PETite

VETERINARY INFUSION PUMP

IPR210

USER MANUAL

IPR
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PREFACE

1. The Overview of the User Manual

This manual is for the sole use of the PETite™ (IPR210) veterinary infusion pump, in affiliation to Infusion Pump Repair Corp.

This User Manual describes the product's extensive configurations, accessories, and functions that may not occur in the User's device. For more detailed information, please contact Infusion Pump Repair Corp.

2. The Operator of the User Manual

This manual is intended for professionally trained veterinary nurses/doctors, veterinary anesthesiologists, and certified veterinary equipment technicians.

3. Instructions for the User Manual

This User Manual covers the basic information on the safety and effectiveness of the product for guiding the operator to install correctly, test, operate, use, and maintain the product. Please read this manual thoroughly before using and utilizing the product perfectly. We encourage users to keep the User Manual for future use.

IPR will take responsibility for the reliability and performance of the equipment if all the following conditions are met:

● The equipment is used according to this User Manual.

●The equipment has only been disassembled, assembled, replaced, tested, improved, and repaired by the professional technicians of our company.

● IPR provides all components and accessories as well as consumables for repairing.

● All relevant electric devices meet the international standard IEC/EN 60601-1 and this Manual.

4. Terminology

【】 means mechanical button

『』 means touch button

( ) further information

- means inapplicable

√ means accordant

→ means operation steps

Bolus: Infuse large volumes of liquid in a short time.

KVO: Keep Vein Open, provides a constant flow to prevent blood/needle blockage.

Anti-bolus: Motor automatically reverts when the IV line has high pressure.

DPS: Dynamic Pressure Show, used to indicate real-time detection and notification of any blocking pressure.

Warning /Attention/Caution: There is a possibility of physical injury, death, or property loss if the concerns/cautions in the Warning section occur.

Note: By failing to follow the supplementary or prompt information on the operation instructions, the User may cause damage to the equipment, which may lead to error or property loss.

Accessories: There are optional components necessary and (or) suitable for use with this infusion pump. Accessories help achieve the expected purpose, provide convenience for attaining the desired purpose, improve the expected purpose, and (or) increase the additional functions of the equipment.

5. Copyright

This User Manual will be revised and subject to product improvement, law updating, or instructions improving based on the preconditions of meeting-related laws and regulations, and all modified records will be stated in the new version.

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Chapter 1 - Safety Instructions

1.1 Warnings

- Before using, please check the equipment, connecting wire, and accessories to ensure that it can work essentially and safely. If anything is abnormal, immediately stop working and contact our customer service department. Additionally, the adhesion or intrusion of fluid/drug may cause the equipment to fault and malfunction. Therefore, we suggest cleaning the equipment after use and storing it correctly.
- This equipment must be operated by trained professional or medical-care personnel.
- This equipment is not applicable for blood transfusion.
- To avoid any fire or explosion, do not put and use the equipment in the environment with both anesthetic and other flammable/explosive articles.
- Do not store or use the equipment in the environment with any active chemical gas (including gas for disinfecting) and moist environments. Unideal environments may influence the infusion pump's inside components and cause a performance drop or damage to the inside parts.
- The operator shall guarantee that the set infusion parameters of this equipment are the same as the medical advice before starting the infusion.
- Please correctly install the infusion IV set according to the infusion indication direction of this equipment. Ensure that the IV set is smoothly and straightly cross the mechanism of the device. Otherwise, it may harm the patient or fail to reach the expected performance.
- Please do not only depend on the information prompt during use. Please periodically check the device to avoid accidents.
- We suggest that devices be fixed on an infusion stand to ensure the stability of the infusion device. We also advise users to be careful when moving the infusion stand to avoid the equipment from dropping or falling and damaging the surrounding objects.
- If the IV line is twisted, the filter or needle is obstructed, or blood in the needle is obstructing the infusion, then the pressure of the IV line will rise. During occlusion adjustments, pressure may cause a "bolus injection" (temporary excess of infusion) to the patient. The correct method to resolve an occlusion is to tightly hold or clamp the IV line near the puncturing position, then open the device door to drop the pressure in the infusion line. Once loosened, the infusion tube will determine the reason for the occlusion and begin infusing. If the infusion is restarted as the occlusion error exists, it may cause occlusion alarm persistently, and the pressure in the infusion tube may keep rising. An increase in line pressure may also break or cut off the infusion tube and (or) hurt the animal.
- This equipment injects fluids/drugs by squeezing the IV line and cannot detect any leakage if the infusion line is cut off or broken. Therefore, please periodically check the device and the IV line to avoid any fault during the working period.

- During infusion, please periodically check the dripping state of the fluid and the fluid/drug in the IV set. Periodically checking helps to ensure the infusion is working. This equipment doesn't precisely measure the quantity of infusion fluid; therefore, it can't detect any missing intake under extreme conditions.
- This equipment has the occlusion detection function for detecting and alarming when the infusion needle deviates from the position in the vein or if the needle is not correctly inserted in the vein. However, the pump will only alarms when the occlusion pressure has reached a particular numerical value. The cannula site may become reddish, swell, or bleed. Additionally, in the chance, the device doesn't alarm for an extended period if the actual occlusion pressure is lower than the alarm threshold value, 6*. Therefore, please periodically check the cannula position. If there's any abnormal phenomenon, please take suitable measures to resolve the abnormality.
- Only use IV sets, lines, infusion needles, and other medical components that meet the local laws and regulations and the requirements covered in this User Manual. We highly suggest utilizing the IV sets programmed with the equipment. We can't ensure the infusion accuracy if an unsuitable IV set is used.
- Do not disassemble or refit this equipment or use it for other purposes except standard infusion.
- No one is allowed to repair this equipment except our company or an authorized repair technician of our company.
- Maintenance or replacement of spare parts is prohibited during the clinical use of the equipment.
- This equipment must only be connected to A.C. with ground protection to avoid the risk of electric shock.

1.2 Cautions

- Before its first use after purchase, or if this equipment is not used for an extended period, please charge the equipment with the A.C. power supply. If the device is not fully charged and is experiencing power failure, the equipment can't fully function with just the built-in battery power supply.
- This equipment cannot be used in rooms with radiological installation, magnetic resonance equipment, and high-pressure oxygen therapy.
- Do not position this Medical Electrical Equipment to make it inaccessible for disconnection of the device.
- The DC power supply is only suitable for applications requiring a backup power supply. Only use the D.C. power supply line provided.
- Other devices near this equipment must meet corresponding EMC requirements. Otherwise, it may influence the performance of this equipment.
- Under general conditions, please use A.C.'s power supply as much as possible since it can prolong the battery's service life to a certain degree. When using an A.C. power supply, ensure that the grounding wire is relatively close to the ground, and only the A.C. power wire attached with this equipment is used. The built-in battery can only be used as the assistant of the power supply when the A.C. power supply can't reliably be connected and is under abnormal conditions (i.e., power failure or moving infusions).
- Please keep the power socket and plug dry before connecting this equipment with the power supply. We also recommend that the power voltage and frequency meet the requirements listed in the equipment label and this User Manual.
- This device is equipped with an audible and visual alarm system. When the device turns on, the red and yellow alarm indicators will light up to show that the alarm system is usually working, and the speaker makes the "beep" sounds.
- Please keep the device away from the A.C. power socket. We recommend a certain distance to avoid fluid/drug splashing or dropping in the outlet as it may short circuit and (or) cause electrical damage.
- Please use the fluid/drug at or near room temperature; when the fluid/drug is used at low temperature, the air dissolved in the fluid/drug may cause more air bubbles and more frequent air bubble alarms.
- Do not press or operate the device's buttons with a sharp object (pencil tip and nail. Sharp objects may cause early damages to the switch and (or) the surface film of the device.
- Please do not use the infusion IV set for more than 8 hours at the same pumping position. This action may lead to the distortion of the IV line after using the line for an extended period and create a flow rate error. We highly suggest adjusting the IV line's position or directly replacing the IV line every 8 hours.
- Please close the IV clamp of the infusion IV set before taking out the line. This action will help users to avoid liquid leakage.
- Under the condition of a low flow rate infusion, please pay special attention to occlusion. The lower the infusion flow rate, the longer the time of detecting occlusion, which may cause a longer infusion process.

- If the equipment is damaged from a drop or impact, please immediately stop using it, and contact our customer service department. The damage may cause the inside components to be damaged even when the appearance is not damaged.
- We recommend using the accessories specified in this manual to ensure patient safety.

1.3 Dialogue Window

Dialogue window displays options, including operation selections, operation confirmations, and further information. For instance：

Figure1.3-1 Operation selection information

Figure 1.3-2 Parameter error reminder

1.4 Symbols

Not all the below symbols may exist in the product.

Table 1.4-1

Marks	Description	Marks	Description
LOT	Batch code		Protective earth (ground)
SN	Serial number	**IP44**	Dustproof and water-resistant Prevent the pouring of solid objects larger than 1.0 mm in diameter and the intrusion of splashing water in all directions
	Caution		Both direct and alternating current
	Defibrillation-proof type C.F. applied Part		Battery
	Date of Manufacture		Handle with care
20	Environment-friendly use period (20 a)		Manufacturer
	Input / output		Non-ionizing electro-magnetic radiation
	Unlock		Direct current
	Lock		This side up
	Keep dry		Fragile items
	Please refer to the instruction manual/manual	8	Stacking level limit
-20℃ 60℃	Transportation package's temperature limit range is-20～60℃	10% 95%	The limited humidity range of transportation packages is 10%～95%
50kPa 106kPa	The environmental pressure of transportation package is limited to 50～106kPa		

Chapter 2 – Overview

2.1 Application Scope

The infusion pump is used together with an IV set to control the dose of liquid infused into the patient's body, i.e., IV infusion.

2.2 Operating Conditions

Animal Hospital, Pet clinic.

2.3 Intended Patients

Animals.

2.4 Specifications

This equipment is not applicable to blood transfusion.

Remarks: ● means standard; ○ means optional.		
Function /Model		PRIP-E500V Vet
Infusion Mode	ml/h Mode	●
	Bodyweight mode	●
	Drip mode	○
	Drug library mode	○
	Micro Mode	○
	Sequence Mode	○
Occlusion alarm level		5 Levels (adjustable)： Level 1：50mmHg Level 2：150mmHg Level 3：300mmHg Level 4：600mmHg Level 5：900mmHg
Drug library		≥2000
History entries		≥5000
Brand Library		≥200
WIFI		○

2.5 Purpose

This equipment is an instrument that can drive the pump to extrude the infusion line, accurately controlling the infusion drops or infusion flow rate with the motor. This device can guarantee delivery of fluid/drugs safely in the patient's vein with an even pace and accurate dosage.

