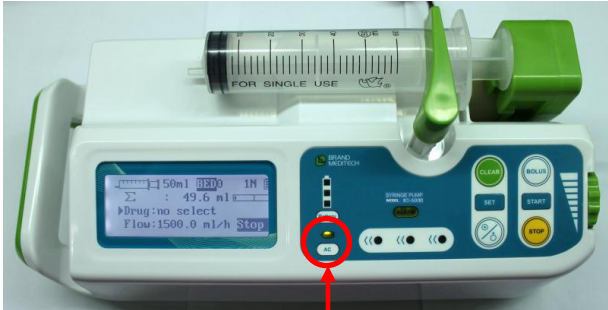
Figure 32

Note:

- Long potentiometer value is the reference value, when the piston is running to left, the value will become larger.
- Short potentiometer value is the reference value, the bigger the diameter of the syringe is, the larger value it will be.
- Pressure sensor value is the pressure of the current using syringe.

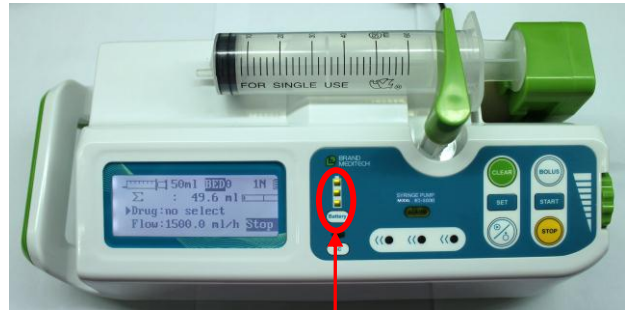
4.10 Battery Charge

1) As shown in Figure 33, after the pump is connected to the AC power and turned on, the AC indicator light is on and the battery begins to charge automatically. When the battery is fully charged, it will stop charging automatically.



The AC indicator light is on and the battery begins to be charged automatically

Figure 33



Display the battery capacity

Figure34

2) As shown in Figure 34, the AC indicator light will be off if the AC power is disconnected. And the battery indicator light is flashing, which means the syringe pump is using the battery supply. The syringe pump will send out an alarm to alert the user to charge the battery when the battery power is in shortage. After some time of short battery, alarm of serious battery shortage rings, while the battery indicator flashes. If the syringe pump is running, please stop the injection immediately, and the pump cannot run without being connected to the AC power. This alarm can be canceled only after the pump being connected to the AC power.



Warning:

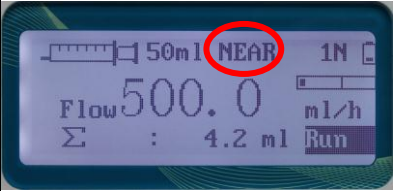
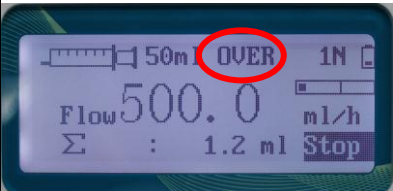
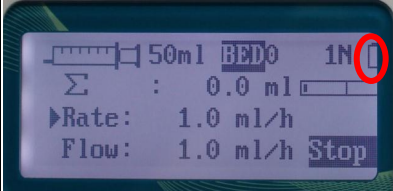
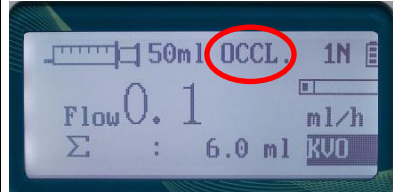
- The battery can be charged only when the syringe pump is on.


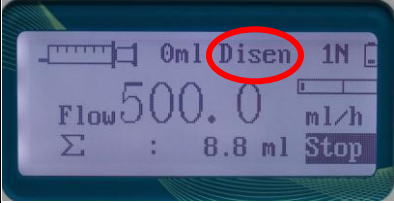
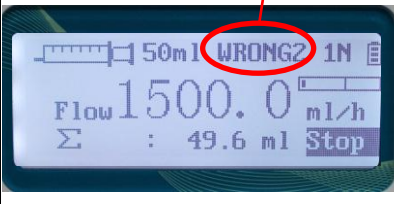
Note:

- It takes 8-14 hours to charge the battery fully after the battery is used up.
- Battery is consumable components, and should be changed after the battery is used out.
- If the syringe pump will not be used for a long time, please charge and discharge the battery every 3 months in order to avoid the damage of the battery.

