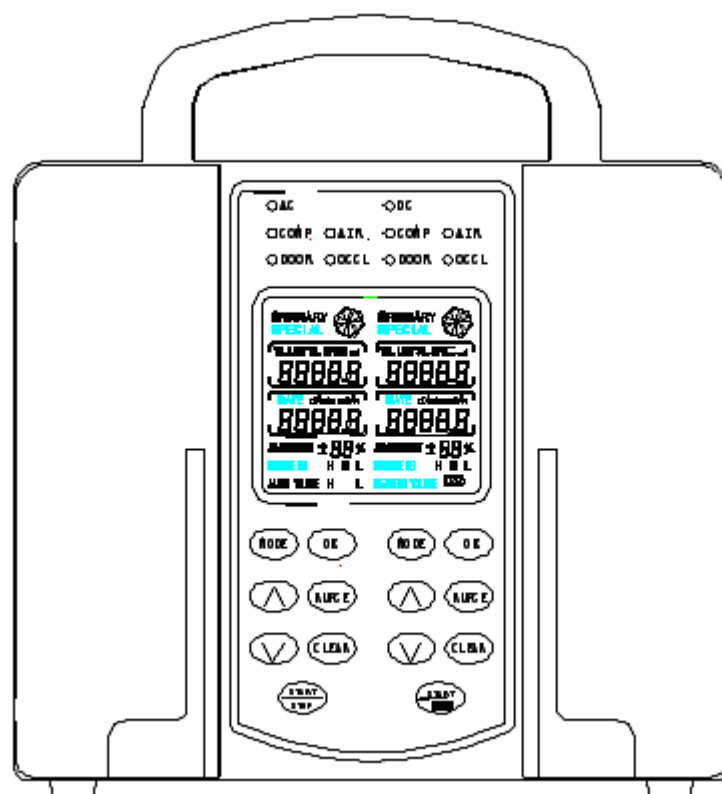


WH-DIP1200 Intelligent Infusion Pump



Instruction manual

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WH-DIP1200 Intelligent Infusion Pump Instruction for Use

1、Introduction

WH-DIP1200 intelligent infusion pump is our company development and production of the second-generation product that has been used a liquid crystal . It is an intelligent infusion pump automatically, which has been adopted the computer implementation the comprehensive control with linear peristaltic pump as the power source. It has been supplied by the implementation of multi-sensor monitoring with a variety of alarm functions, which can meet a variety of situations transfusion requirements. You can transfuse one solution or two kinds of solutions or for two patients, and its operation is more convenient and flexible. It is applicable to the infusion occasions of all kinds of departments and operating theaters of the hospitals, especially, it is the one of the necessary devices in ICU and CCU.

1.1Function

1.1.1 Auto-transfusion

According to the written by the doctor, nurses will set the infusion volume and infusion speed. The linear peristaltic pump controls the running by the micro-computer, and the machine automatically transinfuses according to the setting infusion speed.

1.1.2 KVO Status

After the total infusion is completed, it will be transferred into KVO status automatically (keep vein open state).

1.1.3 Sound and light alarm

This machine has five kinds of alarms, including (block) (bubble) (open) (finish) (under-voltage), etc.. When infusion fails, it will use the alarm of the sound and light mode to remind the health care workers in time

1.1.4 The application of various solutions

It can be used for the colorless and transparent solution, but also for the high nutrition with color and opaque solution. It does not recommend to use for the plasma and so on.

1.1.5 The application for infusion (transfusion) pump

Ordinary infusion:

When the ordinary infusion with PVC burette-type transparent or light-protected (diameter is about 3.5mm) is used, the infusion tube and wall need a certain elastic factor. Please use the infusion to meet with GB 8368-2005 standard. Before the new batch infusion is used, please calibrate the precision of the infusion.

Note: Other specifications of the infusion may not keep the precision (Even if the precision is calibrated)

Special infusion:

The special infusion is used the high elasticity silicone tube, and the user need to contact our factory purchasing.