2.6 Design and Performance

2.06.1 Design and Performance

The infusion pump comprises a control system, a motor driving unit, a contacting/pressing mechanism, a detecting device, an alarm device, an input and display device, a housing, a supporting structure, and a software component. Optional features are a drop number sensor, D.C. power cable, DB15 serial communication cable. This device uses a double CPU in the pump to ensure infusion safety. This equipment provides several infusion modes, such as ml/h mode, bodyweight mode, drip mode, sequence mode. In addition, it also has functions such as history records, drug library, anti-bolus, and so on.

2.06.2 Functional Specifications

⚠ This User Manual defines the most configurations and most complete functions. Due to model differences or optional components, not all parts are equipped in the purchased product.

2.7 Product Specification

Safety Classification	
Electric Class Type	Class I
Electric Level	Type CF Defibrillation Proof Applied
Water-Resistant Class	IP44
Working mode	Continuous Operation
Classification	Portable equipment, non-portable during infusion*
Specification Parameters	
IV set Specifications	10-60 drips/ml
Infusion Rates	0.1-2000ml/h, minimum step is 0.01ml/h ＜100ml/h step is 0.01ml/h, ＜1000ml/h step is 0.1ml/h, ≥ 1000ml/h step is 1ml/h
Infusion Accuracy	≤ ±5%

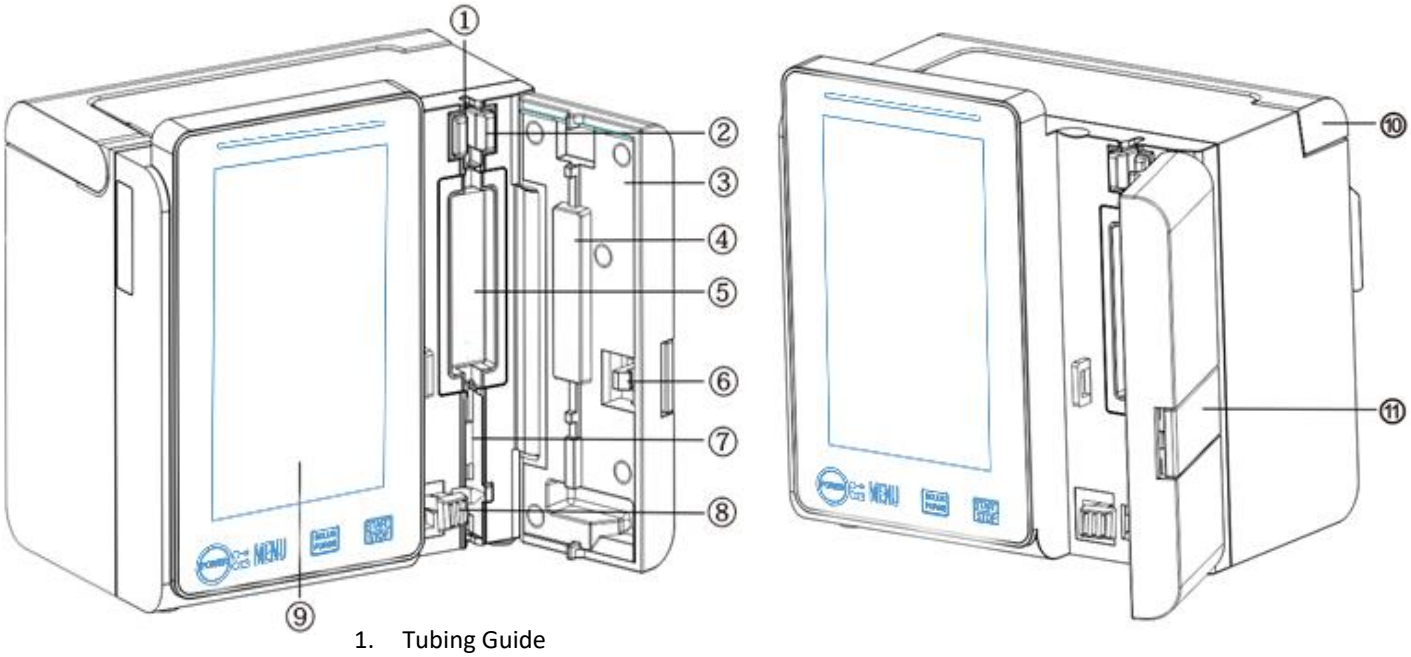
Drop Rate	Infusion set drip setting range 10—60 drops/ml, drip rate 1-2000 drops/min, step is 1 drops/min
Drop Rate Accuracy	≤ ±5%
Bolus Rate （Bolus）	1-2000ml/h, minimum step is 0.01ml/h ＜100ml/h step is 0.01ml/h, ＜1000ml/h step is 0.1ml/h, ≥ 1000ml/h step is 1ml/h
Bolus Rate Accuracy	≤ ±10%
Purge Rate	100-2000ml/h, minimum step is 0.1ml/h ＜1000ml/h step is 0.1ml/h, ≥ 1000ml/h step is 1ml/h
Purge Rate Accuracy	≤ ±5%
VTBI	0-9999.99ml, minimum step is 0.01ml
Infusion Accuracy	≤±5%
Total Volume Infused	0-9999.99ml
KVO Rate	0～5ml/h, minimum step is 0.01ml/h
KVO Rate Accuracy	≤±10%
Micro Mode Setting Range	0.1～200ml/h
Time Range	1s-99hrs59min59s
Accumulated Bubbles	50～1000ul/15min
Acti Agentia	0.01 - 99999
Volume	0.01 - 9999ml
Concentration Unit	0.01 - 99999
Dose Rate	0.01 - 9999
Cumulative Bubble	50～1000 ul/15 min

Single Fault Bolus Volume	≤ 2ml
Anti-Bolus Volume	≤0.2ml
Fuse Type	T2AL 250V
Dimensions	5.2 x 3.5 x 5.4 inches (No Fastening Clamp, No Drop Sensor Hook)
Weight	Single Battery with Clamp ≤ 3.2 lbs. Double Batteries with Clamp ≤ 3.4 lbs.
Power Supply	
AC power supply	100V-240V AC,50Hz/60Hz,0.25A-0.1A
Input power	50VA
D.C. power supply	DC 10V-16V,1.5A-0.94A
Battery	
Battery quantity	One Battery（standard） or Two Batteries （optional）
Battery type	Lithium Battery
Rated battery voltage	7.4V
Battery capacity	2600mAh（1 piece battery） or 5200mAh（2 pieces batteries）
Charging time	Off status ≤ 4 hrs.（1 piece battery） or ≤ 8 hrs. (2 pieces batteries）
Running time	Use a new battery full of electricity to power: Standard（1pc） battery, running at 25 ml/h, the running time from start-up to exhaustion of alarm batteries is not less than 5 hours. Optional（2pcs） battery, running at 25 ml/h, the running time from start-up to exhaustion of alarm batteries is not less than 10 hours.

	Standard（1pc） battery, running at 2000 ml/h, the running time from start-up to exhaustion of alarm batteries is not less than 2.5hours. Optional (2pcs） battery, running at 2000 ml/h, the running time from start-up to exhaustion of alarm batteries is not less than 5 hours.
Alarm	
Alarm signal's sound pressure level	When the sound is set at the lowest level, the alarm signal's sound pressure level ≥50 dB(A) When the sound is set at the highest level, the alarm signal's sound pressure level ≤80 dB(A)
Alarm information	VTBI near end, VTBI infused, Pressure High, Battery Nearly Empty, Battery Empty, System Error, No Power Supply, Reminder Alarm, Standby Time Expired, KVO Finished, Drop Sensor Connection, Drop Error, Empty Bottle, Single Bubble, Cumulative Bubble, Door Open, Occlusion Pre-Alarm, Drop-in Pressure, Drug Dose Limits Exceeded
Environment	
Non-AP/APG type equipment	Please do not use it in the environment with a flammable anesthetic gas mixed with air or a combustible anesthetic gas mixed with oxygen or nitrous oxide
Operating	(1) Temperature: 41 - 104 °F (2) Humidity: 15-95%, non-Condensable (3) Atmospheric Pressure: 57-106kPa
Transport & Storage	(1) Temperature: -4 - 140 °F (2) Humidity: 10-95%, non-Condensable (3) Atmospheric Pressure: 50-106kPa

Chapter 3 – Appearance

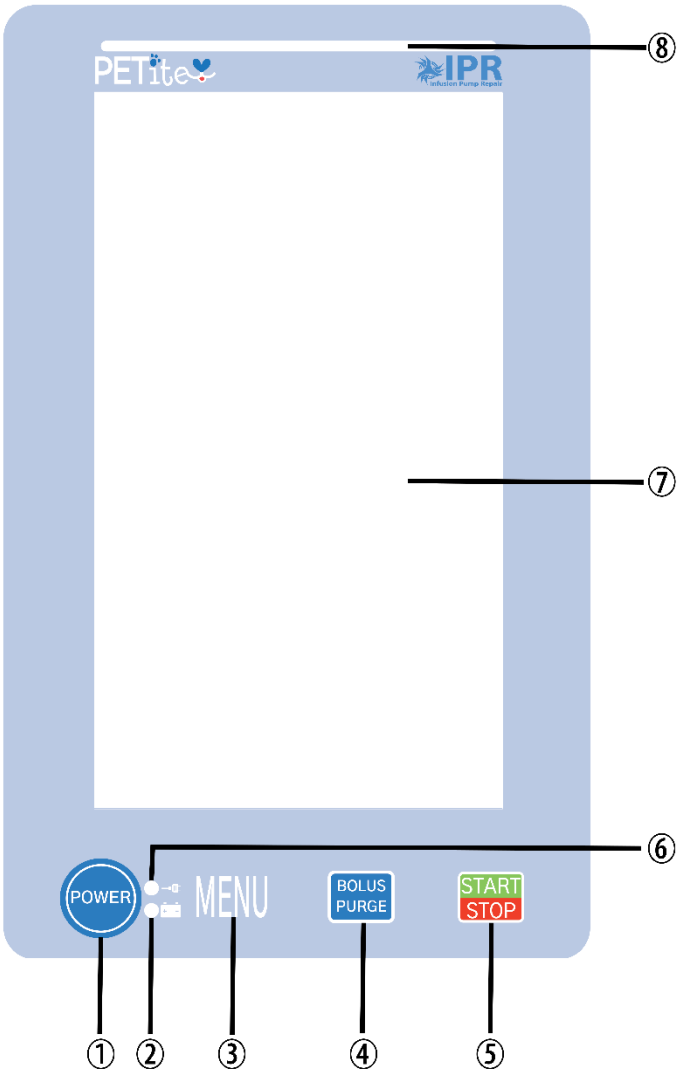
3.1 Front View



1. Tubing Guide
2. Air-in-line sensor (Detection of bubbles)
3. Pump Door
4. Pressure Plate
5. Water-resistant Film
6. Door Holder
7. Pressure Sensor - DOWNSTREAM
8. Anti-Free Flow Clamp
9. Display Screen
10. Handle
11. Door Switch

⚠ Note: <u>The Water-resistant film is recommended to be replaced once every two years.</u>

3.2 Operation Panel



1. 【 POWER 】

   To power on, press and hold the power button. To power off, press and hold the power button for ~7 seconds or until the screen powers down and the pump shuts down. Press the power button until options appear for standby mode and select "Standby."

