Infusion Pump
Model： BD-6000
Instruction Manual

Brand Meditech (Asia) Co., Ltd.

Please read the manual before using the product.
Please keep the manual for reference!

CE 0197

Introduction

Thank you for purchasing Model BD-6000.

Please read the manual before using the product.

Please keep the manual for reference.

Product name:	Infusion Pump
Model:	Model BD-6000
Product registration No. :	
Product standard:	
Production license No.:	
Product performance and structure:	Mainly composed of shell assembly, pump assembly, boards, battery and so on
Application:	It is used in hospitals where patients need to be given steady and continuous intravenous infusion 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

Statement

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Shenzhen Kang Brand Meditech Co., Ltd. has the right to revise the user manual without prior notice. 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 Co., Ltd.

◆All of the components used for maintenance, accessories and disposables compatible with the pump are supplied by Shenzhen Kang Brand Meditech Co., Ltd. originally or recognized by Shenzhen Kang Brand Meditech Co., Ltd.

◆ Related electronic devices comply with the requirements of state standard and the user manual.

◆ Operation should be done according to this manual.

Contents

Chapter 1 Safety

1.1 Safety Information

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

Notice:	It highlights important guideline information, which will affect how to use this user manual and this infusion pump, or provide some extra information, such as detailed explanation, clue or reminder.
 **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 Notice

◆ Please keep the user manual for reference.

◆ Please install the infusion pump in the place where is easy to observe, operate and maintain.

◆ The user manual gives a full introduction of most complete specifications and functions. The infusion pump you bought may not have certain configuration or function.

◆ After over 24 hours infusion, please replace a new IV set, or take off over 15cm of the accessory part of the IV set, and install a new part.

◆ Please use your fingers to press the buttons of the panel. Sharp tool would damage the surface of the panel.

◆ The serial number of the infusion pump has been set before leaving the factory. It cannot be changed by users.

1.1.2 Danger

The IV set should be installed straightly, and make it reach the bottom of infusion pump's groove.

1.1.3 Warning

◆ The infusion pump is used for clinical infusion. Unqualified and untrained people are not allowed to operate it.

◆ Check the infusion pump and its accessories in order to confirm that they can work normally and safely before use.

◆ Do not use the infusion pump in the place where there is inflammables and explosives in case of a fire and explosion.

◆ Alarms setting should be done according to the patient's actual situation. Please keep watching the patient's clinical symptoms, and do not just reply on the alarm function of the infusion pump.

◆ During infusion process, keep watching the amount of the rest volume liquid. Do not just reply on the alarm function of the infusion pump.

◆ In the high pressure atmosphere, such as Hyperbaric oxygen therapy, the pressure inspection may not work normally.

◆ Make sure patient's blood vessels have been protected before infusion.

◆ In the infusion pipe, the occlusion caused by pipe knot and filter coagulation or intubations would cause the rise of the inner pressure of the infusion pipe. At this moment, the elimination of the occlusion may cause too much liquid to be injected to the patient's body. Proper measures should be taken to prevent too much liquid to be injected into the patient's body. For example, squeeze the infusion pipe before occlusion elimination.

◆ Use the infusion pump 120 cm above or below the patient's heart.

◆ Avoid using the infusion pump when there are alarms.

◆When one giving pipe be connected to two infusion pumps,the real output volume will be different with what you need to

◆ Please use the standard infusion set and extension line. Please contact the agency for the detailed information.

◆ When using non-national standard infusion pipe or setting the infusion parameters incorrectly, the accuracy will not be ensured and the maximum discrepancy may reach to over 40%.

◆ The used accessories should be dealt with properly according to the related regulations of the hospital.

◆ The protection against electric shock of the infusion pump belongs to Class II, PE earthing terminal of power cord of I class assembled with the pump cannot be used for protection of earthing.

◆ Do not open the outer shell of the pump avoiding the risk of getting an electric shock. Maintenance and upgrade should be done by person who is trained and authorized by our company.

◆ Package disposing should be done according to the related local laws or the rule of hospital. Package should be kept out of children's reach.

1.1.4 Caution

◆ To ensure the safety of patients, please use the appointed accessories in the instruction manual.

◆ Take care of the cables which may make the patients twined and suffocated.

◆ Please do not reuse disposable accessories to avoid hypofunction and cross-infection.

◆ The thickness of the two-tier pipe cannot be beyond 2mm. The diameter should be between 3.5mm and 4.5mm.

◆ Before infusion starting, please check the infusion pipe. If there is leakage of liquid, a prompt inspection is needed.

◆ When infusion is started, the infusion pipe which is in the groove need adjusting every 4 hours to keep the accuracy. Please change a new infusion pipe when it is used for 24 hours continuously.

◆ The infusion pump and its accessories should be discarded according to the related rules of local laws or the rules of the hospital, when they are about to end the service life. Please contact the

distributors or manufacturer if you have any question.

◆ As the performance of the infusion pump will be impacted by electromagnetic field, the devices near to the pump should conform with the related rule of EMC. Mobile phone, X-ray and MRI devices are the potential sources of disturbance as all of them can generate the magnetic field with high intensity.

◆ Avoid the direct sun shine, abnormal high temperature or humidity.

◆ Avoid conducting high-pressure sterilization to the infusion pump or exposing it in chemical substance.

◆ Before using the built-in battery, please check the battery to ensure that it has enough power. Please recharge it if needed.

◆ Before the AC power is connected, please make sure the voltage and its frequency is suitable according to the label and the manual of the infusion pump.

◆ Please install and carry the infusion pump properly, to avoid fall, collision, serious vibration and the damage caused by mechanical force.

◆ Wipe the surface of the infusion pump with a piece of soft cloth drenched by warm water.

◆ If the surface tension, specific gravity and viscosity of the infusion liquor (such as a liquor which is mixed with surfactant) are different from the saline's, the infusion accuracy may be different from the value in the reference table.

◆ When a rapid infusion needed (flow rate≥1000ml/h), please use a silicone pipe with the transfusion needle which is more than 0.9mm to keep the infusion accuracy.

◆ If the infusion pump does not work according to the instruction manual, and the cause is not clear, stop the infusion pump and feedback the error (including the information of the IV Sets, infusion accumulated volume set, infusion rate, ID No., the type of the infused liquid, etc.) to the distributor who sells the product to you.

Chapter 2 Product Introduction

2.1 Product Structure and Components

Model: BD-6000 infusion pump consists of the main engine and the built-in rechargeable battery.

2.2 Application Scope

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

2.3 System Structure

Model: BD-6000 infusion pump contains the following parts:

1) **The microcomputer system:** the “brain” of the whole system, which gives intellectualized control and management over the whole system and processes the detected signals. The two single chip Micyoco (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 main engine, which makes the machine stop working, and thus ensures patient's safety.
2) **The pump device:** the “heart” of the whole system and the main driving force of the infusion, which drives the peristaltic pump with stepper motor.
3) **The inspection device:** including infrared sensor (detecting air bubbles inside the infusion pipe), pressure sensor (detecting the pressure inside the infusion pipe), Hall sensor (detecting the motor control) etc., which can give corresponding signals, which will, after being magnified, be sent to the microcomputer for signal processing. After that, a control instruction will be sent for corresponding operation.
4) **The alarm device:** after the signal received by the sensor is processed by the microcomputer, an alarm control signal will be sent, which will be responded by the alarm device to alert the user for

the proper operation. There are mainly two kinds of alarms, namely the photoelectric alarm (light-emitting diode) and the sound alarm (buzzer), etc.

