

USER MANUAL

VETERINARY SYRINGE PUMP (EN-S3Vet)



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Preface

1 Application Scope of the User Manual

Applicable to EN-S3Vet syringe pumps of our company.

This User Manual describes the product's most complete configuration, the accessories and functions may not be existed in the product of the user, for more detailed information, please contact manufacturer.

2 Applicable Object

Applicable to professionally trained veterinary nurses, veterinary anesthesiologists, veterinary equipment repairers, etc.

3 Use Instructions

This User Manual covers the basic information on the safety and effectiveness of the product for guiding the operator to correctly install, test, operate, use and maintain the product. Please read this manual thoroughly before use.

Our company is responsible for the reliability and performance of the equipment only all following conditions are met:

- Use the equipment according to this User Manual.
- The equipment can only be disassembled, assembled, replaced, tested, improved and repaired by the professional technicians of our company.
- All components and accessories as well as consumables for repairing are provided by manufacturer.
- Relevant electric devices meet the international standard IEC/EN 60601-1 and this User Manual.

4 Paraphrase

【】 means mechanical button

() further Information

- means inapplicable

√ means accordant

→ means operation steps

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

KVO: Keep the vein open, prevent blood back to the IV tube and needle blocked.

Anti-bolus: Motor automatically reverse while the IV tube needle with high pressure.

Warning /Attention: it may possibly cause physical injury or death if the cautions covered in the Warning are not obeyed.

Caution: it may possibly cause physical injury or property loss if the cautions are not obeyed.

Note: in case fails to follow the supplementary or prompt information on the operation instructions may possibly cause physical injury the equipment fault or property loss if it is not obeyed.

Accessories: the optional components which are necessary and (or) suitable for using with the equipment in order to achieve the expected purpose, or provide convenience for achieving the expected purpose, or improve the expected purpose, or increase the additional functions of the equipment.

Content

Preface.....	2
Chapter1 Safety Instructions	5
1.1 Warnings.....	5
1.2 Cautions	6
1.3 Dialogue window	7
1.4 Symbols	8
Chapter2 Overview	9
2.1 Application Scope.....	9
2.2 Contraindications.....	9
2.3 Working Principle	9
2.4 Structure and Performance	9
2.5 Product Specification	10
Chapter3 Appearance	12
3.1 LEFT Front View & RIGHT Front View.....	12
3.2 OPERATION PANEL.....	14
3.3 Display Screen	15
3.4 Rear View	17
Chapter4 Installation	18
4.1 Unpacking and Checking	18
4.2 Installation	18
Chapter5 Use Preparation and Cautions	20
5.1 Use Preparation.....	20
5.2 Operation Cautions.....	20
Chapter6 Basic Operation	21
6.1 Operation Flow.....	21
6.2 Infusion Operation.....	21
Chapter7 Set Infusion Parameters	24
7.1 Introduction to Infusion Parameters Setting.....	24
7.2 Infusion Parameters Setting Range	24

7.3	Infusion Mode Setting.....	25
Chapter8	System Setting	26
8.1	Settings	26
8.2	System	28
8.3	Anti-bolus.....	29
8.4	Electronic Memory Function	29
Chapter9	Alarm Prompt and Troubleshooting.....	30
9.1	Introduction to Alarm Level.....	30
9.2	Multilevel Alarm Rules	30
9.3	Alarm Treatment.....	30
9.4	Fault Analysis and Solution.....	31
Chapter10	Maintenance	32
10.1	Cleaning, disinfecting and sterilizing	32
10.2	Periodical maintenance.....	32
10.3	Add new brand and Calibration	34
10.4	Repair.....	34
10.5	Equipment Components/Accessories.....	35
10.6	Production Date.....	35
10.7	Recycling.....	35
Chapter11	Battery.....	36
11.1	Check the Battery Performance.....	36
11.2	Replaced the Battery.....	36
Chapter12	After Sale Service	37
Chapter13	Appendix	38
	Appendix A Start Up Graphs and Trumpet Curves.....	38
	Appendix B Occlusion Response Property	40
	Appendix C Alarm and Solution.....	41
	Appendix D Electro Magnetic Compatibility declaration.....	43
	Appendix E Wireless Module Information	47
	Appendix F Factory Default Data Set	48

Chapter1 Safety Instructions

1.1 Warnings



- Before using, please check the equipment, connecting wire and accessories to ensure that it can work normally and safely. If there's anything abnormal, immediately stop working and contact our after sale service department. Additionally, the adhesion or intrusion of fluid/drug may possibly cause the equipment fault and malfunction. Therefore, please clean the equipment after use, and store it correctly.
- This equipment must be operated by trained professional medical care personnel.
- This equipment **is not applicable** to blood transfusion.
- It is not allowed to put and use the equipment in the environment with anesthetic and other inflammable or explosive articles to avoid fire or explosion.
- It is not allowed to store or use the equipment in the environment with active chemical gas (including gas for disinfecting) and moist environment since it may influence the inside components of the syringe pump and may possibly cause performance drop or damage of the inside components.
- The operator shall guarantee that the set infusion parameters of this equipment are the same as the medical advice before starting infusion.
- Please do not only depend on information prompt during use, please periodically check it to avoid accident.
- Tightly fix this equipment on the infusion stand and ensure the stability of the infusion stand. Be careful when moving the infusion stand and this equipment to avoid the equipment dropping and infusion stand falling or knocking the surrounding objects.
- If the syringe extension tube is twisted, or the filter or needle is obstructed, or blood in the needle which may obstruct the syringe, the pressure in the tube will rise. When removing such occlusion, it may possibly cause "bolus injection" (temporary excess infusion) to the animal. The correct method is to tightly hold or clamp the extension tube near the puncturing position, then loosen the tube, solve the reason of occlusion, and restart infusion. If infusion is restarted when the occlusion reason exists, then it may cause occlusion alarm persistently, and the pressure in the syringe tube may keep rising, and may break or cut off the tube, or hurt the animal.
- This equipment has the occlusion detection function for detecting and alarming when the syringe needle deviates the position in the vein or the needle is not correctly punctured in the vein. However, it only alarms when the occlusion pressure has reached certain numerical value, and the puncturing part may possibly have become reddish, swelling or bleeding, additionally, it is possible that the device doesn't alarm for a long period if the actual occlusion pressure is lower than the alarm threshold value, therefore, please periodically check the puncturing part. If there's any abnormal phenomenon for the puncturing part, please timely take suitable measures, such as puncturing again.