2. Battery indicators (Green)

   -A flashing indicator signifies the device is on with a sufficient battery supply/power supply

   -A constant light indicates a full battery when plugged in.

   -The lights off signifies the equipment is shut down, or there are no batteries

3. 【 MENU 】

   Enter System's home page.

4. 【BOLUS/PURGE】

   Infusing the patient with large amounts of liquid with setting times.

5. 【Start/Stop】

   Begin or Pause Infusion

6. AC/DC indicator (Green）

   Turn on： Connect AC/DC power supply

   Turn off： Dis-connect AC/DC power supply

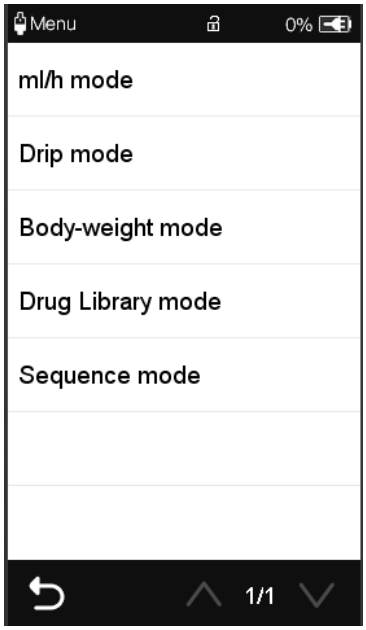
7. 4.3 inches TFT(LCD) Touch Screen

8. Alarm Indicator (Red/Yellow)

While pump alarms, indicators will light with different frequencies and colors. For more information, please refer to Chapter 8.1.

3.3 Display Screen

The display screen layout consists of a title bar and typical interface options.



3.03.1 Title Bar

The title bar displays real-time information and is not touchable. The left upper corner indicates the name of the current editing parameter

Table 3.03.1-1

Icon	Paraphrase	Description
	IV Set	Infusion IV Set description
	Lock Screen	Unlock state icon is 
	Battery Charging	Light on indicates the battery is charging.
	Wi-Fi	Light on indicates a Wi-Fi connection state.

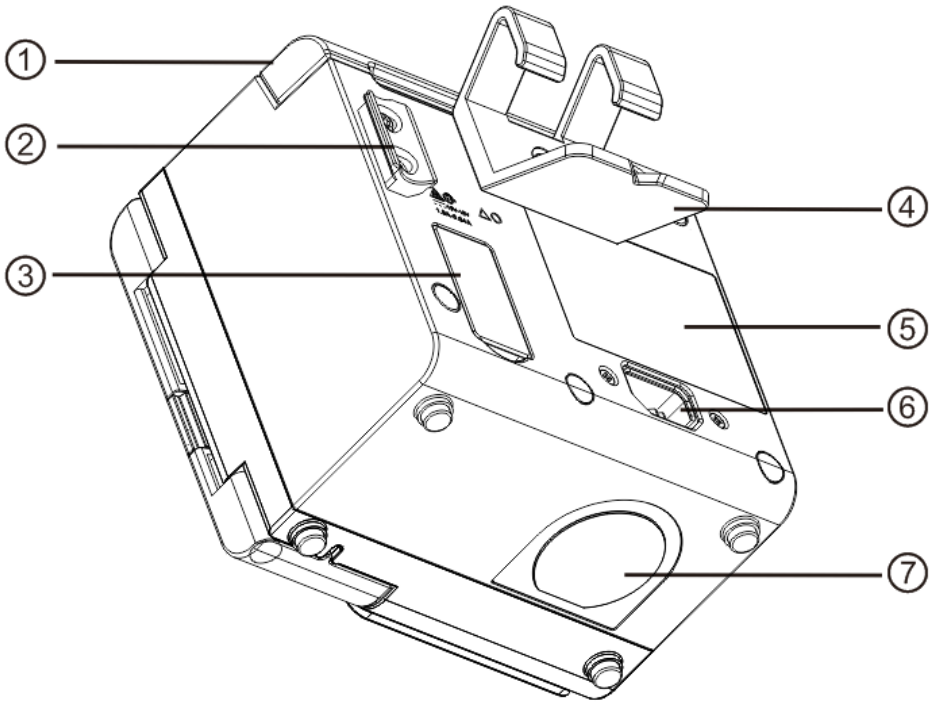
	Battery status	A numerical percentage or time value is displayed on the left side of the screen. The remained battery life may change. It may show the following states: 

3.03.2 Menu Icon Descriptions

Table 3.03.1-1

Icon	Paraphrase	Description
#(X)/#(Y)	Page Numbers	#(X) is the current page; #(Y) is the total page
	Up	Click this icon to return to the back page
	Down	Click this icon to enter the next page
	Return/Cancel	Click this icon to return to the back menu
	Radio button	The current option is selected
	Radio button 2	The current level is selected
	Confirm	Click to save the input parameters or the selected parameters and exit
	ON	Mean this function is ON
	OFF	Mean this function is OFF.
	Clear button	Click it to clear input
	**toggle key**	Click to switch into English or case input setting

3.4 Rear View

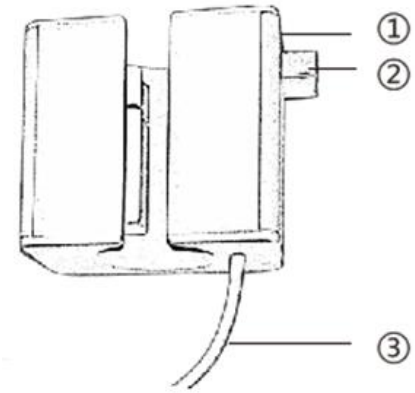


1. Handle
2. Drop sensor bracket
3. DB15 Multi-functional interface, with following functions
    - D.C. power input Interface
    - Software uploading Interface
    - Nurse call Interface
    - Drop sensor Interface

⚠ Note: The functions listed above cannot be used concurrently.

4. Clamp
5. Product Label
6. AC/DC Adapter Port
7. Loudspeaker

3.5 Drop Sensor (Optional)



1. Housing
2. Slider

   Push the slider to the left direction to adjust the spacing, loosen the slider to return automatically
3. Cable

Chapter 4 – Installation

4.1 Unpacking and Checking

1. Please check the appearance before unpacking. Please get in touch with the transportation company or our customer service department quickly if broken.
2. Please carefully open the package to avoid damaging the equipment and relevant accessories.
3. After unpacking, please check according to the packing list. If there're insufficient or damaged accessories, contact our company.
4. Please keep all relevant accessories. (ex. User Manual)
5. Please keep the packing case and materials for future transportation or storage.

⚠ Warning: Please put the packing materials out of reach of children. Please obey local laws and regulations or hospital waste treatment systems to handle the packing materials.

4.2 Installation

⚠ Warning：

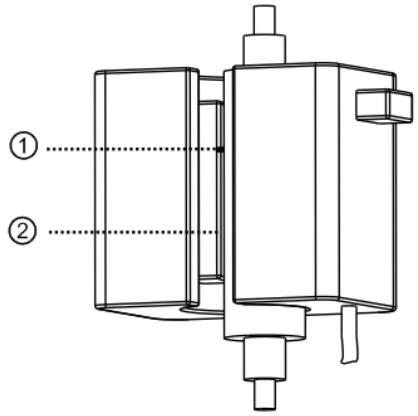
- The designated technicians of our company should install this equipment.
- Please check with a technician when connecting this equipment with other electric devices to perform special functions. Verification is recommended. Please contact our company or a hospital technician to ensure that all necessary safety precautions are taken so that all devices in the combination won't be destroyed.
- This equipment must be used and stored in an environment regulated by our company.

4.02.1 Installing the Infusion Pump

The image below shows that the fastening clip can hang the infusion pump against the animal cage.

⚠ Note: ●Ensure the stability of the animal cage that is attached to the infusion pump. Be careful when moving the animal cage and infusion pump to prevent the equipment from slipping or colliding with nearby objects.

4.02.2 Installing the drop sensor



1. Insert the drop sensor plug into the drop sensor port of this device and ensure a tight connection.
2. Drop start should be above the line①.
3. The liquid level should be below the line②.

⚠Warning:

The fluid/drug volume in the dropper must be less than 1/3 of its volume, and the drop sensor should remain vertical.

Chapter 5 – Preparation and Precautions Before Use

5.1 Use Preparation

When using new equipment, or reusing after storing for a period, or reusing after repair, please confirm that:

- The equipment's appearance is clean and in good condition without cracks and leakage.
- The moving components are smooth and functional. For example, the pump door can be opened and closed smoothly, and the buttons work.
- The touch screen can be operated smoothly and effectively.
- The power cable is installed tightly and can't be easily damaged when pulling.
- Set and check the system time to ensure that the history records will be correctly recorded.
- *In exceptional cases only* The built-in battery will supply power. Before using it, please charge it to complete and ensure that the battery keeps working adequately.
- Carefully read the Warnings, Cautions, and Operation Steps listed in this User Manual.

5.2 Operation Cautions

⚠ Cautions:

- Avoid direct sunlight, high temperature, or high humidity.
- The equipment shall be put at less than 1.2m to the animal's height.
- The parameters can only be set or changed by trained and professional personnel.
- Avoid the equipment working with fault to avoid medical negligence, which may hurt the animal's health and even life.
- If the working environment temperature exceeds the designated range, it may drop the equipment's infusion accuracy or cause abnormal work.
- The viscosity and specific gravity of infusion fluid will influence the infusion accuracy.