5) **The input and display device:** The input part is in charge of setting various infusion parameters, such as infusion volume and infusion rate, etc. The display part is in charge of displaying various parameters and shows the current operation progress on the LCD.

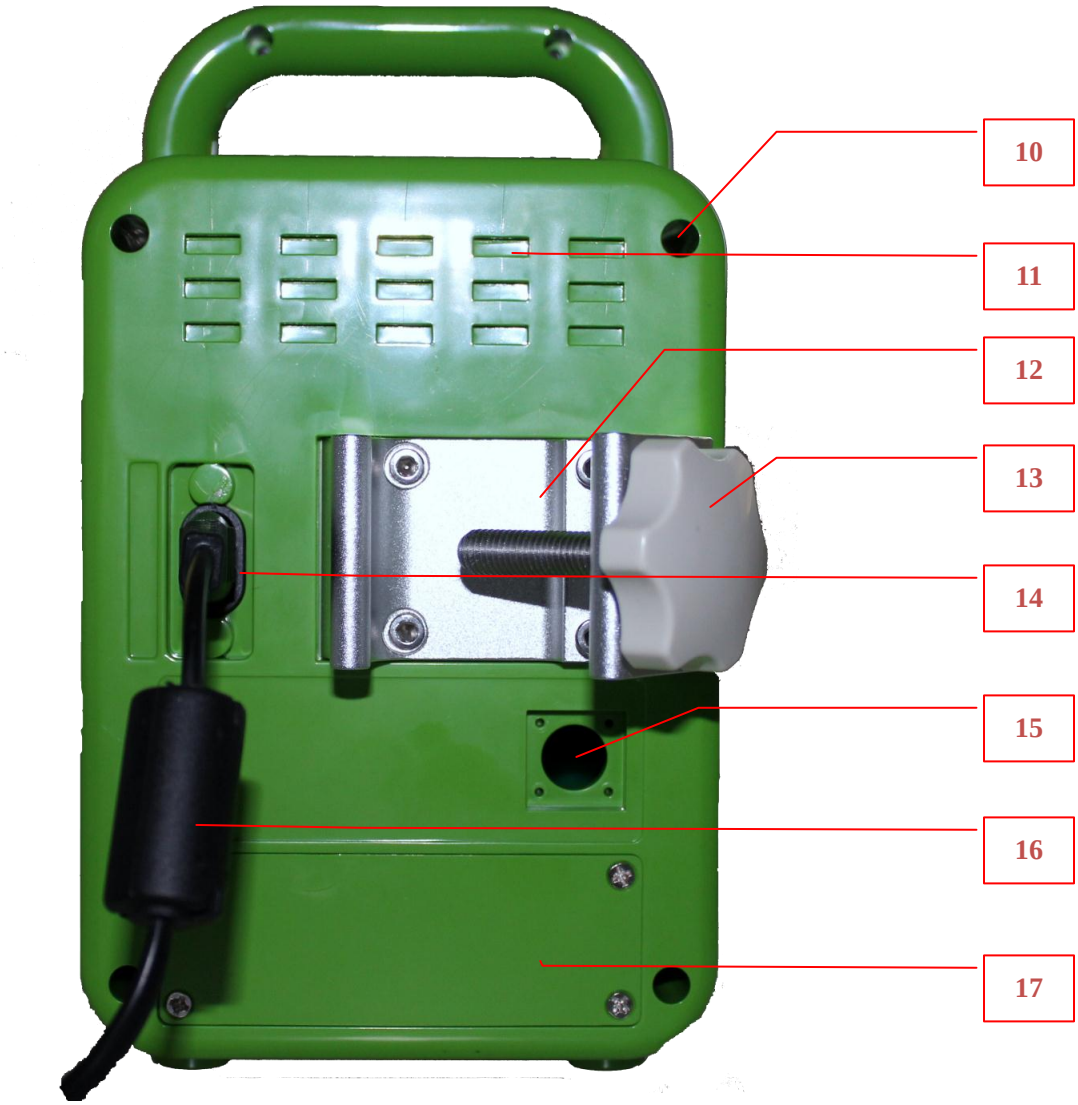
6) **The built-in rechargeable battery component:** This component supplies electric power to the infusion pump to ensure continuous use when the AC Power is disconnected or unavailable.

Chapter 3 External Characteristics

3.1. Front Panel Description

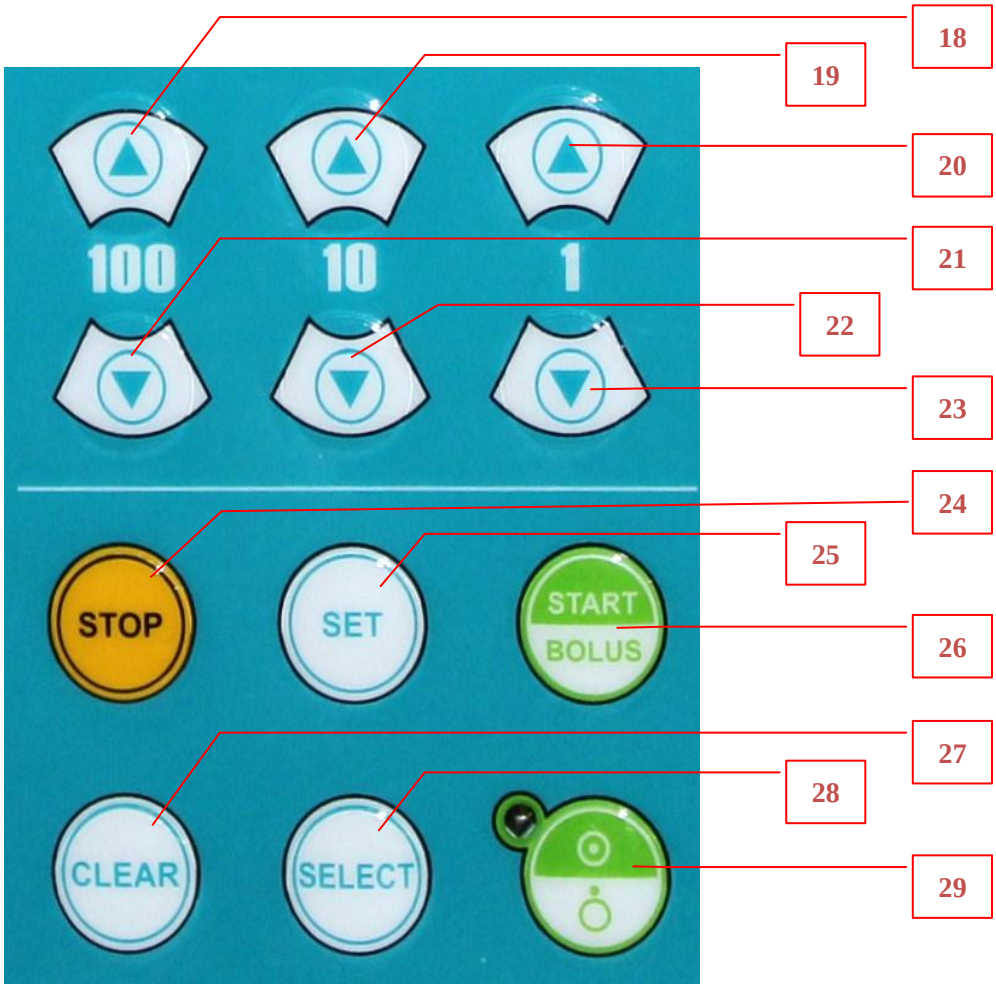
1) Handle.
2) Decoration Strip.
3) Indicator Light: AC Indicator (Orange), Infusion Installation Indicator (Green), Operation Indicator (Green flashing)
4) LCD: Displaying Graphics and Character with Backlight
5) Mounting Groove
6) Fluid Flow Direction Label
7) Key Switch
8) Power Indicator Light
9) Door Lock