Warning: When the non-recommended infusion is used, the precision of this device couldn't be kept while running.

1.1.6 Both AC and DC use

When the power stops suddenly, the device can work properly based on the built-in rechargeable nickel-metal hydride batteries. This device can switch each other automatically. When the battery runs low, it will be recharged automatically. When recharged is ok, it will stop automatically. This time, [the battery] lamp is off. In the re-charged process, (approximately 7 hours), please do not turn-off power supply to ensure adequate power in one time, or the battery will be reduced the use life due to the memory effect. In battery-powered conditions, the device will alarm due to under-voltage. At this time, the lamp of the charger display will flash to remind the medical and nursing staff processing it promptly.

1.1.7 Puge Mode

Press the Puge button into the Puge status, then into the fast flow status. The remove solution is not included in the amount of the accumulated solution; Release the button, then the quick remove is over soon.

1.1.8 Infusion speed

With two kinds of setting methods [drops/min] and [ml/h] respectively, the user can choose freely.

Note: [drops/min] and [ml/h] is converted based on 20 drops/ml, which has the difference with the actual drop of the pot.

1.1.9 Call Interface

The call interface has been reserved, which is used for the selected nursing centralized monitoring function of the hospitals.

1.2 Technical parameters:

1.2.1 Infusion flow speed:

Special infusion: 0.1ml/h-1200ml/h

Ordinary infusion: 0.1ml/h-600ml/h

Note: 0.1-30ml/h (each grade 0.1ml / h);
30ml/h or more (each level 1ml)

1.2.2 Infusion precision error

Special infusion: $\pm 5\%$ (Middle speed, 23°C, humidity 60%)

Ordinary infusion: $\pm 10\%$ (Middle speed, 23°C, humidity 60%)

1.2.3 Infusion amount preset 0.1-9999ml

Note: 0.1-30ml / h intervals (each level 0.1ml);
30ml or more (each level 1ml)

1.2.4 Block sensitivity: the block pressure is set the three grades: high, middle and low, adjustable.

Note: When the infusion tube is got the pressure, it does not alarm at once, which just checks the tube wall pressure, so the alarm time has something to do with the position of the oppressed tube. The following is the trigger time of the visible and audible alarm in the sensitivity (The smaller value is measured in the pump outlet by human blocked, and the larger value is measured from 1 meter of the pressure sensor by human blocked)

Low speed (1ml / h): 250 ~ 500 second

Middle speed (120ml / h): 7 ~ 14 second

High speed (600ml / h): 0.2 ~ 1 second

The above data is measured under the conditions of 25℃ room temperature, using the ordinary PVC (φ 3) infusion and the high sensitivity.

1.2.5 KVO: 1-3ml/h

1.2.6 Power Voltage: AC: 90V~270V 50Hz~60Hz

DC: 12 V(built-in batteries)

Fuse: F0.75AL (each inside and outside)

1.2.7 Power: 25VA

1.2.8 Built-in battery working time:

When the battery is fully charged, under the middle speed condition, it can continuously work for about 2 hours after power off. The relationship between running time and speed is not less than 2 hours within the normal life of the battery. Battery charge and discharge times are about 400.

1.2.9 Working Environment:



Temperature: +5℃--+40℃

Relative Humidity: 20%-90%

1.2.10 Dimensions (mm) and Weight: 185×115×196(mm) 3.8Kg

1.2.11 Save parameters: It can automatically save the setting value about 100 years, when the system is power off (infusion volume and infusion speed do not save).