Chapter 5 Alarm and Solutions

5.1 Common Alarms and Solutions

| Description | Display | Reason | Solutions |
|-------------------------|---|---|---|
| “NEAR” Alarm |  | The syringe is about to be empty | <ol style="list-style-type: none"> 1. Press the knob to stop the alarm. 2. Press the STOP key to stop the injection and eliminate the alarm. |
| “OVER” Alarm |  | The syringe becomes empty | <ol style="list-style-type: none"> 1. Press the knob to stop the alarm(the alarm will ring again after two minutes) 2. Press the STOP key to stop the injection and eliminate the alarm. |
| Low Battery Power Alarm |  | The battery power is too low. | Connect to the AC power supply to charge the battery |
| | | Battery aging or something wrong with the battery charge circuit. | Contact the manufacturers or agent to maintain. |
| “OCCL” Alarm |  | Syringe loop occlusion | Press the STOP key to stop the injection and the alarm. And then press the START key to restart the injection after eliminating the occlusion in the loop. |
| | | The occlusion sensitivity value is much too high. | Refer to this manual on “4.5 Advanced Setting” |
| | | Something wrong with the syringe pump sensor | Contact the manufacturer to maintain. |

| | | | |
|-------------------------------|---|--|--|
| Alarm for no AC Power Supply |  | No AC power supply for the syringe pump. | Check if the power cord is not plugged in or not properly. |
| | | Something wrong with the power supply circuit of syringe pump. | Contact the manufacturer or agent to maintain. |
| Alarm for Installation Errors |  | The syringe is off or not installed well. | Reinstall the syringe properly. |
| | | Syringe parameters setting error. | Refer to this manual “4.4 Define the Syringe Brand” to reset the syringe parameters. |
| | | Something wrong with the potentiometer of the syringe pump | Contact the manufacturer or agent for maintenance. |
| Alarm for Abnormal Control | <p>LCD displays “WRONG1”, “WRONG2”, and WRONG3”</p>  | -Something wrong with the CPU data communication. | Contact the manufacturer or agent for maintenance. |
| | | Something wrong with the motor of the syringe pump. | Contact the manufacturer or agent for maintenance. |
| | | Something wrong with parameter settings. | Reset all the parameters. |

5.2 Common Problems and Solutions

| Description | Results | Causes | Solutions |
|---|---|---|--|
| Press the START key but the operation indicator light is not on. | The syringe pump does not work. | The syringe is not properly installed. | Reinstall the syringe. Check if the right indicator light is on. |
| Turn the knob but the injection rate does not change. | The injection rate does not change. | The parameter of the syringe pump cannot be set during operation. | Press the STOP key to stop the syringe pump. Press the SELECT key until the rate indicator light is on, turn the knob to set and press the knob to save the value. |
| The syringe pump can not be turned on with the battery | The syringe pump can not be turned on | Battery used up. | Connect the syringe pump to A.C. power supply to charge the battery. |
| The occlusion alarm signal sounds soon after the syringe pump starts operation. | The occlusion light is on and the syringe pump stops. | The occlusion sensitivity of the syringe pump is too high. | Refer to this instruction manual in “4.5 Advanced Setting”. |
| The syringe indicator light cannot indicate the specifications of the syringe. | The indicator light of the corresponding syringe is not on. | The syringe pump cannot identify the specification. | Refer to this instruction manual in “4.4 Define the Syringe Brand” to set the parameter again. |

Chapter 6 Product Maintenance

6.1 Cleaning and Disinfection

Please clean the syringe pump regularly. In some regions suffering from serious pollution and sand blown by wind, the cleaning should be more frequent. Before cleaning, please refer to or know rules of cleaning medical equipment.