3.2 Back Panel Description



10) Screw Holes
11) Vents
12) Pole Clamp
13) Clamp Knob
14) AC Power Outlet
15) Multi-functional Interface: Car Power Socket
16) AC Power Code
17) Battery Cover Plate

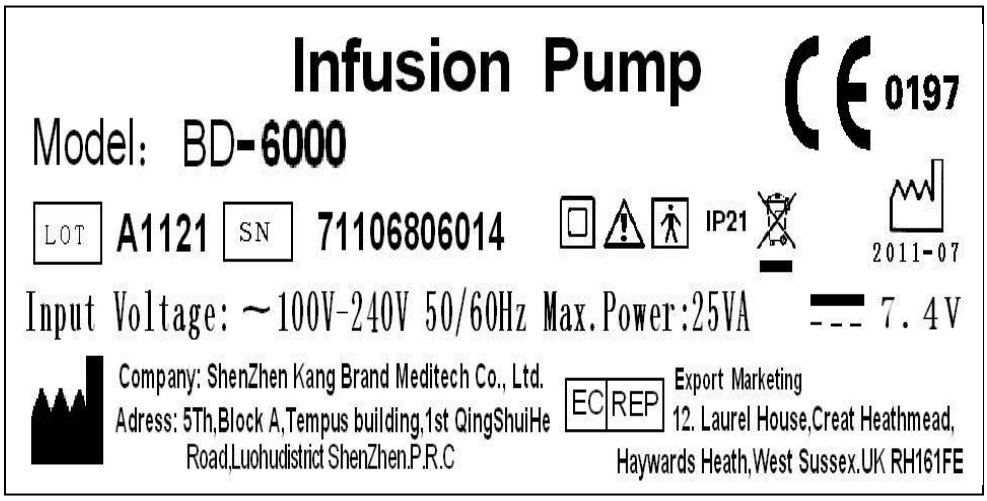
3.3 Key Switch Instruction



18) ↑100 Key**:** Used to add 100 to the initial value in the parameter setting.
19) ↑10 Key：Used to add 10 from the initial value in the parameter setting.
20) ↑1 Key：Used to add 1 to the initial value in the parameter setting.
21) ↓100Key：Used to reduce 100 from the initial value in the parameter setting.
22) ↓10 Key：Used to reduce 10 from the initial value in the parameter setting.
23) ↓1Key：Used to reduce 1 from the initial value in the parameter setting
24) STOP Key：Stop infusion or stop the alarm.
25) SET Key：To set the flow rate, volume limit, and system parameters.
26) START/BOLUS Key：Start to infuse; Press “BOLUS” key in the infusion status to infuse at the maximum rate (flow rate: 600ml/h).
27) CLEAR Key：Press this key in "stop" status to turn the accumulated value back to "0".
28) SELECT Key：Used to select the parameters for setting in the "Setting" interface.
29) POWER Key：Press the key for more than 2 seconds to turn on /off the pump; Open or Close the light version of the pump under the open status.

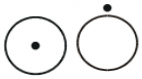
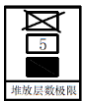
3.4 Packing

3.4.1. Product Label (pasted on the back shell of the pump)



3.4.2. Label Marks and Signification

Mark	Description
LOT	Batch No.
SN	Serial No.
	Caution!
	Class II Equipment
	Type BF Applied Part
IP21	Out Shell Protection Class
	Treat with a pollution-free way
	Date of Manufacture

	Manufacturer
	Alternating Current
	Direct Current
	Reach the Standards of 93/42/EEC
	Power Switch
	Non Ionization Radiation
	Caution of Rain During Transportation
	Fragile, Handle with Care During Transportation
	Up During Transportation
	Maximum 5 same products above

3.4.3 Standard Configuration in the Packaging Case

- ◆ Infusion Pump 1 set
- ◆ AC Power code 1 piece
- ◆ Instruction manual 1 piece
- ◆ Pole Clamp 1 piece
- ◆ Certificate 1 piece

Notice:

●Please contact the sales agent when find any components above mentioned is missing.

Chapter 4 Operation Guidelines

4.1 Operation Flow Chart

Fix the Machine	Fix the infusion pump on the stable IV stand.
Connect to the Power Source	Press  for 3~5 seconds.
Install the IV Set	Install the IV set.
Set Infusion Parameters	Press the SET key to set parameters.
Eliminate Air Bubbles from the IV set	Press the START key to infuse and eliminate the air bubbles from IV set, then press the STOP key.
Clear the Accumulated Volume	Press the CLEAR key.
Insert Infusion Accessories into Patient	Connect infusion accessories with patients
Start the Infusion	Press the START key.
Infusion Completion	Press the STOP key.
Turn off the Power Supply	Press  for 3~5 seconds.

4.2 Basic Operation Steps

Step 1: Fix the Infusion Pump

1) Rotate the knob of the pole clamp anticlockwise, and leave enough room to put the IV stand in as shown in Figure 1.

2) Fix the infusion pump properly on the IV stand, and rotate the knob of the pole clamp clockwise to get the pump well fixed on the IV stand as is shown in Figure 2.