1.2.12 Safe Classification:

















a): I type BF type, ordinary equipment, operation continuously. It can't be worked in the circumstances of anesthesia flammable gas and air mixture, or oxygen or nitrous oxide gas mixture  is representative the BF-type equipment.  means:

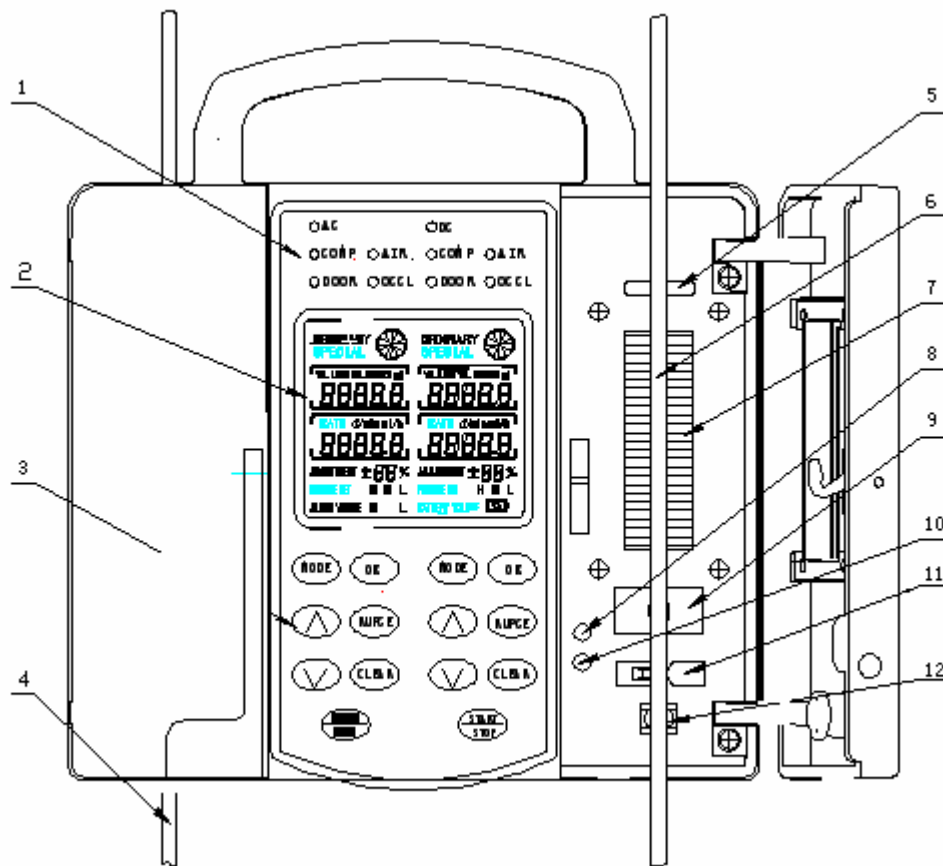
Note! Reviewing

the random file.

b): This device complies with IEC60601-1-2 requirements, which can resist a certain degree of the electromagnetic interference. This device doesn't produce the battery interfere to other equipment. But please keep away from strong electromagnetic devices, such as electrosurgical generator, MRT nuclear magnetic resonance.

2. Device Specification of the Panel

Power alarm display area	 AC	When it uses the AC working, the lamp is on.
	 DC	When it uses the built-in battery, this lamp is on; When is under-voltage, the lamp is flashing.
	 COMP	When infusion is completed, the lamp is on and alarming.
	 DOOR	When the pump door is open, the lamp is on. When pump is working, the opened door alarms.
	 AIR	When tube is not on the position or detected bubbles, this lamp is on and alarming.
	 OCCL	When infusion tube is blocked poor, this lamp is on and alarming.
LCD display		Lock, which is locked for setting infusion parameters (reserved)
	Ordinary infusion Special infusion	Display the type of infusion
		Infusion monitor, infusion displays the solution flow status.
	Vol.Limit	Display the presetted infusion amount.
	Vol.infused	Display the finished infusion amount in the fusion.
	Flow speed ●/min ml/h	Display the setting speed and unit, drops/min and ml/hour conversion.
	Adjustment $\pm 50\%$	Display the adjustment value of precision, adjustment range $\pm 50\%$.
		Charged display, which displays the battery charge status.
	Alarm Volume H.L	Alarm volume setting two grades, high and low respectively.
	Pressure set H.M.L	The Block pressure is set by three grades, high, meddle and low respectively.
Operation Press buttons		Press this button to select the function item.
		Press this button to change the mode function. While running, press this button to check the preset solution volume and the infused volume; The increasing button after the function is determined.
		Press this button to change the mode function. While running, press this button to check the transfer of the flow speed; The decreasing button after the function is determined.
		Pressing this button confirms to the selected specific functional items;
		Press this button, when it is in stop status, it is quick remove the solution, and when it is in running status, it is quick infusion.
		When pump is stopped, please press this button, and the accumulated infusion amount is changed into zero.
		Start and stop are the same button. When starting, the infusion is displayed the rotation.