- Only those sterile hypodermic syringes for single use and other medical components that meet the local laws and regulations and the requirements covered in and this User Manual can be adopted, it is suggested to adopt the syringe with same brand as this equipment. It can't ensure the infusion accuracy if the unsuitable syringe line is adopted. Please use the syringe and the extension tube with a screw, or may be because of the pipeline pull to cause damage to the animal.
- It is not allowed to disassemble or refit this equipment or use it for other purposes except normal infusion.
- No one is allowed to repair this equipment except our company or the authorized repair technician of our company.
- Maintenance or replacement of spare parts is prohibited during the clinical use of the equipment.
- To avoid risk of electric shock, this equipment must only be connected to a supply mains with protective earth

1.2 Cautions



- Before its first use after purchase, or this equipment is not used for a long period, please charge the equipment with AC power supply. If it is not fully charged, under power failure, the equipment can't continue working with built-in battery power supply.
- This equipment can not be used in the places with radiological installation or magnetic resonance equipment as well as the places with high pressure oxygen therapy.
- Not to position ME Equipment to make it difficult to operate the disconnection device.
- The DC power supply is only suitable for applications where a backup power supply is required. Only use the DC power supply line provided by the manufacturer.
- Other devices near this equipment must meet corresponding EMC requirements, otherwise, it may influence the performance of this equipment.
- Under general conditions, please use AC power supply as much as possible since it can prolong the service life of the battery at a certain degree. When using AC power supply, ensure that the grounding wire is reliably connected with the ground, and only the AC power wire attached with this equipment shall be adopted. The built-in battery can only be used as the assistant power supply when the AC power supply can't reliably connect with the ground and is not under normal conditions (power failure or moving infusion).
- Before connecting this equipment with power supply, please keep the power socket and plug dry, and the power voltage and frequency meet the requirements listed in the equipment label or this User Manual.
- The equipment is equipped with the audible and visual alarm system, and the red and yellow alarm indicators will light on by turn to check if the alarm system can work normally, and the speaker makes the "beep" sound.
- Please keep the equipment away from the AC power socket for a certain distance to avoid

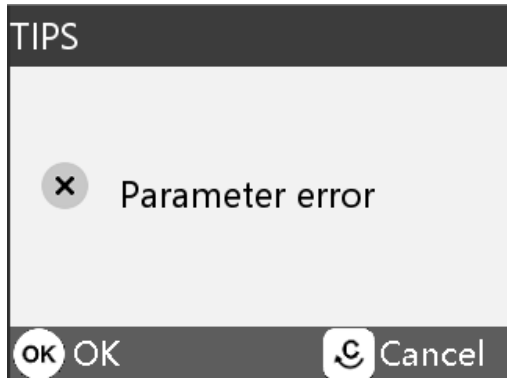
fluid/drug splashing or dropping in the socket, otherwise, it may possibly cause short circuit.

- Please use the fluid/drug after it has reached or nearly reached room temperature. When the fluid/drug is used at low temperature, the air which is dissolved in the fluid/drug may cause more air bubbles and result in frequent air bubble alarm.
- It is not allowed to press and operate the button with sharp object (such as pencil tip and nail), otherwise, it may possibly cause early damage to button or surface film.
- Under the condition of low flow rate infusion, please pay special attention on occlusion. The lower the infusion flow rate, the longer the time of detecting occlusion, and it in turn may possibly cause a long time infusion stop during this period.
- If the equipment suffered from dropping or impacting, please immediately stop using it, and contact our after sale service department, because the inside components of the equipment may be possibly damaged even the appearance is not damaged and abnormality is not occurred when working.
- It is recommended to use the accessories specified in this manual to ensure animal safety.

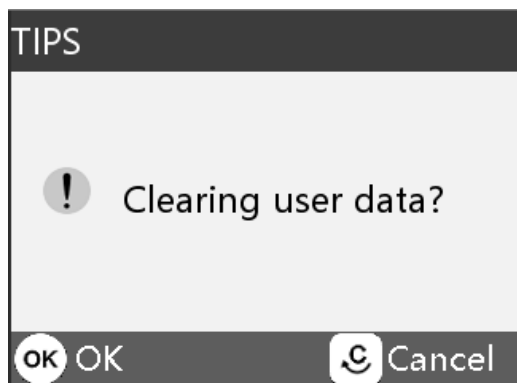
1.3 Dialogue window

Dialogue window mainly content include operation select, operation confirm etc. tips information. For instance:

(Figure1.3-1: Operation select window)



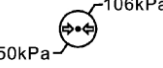
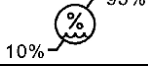
(Figure1.3-2: Operation confirm window)



1.4 Symbols

Not all of the below symbols are existed in the equipment you have purchased.

Table:1.4-1

Marks	Description	Marks	Description
	Batch code		Protective earth (ground)
	Serial number	IP24	Drip Proof(Degree of protection against ingress of fluids)
	Caution		Alternating current
	Defibrillation-proof type CF applied Part		Direct current
	Date of Manufacture		Handle with harmless method
	environment-friendly use period (20 years)		Manufacturer
	Unlock		Refer to instruction manual /booklet
	Input / output		Lock
	This side up		Input
	Keep dry		Fragile items
	Non-ionizing electromagnetic radiation		Stacking level limit
	Transport package temperature limit is -20 ~ 60 °		The environmental pressure limit of the transport package is
	Transport package humidity is limited to 10% to 95%		

Chapter2 Overview

2.1 Application Scope

2.1.1 Expected Purpose

The syringe pump is used together with syringe to control the dose of liquid infused into animal's body, for example intravenous infusion.