When cleaning the syringe pump:

- 1 Make sure the pump is turned off and disconnect it from the AC power supply before cleaning.
- 2 Wrap the surface of the syringe pump with the wet warm cloth.
- 3 Use a tampon moistened with 75% alcohol to wipe the outer shell of the machine for disinfection.
- 4 After cleaning or disinfection, put the syringe pump in the ventilated and cool place to dry it.
- 5 Do not use something like xylene, acetone or anything analogous to clean the pump. Otherwise, these chemicals will cause damage to the outer shell.

The above ways are just for reference. Sufficient measures should be taken to check the effect of the disinfection.



Warning:

- Before cleaning, please turn off the power supply, disconnect the power cord and the socket.

6.2 Regular Maintenance

- 1 Check the injection flow rate

Use the measuring cup and stopwatch to test the injection flow rate every six months.

- 2 Maintain battery performance

- 1) When using the battery first time, please optimize the battery.

A complete optimization cycle: charge the battery continuously until it is full, and discharge the battery until the syringe pump turns off; recharge the battery until it is full. During using the battery, please maintain the battery regularly in order to extend the lifespan.

Note:

As time went on and the battery keeps being used, the actual storage capacity of battery will decrease. If the power supply time of battery reduces obviously, please replace it with a new one.

2) Check the battery performance

As time went on, the performance of the battery will decrease. Please check the battery performance regularly. Please check the battery in the following ways:

- a). Connect to AC power for over 8~14 hours for recharging.
- b). Keep the pump working continuously until it turns off due to low battery.
 - If the syringe pump takes 200 minutes or even longer from start to shutdown, the battery is in good condition
 - If the syringe pump takes 60~200 minutes from start to shutdown, the battery life is near to its end.
 - If the syringe pump operation takes less than 60 minutes from start to shutdown, the battery life is at its end and you are required to replace the battery.
- c) After the battery inspection, recharge the battery again for the next use.

Note:

- If the supply time of the full charged battery is too short, the battery may have been damaged or broken down. The supply time of the battery depends on the configuration and its frequency of use, such as, long time use of back light.
- If there is obvious damage (bulge, deformation and leakage), or the battery cannot store the capacity, please change it and recycle it in a correct way.

3) Battery recycling

If there is obvious damage (bulge, deformation and leakage), or the battery cannot store the capacity, please change it and recycle it in a correct way.

When dealing with the old and waste battery, please obey the related rules.



Warning:

- Please don't disassemble the battery, put it into fire or short-circuit it. The burning, explosion or leakage may cause personal injury.

3 Routine Maintenance

| Interval | Routine Maintenance Procedures |
|--|--|
| According to the hospitals' policy | Thoroughly clean the syringe pump shell before or after long period of storage. |
| Give a check to the pump at least once a year. | 1. Check the AC power plug and cord. 2. Run the syringe pump with battery until the alarm of low power rings, and then charge the battery. Please make sure the operation and charge is normal. |

4 Pollution-Free Treatment and Recycling

The unit must be fully calibrated by as service engineers approved by the manufacturer after 3 years' use.

Please refer to the part: Step 3 in Chapter 4.4 for calibration procedures.

The service life of this product is 3 years. Machine exceeding its service life should be discarded.

Please contact the manufacturer or distributor for more relevant information.

- 1) BD-5000 syringe pumps that are no longer in use could be sent back to their distributors or manufacturers for proper recycling.
- 2) Used-up lithium polymer batteries could be delivered to its distributor or manufacturer for disposition, or dealt with according to the applicable laws and regulations.

6.3 Storage

Ambient temperature -40~55°C

Air pressure 50~106kPa

Relative humidity≤95%

Chapter 7 Electromagnetic Compatibility and Interference

This pump is designed to prevent external interference, including high-intensity radio frequency radiation, magnetic field and electrostatic. But users are advised not to use mobile phone within 0.5 meters away from the machine.