WH-DIP1200 intelligent infusion pump (Double ways)

Every part of name of the infusion pump:

1. Power, alarm display area
2. LCD display area
3. Operation button
4. Infusion pump (1)
5. The keeping shelf of the infusion tube
6. Infusion pump (2)
7. Peristaltic pump
8. Pinch for the solution and the close pole
9. Bubble detector
10. Pinch for the solution and the open pole
11. Pinch for the solution seat
12. Block the transducer

3. Operation method:

3.1 Fixed infusion pump

The fixed pinch, which is in the infusion pump behind, is fixed in the appropriate height of the infusion shelf and screwed the handle tightly. Please note the stability of the pole to prevent the fall when using.

3.2 Start power

The cable with the machine randomly is inserted into the outlet behind, and the another cable end is received to the 110V socket, then the switch machine in the behind is started, so all lamps and LCD in the panel will be displayed for one second to do the test-self, then stop in the waiting status (see Fig. 1), at this moment, the lamp is on [DC]. When it is used battery as the power, the lamp is on [Battery].

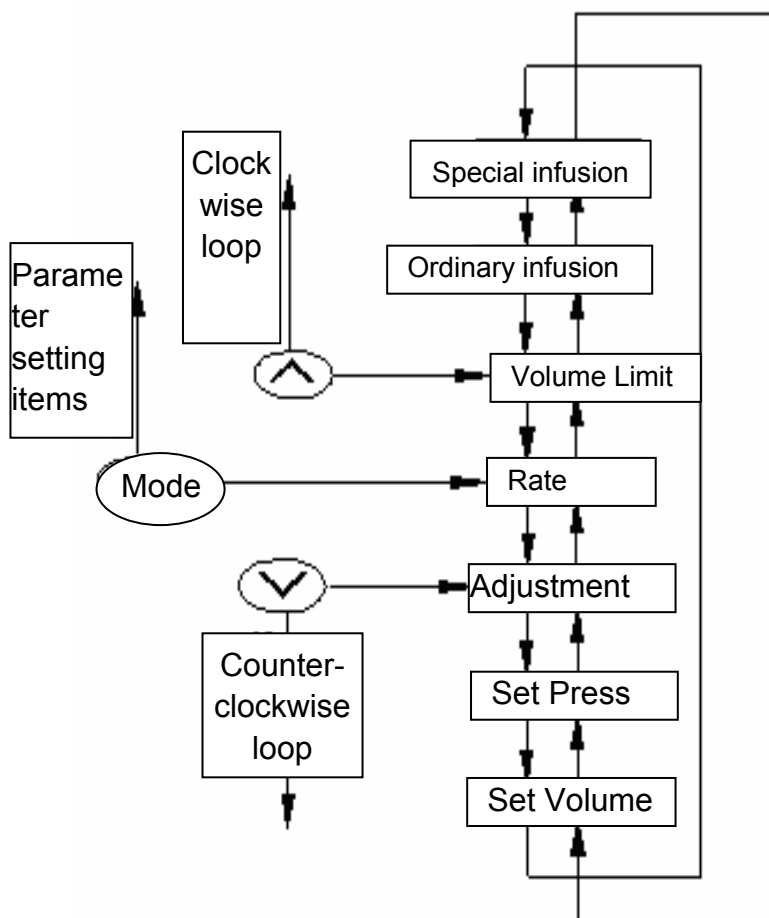


Fig.2



3.3 Installation the infusion pump:

3.3.1 Open the pump door

Open the pump door: when the door handle is got to the appropriate height upwards, the pump door is opened automatically, at this moment, [open the door] the lamp is on [the bubble].