2.1.2 Expected Working Environment

Animal Hospital, Pet clinic.

2.1.3 Suitable object

Animal.

2.2 Contraindications

No.

2.3 Working Principle

It is controlled to move into a linear motion from a microcontroller based system which drives a step motor, allowing a wide range of pumping rates configured to the inside diameter of the loaded syringe. The syringe plunger is driven from a leadscrew and drive-nut mechanism, infusing the drugs into the animal.

2.4 Structure and Performance

2.4.1 Structure and Performance

The syringe pump mainly composes of the main unit and built-in battery. This equipment provides several infusion modes, such as ml/h mode, body weight mode, loading dose mode. Additionally, it also has functions such as history records, drug library, Anti-bolus, and alarm and so on.

2.4.2 Accessories

Power wire、 Pole clamp、 Handle

2.4.3 Applied parts

Housing, push-pull box, handle, display, buttons, and matching syringe.

2.4.4 Description on Model

Function /Model		EN-S3Vet
infusion mode	ml/h mode	√
	Body weight mode	√

	Loading dose mode	√
Drug Library	Drug name display	√
	Drug names	20
Occlusion alarm level		3 levels

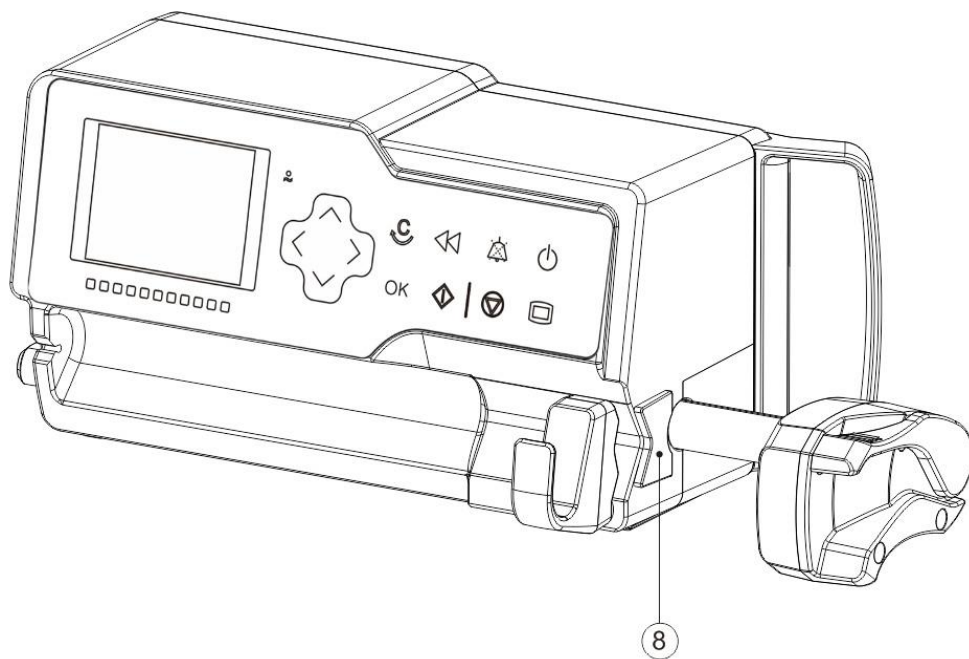
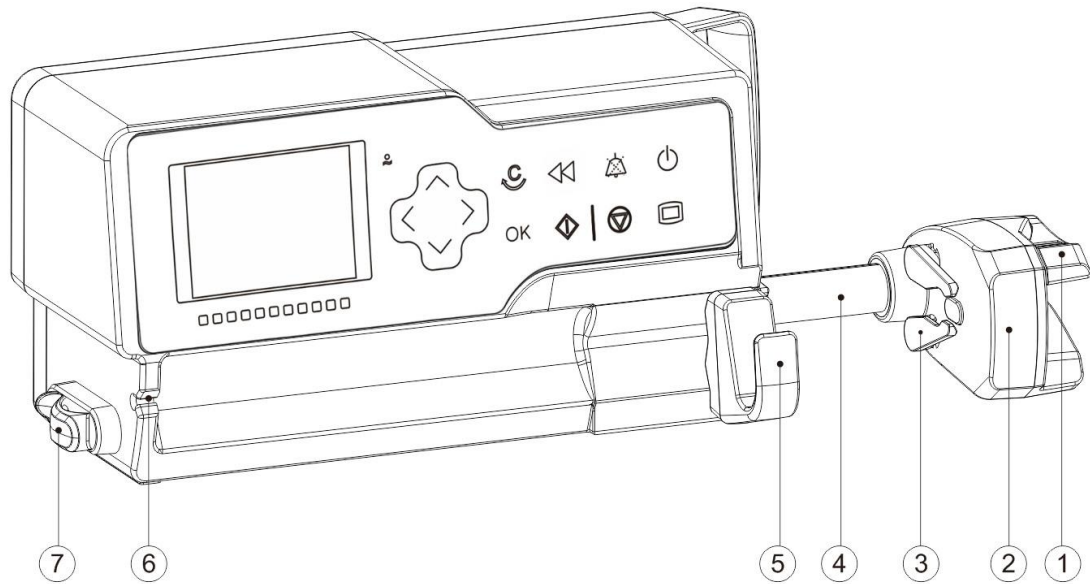
2.5 Product Specification