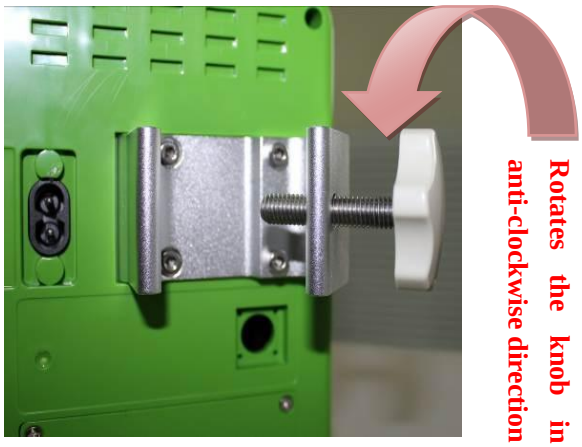


Figure 1

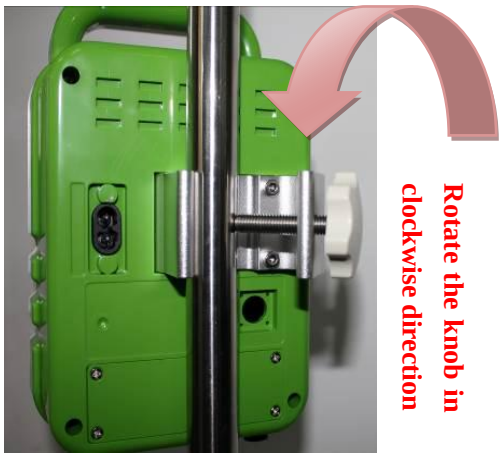


Figure 2

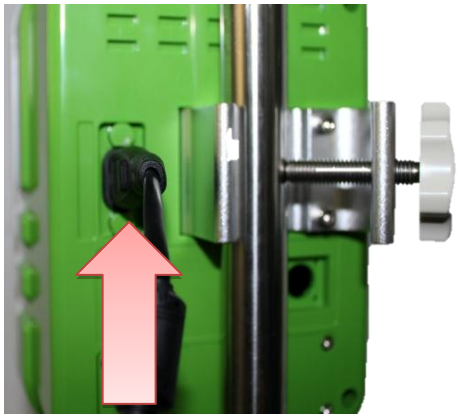


Figure 3

Waining:

- Place the machine in the horizontal position.
- The applicable power scope is ~100V-240V, 50/60Hz.
- Only use the enclosed AC power cord.

Step 2: Connect to the Power

3) Plug the power cord into the outlet of the infusion pump as shown in Figure 3.

Step 3: Turn on the power supply

4) Press the  key for 3-5 seconds as shown in Figure 4, and the pump will start the self-diagnosis and the LCD will display the version No. and the serial no. of this pump as shown in Figure 5.

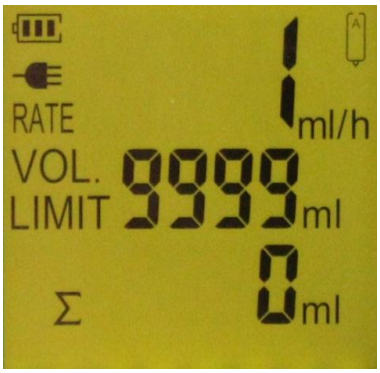


Figure 4

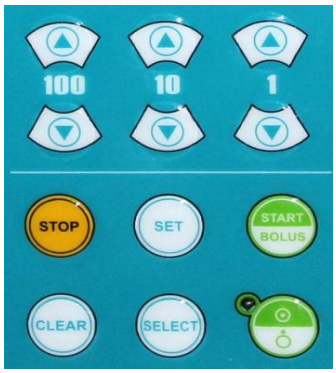


Figure 5

Notice:

● When the pump is on and is connected with AC power, the battery can be recharged automatically as the LCD displays the AC power supply symbol.

● Press the  key (just on touch) to turn on the night vision in the dark.

Step 4: Install the IV set

5) Pull out the door lock as shown in Figure 6.

6) Straighten the infusion pipe and put it into the mounting groove. Make sure it reaches the bottom as shown in Figure 7.

Figure 6

Figure 7

7) Put down the door lock gently back to its place as shown in Figure 8. If the infusion pipe is properly installed, the green indicator light will be on. Otherwise reinstall it until the green light is on.

Figure 8

Warning: ● Check and make sure there is no air bubbles in the infusion pipe.

Caution: ● Make sure the infusion pipe reaches the bottom of groove.

Attention: ● The infusion pipe must be discarded after 24 hours of continuous use.

Step 5: Set Basic Parameters

8) Press the SET key as Figure 9, the LCD will display 3 values as shown in Figure 10: the upper one is flow rate, the middle one is volume limit, the bottom one is bed No.

9) Press the SELECT key as shown in Figure 11 to choose the parameter to be set. When the value is flashing, it means the corresponding parameter is selected and it can be adjusted by pressing the number keys.

10) After setting all the parameters, press the SET key as shown in Figure 9 to save the value and quit the interface.

Figure 9

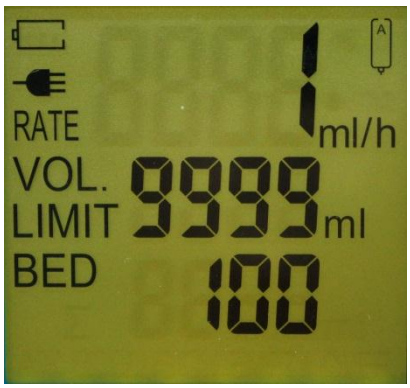


Figure 10

Figure 11

Notice:

● The bed No needs setting only when the infusion pump is used together with our infusion supervision system. Otherwise, there is no need to set bed No.

Step 6: Eliminate the Accumulated Volume

11) Press the CLEAR key once as shown in Figure 12, then the accumulated volume will change into "0" and begin to recalculate as shown in Figure 13.

Figure 12

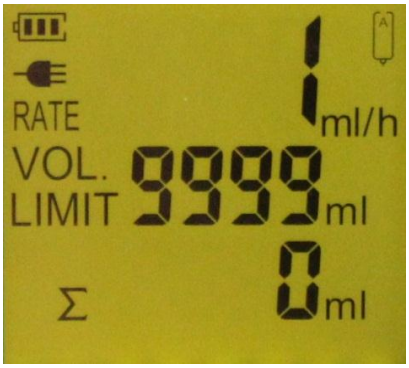


Figure 13

Notice:

● During the infusion, the accumulated volume can only be observed. If you need to eliminate it, please stop the infusion and eliminate it.

Step 7：Start the Infusion

12) After setting all the parameters and properly installing the infusion pipe, press the START key once as shown in Figure 14 and the indicator light will become flashing as shown in Figure 15. The motor begins to run, and the pump starts infusing.

Figure 14

The indicator light is flashing during the infusion.

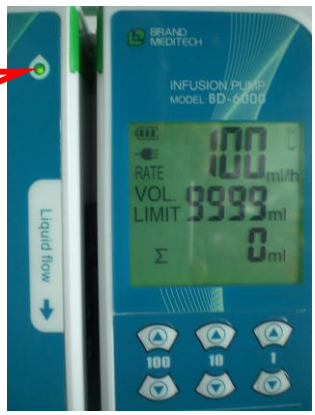


Figure 15

Warning: ● Please check and make sure there is no air bubble in the pipe before infusing. Otherwise, press the START key to eliminate the air bubble from the pipe.

Notice: ● The alarm will sound once there is a serious low capacity of battery during the infusion, then the pump will stop automatically.

Step 8: Complete the Infusion

13) As shown in Figure 16, when the accumulated volume reaches to the volume limit, the LCD will displays "OVER" and sends out an audible and visible alarm to alert the user that the infusion is finished. Press the STOP key to stop infusion as shown in Figure 17.