3.3.2 Setting the infusion pump type:

According to the function chosed the drawing (See Figure 2) [ordinary infusion pump] or [special infusion pump]

a. According to the used infusion pump types, press the **MODE** button, when the "flow speed" lamp is flashing, it has already suggested the mode set.

b. Press **▲** button or **▼** to select the the type of infusion, then press **OK** button, and automatically enter the next menu or press **MODE** button into the waiting status.

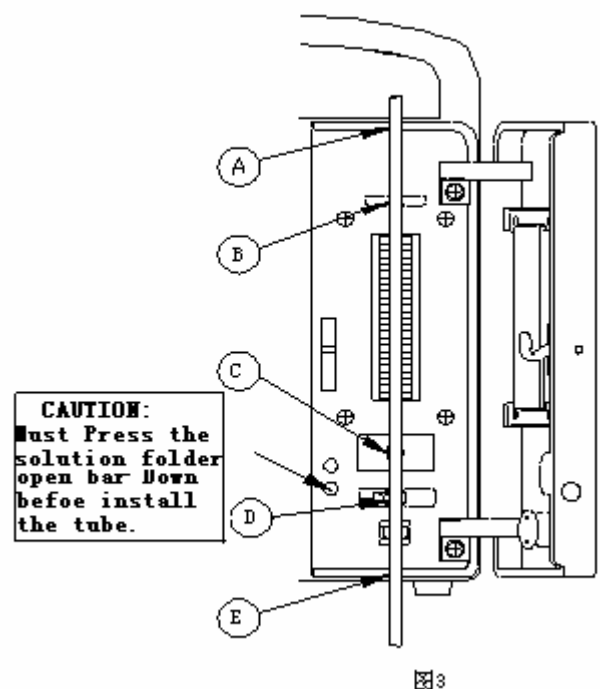
Note: If the set type is inconsistent with the selected infusion pump, the infusion precision would be error.

3.3.3 Open the solution pinch:

Press the solution pinch to the open pole strongly, and press to finally, the solution pinch is in the open status. While closing the door, solution pinch is reseted automatically. Don't press the solution pinch to the close pole.

The installation of special infusion pump:

The infusion solution buttle on the bracket, press the button then inject the solution into the infusion pump according to the proper operation mode. Close the original infusion flow regulator, the silicone tube parts of this infusion pump vertical are taken into the port A, B, C, D, E (see Figure 3) in order. Note: The pump inside are all silicone tube, and the two joints of the top to buttom have to be remained in the infusion pump panel outside. The pump door is closed tightly and the handle will be





reseted. At this point, [open] and [Bubble] lamps are off. Then all flow speed regulator on the infusion are opened.





In order to prevent the air enter the body of patient, please make sure the quick remove mode before infusion to empty bubble in the tube. If there are bubbles in the infusion, the bubbles will be tapped by the fingers method to the drop pot.


Installation of ordinary infusion: the method is the same as the special infusion.

3.4 Set the infusion flow speed:

According to the function to select the drawing (See Figure 2), select [flow speed].

a Press  button, the flow speed lamp is flashing, press  . At this time, the digit in the flow speed column is flashing, it will suggest set up the flow speed of the infusion.



b Press  button and  button to set up the solution flow speed until the shown values are required the solution of the flow speed. Press the  button to confirm and it will be returned last manual automatically or press  button to enter into the waiting status.

c. When Infusion, press the  button, which could be transferred [drops/min] each other.