Safety Classification	
Electric protection Type	Class I
Electric protection Level	Defibrillation proof type CF applied Part
Protection against fluid ingress	IP24
Working mode	Continuous operation
Classification	Portable equipment, non-portable syringe pump
Specification Parameters	
Compatible Syringes	5ml, 10ml, 20ml, 30ml , 50/60ml
System Accuracy	≥1ml/h, ±2% (mechanical accuracy ±1%)
Bolus Accuracy	≥1ml/h, ±2%
Infusion Rate	Syringe size 5ml: (0.1-100) ml/h Syringe size 10ml: (0.1-200) ml/h Syringe size 20ml: (0.1-400) ml/h Syringe size 30ml: (0.1-600) ml/h Syringe size 50ml: (0.1-1500)ml/h
Bolus Rate	Syringe size 5ml: (0.2-100) ml/h Syringe size 10ml: (0.2-200) ml/h Syringe size 20ml: (0.2-400) ml/h Syringe size 30ml: (0.2-600) ml/h Syringe size 50ml: (0.2-1500)ml/h
Purge rate	Syringe size 5ml: 100 ml/h Syringe size 10ml: 200 ml/h Syringe size 20ml: 400 ml/h Syringe size 30ml: 600 ml/h Syringe size 50ml: 1500 ml/h
KVO Rate	0-5.0ml/h
Minimum flow rate increment	0.1ml/h
Bolus Volume	Syringe size 5ml: Minimum 0.1ml, max 5ml Syringe size 10ml: Minimum 0.1ml, max 10ml Syringe size 20ml: Minimum 0.1ml, max 20ml

	Syringe size 30ml: Minimum 0.1ml, max 30ml Syringe size 50ml: Minimum 0.1ml, max 50ml
VTBI	0.1-9999ml, minimum step is 0.1ml
Total Volume Infused	0-9999.9ml, minimum step is 0.1ml
Time Range	1min-99hrs59min
Fuse Type	T2AL 250V
Dimensions	280(W)*90(D)*123(H) mm
Weight	2kg
Power Supply	
AC power supply	100-240V 50/60Hz
Input power	50VA
DC power supply	DC 12V-16V, 1.5A-0.94A
Battery Specifications	Model: DC 203 Specification: 11.1V 2600mAh Charging time: 5h under OFF status Working time: ≥12h (after completely charging the new battery, when the environment temperature is 25℃ and flow rate is 5ml/h, the constantly working time)
Alarm	
Alarm signal sound pressure level	When the sound is set at lowest level, alarm signal sound pressure level ≥50dB(A) When the sound is set at highest level, alarm signal sound pressure level ≤80dB(A)
Alarm information	VTBI near end, Syringe near empty, VTBI infused, Syringe empty, Pressure high, Battery nearly empty, Battery empty, No battery inserted, No power supply, Check syringe, Reminder alarm, Standby time expired, KVO finished, system error.
Environment	
Non AP/APG type equipment	Do not use it in the environment with inflammable anesthetic gas mixed with air, and inflammable anesthetic gas mixed with oxygen or nitrous oxide
Operating	(1) temperature: 5-40℃ (2) humidity: 15-95%, non-condensable (3) atmospheric pressure: 57-106kPa
Transport & Storage	(1) temperature: -20-60℃ (2) humidity: 10-95%, non-condensable (3) atmospheric pressure: 50-106kPa

Chapter3 Appearance

3.1 LEFT Front View & RIGHT Front View



① ——Handle

Control syringe pump push-pull sliding box and clip

② ——Slider box

③ ——Syringe clip

Clamp the syringe plunger

④ ——Lead-screw

⑤ ——Syringe fixture lever

Press syringe tightly and recognize size of syringe

⑥ ——Extension tube slot

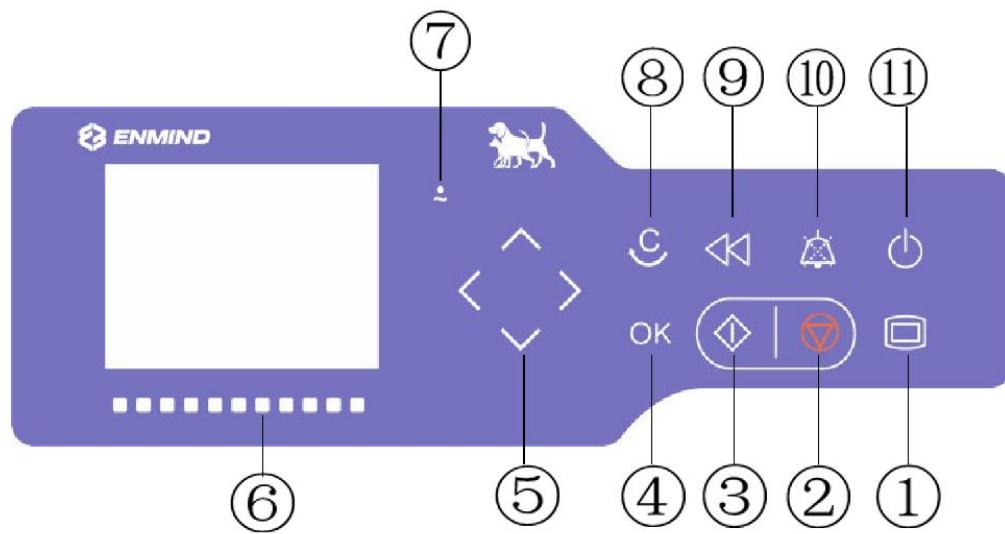
⑦ ——Tube line clamp

Keep extension tube in line and neat

⑧ ——Syringe flange plate

Put the syringe flange into the slot for positioning

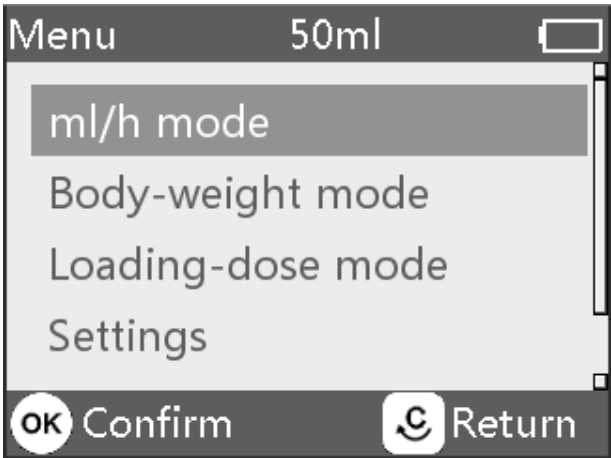
3.2 OPERATION PANEL



- ① — Menu
- ② — Stop
- ③ — Start
- ④ — OK
- ⑤ — 4 directions
- ⑥ — Gliding alarm light
- ⑦ — AC indicator
- ⑧ — Clear
- ⑨ — Bolus/Purge
- ⑩ — Mute
- ⑪ — Power

3.3 Display Screen

The display screen interface layout composes of title bar and typical interface.