Step 9: Turn Off the AC Power

14) Press  for 3-5 seconds as shown in Figure 18, and the power will be turned off.

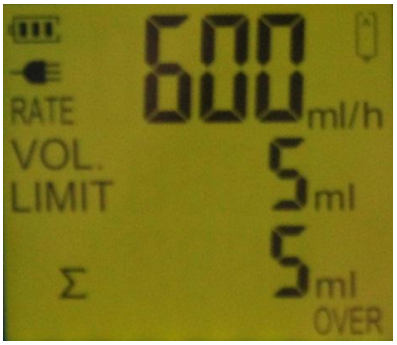


Figure 16

Figure 17

Figure 18

4.3 Start "BOLUS" Function

During the injection, keep pressing BOLUS key as Figure 19 to accelerate the infusion to the maximum flow rate of 600ml/h when the current rate is under 600ml/h. Release the key to return to the original rate.

Figure 19

Figure 20

Figure 21

Notice:

- Bolus function should be started under the condition of normal infusion.
- Bolus infusion will not affect any alarm functions.

4.4 Parameters Setting

Infusion pipe of the brand of "Dragon Heart" was used to test and set the parameters. If new infusion pipe of other brand is needed, please reset the parameters as following steps:

Step 1: Set the Occlusion Value for Alarm

1. Install a new brand of infusion pipe filled with liquid. Press the ↑100 and the ↓100 key together as shown in Figure 20, the LCD will display 3 values as shown in Figure 21. The pressure value is in the top line.

2. Press the SET and the STOP key together as shown in Figure 22, the LCD will display another 3 values as shown in Figure 23, and the upper one is the occlusion alarm value. The higher the value is, the less sensitive the pressure sensor will be. Adjust the occlusion alarm value into a proper value by pressing number keys. At last press the SET key to save the value as shown in Figure 24.

Figure 22

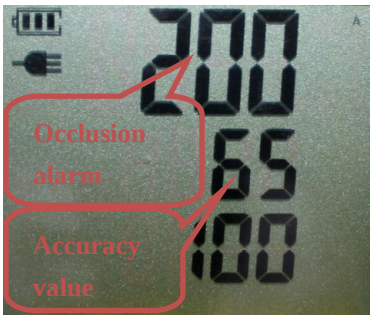


Figure 23

Figure 24

Notice: ● Occlusion alarm value > Recorded pressure value+50

Step 2: Adjust the Accuracy

1. Set the infusion rate to 250ml/h, and the volume limit to 10ml. Start infusion after installing the new brand of infusion pipe properly, and measure the liquid volume flowed from the infusion pipe with a

measuring cup.

2. Press the SET and the STOP key together as Figure 22, the LCD will display 3 values as shown in Figure 23, and the middle one is the accuracy value. If the liquid flowed into the measuring cup in Step 1 is 1ml more than 10ml, then add 2 to the accuracy value. If the liquid flowed into the measuring cup is 1ml less than 10ml, then reduce 2 from the accuracy value. If the actual liquid flowed into the measuring cup is the same as the volume limit 10ml, then there is no need to adjust the accuracy. Press the SELECT key to select the accuracy. Adjust the suitable accuracy value by pressing the number keys, and then press the SET key to save the value as Figure 24.

3. Example 1: The liquid flowed into the measuring cup is 11ml, and the initial accuracy value is 50, so we should change the accuracy into 52.

Example 2: The liquid flowed into the measuring cup is 8ml, and the initial accuracy value is 50, so we should change the accuracy into 46.

4. Repeat step 1 and step 2 until the accuracy value is accurate. (That means the actual volume of the liquid flowed into the measuring cup is the same as the volume limit.)

Notice:

- Infusion accuracy: ±5%
- In order to reduce the error in infusion accuracy test, the infusion pipe should be filled with liquid, without any air bubbles inside before operating the infusion pump.

4.5 The Infusion Pipe Parameters

1. BD-6000 infusion pump can save parameters of three kinds of infusion pipes. The LCD will display “A”, “B” or “C” in the top right corner as shown in Figure 25 when the parameters of the infusion pipe of Type “A” Type “B” or Type “C” is in use.
2. Press the STOP and the SET key together as shown in Figure 26, the LCD will display the parameters of the infusion pipe in use as shown in Figure 27.
   a) If you want to see the parameters of the Type A infusion pipe, press the CLEAR and the

↓100 key at the same time as shown in Figure 28, and the LCD will display “A” in the top right corner.

b) If you want to see the parameters of the Type B infusion pipe, press the CLEAR and the ↓10 key at the same time as shown in Figure 29, and the LCD will display “B” in the top right corner.

c) If you want to see the parameters of the Type C infusion pipe, press the CLEAR and the ↓1 key at the same time as shown in Figure 33, and the LCD will display “C” on the top right corner.

3. After setting the parameters of the infusion pipe, press the SET key to save the value as Figure 31.

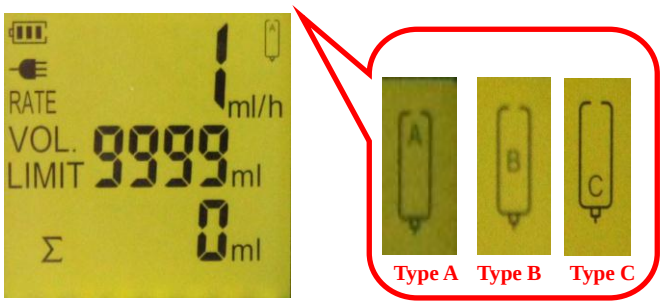


Figure 25

Figure 26

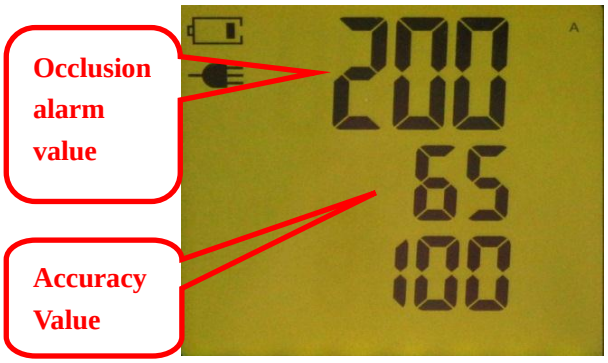


Figure 27

Figure 28

Figure 29

Figure 30

Figure 31

4.6 Battery Charge

1. After connecting to the power supply and turning on the pump, it will display the symbol of AC power supply and the symbol of battery as Figure 32, and begins to be charged automatically. Press the ↑ 100 key and the ↓ 100 key together as Figure 33, and the LCD will display 3 values as Figure 34, and the middle one is the battery capacity value. When the battery is fully charged, the value will be 640. If the value is lower than 640, the battery will be charged automatically. When the value is more than 640, the battery charge will stop automatically.
2. When the power cord is disconnected as shown in Figure 35, the battery supply symbol will be displayed on the pump, which means the pump is supplied by battery and the blank stands for the capacity of battery. When the battery is used up, the pump will send out an alarm sound to alert the user that the battery power is low and needs to be recharged.
3. If the AC power is not connected after a period of battery shortage, the pump will give a serious low battery alarm with the battery indicator flashing and an urgent alarm sound. If the pump is in the infusion status, it will stop automatically and keep alarming until AC power is connected.