Chapter 6 – Basic Operation

6.1 Operation Flow

- Power On
- Install IV Set
- Select infusion tube brand or add a new brand
- Select infusion mode
- Set Infusion Parameters
- Remove air bubble(s) from the line
- Connect the infusion line with the patient
- Start infusion
- Infusion finish
- Remove the IV Set
- Power off or Standby

6.2 Infusion Operation

6.02.1 Starting and Self-Test

1. Press POWER to power on the equipment.
2. After power is on, the system will automatically check the motor, sensor, battery, memorizer, CPU communication, alarm indicator.
3. After the self-test is successful, the screen will prompt: "New treatment" and "Last treatment."

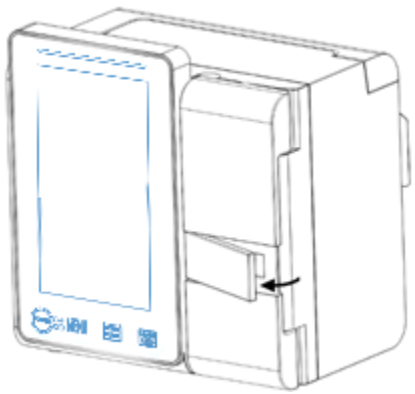
   Select "New Treatment" to go directly to the ml/h mode-setting.

   Select "Last treatment" to enter the last usage mode parameter setting.

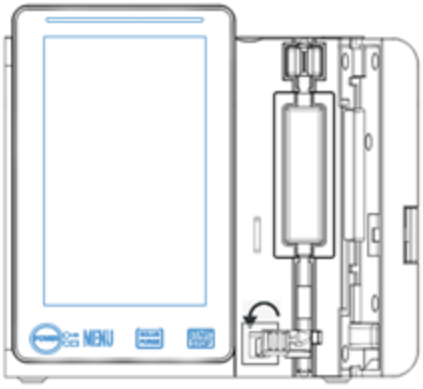
⚠ Warning: If the self-test item does not pass, please contact the company. Do not continue using the equipment.

6.02.2 Infusion IV Set Installation

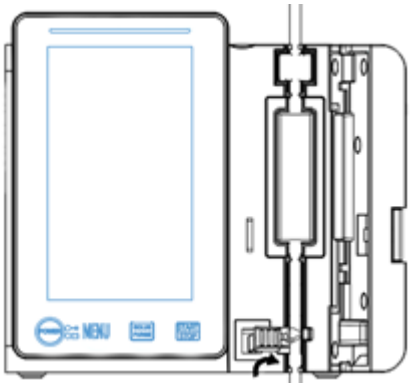
1. Open the pump door, lift, and open it.



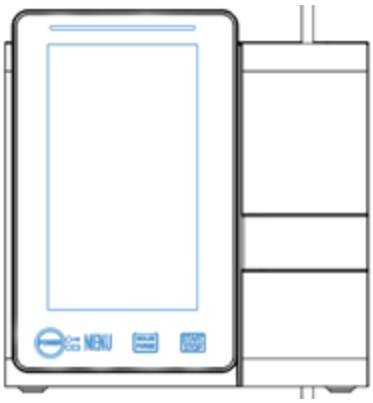
2. Push the Anti-flow free clip to the lower-left position



3. Gently pull the IV line, straighten it, fix the IV line to fit both ends from top to bottom, and close the Anti-free flow clip to clamp the infusion line.



4. Close the pump door. The screen should indicate that the infusion tube is installed correctly. Otherwise, you need to reinstall



⚠ Warning:

- It is recommended to use the IV sets calibrated into the system.
- Please confirm the infusion set brand specifications displayed on the touch screen is consistent with the actual use.
- Although the device supports the calibration of the customized infusion set, to ensure the accuracy of the infusion, it is strongly recommended that the User contact the company for an IV set calibrated and tested by the company's professionals.

6.02.3 Replace Infusion Line/Infusion Bag

★ Please replace the IV set according to the following steps:

1. Close the flow rate adjuster of the IV line, open the infusion pump door, and then remove the infusion IV set.
2. Prefill and install the new infusion IV set, according to the manual Chapter 6.02.2.
3. To restart infusion, operate according to the above infusion steps if needed.

★ Please replace the IV bag according to the following steps:

1. Close the infusion IV set clamp, open the infusion pump door, and remove the infusion tube assembly.
2. Remove the IV bag from the infusion IV set.
3. Connect the infusion line with the new IV bags.
4. Restart infusion according to the above steps of replacing the IV set.

⚠ Warning: The IV line will distort if it were worked for a long time and may result in flow rate error. We suggest replacing the pump pressing position or IV set after working for 8 hrs.

6.02.4 Selecting the IV set Brand

In the Menu selection, click on the currently used infusion set brand. See 7.01.13 brand for specific brands.

⚠ Warning: Baxter is the brand of infusion set built in the device. If using a non-built-in infusion set, please confirm the relevant infusion performance (accuracy, air bubble, pressure) on the infusion pump before use. Otherwise, the infusion will not be guaranteed.

6.02.5 Set Infusion Parameter

Enter the 『Modes』 interface, select infusion mode, then set infusion parameters.

6.02.5.1 ml/h mode

ml/h mode allows the User to set three parameters: Rate, VTBI (Volume to be Infused), and Time. The system will automatically calculate the third parameter with any two of the three parameters. If the VTBI is 0, the equipment works at the set rate until the alarm stops.

6.02.5.2 Bodyweight mode

Under this mode, set the weight (bodyweight), Acti agentia (drug mass), Conc. unit (concentration unit), Volume (fluid volume), Dose rate, Dose unit, VTBI.

The system will automatically calculate the flow rate from the specified dose rate (ug/kg/min, mg/kg/min, ug/kg/h, mg/kg/h…etc.) according to related formula {dose rate × weight}/ {Acti agentia (drug mass)/Volume (fluid volume)}, and automatically calculate the time according to (VTBI) / (flow rate).

6.02.5.3 Drip mode

Under this mode, set the VTBI and drop rate, and the system will automatically calculate the infusion flow rate and time.

⚠ Note: The flow rate under drip mode is calculated according to the specification of the current infusion set. Before adopting the dripping mode, please confirm that the specification of the current IV set matches

the specification displayed in the interface title bar display. If they disagree, please contact the equipment maintenance technician to modify. Otherwise, it may cause serious deviation of flow rate.

6.02.5.4 Drug library mode

『None』means that the drug library mode is turned off. Click on the drug name and follow the instructions to enter the infusion parameters.

DERS (Drug-Error Reduction Systems) is suitable for this model, and the drug dose rate will be limited. If the cumulative dose exceeds the preset dose limit for a certain period, the "drug dose overrun" alarm will be triggered.

⚠ Note: This device supports customized drug information editing functions. Please contact the company if necessary.

6.02.5.5 Sequence Mode

Sequence mode means infusion according to the set sequence after setting the rate and time of different sequence groups. At most, five sequences can be entered in this mode.

6.02.6 Purge Air

To prevent the pump from infusing air into the patient's body, the User must purge the air bubbles from the syringe before infusion. Under the parameters setting menu, short press【Bolus】button to enter the purge setting, and purge according to the menu instructions to clear the bubbles in the infusion line.

The total purge volume is not calculated in the Total Volume Infused.

⚠ Cautions: Before purging air, please confirm the infusion line is **not connected** to a patient.

6.02.7 Set the Infusion Parameters

The User sets the infusion parameters through the touch screen in each infusion mode. For the range of the infusion parameters, see 2.5 Product Specification.

6.02.8 Start Infusion

Connect IV line with the patient confirms infusion parameters. Press【Start】button to start the infusion.

6.02.9 Changing Infusing Parameters During Infusion

Click the flow rate value on the running interface during the infusion process to reset the flow rate. After confirmation, click ✓ to continue the infusion.

⚠ Note: Sequence mode does not support changing the flow rate during infusion.

6.02.10 Bolus

Bolus functions have two operation modes: Manual bolus and Automatic bolus.

1. Manual Bolus: Short press the【Bolus】button to enter the fast forward infusion setting menu, set the fast infusion speed. Long press the【Bolus】button to fast forward the infusion and release the button to the initial rate infusion.
2. Automatic Bolus: Short press the【Bolus】button to set any two parameters of the preset amount, speed, and time of the fast-forward infusion. Click the bottom line 【Start】. After the bolus set volume is

completed, the device reuses the initial infusion rate. If you want to end the fast-forward infusion early, press the 【Bolus】 button.

Note: The "VTBI near end" alarms are not triggered during the bolus.

6.02.11 Infusion Completion

When the infusion is near completion, the pump will alarm. If a user ignores it, the system will keep alarming until the infusion is finished.

After VTBI is completed, it activates VTBI infused alarm; if the KVO function is ON, the equipment automatically starts the KVO function, click  in the alarm interface to stop KVO, and end the alarm.

The default working time of the KVO system is 30min. After reaching the time, it will activate the KVO completion alarm and stop the infusion.

Please refer to Chapter 7.01.2 for KVO settings.

6.02.12 Stop Infusion

During Infusion or after Infusion, click【Stop】, the infusion will stop. The display screen will identify the Total Volume Infused and adjustable parameters.

6.02.13 Removing IV sets

First, disconnect the infusion set from the patient. After opening the pump door, push the Anti-flow clamp button to the lower left to remove the IV set.

6.02.14 Power off or Standby

Method 1: Hold the 

button until the screen is OFF, and the equipment is OFF.

Method 2: Press the 

button to enter OFF options.

1. To turn off the equipment: click 『Power off』 icon, the equipment is turned OFF.
2. For Standby mode: click the 『Standby』 icon to enter the standby time settings set the standby time.

   Standby time ranges from 1 min – 99 hrs59 min

   Under the standby state, the screen brightness will be the lowest. After Standby, the screen brightness will be recovered.

   1. Cancel: click『Cancel』, return to the Menu before OFF setting.
   2. If there is no operation, the device will automatically enter standby mode.

Note: The equipment has a standby function only under the non-working state.

Chapter 7 - System Setting

7.1 Settings

Click the『Settings』icon displayed on the main menu to enter parameters setting options.

7.01.1 Drug library

Click 『Settings』 in the main menu, find the『Drug Library』click the ON/OFF to enter the set state of drug library and view drug library information.