3.3.1 Title Bar

Title bar displays real-time state information and is not touchable, the left upper corner displays the name of current editing parameter.

Table3.4.1-1: Title Bar Icon

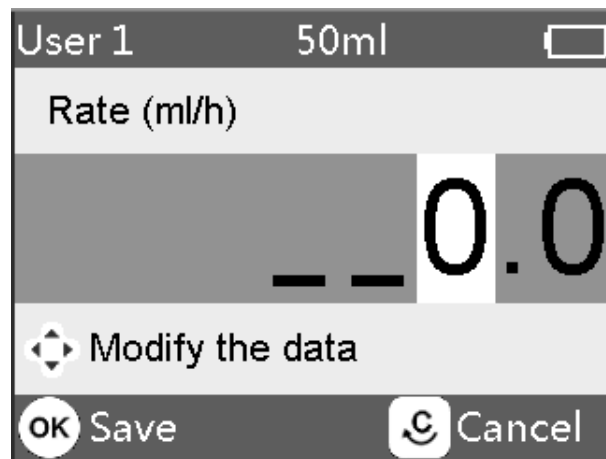
Icon	Paraphrase	Description
	Syringe apparatus indication icon	/
	Lock screen indication icon	Unlock state icon is 
	Battery status indication icon	The percentage numerical value at the left side of the icon displays the remained battery. Since the remained battery may change, it may possibly show the following states: 

3.3.2 Typical Interface

During pre-infusion and infusion, the typical interface will display the following: main interface, working interface, alarm interface, prompt interface, control panel, parameters setting, input method, standby interface etc.

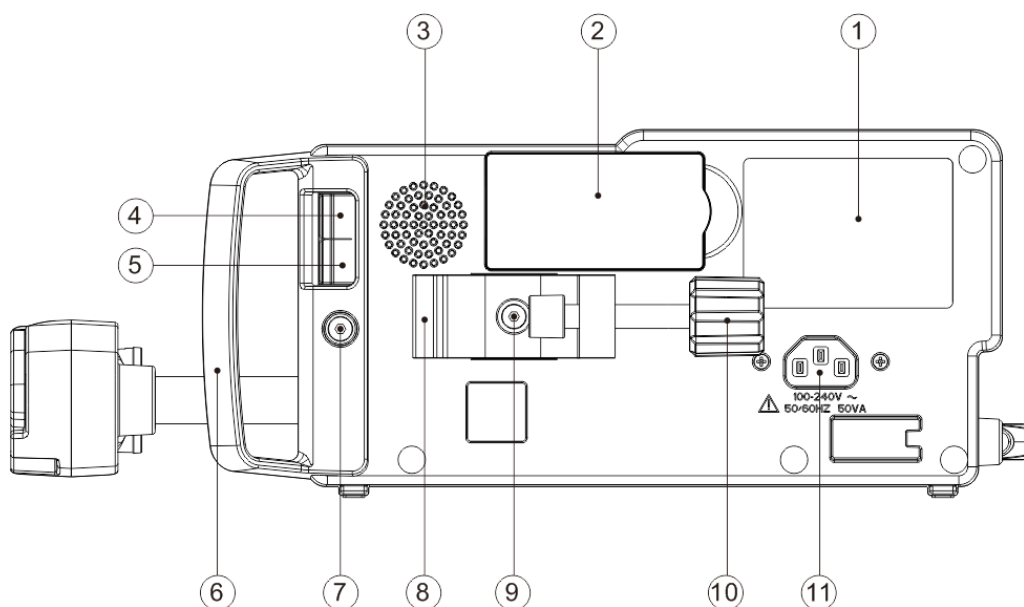
3.3.2.1 Input Method Interface

The input method interface composes of the title bar, sub-title bar, input box, hint box and buttom title bar.



- (1) Title bar: display parameters line syringe brand, size of syringe.
- (2) Sub-title bar: display the name of current editing parameter.
- (3) Input box: real-time display the input content.
- (4) Hint box: hint of how to edit data.

3.4 Rear View



① ——Label

② ——Battery cover

③ ——Loudspeaker

④ ——Multi-functional interface-A

Can be used for DC power supply interface

⑤ ——Multi-functional interface-B

Can be used for software upgrade interface

⑥ ——Handle

⑦ ——Hole for mounting handle

⑧ ——Pole clamp

Used for mounting the equipment on the infusion stand

⑨ ——Hole for mounting pole clamp

⑩ ——Knob of pole clamp

⑪ ——AC adapter port

Chapter4 Installation

4.1 Unpacking and Checking

- 1) Please check the appearance before unpacking, if broken, please contact the transportation company or our after-sale service department quickly.
- 2) Please carefully open the package to avoid damaging the equipment and relevant accessories.
- 3) After unpacking, please check the objects according to the packing list, if there're insufficient or damaged accessories, please contact our company as soon as possible.
- 4) Please keep relevant accessories, warranty card and User Manual.
- 5) Please keep the packing case and packing materials for future transportation or storage.