This pump is quite low in electromagnetic frequency, which will not interfere with the surrounding electronic equipment. But this pump shall produce certain amount of electromagnetic radiation, which is in compliance with IEC/EN 60601-1-2 and IEC/EN60601-2-24 standard. If interference occurs when this pump is used with other equipment, certain measures need to be taken to reduce this interaction, such as proper relocation of the two kinds of machines that cause mutual interference.

Avoid using this system in combination with electro tomes or similar devices. Otherwise the electromagnetic interference will cause mechanical failure or system collapse.

When using this syringe pump, avoid using such equipment which produces electromagnetic field as mobile phones close to it. Otherwise the electromagnetic interference will cause mechanical failure or machine collapse.

Chapter 8 Product Specification

8.1 Product Features

| | |
|------------------------------|---|
| Product Model | Model: BD-5000 |
| Maximum Injection Rate | 1500 ml/h (Different syringes have different maximum rate.) |
| Range of Flow Rate | 5ml syringe: 0.1-100ml/h 10ml syringe: 0.1-200ml/h 20ml syringe: 0.1-400ml/h 30ml syringe: 0.1-600ml/h 50ml syringe: 0.1-1500ml/h |
| Injection Increment | 0.1ml |
| Bolus Rate | 5ml syringe: 100ml/h 10ml syringe: 200ml/h 20ml syringe: 400ml/h 30ml syringe: 400-600ml/h 50ml syringe: 400-1500ml/h |
| Injection Mode | Rate mode Time mode Body Weight mode |
| Rate Mode | Rate: 0.1-1500ml/h (the maximum value depends on the syringe specifications) |
| Time Mode | Time: 1~2000 minutes Accumulated injection volume: 0.1-999.9ml |
| Body Weight Mode | Weight: 0.1~300.0kg Drug: 0.1~999.9(mg) Volume: 0.1~999.9ml Dose: 0.1~9999.9(depending on unit, drug, volume, weight and syringe specifications). Units: mg/kg/h, ug/kg/min |
| KVO Rate | Adjustable range: 0.1ml/h~5.0ml/h (the KVO function starts under the occlusion situation) ; Pressing STOP key to cancel the KVO function when it is unnecessary in use. |
| IP Grade | IPX1 |
| Injection Pressure | The maximum pressure is 0.3Mpa,the occlusion alarm pressure value is 0.04~0.16MPa. When the pressure value is minimum the injection rate is 25ml/h, and the longest occlusion alarm time is 10 minutes. When pressure value is minimum and the injection rate is 5ml/h, the longest alarm time is 10 minutes. |
| Preset Volume | 0.1~9999.9 ml |
| Preset Time | 0~99 hours, 0~59 minutes |
| Accumulated Injection Volume | 0.1~9999.9 ml |

| | |
|---------------------------------|--|
| Accuracy | ±5% (up to 2% after being adjusted) |
| Power Supply | AC100-240V, 50/60Hz |
| Battery | Rechargeable lithium polymer battery, 7.4V, 1600mAh. |
| Maximum Power Consumption | Max25VA |
| Battery Charge | When the syringe pump is connected to AC power, the battery will automatically be recharged. (It takes more than 8 hours to fully recharge the battery.) After fully recharged, it can run more than 3 hours at the rate of 25ml/h |
| Fuses | Double 250V 2A |
| Displayed Information | Flow rate; accumulated injection volume; syringe specification; battery capacity; bed No.; AC power indicator, operation indicator, etc. |
| Status Indicator | Stop, inject, bolus, KVO (stop flashing, the other indicators flash by turns.) |
| Alarm | Near, over, occlusion, low battery, abnormal 1 (communications failure), abnormal 2 (pump stuck), abnormal 3 (wrong parameters), volume limited alarm, no AC power |
| Electronic memory time | 10 years |
| Maximum Size of the Outer Shell | 280mm×130mm×120mm (length × width × height) |
| Maximum Weight | <3.0 kg |
| Classification | Class II, Type BF |
| Shell Material | ABS Plastic |
| Operating Conditions | Environment temperature: 5 °C ~40 °C; air pressure: 86kPa ~106kPa; relative humidity ≤80% |
| Storage Conditions | Environment temperature: -40 °C ~55 °C; air pressure: 50kPa~106kPa; relative humidity ≤95% |
| Applicable Syringes | National standard syringes: 5ml, 10 ml, 20 ml, 30ml, and 50 ml |
| Applicable Standard | GB/T191-2008; GB8368-2005; GB9706.1-2007; GB 9706.27-2005; GB9969.1; GB/T14710-1993; YY0466-2003 |