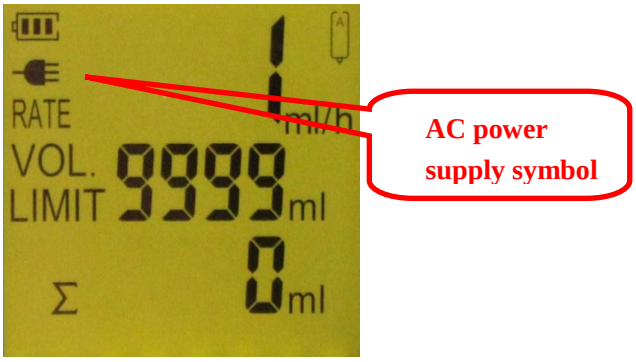


Figure 32

Figure 33

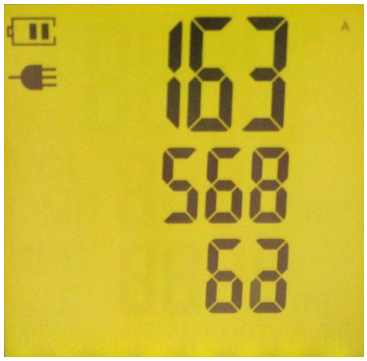


Figure 34

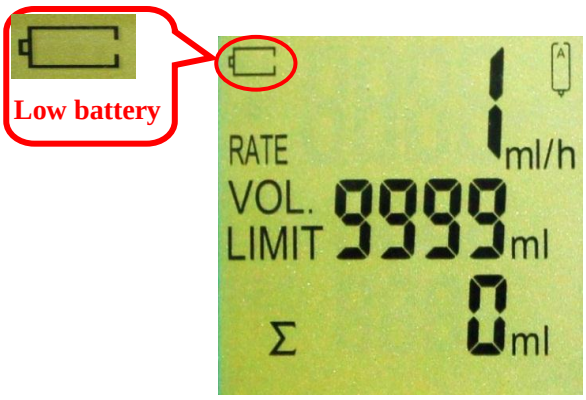


Figure 35

Warnings:

● Battery should only be charged when the pump is on.

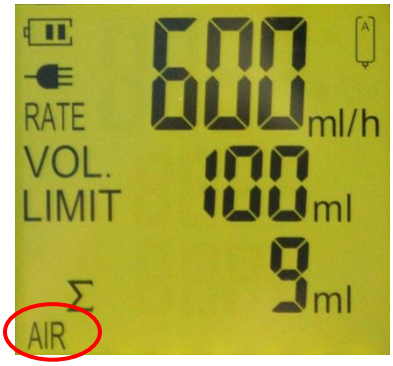
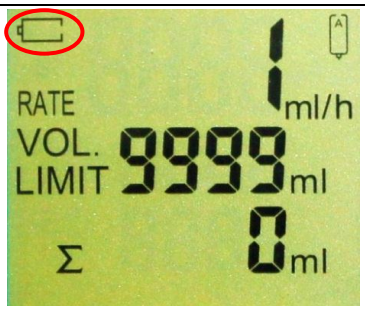
Notice:

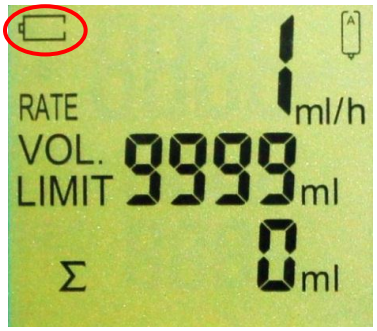
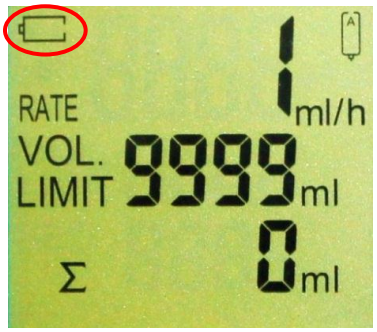
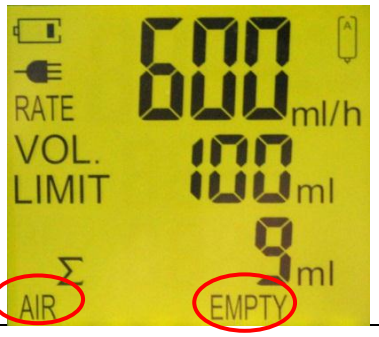
● It will take about 8-14 hours for fully recharging after it is used up.

● Batteries belong to expendables. Replace them when they are run out.

● If the product has not been used for long time, its battery should be discharged and charged every three months to avoid battery damage.

Chapter 5 Alarms and Solutions

Description	Display	Reason	Solution
"OVER" Alarm		The accumulated volume reaches to the volume limit	Press the STOP key to stop the infusion and the alarm. Then press the CLEAR key to eliminate the accumulated volume. After that, press the START key to start the infusion.
Air bubble Alarm		Air bubbles in the pipe	Press the STOP key to stop the infusion and the alarm. Eliminate the air bubbles in the pipe, and then press the START key to restart the infusion.
		Improper installation of the Infusion pipe	Reinstall the infusion pipe properly.
		Something wrong with the infrared sensor	Contact the manufacturer or agent to repair.
"OCCLUSION" Alarm		Infusion loop occlusion	Press the STOP key to stop infusion and eliminate the alarm. Press the START key to restart the infusion after eliminating the occlusion in the loop.
		The occlusion sensitivity is much too high.	Refer to this instruction manual at the first step of "4.4 Parameters Setting": "Set the occlusion alarm value".
		Something wrong with the sensor.	Contact the manufacturer or agent to repair.
Alarm for No AC Power Supply		No AC power supply.	Check if the power cord is connected properly.
		Something wrong with the power supply circuit of the infusion pump.	Contact the manufacturer or agent to repair.

Description	Display	Display	Solution
Alarm for Low Battery		The battery 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 manufacturer or agent to repair.
Alarm for Battery Used Up		A serious low battery alarm is sent out with the battery indicator flashing and an urgent alarm sound. If it is under the infusion status, the pump will stop the infusion automatically and keep alarming until the AC power is connected.	Connect to the AC power supply to charge the battery.
Alarm for Installation Eros		Air bubbles in the infusion pipe	Press the STOP key to stop the infusion and clear the alarm. Then restart infusion after eliminating the air bubble in the pipe.
		Incorrect installation	Reinstall the infusion pipe properly.
		Something wrong with the sensor of the infusion pump.	Contact the manufacturer or our agent to repair.
Alarm for Abnormal Control		Something wrong with the motor.	Press the STOP key to stop infusion and eliminate the alarm. Then press the START key to restart the infusion. If the alarm is sent out again, please contact the manufacturer or agent to repair.