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

4.2 Installation

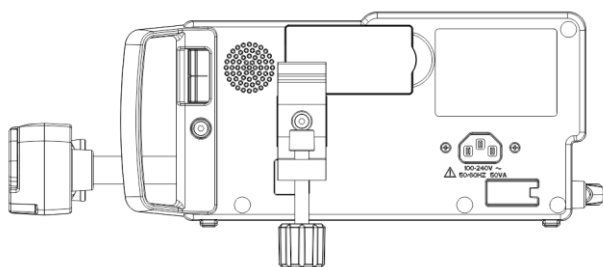
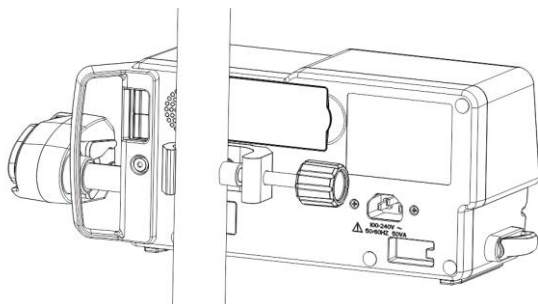
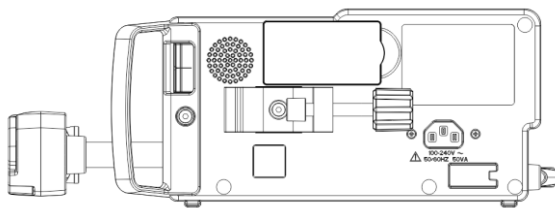


Warning:

- This equipment shall be installed by the designated technicians of our company.
- When connecting this equipment with other electric devices to form the combination with special function, if the combination can't be confirmed dangerous or not, please contact our company or the electric expert of hospital to ensure that the necessary safety of all devices in the combination won't be destroyed.
- This equipment must be used and stored in the environment regulated by our company.

4.2.1 Install the syringe Pump

- (1) Rotate the pole clamp screw(knob) and unscrew to leave the space.
- (2) Lock the Pole Clamp on the infusion stand, adjust the position of the syringe pump, tighten the pole clamp to fix the syringe pump on the infusion stand (shown in drawing below). Hold the syringe pump when tightening the fixing clamp; loose it after tightening to avoid falling.
- (3) The pole clamp supports the vertical pole at default state. To adjust the pole clamp direction, please remove the bolt from the pole clamp screwdriver, take out the pole clamp and adjust the direction, then tighten the bolt.
- (4) Install the handle as shown in the figure. Align with the holes, then tighten the screws.



Chapter5 Use Preparation and Cautions

5.1 Use Preparation

The new equipment, or reusing after storing for a period, or reusing after repair, please check it to ensure before use:

- The equipment appearance is clean and under good condition without crack and leakage.
- The moving components are smooth and effective; the button is effective.
- The touch screen can be operated smoothly and effectively.
- The power wire is installed tightly and won't be easily damaged when pulling.
- Set and check the system time to ensure that the history records will be correctly recorded.
- In case only built-in battery is adopted for supplying power, please charge it to full before using, and ensure that the battery keeps at the effective working conditions.
- 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 the position less than 0.65m to the heart of the animal.
- The parameters can only be set or changed by the trained and professional personnel.
- Avoid the equipment working with fault so as to avoid medical negligence, which may hurt the health and even life of the animal.
- It may possibly drop the infusion accuracy or abnormal work of the equipment if the working environment temperature exceeds the designated range.
- The viscosity and specific gravity of infusion fluid will influence the infusion accuracy.

Chapter6 Basic Operation

6.1 Operation Flow

1. □ Mount the syringe pump on the IV stand
2. □ Power on
3. □ Install syringe
4. □ Select syringe brand or add new brand
5. □ Select infusion mode
6. □ Set infusion Parameters
7. □ Remove air bubble in the line
8. □ Connect infusion line with animal
9. □ Start infusion
10. □ Infusion finish
11. □ Remove syringe
12. □ Power off or Standby

6.2 Infusion Operation

6.2.1 Equipment Installation

Mounting the device on the infusion stand according to **Chapter 4.2**, connect with AC power supply, check the AC indicator lights.

6.2.2 Starting and Self-test

- 1) Press  , power on the equipment
- 2) After power on, the system will automatically check the motor, sensor, battery, memorizer, CPU communication, alarm indicator.
- 3) After passing self-test, pump enters into ml/h mode interface.

 **Warning:** ● If self-test failed, pump cannot operate properly or damaged, it cannot used for animal infusion, please contact the company actively.

6.2.3 Install Syringe

- (1) Hold the clutch and pull the slider to the right side.

- (2) Pull the syringe fixture lever, turn to the right.
- (3) Insert the syringe flange into the slot, clip the plunger firmly.
- (4) Hang the extension tube of the syringe on the extension hook and put the IV tube inside the tube clamp



Warning:

- The flange of the syringe should be firmly inserted into the slot, and not jutting on the outside of the flange plate.
- Before using the syringe pump, pls. ensure the syringe brand specifications of the syringe used must be confirmed. The brand of syringe pump should be calibrated on the equipment. If there are no settings for the syringe used, the rate and the alarms may not be accurate.

6.2.4 Set Infusion Parameters

Enter the **【Home】** interface, select infusion mode, then set infusion parameters.

6.2.5 Remove Air bubble

Under the parameters setting interface, Press **【Bolus】** button and hold on, eliminate the air bubble in the line .

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



Cautions:

- Before purge air, pls. confirm the infusion line is **not connected** with the animal.
- Purge rate is the max rate of the syringe size, when purge volume $\geq 5\text{ml}$, purge will automatically stop.

6.2.6 Start Infusion

Connect IV tube with animal, confirm infusion parameters, Press **【Start】** button ,start infusion.

6.2.7 Change the Rate During infusion

Flow rate can be modified during the infusion process. Click **【OK】** in the running interface, and amend the flow rate in the pop-up input box.



Note: ● Only the *ml/h mode* and *Body weight mode* support rate modification function

6.2.8 Bolus Application

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

(1) **Manual bolus:** press and hold the **【Bolus】** button, pump will work at the default max flow rate of current syringe size. (syringe flow rate range pls. refer to 2.5). Release the button, pump will re-work at previous setting infusion rate.

(2) **Automatic bolus:** Under the running interface, click **【Bolus】**, set any two parameters among bolus infusion volume, rate and time, then click **『Start』**. After bolus infusion finished, the equipment will re-work at previous setting infusion rate. Click the **【Clear】** to stop Bolus in advance.



Note: The “VTBI near end ” alarms are not triggered during Bolus.

6.2.9 Infusion Completion

When infusion near completion, pump will alarm. If ignore it, the system will keep alarming until finishing infusion.