7.01.1.1 Introduction to Drug library

This device supports over 2000 drug names, which our company can import, and has the functions such as upper and lower limit, concentration, etc.

Select drug and then import the drug parameters, the User may change the parameters, including the concentration and dosage rate, but the parameters won't be saved.

7.01.1.2 Setting Drug library

After the drug library function is turned on, the infusion pump can sense the IV line and select the infusion set brand. In the pop-up drug information selection setting, click the preset drug name. The drug chosen will be displayed in the infusion mode parameter.

7.01.2 KVO rate

Click『KVO rate』, input the numerical value, confirm value, click ✓.

Please refer to Chapter 2.5 for the adjustable KVO range.

⚠ Note: KVO will be closed if the KVO rate is 0ml/h.

7.01.3 Bolus rate

Click『Bolus rate』, input the numerical value; after confirming, click ✓.

Please refer to Chapter 2.5 for the adjustable Bolus rate range.

7.01.4 Occlusion Pressure

Click『Occlusion pressure』to enter the occlusion pressure level setting, move the long box from the preset level, after confirming, click ✓.

The higher the chosen click level, the higher the occlusion level. We suggest selecting suitable occlusion pressure according to actual requirements.

DPS (Dynamic Pressure Show) is turned on by default, and the line pressure is graphically and dynamically visible during infusing status.

⚠Warning：

- When infusing fluid/drug of high viscosity and the occlusion pressure is set at a low level, the system may sound the occlusion alarm even when the line is not blocked. Under this condition, please carefully observe the pressure indication icon in the display screen and the infusion line. Raise the occlusion pressure if needed.
- When the occlusion pressure is set at a high level, it may cause the animal to feel uncomfortable; after raising the occlusion pressure, please carefully observe its condition. Immediately take measures if there's any abnormality.

- Under the equipment fault state, the max pressure generated by the infusion line is 1500mmHg. Under a single fault state, the max infusion volume is 2ml.
- If not used for IV infusion, for example, Intra-arterial Infusion, TPN (Total Parenteral Nutrition), or EN (Enteral Nutrition) treatment, the occlusion level should be adjusted to higher levels.

⚠ Note: The lowest pressure (50mmHg) limits the flow rate to ≤100ml/h, and the remaining 2-5 levels have no flow rate limit.

When the line occlusion activates the occlusion alarm, the system will automatically trigger the anti-bolus function to drop the line pressure and avoid additional impact bolus to the animal after contacting the occlusion. Liquid leakage will be less than 0.2ml, and line pressure will be less than 300mmHg.

7.01.5 Bubble Detection

Click『Bubbles size』to enter the air bubble setting menu, move the long box from the preset level, confirm, and click ✓.

The bubble sensitivity is 20ul.

Single bubble detection: A single bubble alarm is triggered when the individual bubble volume of the infusion tube reaches the preset bubble detection alarm threshold. The individual bubble detection levels are detailed in the table below:

Standard software	
Air Bubble detector level	Alarm Threshold Value
Level 1	50ul
Level 2	100ul
Level 3	200ul
Level 4	400ul
Level 5	800ul

Optional software	
Air Bubble detector level	Alarm Threshold Value
Level 1	20ul
Level 2	50ul
Level 3	100ul
Level 4	200ul

Level 5	400ul
Level 6	800ul

7.01.6 Cumulative Bubble

Click『Cumulative Bubble』to enter the accumulative bubble setting, input the threshold value for the cumulative alarm, and click ✓ to confirm.

The accumulated bubble detection range is 50 ~ 1000 ul/15min. The accumulative bubble alarm is triggered when the cumulative bubbles within 15min reach the preset alarm threshold.

We recommend setting the cumulative bubble detection range according to actual needs.

7.01.7 Finish Pre-Alarm

Pre-alarm refers to the time of infusion nearing completion. The alarm signifies when the fluid/drug-infused volume nearly reaches the preset value.

Click『Finish pre-alarm』to enter the pre-alarm setting, select ON or OFF, click the preset time option and change the desired icon into ◉.

The adjustable time range for pre-alarm is 2 min, 5 min, 10 min, 15 min, 20 min, 30 min.

7.01.8 Reminder alarm

Click 『Reminder alarm』to enter a time for reminder alarm setting, select ON or OFF, click the preset time option, and change the desired icon into ◉.

The adjustable range of time for the Reminder alarm is 2min, 5min, 10min, 15min, 20min, 30min.

A reminder alarm means that the system will activate a "Reminder alarm" if no button is pushed within the preset time for the "Reminder alarm." However, there is no reminder alarm state when the equipment is under no infusion.

7.01.9 Weight unit

Click『Weight unit』to enter the bodyweight menu, click the preset body weight unit option, and then the desired should change to ◉.

⚠ Note: The current software version only supports unit kg.

Unit Mark	Unit Conversion
kg	1 lbs. = 0.4535 kg

7.01.10 Pressure Unit

Click『Pressure unit』to enter the pressure unit select menu; four-unit options are available: mmHg, kPa, bar, psi, click the desired unit option.

⚠ Note: Please carefully confirm when changing the current pressure unit.

Unit Mark	Unit Conversion
kPa	1 kPa=7.5 mm Hg=0.145 psi =0.01 bar
PSI	1 psi = 51.724 mm Hg=6.897 kpa =0.069 bar
Bar	1 bar =750 mm Hg = 14.5 psi = 100 kPa

7.01.11 Micro Mode

Click『Micro mode』to enter the micro mode selection menu. ON/OFF is an optional function. Under the ON mode, set the rate limit, then the infusion rate under any infusion mode is not allowed to exceed this limit.

7.01.12 Drop Sensor

Click『Drop sensor』to turn ON or OFF.

The "Drop error" alarm function is only available when the drop sensor is installed.

⚠ Note: The default state for the drop sensor function system is OFF. The User can manually turn it on when the drop sensor is implemented. If the function is ON when the drop sensor is not installed, the system will report a "drop sensor connection" alarm.

7.01.13 IV Brand

To change the IV set brand for the infusion pump.

1. Install the IV set. Click 『Commonly used IV set』to enter the IV Brand set menu, confirm the IV set by clicking the brand option.

The system built-in IV set brands are Baxter and more+.

⚠ Note: The IV sets of different brands may cause flow rate deviations. When used, please confirm if the displayed information on the screen is congruent with the actual IV set.

7.01.14 Reset Total Volume

Click『Reset total volume』, the menu will display a confirmation message, click ✓ to confirm the reset. Otherwise, please click ↩.

7.2 General

In the main menu display, click『General』to enter the general setting options.

7.02.1 Network

This equipment supports wireless or wire interconnection. When equipped with a wireless module and connects with the internet through Wi-Fi, the equipment screen will display an icon.

Click『Network』in main menu to set the response.

⚠ Notes:

- Our company's professional technicians can only put this function.
- After activating the interconnection function, the equipment can periodically transmit data to the central monitor system (outside the room). The data is only for displaying and doesn't provide any suggestions on therapy.

7.02.1.1 Connection Mode

The connection mode also supports WLAN mode.

7.02.1.2 WLAN

When the Wi-Fi function is in use, turn on the WLAN switch of the equipment, set the name and password of the access point, and configure the TCP/IP parameters.

⚠ Notes:

- The wireless access must be set by the professional technician recognized by our company.
- The transmitted data of this equipment doesn't provide any suggestion on therapy, and this data shall not be used for calculating the therapeutic schedule.
- When the data is adopted by the third party's equipment or software, it is only for display and shall not be used for alarming or calculating.

7.02.2 Sound

Click『Sound』to enter the sound parameters setting interface. The volume has ten level settings. The lowest volume is ≥50 dB, and the highest volume is ≤80 dB. Move the long box from the preset level, confirm and click ✓.

7.02.3 Date &Time

Click『Date &Time』to enter the date and time into the device. It allows users to set the device's date, time, and format.

When setting date and time, directly input the numerical value into the input. For example, to preset one date "2022-02-13", input "20220213"; to preset the time "12: 34", input "1234".

The time can be displayed in 24 hr. format or 12 hr. format, the date can be shown in Euro-American style or Eastern-Asian style, please set accordingly.

7.02.4 Screen Lock

Click『Screen lock』to enter the automatic lock screen setting menu, select ON or OFF.

Automatic lock screen time can be set at 15 secs, 30 secs, 1 min, 2 min, 5 min, 10 min or 30 min and so on, which means that the equipment will automatically lock the screen if it is not touched, or the button is pressed within corresponding time after starting. If the screen or keypad is locked, no operation can be conducted.

After turning on 『Screen lock』function during infusing, press【Power】key to lock or unlock the device manually.

To unlock: Press any keypad or click the screen. A reminder of unlocking will pop up, click ✓.

⚠ Note: The equipment will automatically unlock if there is a High-Level alarm.

7.02.5 Brightness

Click 『Brightness』 to enter the display brightness setting menu. The brightness setting has ten levels.

7.02.6 Night mode

Click 『Night mode』 to enter the night mode switch menu. Set the start and end times of the night mode and the night brightness. The system automatically adjusts the brightness to the user-defined value at night.

7.02.6 Nurse call

Click『Nurse call』 to select functions ON and OFF.

⚠ Notes:

The nurse call function must be used with a special cable.

The User should depend not only on the nurse call function as the primary alarm notice but also on identifying the alarm according to the equipment and the animal state.

7.02.7 Nurse call Alarm Level

Click『nurse call alarm level』 to select different alarm levels.

7.02.8 Battery Capacity Display

Display of battery capacity under h:m or percentage status can be switched. This display will change the title bar display accordingly.

7.3 Patient

Click『Patient』 in the main interface to enter the patient setting menu.

7.03.1 Patient Information

Click『Patient』 to enter the patient information setting menu. Users can set bed numbers, MRNs, names, genders, ages, body weights, and heights.

7.4 Records

Click『Records』 in the main menu to enter records settings.

7.04.1 History entries

Click 『Records』 in the main menu after entering the submenu, click the 『History entries』 button to see the records list. The equipment can save over 5000 historical records and display event names, dates, and times. When it is full, the new records will cover the old records by turn.

The historical record contains alarm information, treatment and purges records, cumulative bubbles, changes, and standby operations.

7.04.2 Last therapies

Click 『Records』 in the main menu to enter the submenu and click the "Last therapies" menu to view the last therapy record.

(1) This submenu will display the latest 20 medical records. After confirming the parameters, a user may select a congruent infusion plan and start the infusion.