Notice:  and  buttons, each press at one time:

Increase (decrement) 0.1ml/h (0.1-30ml /h)

Increase (decrement) 1ml/h (30-1200ml/h)


 and  press button continuously:




Pressing button is for the increase or decrement. The longer the button is pressed, the faster the increase (decrement) is, which can be used to press continuously, so that the increase (decrement) running is in the ideal speed. It will be convenient to control the infusion value of the flow speed.




3.5 Set infusion

Select by function diagram (see Figure 2) Select [infusion].


According to the function to select the drawing (See Figure 2), select [infusion amount].

a. Press  button, when the [flow speed] is flashing, it will suggest you set the infusion amount.

b. Press  or  button to select the [infusion amount]. When the [infusion amount] is flashing, press  button to confirm. At this time, the digit in the infusion amount column is flashing, it will suggest set up the infusion amount.

c. Press  or  to set the infusion amount until the shown values are required the infusion amount. Press  button to confirm, and return to the last menu

automatically or press  button into the waiting status.

d While infusing, press  button to switch to the set status between the infusion amount with accumulated amount.




Notice: 1:  and  buttons, each press at one time:


Increase (decrement) 0.1ml/h (0.1-30ml /h)

Increase (decrement) 1ml/h (30-1200ml/h)


Pressing button is for the increase or decrement. The longer the button is pressed, the faster the increase (decrement) is, which can be used to press continuously, so that the increase (decrement) running is in the ideal speed. It will be convenient to control the value of the infusion amount.

3.6 Puge:

While in stop status, press  button is made the solution to be filled in the infusion pump quickly or the solution or air bubbles in the infusion pump to be removed outside or clean the infusion pump, and at this time, the removed amount will not be calculated. While in running status, pressing  button is rapid infusion in a short-term, and at this time, the infusion amount will be calculated. Release  button, the flow speed of the pump is still followed the original speed.

While quick removing, the actual speed is about 600ml/h. Do not use the quick remove button in the infusion. While using, at first, press  button then press the quick remove button so that it can be quick remove.

3.7 Start:

Press  button, start the pump, the infusion monitor will rotate to begin infusion.

Note: (1) Don't start if there is no the set infusion flow speed and infusion amount or alarm existed.


(2) The quick or slow of the infusion monitor rotation has nothing to do with the flow speed.

3.8 Stop:

Stop Automatically

When the output liquid capacity is equal to the set capacity, the infusion pump stops automatically, and starts KVO mode (to keep vein opening). In the transfusion process, it can also pause by manual.


Manual stop:

Press  button, the infusion monitor will stop rotating, and the alarm is eliminated, stop infusion.


Alarm stop:

After the alarm occurred, the machine will stop automatically, at this time, KVO has no function. Please remove the alarm failure in time.


3.9 Clear

While in stop status, press  button, the accumulated amount will be zeroed.


This counter of the infusion pump has the automatic accumulating function, which can be used this to infusion the different kinds solutions for the patients in order and the counter will display the total amount of the patient. For example: the patients is infused into the solution A at the first time, and the presetting amount is 100ml; Starting the pump, when it reaches to 100ml, the [finish] lamp is on and alarming, so that the infusion of the solution A is over when its accumluating amount reaches to 100ml. The patients is infused into the solution B at the second time, and the presetting amount is 200ml; Starting the pump, when it reaches to 300ml, the [finish] lamp is on and alarming, so that the infusion of the solution B is over when its accumluating amount reaches to 200ml. At this time, the patient is infused into 300ml totally (A:100ml, B:200ml).

If you do not make use of the auto-accumulated function, after the infusion is finished in every time, and it is in the stop status, press  button to clear the accumulated amount, which is right displayed zero.

3.10 Alarm handle

While the alarm is on, please observe the tips on the alarm lamp, and then press the  button, at this time the alarm lamp is off and the alarming sound stops, then, do as the tips of the alarm lamp.