8.2 Occlusion pressure, Maximum Alarm Time and BOLUS Volumes

| Standard Occlusion pressure (Kpa) | Rate (ml/h) | Pressure value (Kpa) | Alarm time (Min) | BOLUS volume (ml) |
|-----------------------------------|-------------|----------------------|------------------|-------------------|
| 40 | 5 | 38.13±10 | 00:07:11 | 0.59 |
| | 100 | 32.93±10 | 00:00:22 | 0.37 |
| | 500 | 45.47±10 | 00:00:08 | 0.67 |
| 100 | 5 | 105.0±20 | 00:08:09 | 0.67 |
| | 100 | 104.9±20 | 00:00:41 | 0.68 |
| | 500 | 102.0±20 | 00:00:18 | 1.5 |
| 160 | 5 | 155.3±30 | 00:14:13 | 1.18 |
| | 100 | 156.4±30 | 00:00:45 | 0.75 |
| | 500 | 157.2±30 | 00:00:27 | 2.25 |

The above values tested in the following conditions:

- 1) FLUKE IDA4PLUS TESTER
- 2) Syringe brand: Double Dove
- 3) Extension line brand: Dragon Heart

Note:

- Standard Occlusion pressure setting at factory is 100KPA.
- Standard Occlusion pressure ranges from 40KPA to 160KPA.
- Maximum volume transfuse is 50ml under the single breakdown.

8.3 Infusion Accuracy Figure

The following is the infusion accuracy Figure which shows the feature after starting injection and the change of the injection after the pump running at the normal rate.

Note:

- The infusion accuracy cannot reflect the clinical standard, such as the patient's age, weight and the drug using.
- The infusion accuracy can be influenced by the environment (pressure, temperature, humidity and the infusion accessories and extension lines and so on)

1. Startup Curve

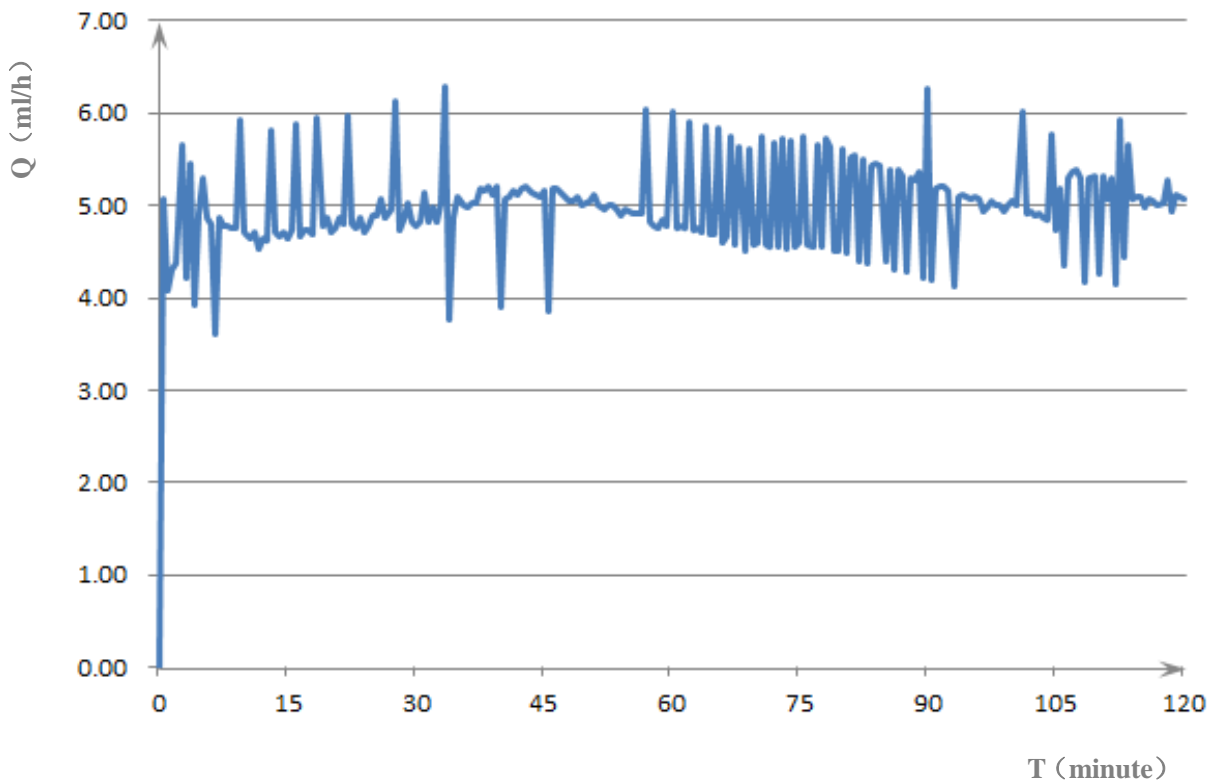
Be made according to the collection of 2 hours' test period.