(2) The System can save 20 medical records at most. When it is full, the new records will cover the old records by turn.

7.04.3 Export history records

With the P.C. tool, connect this equipment to a P.C.

After the equipment has achieved connection with P.C., the P.C. can automatically read the data in the device.

We encourage users to create a history record folder in the P.C. to export the data into that folder.

Note: Please do not export data when the equipment is working.

7.5 System

Click『System』under the main menu and enter the system setting interface

7.05.1 Language

This equipment supports English, simplified Chinese, and more. Click『Language』to change device language.

7.05.2 S.N. (Serial Number)

Check the serial number of the equipment. A user cannot modify the serial number.

7.05.3 Version

Check the software version in this interface.

7.6 Electronic Memory Function

After the device is turned off or loses all its power, the history and alarm settings of the device storage are not affected, and the electronic memory function is saved for no less than ten years.

When the power failure time is ≤ the 30s, the alarm setting will automatically recover before power failure.

Chapter 8 - Alarm Prompt and Troubleshooting

8.1 Introduction to Alarm Level

This equipment will alarm when reaching or exceeding the set alarm threshold values. During infusion preparation and infusion, alarms will prompt with sound, light, and text. According to the importance of alarm information, emergency and safety, the alarm will be divided into high, medium, and low. Please refer to the table below for details:

Table8.1-1

Alarm Level	Sound Signal Interval	Sound Signal Interval	Light color /flash frequency	Duty cycle
High alarm	10s	Di di di-di di, Di di di-di di	Red indicator flashes /2.0±0.6Hz	20%～60%
Medium alarm	15s	Di di di	Yellow indicator flashes / 0.6±0.2Hz	20%～60%
Low alarm	25s	Di di di	Yellow indicator lights on	100%

If there is an alarm, the system will display an alarm prompt. Click  to exit the alarm prompt.

Click  to mute. If the alarm is not muted, an alarm sound will be sent out 2 minutes later.

Alarm signal's sound pressure level range:

50 dB (A) ≤ the low priority auditory alarm signals ≤ the medium priority auditory alarm signals ≤ the high priority auditory alarm signals ≤ 80dB (A)

 Warning: Some alarm thresholds of this device can be set by the User without password protection restrictions: occlusion pressure, reminder alarm, VTBI infused pre-alarm, alarm sound volume, and Standby time. The User shall confirm the parameters when setting the alarm threshold value; otherwise, it may influence the alarm function or infusion safety.

8.2 Multi-level Alarm Rules

When there are several alarms, the system will alarm according to the following rules:

Table 8.2-1

Multi-level Alarm	Rules
Several alarms of different levels generate simultaneously	Display the alarms of the highest level with sound, light, and text, report medium alarm after eliminating all alarms of the highest level
Several alarms of the same level generate simultaneously	Alarm circularly by turns; the time interval is 3s for each alarm.

8.3 Alarm Treatment

⚠ Warning: When there's an alarm, please check the conditions of the animal, remove the reason for the alarm, and then continue working.

Please refer to Appendix C for the alarm solution.

8.4 Malfunction Analysis and Solution

When there is a fault, the infusion pump screen will display the fault alarm information; this item is a high-level alarm. Please eliminate the fault alarm according to the prompt. If it can't be eliminated, please stop the equipment, contact our company to repair and test it, and do not put it into operation before the equipment has passed the inspection. Otherwise, it may cause unpredictable harm if it works with fault.

Suppose the equipment is on fire/burns for an unknown reason or has any other abnormal conditions. In that case, the User shall immediately cut off the power supply and contact our customer service department.

Under a single fault state, the max infusion volume is 2 ml.

⚠ Notes: The distance between the operator of the infusion pump and the pump should not exceed 0.5 m so as not to affect the operator to identify the alarm correctly.

The visual alarm signal should be visible from 4 meters away. The alarm indicator or analog alarm indication area should be visible to the naked eye; the visual alarm information should be visible 1 meter away. The alarm text or alarm icon is visible to the naked eye.

Chapter 9 - Maintenance

9.1 Cleaning, disinfecting, and sterilizing

⚠ Warning

- Please cut off the power supply and unplug the AC/DC power wire before cleaning the equipment.
- Please keep the equipment horizontal and upwards during cleaning and disinfecting to protect the equipment and accessories from a fluid.

9.01.1 Cleaning

1. The daily maintenance is mainly to clean the housing and pump body. Fluid/drug may inevitably flow in the equipment during infusion. But some fluids/drugs may corrode the pump and cause a fault. After the infusion, please clean the equipment. Wipe it with moist, clean, soft fabric, and please dry naturally.
2. When cleaning the equipment interface, please wipe it with dry and soft fabric and confirm the interface is dry before using it.
3. Please do not soak the equipment in water. Although this equipment has certain water-resistant functions, please check beforehand and ensure it still works when fluid splashes on the equipment. Perform a test infusion and electric leakage test, if needed.

9.01.2 Disinfecting

1. Disinfecting may cause harm of a certain degree to the equipment. We suggest disinfecting the equipment only if it is needed.
2. Please disinfect the equipment with common disinfecting agents such as 70% ethanol, 70% isopropyl alcohol, etc. Please follow the instructions of the disinfecting agent.
3. After disinfecting, wet wipe with a soft fabric and warm water. With another dry cloth and wipe the equipment thoroughly.
4. Do not sterilize the equipment with a high-pressure steam sterilizer, do not dry the equipment with a dryer or similar product.

⚠ Warning: Please do not adopt Cidex OPA orthophthalaldehyde, methyl ethyl ketone, or a similar solvent. Otherwise, it may corrode the equipment.

9.2 Periodical maintenance

⚠ Notes:

- With this device, please set up a complete maintenance plan. Otherwise, it may cause the equipment malfunction or fault and may hurt the physical safety of others.
- To ensure the safe use and prolong the equipment's service life, we suggest periodically maintaining and checking it once every six months. The User shall hold some items, and some parts shall be maintained by the dealer of the equipment, IPR.
- Please timely contact our company if the equipment is found defective.

9.02.1 Check the Appearance

1. The appearance of the equipment should be clean and under excellent condition without crack and water leakage.
2. The buttons are flexible and effective without invalid use; the touch screen's sensitivity is normal.
3. The infusion pump door can be smoothly opened and closed; the safety clamp switch is good.
4. The power wire is in good condition and installed tightly.
5. After connecting with the external power supply, check whether the A.C. and D.C. indicators of the device and the battery indicator are lit.
6. Adopt the accessories designated by our company.
7. The environment meets the requirements.

9.02.2 Performance Check

- Self-test and normal infusion function.
- The alarm function is normal
- Battery performance.

9.02.3 Maintenance Plan

The following check/maintenance items must be performed by the professional technician recognized by our company. If the following maintenances are necessary, please contact our company. Please clean and disinfect the equipment before testing or maintaining it.

Maintenance Items	Cycle
Safety check according to IEC 60601-1	Once every two years, check and replace the printed circuit board assembly or if the equipment has been dropped or knocked.
Preventive system maintenance items (pressure calibrate, sensor calibrate, pump)	Once every two years, when the occlusion alarm, air bubble alarm, or infusion accuracy is doubted to be abnormal
Brand of user-defined IV Set, infusion accuracy calibration	Using the equipment for the first time, IV set brand for the first time, reusing the equipment after stopping for a very long period.

9.3 Add New Brand and Calibration

In the 『System』 submenu, click 『maintenance』 to enter the brand setting menu, this allows you to create a brand, delete, and calibrate any IV set brand.

⚠ Warning: We suggest contacting our company to customize and calibrate sets with our professional technicians. Otherwise, there is no guarantee of infusion accuracy.

⚠ Note: The built-in brand of the system cannot be deleted.

1. Add new brand

⚠ Note: If the existing IV set brand is not listed in the system, please create, and test the IV set brand with the pump.

Click『Add new brand』to enter the new brand interface, edit infusion set brand name, specifications, and other information.

2. Delete

Enter the『Delete』option and click delete to user-defined IV set brand.

3. Calibrate

⚠ Note

- With the first-time use of the pump, it will need calibration.
- When adding a new IV brand, the pump will need calibration.
- When accuracy is not correct, the pump needs calibration.

Please calibrate the IV set when using the built-in brand IV set for the first time, the first user-defined IV set brand, or after periodical maintenance.

Please prepare the following materials before calibrating:

One new and unused IV set, a scale balance, and a 50 ml measuring cup.

9.03.1 Calibrating Steps:

1. Select the brand name.
2. Install the IV tube.
3. Press【Bolus】to remove the air bubble in the line, put the needle into the measuring cup to collect fluid.
4. Click『Start Calibrate』to start Calibrate.
5. After 3 mins, the equipment will automatically stop, then record the net weight of fluid by ml.
6. Click 『Volume』; input the net weight(ml).
7. Calibration completed.

9.4 Repair

⚠ Warning: The maintenance of equipment and the replacement of components shall be carried out by professionals of the company. When the power module is replaced, particular attention shall be paid to detecting the power supply. Observe whether there is a false alarm, connect the A.C. power supply, and charge the battery normally.

9.4.1 Normal Repair Process

Please contact our company to repair if there's any fault, do not disassemble and repair the equipment. After repair, please perform a comprehensive test for the equipment. Please contact our company if an authorized repair technician if needed.

9.4.2 Maintenance for Long Term Store

If the device won't be used for an extended period, we encourage packing it with its original packaging and storing it in a shady, cool, dry place without direct sunlight.

Please note the following operations are necessary for using it again:

1. Verify flow rate accuracy to avoid unconformity between the IV set parameters set in the equipment and the actual parameters after. There may be an infusion error if it hasn't been used for an extended period or for other reasons. This error may influence the therapeutic effects and even cause medical negligence.
2. We highly encourage performing an air bubble and occlusion alarm test.
3. Experiment with the battery discharging and charging duration to confirm that the battery is also usable.

9.5 Equipment Components/Accessories

⚠ Warning: Only the components and accessories designated by our company shall be adopted. Otherwise, it may damage the equipment or drop the equipment performance.

During the average service life of the equipment, the battery and water-resistant membranes are consumables. As a suggestion, it is best to replace them once every two years. Please contact our company to replace them.

Standard Accessories	One battery
	Water-resistant film
	Locking mechanism
	Power cable
Optional Accessories	Two batteries
	Wi-Fi module
	Drop sensor
	D.C. Power cable
	DB15 serial port communication wire

9.6 Production Date

Please refer to the label of the product.