Chapter 6 Product Maintenance

6.1 Cleaning and Disinfection

Please clean the infusion pump regularly. Increase the frequency of cleaning when it is suffering in a sandy wind or serious pollution environment. Please learn the related regulations of cleaning medical devices.

Infusion Pump Cleaning:

1. Make sure to turn the pump off and disconnect AC power cord from the socket.
2. Use a piece of soft cloth drenched by warm water to wipe the shell of the pump.
3. Use a tampon moistened with 75% alcohol to wipe the outer shell of the machine for disinfection.
4. After the cleaning and disinfection, put the pump in a shady and cool place and keep ventilated to air-dry the pump.
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 instructive. Sufficient measures should be taken to check the effect of the disinfection.

6.2 Regular Maintenance

6.2.1 Check the Infusion Flow Rate

Test the infusion flow rate every six months with the measuring cup and stopwatch.

6.2.2 Maintain the Battery Performance

1. Optimize the battery performance

Battery should be optimized for the first use. A complete cycle for the optimization should be: Firstly, charge the battery until it is full, and discharge the battery until the pump shut down automatically. Then, recharge it to full status. Please do optimization regularly to extend the service life of battery.

Notice:

● With the passage of time and the use of the battery, the actual storage capacity of battery will be reduced. Please replace the battery if the working time of battery is found shortened obviously when optimizing it.

2. Inspect the battery performance

Regular battery inspections should be done as the performance might become lower with the passage of time.

Please refer to below steps for battery inspections:

① Connect to the AC power for 8~14 hours for recharging

② Disconnect the AC power, then keep the pump running continuously until it turns off due to low battery.

If it takes 90 minutes or even longer from start to shutdown, the battery is in good condition.

If it takes 45～90 minutes from start to shutdown, the battery life is close to its life end.

If it takes less than 45 minutes from start infusion to shutdown, the battery life is at its end and a new battery is needed.

③ After battery inspection, recharge the battery again for the next use.

Notice:

● If the power supply time is too short after a full recharging, that means the battery might have faults or have been damaged. Power supply time depends on the configuration of infusion pump and the frequency of use. Example: long time use of back light.

● If the battery is obviously damaged (such as: bulge, deformation, leakage) or it can't store power, please recycle it and change a new battery.

3. Battery Recycling

If the battery is obviously damaged (such as: bulge, deformation, leakage) or it has been run out,

please recycle it and change a new one. Run out battery treatment should follow the corresponding laws and regulations.

6.2.3 Routine Maintenance

Interval	Routine Maintenance Procedures
According to the hospital policy	Thoroughly clean the infusion pump shell before or after long period of storage.
Give a check to the pump at least once a year.	● Check the AC power plug and cord. ● Run the machine until it gives a low battery alarm. Then charge the battery to ensure the normal operation and charging.

6.2.4 Pollution-Free Treatment and Recycling

The service life of this product is 3 years. The pump exceeding its service life should be discarded. Please contact the manufacturer or distributor for more relevant information.

1. Model BD-6000 infusion pump that are no longer in use could be sent back to its distributors or manufacturer 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 Condition

Environment temperature: -20℃~+50℃

Air pressure: (50~106)Kpa

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.

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

Do not use electro tomes or similar devices together with this pump. Otherwise the electromagnetic interference will cause mechanical failure or system collapse.

When operating the pump, do not use Electromagnetic devices close to it, such as mobile phones. Otherwise the electromagnetic interference will cause mechanical failure or machine collapse.

Chapter 8 Product Specifications

8.1 Specification Table

Product Name	Infusion Pump
Product Model	Model: BD-6000
Infusion Pump Mechanism	Peristaltic Mechanism
Flow Rate Range	1~600 ml/h
Bolus Rate	600 ml/h
Increment	1, 10, 100
KVO Rate	1ml/h (the pump will infuse at the KVO rate when there is an occlusion alarm)
Preset Volume	1~9999 ml
Accumulated Volume	1~9999 ml
Infusion Accuracy	±5%
Power Supply	~100-240V, 50/60Hz; Rechargeable lithium polymer battery, 7.4V⎓, 1600mAh
Maximum Power Consumption	Max. 25VA, running more than 2 hours with full power when infusing at 25ml/h.
Battery Charge	When the infusion pump is connected to the AC power, the battery will be automatically charged (about 8-14 hours to be fully charged).
Fuses	T 2AL 250V~
Displayed Information	Battery symbol, AC symbol, infusion pipe type, flow rate, flow rate value and unit, preset volume, preset value and unit, accumulated volume, accumulated value and unit, infusion completion, occlusion, air bubbles, bed no., and pressure value, etc.
Status Indication	Stop, Infusion, Bolus, KVO

Alarm Information	Over, occlusion, air bubbles, installation error, control abnormal, no AC power supply, low pressure, serious low battery.
Bubbles Measure	At the rate of 600ml/h, the smallest bubbles that can be detected are 0.005ml of volume.
Infusion Pressure	Maximum pressure is 300kPa, occlusion gate value is 40kPa~160kPa. The longest time to give occlusion alarm is 2 minutes at rate of 25ml/h
Size of the Outer Shell	125(W)×205(H)×140(D)mm
Weight	<1.75 kg
Classification	Class II, Type BF
Work Mode	Continuous operation
Outer Shell Material	ABS Plastic
Waterproof Classification	IP21
Operating Conditions	Environment temperature: +5℃~+40℃, Air pressure: (860~1060)kPa, Relative humidity: 20%~80%
Storage conditions	Environment temperature: -20℃~+50℃, Air pressure:(50~106)kPa, Relative humidity ≤95%, Non-corrosive gases and well-ventilated room.
Applicable infusion pipes	National standard infusion pipes
Applied 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 （Kpa）	Flow Rate （ml/h）	Pressure Value （Kpa）	Alarm Time （Min）	BOLUS Volume （ml）
40	5ml	40.80±10	00:03:44	0.29
	100ml	43.47±10	00:00:10	0.17
	500ml	44.93±10	00:00:03	0.25
100	5ml	101.33±20	00:05:14	0.43
	100ml	102.27±20	00:00:16	0.27
	500ml	107.2±20	00:00:06	0.50
160	5ml	161.20±30	00:08:38	0.70
	100ml	162.27±30	00:00:24	0.40
	500ml	163.8±30	00:00:07	0.58

Conditions to test the above data:

1) FLUKE IDA4PLUS Tester
2) IV set brand：Dragon Heart

Notice:

●The default value of standard occlusion pressure value is 100KPA.

● Standard Occlusion pressure range is from 40KPA to 160KPA.

8.3 Infusion Accuracy Figure

The infusion accuracy Figure shows the feature after starting injection and the change of the infusion after the pump runs at the normal rate.

Notice:

● Infusion accuracy does not reflect the clinical criteria such as the patient's age, weight, and the use of drugs.

● Infusion accuracy may be influenced by the environment where the device is used (pressure, temperature, humidity, infusion components, infusion pipe, etc.).