Sampling rate: 5ml/h

Sampling interval $\Delta t = 0.5$ min

Test cycle $T = 120$ min

Infusion rate: Q (ml/h)



2. Horn shaped curve

Short period infusion rate deviation; ($p\Delta t$)

Sampling infusion rate: 1ml/h

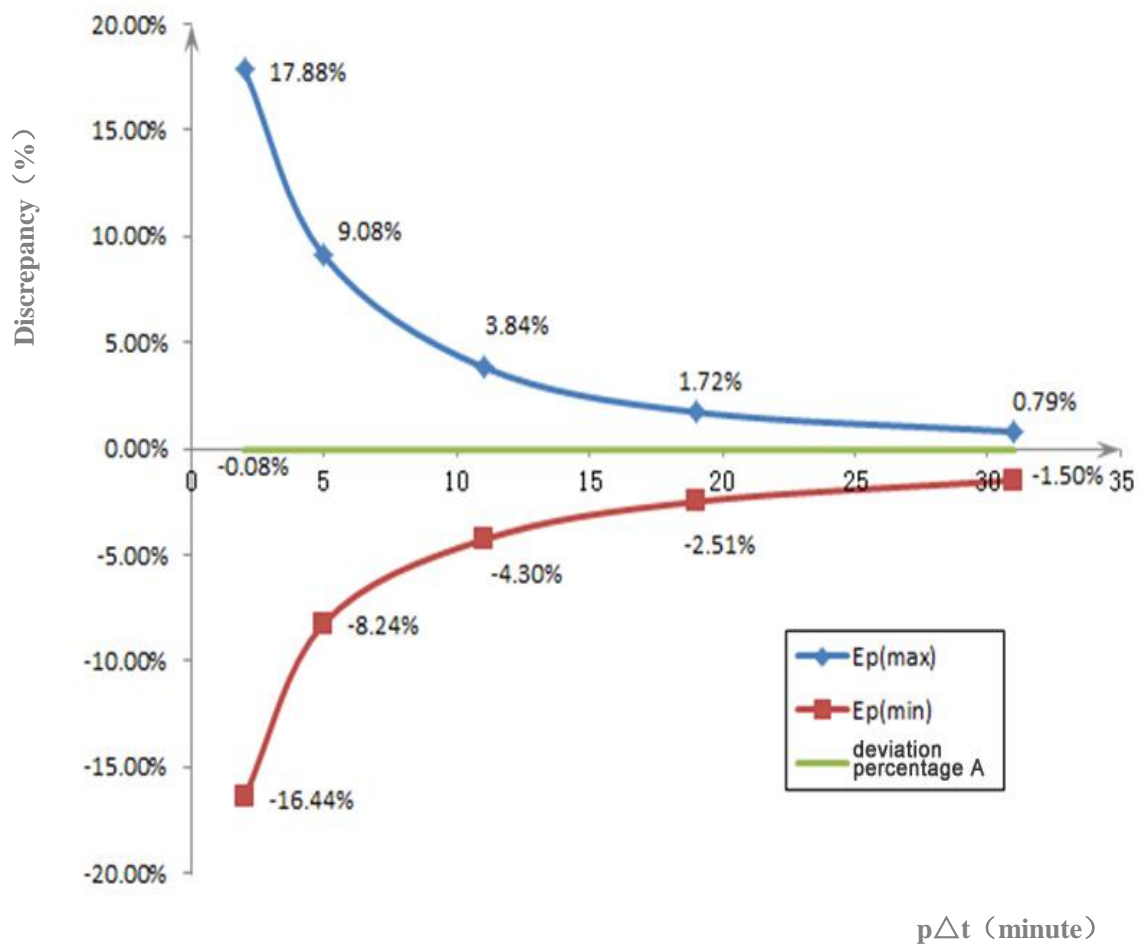
Sampling interval: $\Delta t = 0.5$ min

Observation lasting: $p\Delta t = 2, 5, 11, 19, 31$ min

Maximum deviation at certain lasing time: E_{pmax} (%)

Minimum deviation at certain lasing time: E_{pmin} (%)

Average deviation percentage A (%)



Chapter 9 Advised Syringe and Extension Line

This syringe pumps use disposable “Double Dove” syringes and “Dragon Heart” extension line for calibration.

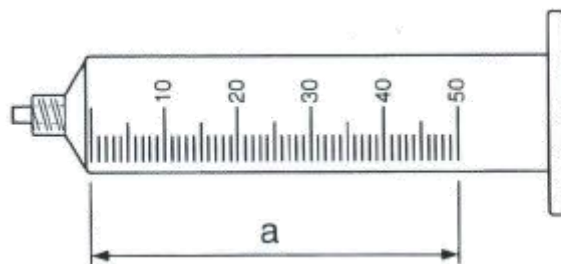
The calibration equipment is Fluke IDA-4 Plus infusion equipment analyzer.

Only 5ml, 10ml, 20ml, 30ml and 50ml standard syringes can use on this syringe pump. Before using the national standard syringes of non- “Double Dove” brands please reset the syringe parameters by referring to this instruction manual. The use of the syringes that are not in accordance with the national standard or the incorrect parameter setting will affect the accuracy of the injection.

| | 5ml | 10ml | 20ml | 30ml | 50ml |
|-------------|---------------------------|------|------|------|------|
| Double Dove | √ | √ | √ | √ | √ |
| | Size for Reference a (mm) | | | | |
| | 5ml | 10ml | 20ml | 30ml | 50ml |
| Double Dove | 37.5 | 55.4 | 61.2 | 68.3 | 75.7 |

Note:

“a” is the length between the “0ml” scale mark of the syringe to the scale mark of its nominal size.



For example: Double Dove 50ml syringe

Chapter 10 Maintenance Service

The warranty period is 1 year from the purchasing day. We can offer free repair service within the warranty time on condition that the product is operated properly. The following situations are not within the range of free maintenance and repair:

1. Malfunction caused by false use, repair or reconstruction by any unprofessional, unqualified or untrained people.
2. Malfunction or damage caused during transportation.
3. Malfunction or damage caused by fire, salt, poisonous gas, earthquake, hurricane, flood, abnormal voltage and other nature factors.

We can provide circuit or parts lists required to the authorized service personnel.

After-Sale Service Center: Shenzhen Kang Brand Meditech Co., Ltd.

Service Center Address: Floor 5A, Blk. A, Tempus Building, Qingshuihe 1st Street, Luohu District,
Shenzhen, China

Post Code: 518023

Tel: +86 755 22218824

Fax: +86 755 22271900