9.7 Recycling

The average service life of this equipment is ten years and depends on the use frequency and maintenance. The equipment must be rejected after reaching its service life. Please contact our company to get more detailed information.

1. We suggest the obsolete equipment be returned to our company.

2. According to the applicable laws and regulations, the used lithium-ion polymer battery needs to be thrown at a hazardous waste facility.
3. Regarding consumables, please handle them according to the waste system of your facility.

Chapter 10 - Battery

This equipment is equipped with a rechargeable lithium-ion polymer battery to ensure a standard infusion if the equipment is moved, or the external power supply is cut off.

When connecting an external power supply, whether the equipment is powered on or not, the battery will charge. When charging, the equipment screen displays the battery charging indication icon  . In extraordinary instances, only a built-in battery is implemented to supply power. When the remaining battery is less than 20%, please connect the equipment with an external power supply to charge the battery.

⚠ Warning: Only the battery designated by our company shall be adopted.

10.1 Check the Battery Performance

The performance of the built-in battery may drop according to the using duration. It is a suggestion to check the battery at least once a month.

1. Disconnect the equipment from the animal and stop all infusions.
2. Supply public power to the equipment to charge the battery for at least ten hours.
3. Supply power to the infusion pump only with the battery, infusion at the rate of 25ml/h, test the time till the battery runs down, and the equipment is turned off.
4. If the battery power supply time is significantly lower than the time stated in the specification, consider replacing the battery by contacting us.

10.2 Replacing the Battery

It is recommended to replace the battery every two years; it is suggested to replace the battery by our company.

⚠ Warning: Untrained personnel are forbidden to replace the battery; otherwise, it may cause the battery to burn, explode, leak, and cause personal injury.

Chapter 11 - Customer Service

This product includes a 1-year warranty after purchase. The warranty period is from the date it is in the User's possession. The equipment damages caused by the following are not covered under the warranty service.

1. Fault caused by incorrect operation, unauthorized refitting, or repair.
2. Damages caused by incorrect operation during the transportation process, after purchase.
3. The fault and damages caused by fire, salt injury, toxic gas, earthquake, windstorm, flood, abnormal voltage, and other natural disasters.

Our company provides repair services for the damages or faults mentioned above but with repair costs.

Chapter 12 - Appendix

Appendix A Start-Up Graphs and Trumpet Curves

Appendix A.1 Start-up Graphs

Brand and specification of infusion set: Lexison (20 drops)

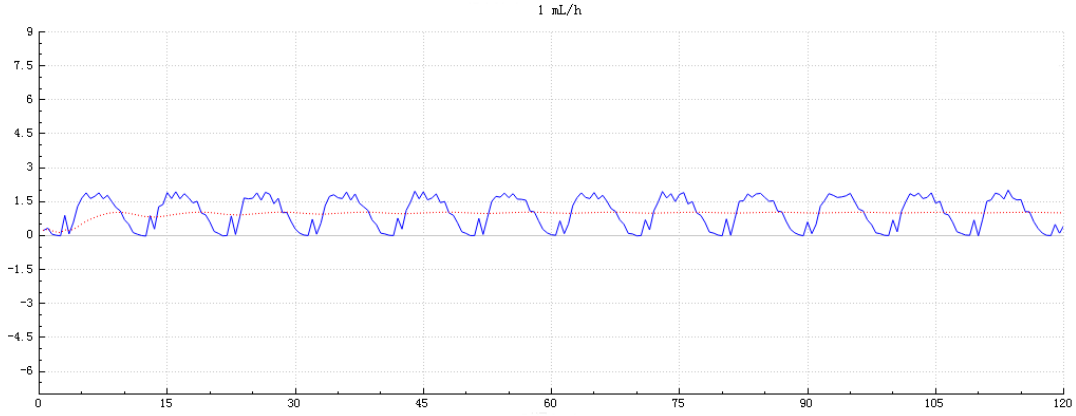
Sample QTY: 3 Units

IV set sample QTY: 3 Sets

Flow Rate: 1ml/h

Measurement Interval: Δ t = 0.5min

Measurement duration: T = 2h



Graph 1 Start-up graph: Flow rate 1 (ml/h) against time (min) plotted from data gathered during the first two hours of the test period.

Brand and specification of infusion set: Lexison (20 drops)

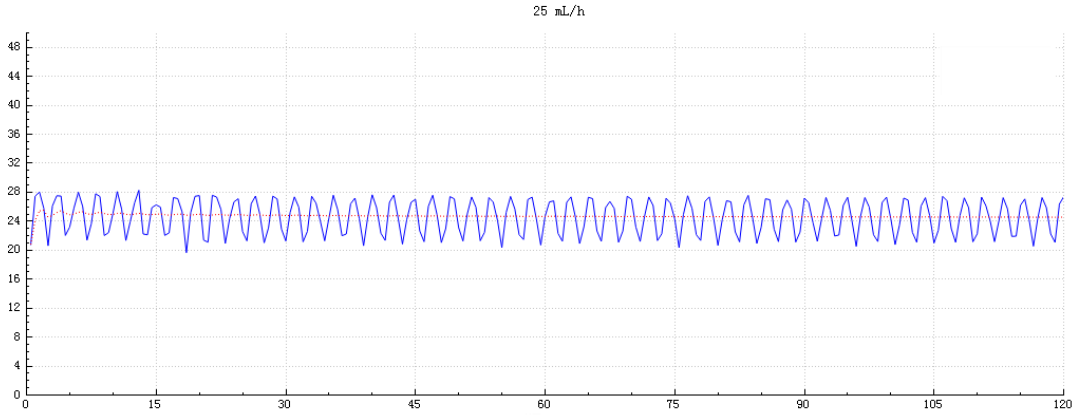
Sample QTY: 3 Units

IV set sample QTY: 3 Sets

Flow Rate: 25ml/h

Measurement Interval: Δ t = 0.5min

Measurement duration: T = 2h



Graph 2 Start-up graph: Flow rate 25 (ml/h) against time (min) plotted from data gathered during the first two hours of the test period

Appendix A.2 Trumpet Curves

Brand and specification of infusion set: Lexison (20 drops)

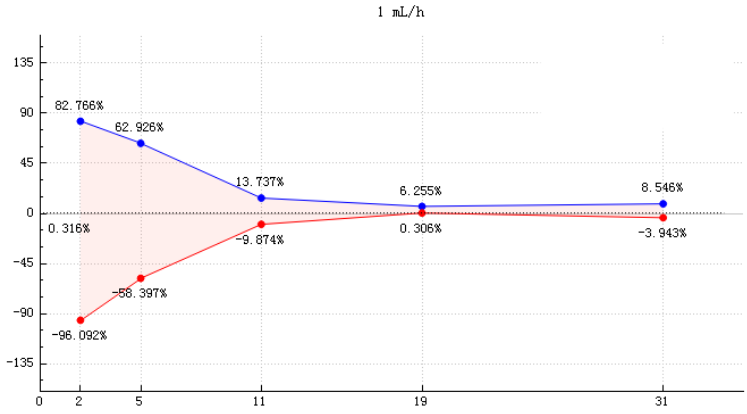
Sample QTY: 3 Units

IV set sample QTY: 3 Sets

Flow Rate: 1ml/h

Measurement Interval: Δ t = 0.5min

Measurement duration: T = 2h



Graph 3 Trumpet curve: Percentage variation Ep against observation window duration P (min) and the overall mean percentage error A plotted from data gathered during the second hour of the test period

Brand and specification of infusion set: Lexison (20 drops)

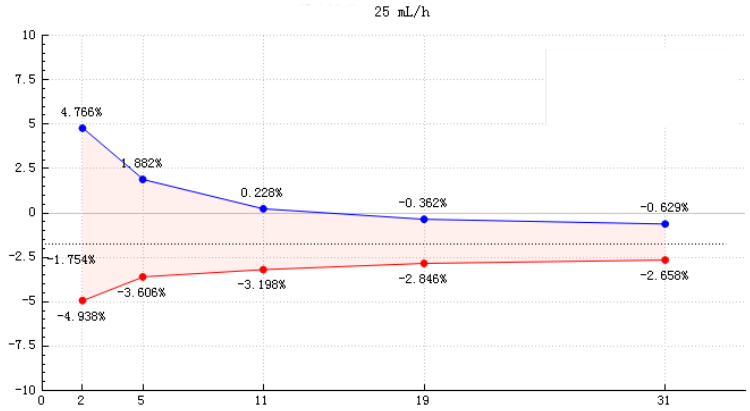
Sample QTY: 3 Units

IV set sample QTY: 3 Sets

Flow Rate: 25ml/h

Measurement Interval: Δ t = 0.5min

Measurement duration: T = 2h



Graph 4 Trumpet curve: Percentage variation Ep against observation window duration P (min) and the overall mean percentage error A plotted from data gathered during the second hour of the test period

⚠ Note: Infusion accuracy may be affected by the infusion pump environment, such as pressure, temperature, humidity, infusion consumables, and so on.

Appendix B Occlusion Response Property

Occlusion Pressure (mmHg)		**Flow Rate (ml/h)**	**Time to occlusion Alarm (hh:mm:ss)**	**Max bolus (ml)**）
1	50	0.1	01:44:10	0.137
		1	00:10:58	0.178
		25	00:00:15	0.134
5	900	0.1	35:07:19	0.102
		1	01:50:32	0.172
		25	00:04:22	0.132

Notes:

The alarm pressure intensity error is ± 40mmHg when the occlusion alarm level is 1.

The alarm pressure intensity error is ± 125mmHg when the occlusion alarm level is 2-4.

The alarm pressure intensity error is ± 180mmHg when the occlusion alarm level is 5.