After VTBI completed, it activates VTBI infused alarm, if KVO function is ON, the equipment automatically starts KVO function, click **【OK】** in the alarm interface to stop KVO and eliminate alarm.

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

Please refer to **Chapter 8.1.3** for setting KVO rate.

6.2.10 Stop Infusion

During infusion process or after infusion finished, click **【Stop】** to stop infusion. The interface then displays Total Volume Infused and adjustable parameters.

6.2.11 Remove the syringe

Disconnect the IV tube with the animal, then remove the syringe sets.

Replace syringe, please follow the steps of Chapter 6.2.3

6.2.12 Power OFF or Standby

Power OFF: press and hold the  **【Power】** Button till the screen is OFF, the equipment is OFF.

Standby: press the  **【Power】** Button to enter into standby interface.



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

Chapter7 Set Infusion Parameters

7.1 Introduction to Infusion Parameters Setting

(1) The drug information can be displayed in the infusion running interface only when the drug library is under active state.

Click 『Settings』 icon in the main interface to enter submenu, find 『Drug Library』 menu item, click to enter then set the ON/OFF state of drug library and select drug. Please refer to this User Manual Chapter 8.1.1 for details.

(2) For both the rate set in infusion parameter and the rate calculated by the system, the range is the system default flow rate of the current working syringe specification.

(3) It doesn't need to set VTBI (Volume to be infused), which means to complete the fluid/drug in the syringe.

7.2 Infusion Parameters Setting Range

Infusion Mode	Infusion Parameter	Parameter Range
ml /h mode	VTBI	0.1-9999ml
	Rate	(0.1-100)ml/h for 5ml syringes (0.1-200)ml/h for 10ml syringes (0.1-400)ml/h for 20ml syringes (0.1-600)ml/h for 30ml syringes (0.1-1500)ml/h for 50ml syringes
	Time	1min-99hrs59min
Body weight mode	Weight(Body weight)	0.1-300kg
	Acti agentia(Drug mass)	0.1-99999
	Conc.unit(Concentration unit)	ug/ml, mg/ml, g/ml, U/ml, kU/ml, IU/ml, EU/ml, mmol/ml, mol/ml, kcal/ml
	Volume(Fluid amount)	0.1-9999ml
	Dose rate	0.1-9999
	Dose rate unit	ug/min, mg/min, g/min, U/min, KU/min, IU/min, EU/min, mmol/min, mol/min, kcal/min, ug/h, mg/h, g/h, U/h, KU/h, IU/h, EU/h, mmol/h, mol/h, kcal/h, ug/kg/min, mg/kg/min, g/kg/min, U/kg/min, KU/kg/min, IU/kg/min, EU/kg/min, mmol/kg/min, mol/kg/min, kcal/kg/min, ug/kg/h, mg/kg/h, g/kg/h, U/kg/h, KU/kg/h, IU/kg/h, EU/kg/h, mmol/kg/h, mol/kg/h, kcal/kg/h
Loading dose mode	VTBI	The same as ml/h mode
	Maintain rate	
	Loading rate	
	Loading time	

7.3 Infusion Mode Setting

After starting the equipment and self-test, the equipment automatically enters into the ml/h mode parameters setting interface, to select other mode, click **【Menu】** icon to enter into the main interface, and select preset infusion mode.

7.3.1 ml/h Mode

Under this mode, it allows to set three parameters: Rate, VTBI (Volume to be infused) and Time, set any two of the three parameters, and the system will automatically calculate the third parameter, if the VTBI is 0, then the equipment works at the set rate till stop with alarm.

7.3.2 Body Weight Mode

Under this mode, set the Weight(body weight), Conc.unit(concentration unit), Acti agentia(drug mass), 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 $\{\text{dose rate} \times \text{weight}\} / \{\text{Acti agentia}(\text{drug mass}) / \text{Volume}(\text{fluid volume})\}$, and automatically calculate the time according to (VTBI) / (flow rate).

Exmaple: the dose rate unit(ug/kg/min)

$$\text{flow rate (ml/h)} = \frac{\text{Dose rate(ug / kg / min)} \times \text{Weight(kg)} \times \text{Volume(ml)}}{\text{Acti agentia(mg)} \times 1000} \times 60$$

Exmaple: the dose rate unit(mg/kg/h)

$$\text{flow rate (ml/h)} = \frac{\text{Dose rate(mg / kg / h)} \times \text{Weight(kg)} \times \text{Volume(ml)}}{\text{Acti agentia(mg)}}$$

7.3.3 Loading dose mode

The Loading dose mode means to infusion with the Loading flow rate according to the Loading time, after reaching the Loading time, it works at the Maintain rate till complete the VTBI(Volume to be infused).

Loading dose VTBI = Loading rate $\times$ Loading time

Maintain time = (VTBI - Loading VTBI) / Maintain rate

Under this mode, set the VTBI, Maintain rate, Loading rate, Loading time, system automatically calculate Loading dose VTBI and Maintain time.

 **Note:** • VTBI must be greater than the Loading dose VTBI otherwise, when setting exceeds the limit, the excess part can't be set.

Chapter8 System Setting

8.1 Settings

Click 『Settings』 icon in the main interface to enter into parameters setting interface.

8.1.1 Drug Library

Click 『Settings』 icon in the main interface to enter submenu, find 『Drug Library』 menu item, click to enter then set the ON/OFF state of drug library and select drug.

8.1.1.1 Introduction to Drug library

EN-S3Vet supports over 20 drugs, which can be imported with external tool, and has the functions such as upper and lower limit, concentration and so on.

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

8.1.1.2 Setting Drug library

Click the medicine name with preset value. The selected medicine will be displayed in the infusion mode parameter.

Select this function ON/OFF.

8.1.2 Occlusion Pressure

Click 『Occlusion』 to enter into occlusion level setting interface, Three different drop sensor levels available, after confirming, click 『OK』 .

The higher the level, the higher the occlusion level, it is suggested to select suitable occlusion pressure according to actual requirement.