Notice: Under alarming condttion, it can't enter into KVO mode.

a Air Alarm: Open the pump door and take away the infusion, the bubbles will be flipped by the fingers back into the drip pot, re-installed the infusion well, and closed the door, press  button to start infusion continuously.

b. Block alarm: Check the infusion pump is bent or not, the needle or filter is blocked or not, the needle slips out of the blood vein or not, the valve of the infusion pump is opened or not, and the installation of the infusion pump in the clip location is ok or not and so on. When block occurs, as the infusion tube has the flexibility and it will delay the output <3ml liquid to start alarm and stop, (at 25°C, using the ordinary PVC (φ 3) infusion is blocked away from the sensor 1 meter, when the sensitivity is set the high).

c Power failure alarm:

1: When the power is off or failure unexpectedly, it will trigger an audible alarm signal, which will be transferred into the battery mode, at the same time, it will accompany the intermittent buzzer to alarm in each 3 minutes.




2: Before the battery exhausts to cause the infusion stop, the audible and visual alarm is for 35min. During this period, the device will produce the visual alarm successively and the audible alarm intermittently.




3: Before the battery exhausts 3min, the device will issue the the audible and the visual alarm and stop the infusion. At this time, the infusion pump is locked and can't be re-started.

3.11 The precision adjustment of the ordinary infusion



The different manufacturers' infusions pumps have the different specifications, so that the precision of the infusion is inconsistent. After buying the lot ordinary infusions, they should be tested the precision by the measuring cup. (Note: The scale of the measuring cup has to be accurate). If the precision is not good, you can adjust it by yourself.

Select by function figure, (see Figure 2) Select [precision adjustment].

a .Press  button, after the [flow speed] is flashing, repeatedly press  button, to select [precision adjustment]. When [precision adjustment] is flashing, press the  button.

b. Press  and  buttons, they can be adjusted the precision error within $\pm 50\%$. Positive is the infusion amount increased (ie, flow speed up); and otherwise decreased. Until the precision error of the infusion pump is adjusted to $\pm 10\%$. Press  button to confirm and return to the last menu. After adjusted, these infusion pumps do not be adjusted. Note: The new purchasing other lot, they need to be re-adjusted to ensure the precision in accurate condition (The special infusion pump needn't be adjusted, as the factory has adjusted well before delivery)

4. Description and Notice

4.1 When [OCCL], [DOOR], [DC], [Air] alarming, press the  button to eliminate the alarming, after the trouble is settled, press the  button, the pump is running continuously. While [Finish] alarming, the pump will transfer into KVO status immediately.

4.2 Under PUGE status, the alarm system is ineffective.

4.3 The elasticity of the ordinary infusion is poor, after it is infused for 2 hours it will stop. The tube will be deformed to affect the precision. Please move a small segment position up or down to continuous use it in order to ensure the patient safety. When necessary, it will be changed into the special infusion. After the ordinary infusion is used for 2 hours, it will stop due to the tube deformed. In order to maintain the precision, open the pump door and reinstall the position between infusion with peristaltic pump.

4.4 Please keep the working environment and no fault for the pump itself. If pump is failure, please repair it and then use it to ensure the patient safety. The temperature, humidity and atmospheric pressure beyond the working environment of the infusion, do not use the pump, otherwise the precision will not be able to be maintained. The infusion pump is designed for transport the normal saline. Don't recommended to transport the viscous liquids such as plasma, Nutrition as well as.

4.5 In order to ensure the electricity safety, please do use the power jack with three-wire phase. The outside cover is connected the ground without electricity to ensure the personal safety.

5. Notice

5.1 Proper use the placed silicone tube

Using a special infusion pump, the silicone tube part of the disposable infusion pump

has to be put into the bubble detector, which is pulled up and down so that the infusion tube is placed in the bubble detector well. At this time [Bubble] lamp is off.

5.2 Protection the block sensor:

The block sensor can't be touch by hand or device to avoid damage.