① **Start-up Curve**

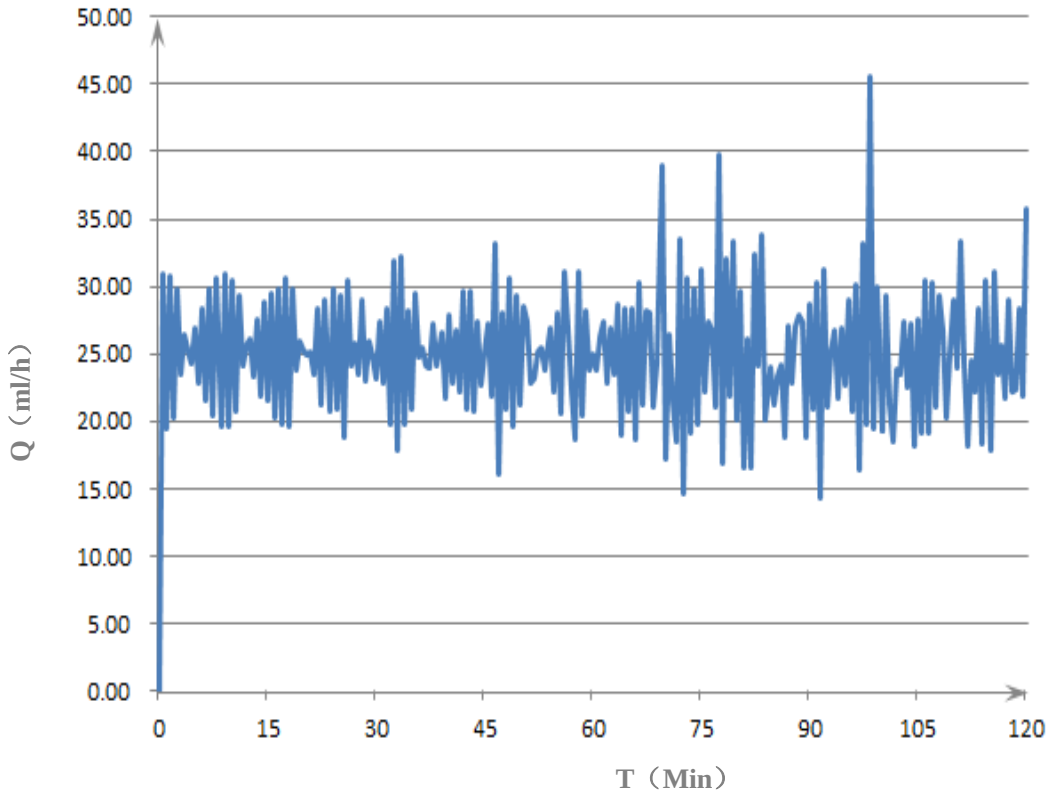
It is made according to the data tested in 2 hours.

Sampling Rate: 25ml/h

Sampling Interval: ∆ t=0.5 minutes

Test Period: T=120 minutes

Flow Rate: Q（m/h）



② **Horn-shaped Curve**

The flow rate error in a short-term infusion（p△ t）

Sampling rate: 25ml/h

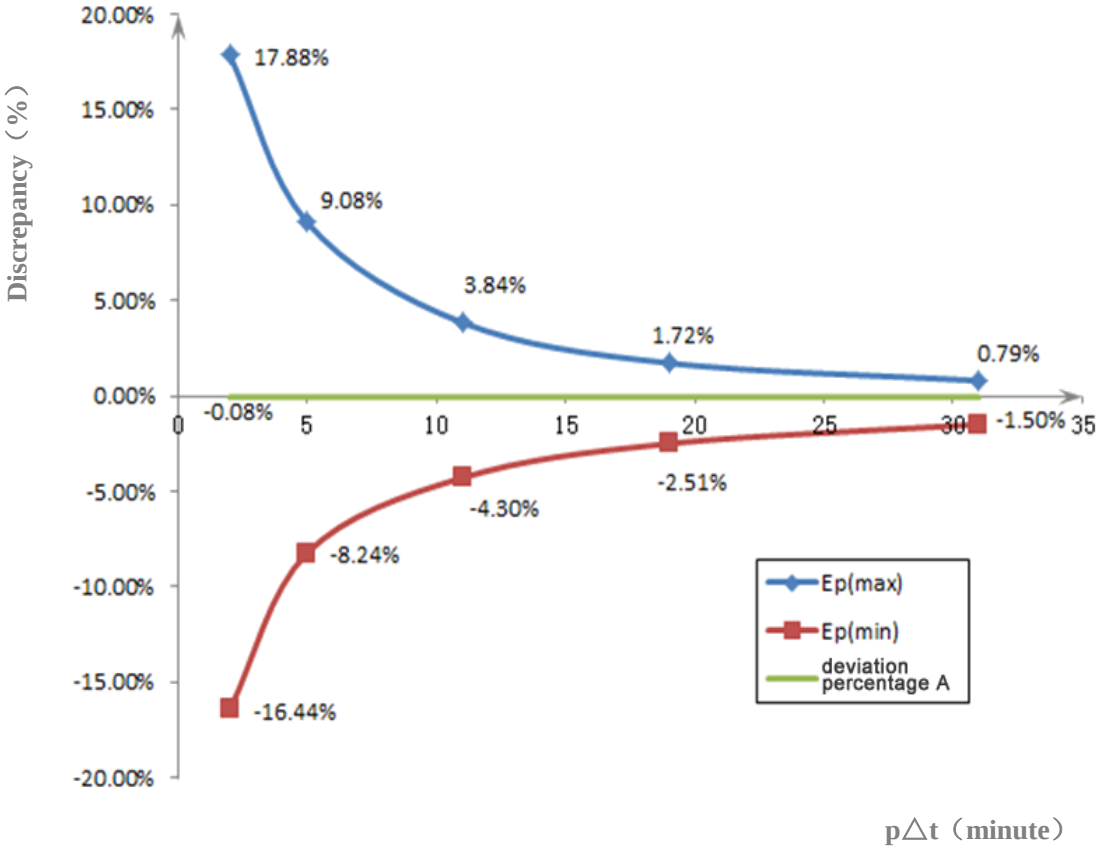
Sampling interval: △ t=0.5 minutes

Observation window duration: p△ t =2, 5, 11, 19, 31 minutes

The maximum measurement error within the stipulated duration: EPmax（%）

The minimum measurement error within the stipulated duration: EPmin（%）

The average percentage of the measured overall flow rate error: A（%）



Chapter 9 Recommended Infusion Accessories

The brand of “Dragon Heart” was used for infusion pump testing and parameters setting. If infusion pipe of other brands with the national standard is needed, please reset the parameters and adjust the accuracy as per this instruction manual.

The connection may be slack if pipes equipped with the sliding connector.

The infusion accuracy may be influenced by the solution viscosity and specific gravity liquor.

Chapter 10 Maintenance Services

The warranty period is 1 year from the purchase date. We can offer free repair service within the warranty period on condition that the product is operated properly. The following situations are not in 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.

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

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FAX: +86 755 22271900