⚠ Notes:

- Conditions for above testing data: The testing infusion IV brand set is Lexison.
- The test conditions, temperature, and line length influence the occlusion alarm pressure, alarm delay time, and bolus. (The increase in line length will lead to the rise of an alarm delay. Lower temperature will lead to poor elasticity of pipeline, exceeding the declared error range of blocking grade, resulting in inaccurate alarm pressure. The shortening in line will lead to higher temperatures but has no effect.)
- The above data is the typical value under the test conditions. Please see the test data of the product for the actual data. The data may be different when the test conditions are different

Appendix C Alarm and Solution

Alarm Type	Alarm Level	Reason	Solution
VTBI infused	High	The preset value infusion completion.	Press 【Stop】 button to stop the alarm.
Pressure high	High	1. Line occlusion during infusion.	Manually solve the problem of occlusion. Press【Start 】button to continue the infusion.
		2. Fluid/drug in the actual infusion line of high viscosity, while the system occlusion level is set too low.	Rise the alarm Level, Press【Start】 button to restart infusion.
		3. The pressure sensor is damaged.	Please contact the dealer or manufacturer for repair
Battery empty	High	When power is supplied by the built-in battery only, under low battery, the alarm duration is >30min.	Immediately connect with the external power supply.
		2. Battery aging or the equipment charging circuit is a fault.	Please contact the dealer or manufacturer for repair.
KVO finished	High	KVO working time reached 30min; infusion pump stopped working.	Press【Stop】 button to stop the alarm
Door Open	High	During infusion, the infusion pump door is opened.	Close the infusion pump door to stop this alarm.

Alarm Type	Alarm Level	Reason	Solution
Single bubble	High	Air bubble in the infusion line.	Press【Stop】button to stop the alarm, disconnect the line from the animal, eliminating the air with the purge function, or open the infusion pump door to remove the air bubbles manually.
Cumulative Bubble	High	When the bubbles in the infusion pipeline within 15 minutes reach the cumulative bubble alarm threshold	Press the 【Stop】button to eliminate the alarm, separate the pipe from the animal, use the purge function to remove the bubbles, or open the door manually to remove the bubbles.
Drug dose limits exceeded	High	While using drugs in the drug library to infuse, the alarm will be triggered if the max dose in a specific time has exceeded the preset limits.	Press 【Stop】button to stop the alarm.
System error	High	The error alarm will give a code number if a system self-check failed or an internal fault.	Restart the device to check whether the alarm is eliminated. If it still exists, contact our company.
Drop error	High	The angle of inclination of the drip cup is too big, or the drop sensor is installed lower than the drip cup fluid level.	Check the installation of the drop sensor or drip cup fluid level. Press【Stop】button to stop the alarm.

Alarm Type	Alarm Level	Reason	Solution
		The specification of the IV set is not accordant with the specification displayed in the interface, which causes a drop rate error.	Check if the infusion apparatus specification is accordant with displayed parameters. If it is not accordant, the professional maintenance technician shall modify it.
Empty bottle	High	The infusion set drip pot was detected without drops falling within the specified time.	Check if the liquid is left in the infusion bag, press【Stop】 to cancel the alarm.
Occlusion pre-alarm	Medium	Line pressure close to preset occlusion pressure level.	Check if there is an occlusion in line and click OK to eliminate the alarm.
Drop-in pressure	Medium	Pressure in the line is dropped suddenly.	Check extension line or animal connection. Click OK to eliminate the alarm.
Standby time expired	Medium	During Standby, after reaching the standby time.	Press【Stop】button to stop the alarm.
VTBI near end	Low	During infusion, the remaining time reached or is less than the set nearing completion time.	This alarm can't be eliminated; wait till infusion completes.
Battery nearly empty	Low	1. When power is supplied only with the built-in battery, under low battery, the alarm duration is >30min	The alarm is automatically eliminated after connecting the external power supply.

Alarm Type	Alarm Level	Reason	Solution
		2. Battery aging or the equipment charging circuit is faulty.	Please get in touch with the dealer or manufacturer for repair.
Reminder alarm	Low	After installing the IV set, under a non-working or alarm state, it is not operated within the set time of the system.	Click any button to stop.
No power supply	Low	Under ON state, A.C. power supply is adopted, but the A.C. power wire is dropped during the process.	The alarm is automatically eliminated after connecting the external power supply.
Drop sensor connection	Low	The equipment is not connected with the drop sensor when turning on the drop sensor.	Connect the drop sensor or turn off the drop sensor in the menu.

⚠ Notes: When the alarm rings, click the 『Mute』 icon on the screen to temporarily stop the sound alarm for 2min.

Appendix D EMC Electro Magnetic Compatibility Declaration

This product needs special precautions regarding EMC and needs to be installed and put into service according to the EMC information provided. This unit can be affected by portable and mobile R.F. communications equipment.

⚠ Cautions:

- This unit has been thoroughly tested and inspected to assure proper performance and operation!
- This machine should not be used adjacent to or stacked with other equipment. If adjacent or stacked use is necessary, this machine should be observed to verify regular operation in the configuration in which it will be used.

⚠ Warnings:

The use of ACCESSORIES, transducers, and cables other than those specified, except for accessories, transducers, and cables sold by the Infusion Pump Repair as replacement parts for internal components, may result in increased EMISSIONS or decreased IMMUNITY of the Infusion pump.

Guidance and manufacture's declaration – electromagnetic emission		
The Infusion pump is intended for use in the electromagnetic environment specified below. The customer or the Infusion pump user should ensure that it is used in such an environment.		
Emissions test	**Compliance**	**Electromagnetic environment – guidance**
R.F. emissions CISPR 11	Group 1	The Infusion pump uses R.F. energy only for its internal function. Therefore, its R.F. emissions are very low and are not likely to cause any interference in nearby electronic equipment.
R.F. emissions CISPR 11	Class A	The Infusion pump is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Not applicable	
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Not applicable	

Guidance and manufacture's declaration – electromagnetic immunity			
The Infusion pump is intended for use in the electromagnetic environment specified below. The customer or the Infusion pump user should ensure that it is used in such an environment.			
Immunity test	**IEC 60601 test level**	**Compliance level**	**Electromagnetic environment - guidance**
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±8 kV contact ±15 kV air	Floors should be wood, concrete, or ceramic tile. If the floor is covered with synthetic material, the relative humidity should be 30%.

Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines ±1 K.V. for input/output lines	±2kV for power supply lines	The main power quality should be a typical commercial or hospital environment.
Surge IEC 61000-4-5	± 1 kV line(s) to line(s) ±2 KV line(s)to earth	± 1 kV line(s) to line(s) ±2 KV line(s)to earth	The main power quality should be a typical commercial or hospital environment.
Voltage dips, short interruptions, and voltage variations on power supply input lines IEC 61000-4-11	<5% UT (>95% dip in UT) for 0.5 cycle 40% UT (60% dip in UT) for 5 cycles 70% UT (30% dip in UT) for 25 cycles <5% UT (>95% dip in UT) for 5 sec	<5% UT (>95% dip in UT) for 0.5 cycle 40% UT (60% dip in UT) for 5 cycles 70% UT (30% dip in UT) for 25 cycles <5% UT (>95% dip in UT)for 5 sec	The main power quality should be a typical commercial or hospital environment. Suppose the Infusion pump user requires continued operation during power mains interruptions. In that case, it is recommended that the Infusion pump be powered from an uninterruptible power supply or a battery.
Power frequency (50Hz/60Hz) magnetic field IEC 61000-4-8	3 A/m	400A/m	Power frequency magnetic fields should be at levels characteristic of a specific location in a typical commercial or hospital environment.
NOTE UT is the A.C. mains voltage before application of the test level.			
Guidance and manufacture's declaration – electromagnetic immunity			
The Infusion pump is intended for use in the electromagnetic environment specified below. The customer or the Infusion pump user should ensure that it is used in such an environment.			

<table>
<tr><th>Immunity test</th><th>IEC 60601 test level</th><th>Compliance level</th><th>Electromagnetic environment - guidance</th></tr>
<tr><td>Conducted RF
IEC 61000-4-6</td><td>3 Vrms
150 kHz to 80 MHz</td><td>10 Vrms</td><td rowspan="2">Portable and mobile R.F. communications equipment should be used no closer to any part of the Infusion pump, including cables, than the recommended separation distance calculated from the equation applicable to the transmitter's frequency.
Recommended separation distance
$d = 1.167\sqrt{P}$
$d = 1.167\sqrt{P}$ 80 MHz to 800 MHz
$d = 2.333\sqrt{P}$ 800 MHz to 2.5 GHz
Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m).
As determined by an electromagnetic site survey, field strengths from fixed R.F. transmitters should be less than the compliance level in each frequency range. b
Interference may occur in the vicinity of equipment marked with the following symbol:  </td></tr>
<tr><td>Radiated RF
IEC 61000-4-3</td><td>3 V/m
80 MHz to 2.5 GHz</td><td>10 V/m</td></tr>
<tr><td colspan="4">NOTE 1 At 80 MHz and 800 MHz, the higher frequency range applies.
NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people.</td></tr>
<tr><td colspan="4">a Field strength from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and F.M. radio broadcast, and T.V. broadcast cannot be predicted theoretically with accuracy. An electromagnetic site survey should be considered to assess the electromagnetic environment due to fixed R.F. transmitters. Suppose the measured field strength in the location where the Infusion pump is used exceeds the appropriate RE compliance level above. In that case, the Infusion pump should be</td></tr>
</table>

observed to verify regular operation. If abnormal performance is regarded, additional measures may be necessary, such as reorienting or relocating the Infusion pump.

b Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 10 V/m.

Recommended separation distances between

portable and mobile R.F. communications equipment and the Infusion pump.

The Infusion pump is intended for use in an electromagnetic environment in which radiated R.F. disturbances are controlled. The customer or the Infusion pump user can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile R.F. communications equipment (transmitters) and the Infusion pump as recommended below, according to the maximum output power of the communications equipment.

The rated maximum output power of the transmitter (W)	Separation distance according to the frequency of the transmitter (m)		
	150 KHz to 80 MHz $d = 1.167\sqrt{P}$	80 MHz to 800 MHz $d = 1.167\sqrt{P}$	800 MHz to 2.5 GHz $d = 2.333\sqrt{P}$
0.01	0.117	0.117	0.233
0.1	0.369	0.369	0.738
1	1.167	1.167	2.333
10	3.689	3.689	7.379
100	11.667	11.667	23.333

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people.

Appendix E Wireless Module Information*

Parameter Name	Parameter Value
Frequency Range	2.412GHz-2.482GHz
Modulating Type	OFDM,CCK,DSSS
Effective Radiating Power	<20dBm

Appendix F Factory Default Setting

Parameters	Default Setting	Parameters	Default Setting
Drug library	OFF	Pressure unit	mmHg
KVO	1ml/h	Micro mode	OFF
Occlusion pressure	300mmHg	Cumulative Bubble	300ul/15min
Bubble size	100ul	Drop sensor	OFF
Screen lock	ON	Sound	10%
Finish pre-alarm	2min	Brightness	50%
Reminder alarm	2min	Nurse call	OFF
DPS	ON		

Version: V1.0

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