5.3 Clean the solution in time to keep the infusion pump well

The infusion pump should be regularly clean to keep the infusion pump well, so that the solution solidifies to affect the elasticity to open the door and so on, as well as the solution will corrode the infusion pump. When it is not used, its out cover should be clean well and put in a dry shelf. If the bubble sensor is polluted, it may be cleaned with alcohol.

5.4 Do not self-disassembly:

In the use processing, if the infusion pump can't work in order or other issues, please contact with the manufacturers in time. Do not self-disassembly. Our company will assign the qualified technical personnel to provide the standard listed 6.8.3C documents.

5.5 Use the specified special infusion:

When the infusion precision demands high or the environmental temperature is under 10℃, please use the special infusion pump, and the disposable special infusion have to be specified by this infusion pump.

5.6 Battery repair and maintenance

Nickel hydride batteries in the infusion pump can be recharged and discharge more than 400 times. Once the batteries are failure, please contact with the manufacturer for replacement. The failure batteries have to be handed in the locations which are approved by the environmental protection department or sent back our company to do the disposition centrally, in order to prevent the environment pollution.

Note: After the battery is used finally, it will be recharged with AC!

5.7 Non-mobile device

While using, please fix on the pole to avoid vibration, as the vibration will bring the air bubbles into the tube.

5.8 The detection for the bubble and block sensitivity and sensor

Bubble sensor: When the 3mm long bubbles are set in the tube by the person, start the alarm is normal.

Pressure sensor: When infusing period, the infusion is suppressed by the person, it can alarm in 10 seconds, so it is normal.

Infusion Type	Bubble Sensitivity		Block Sensitivity 300ml/h
Special Infusion Block Alarm Value	<30	Low	0.03-0.06Mpa
		Middle	0.05-0.08Mpa
		High	0.07-0.12Mpa
Ordinary Infusion Block Alarm Value	>800	Low	0.06-0.09Mpa
		Middle	0.08-0.12Mpa
		High	0.11-0.16Mpa

Note:

1) When the block pressure meets with the above-mentioned table, it will be sound and light alarm immediately. In actual use, as the infusion will has the flexibility, the block up to the threshold time and has something to do with the block location.

2) After the block alarm, please make sure the block reason. When the block reason is excluded (such as forgetting to open the infusion speed wheel) as there is the internal pressure, if open the infusion speed wheel directly, it may cause a large number of infusion to access into the body quickly, please take care.

3) After the block alarm, the pump door is recommended to open and press down the pinch for the solution of the infusion pump. After the block reason is excluded, and close the door to continue infusion.

5.8 Infusion precision adjustment

The infusion precision has something to do with the installation location, environment temperature, infusion tube elasticity, infusion tube used the time, liquid concentration and so on. The precision of the tube needs to be calibrated regularly, and press **MODE** button repeatedly until the precision is flashing, then press the **OK** button, at last, press button to adjust the precision.

Formula:

$$\frac{\text{Set infusion} - \text{Actual infusion}}{\text{Actual infusion}} \times 100\% = \text{Adjustment value (\%)}$$

Note: The above is the theoretical value. After adjusting, the precision needs to be re-calibrated for several times until the transfusion error is within $\pm 5\%$.

5.9 Discard materials as useless and device service life

Please do not re-use the infusion, it can affect the infusion precision itself. The safe use of this product is five years, if it is more than the safe period, the electronic components will be aging and mechanical parts worn, may cause fluid instability, it is recommended to stop using the equipment, some electronic components contain contaminative materials to the environment. After the device is discarded as useless, do not throw away randomly.

6. Other requirements:

Transport and storage:

Temperature: $-40^{\circ}\text{C} - 70^{\circ}\text{C}$

Relative Humidity: 10%-100%

Atmospheric pressure range: 500hpa-106000hpa

Power requirements: The electricity jack has to match with the wire plug of the infusion pump, and have the protective grounding wire.

7. Packaging and Accessories

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