Warning:

- When adopting fluid/drug of high viscosity and the occlusion pressure is set at low level, it is possible that the system will report occlusion alarm even when the line is not obstructed, under this condition, please carefully observe the pressure indication icon in the display screen and infusion line, and rise the occlusion pressure if needed.
- When the blocking pressure is set to high grade, the larger pressure inside the pipeline is likely to be washed away from the extension tube connected to the syringe. Please confirm that the extension tube is securely attached to the syringe.
- When the occlusion pressure is set at high level, it may possibly cause the animal uncomfortable, after rising the occlusion pressure, please carefully observe the condition of the animal, and immediately take measure if there's any abnormality.

Under the equipment fault state, the max pressure generated by the infusion line is 160kPa. Under single fault state, the max infusion volume is 2ml.

(Table 8.1.2-1 Relation of Occlusion level and Pressure)

Applicable Model: EN-S3Vet Occlusion Pressure Level: 3 levels									
Level	Pressure (mmHg)	Intensity	Pressure (Kpa)	Intensity	Pressure (bar)	Intensity	Pressure (psi)	Intensity	
1	150		20		0.2		2.9		
2	525		70		0.7		10.15		
3	900		120		1.2		17.4		

8.1.3 KVO Rate

Click 『KVO rate』 , input the numerical value, after confirming, click 【OK】 .

Please refer to Chapter 2.5for the adjustable KVO range.

8.1.4 Finish Pre-alarm

Finish pre-alarm means pump will alarm at the setting time before VTBI done, this function can choose on or off

Click 『Pre-alarm』 enter the corresponding time setting interface , click time set option

Range of pre-alarm time : 2min、 5min、 10min、 15min、 20min、 30min

8.1.5 Commonly used syringe brand

For the built-in syringe brand of the system, after installing the syringe, click 『Commonly used brand』 to enter into the syringe brand selecting interface, and click the preset brand option.

The system built-in syringe brand: Double-Dove , B.Braun, BD,TERUMO.

Syringe brand	5ml	10ml	20ml	30ml	50ml
Double-Dove	√	√	√	√	√
B.Braun Perfusor			√		√
BD	√	√	√	√	√
TERUMO	√	√	√	√	√



• The syringe of different brand may possible cause flow rate deviation, when use, please confirm if the displayed information in the interface is accordant with the actual working syringe brand.

8.1.6 Reminder Alarm

Click 『Reminder』 enter reminder setting interface, this function can be on or off

Click time setting option, reminder time range : 2min、 5min、 10min、 15min、 20min、 30min

Reminder alarm refers to under the status of syringe having installed without starting ,when reach reminder time , pump will alarm.

8.1.7 Screen Lock

Click 『Auto lock』 enter auto screen lock interface , this function can be on or off status

Auto screen lock time range :15s、 30s、 1min、 2min、 5min、 10min or 30min

it means after running corresponding time, if no any action ,pump screen will lock automatically

Unlock: Click unlock option when touch screen

 Note: • When happened high level alarm, pump will unlock automatically.

8.1.8 Sound

Click 『Sound』 to enter into the sound parameters setting interface, the volume has 3 levels. The lowest volume is $\geq 50\text{dB}$, and the highest volume is $\leq 80\text{ dB}$.

8.1.9 Brightness

Click 『Brightness』 to enter into display brightness setting interface. The brightness has 3 levels.

8.2 System

In the main interface, click 『System』 to enter into the equipment setting interface.

8.2.1 Records

8.2.1.1 History entries

Click 『System』 in the main interface to enter submenu, click the “History entries” menu item into history records query interface. The equipment supports to save over 5000 history records, and can display the event name, event date and time. When it is full, the new records will cover the old records by turn.

The history record contains alarm information, treatment records and exhaust, cumulating clear, switch, standby operation information

8.2.1.2 Data Export

Log on the PC tool to connect this equipment with PC;

After the equipment has achieved communication with PC, the PC can automatically read the data in this equipment;

Create the history record folder in the PC to export the data to the folder.

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

8.2.2 Date & Time

Click 『Date & Time』 to enter into the date and time setting interface. It allows to set the date, time and format in this interface.

When setting date and time, directly input the numerical value in the input method interface. For example, to preset one date “2015-08-31”, input “20150831”; to preset the time “13: 34”, input “1334”.

The time is displayed in 24h format or 12h format, the date is displayed in British type, American type or Chinese type, please set according to the requirement.

8.2.3 SN (Serial Number)

Check the serial number of the equipment, and user can't modify the serial number.

8.2.4 Nurse Call

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



Note: • The nurse call function must be used with special cable.

• The user shall not only depend on the nurse call function as the main alarm notice mode, and shall identify according to the equipment alarm and the animal state.

8.2.5 Factory Default

Click 『Factory default』 to clear the User defined option, and this function is open to the user.

8.2.6 Version

Check the software version in this interface.

8.2.7 Maintenance

More detail pls. refer to Chapter10.

8.3 Anti-bolus

When the line occlusion activates occlusion alarm, the system will automatically drop the line pressure to avoid additional impact bolus to the animal after contacting the occlusion.

8.4 Electronic Memory Function

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

Chapter9 Alarm Prompt and Troubleshooting

9.1 Introduction to Alarm Level

During infusion preparation and infusion, this equipment will alarm when reaching or exceeding the set alarm threshold value and prompt with sound, light and text. According to the importance of alarm information as well as the emergency and safety, the alarm is divided into three levels: high, medium and low. Please refer to table below for details:

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

If there's alarm, the system will display the alarm interface. Click **【OK】** to exit the alarm interface.

Click **【Mute】** to mute, if alarm is not eliminated, the alarm sound will be sent out 2min later.

ALARM SIGNAL sound pressure level range:

50dB(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 set the alarm threshold value, otherwise, it may possibly influence the alarm function or infusion safety.

9.2 Multilevel Alarm Rules

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

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

9.3 Alarm Treatment

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

Please refer to Appendix C for the alarm solution.

9.4 Fault Analysis and Solution

When there's fault, the syringe pump screen will display the fault alarm information, this item is the alarm of high level. 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 the equipment, do not put it into operation before the equipment has passed the inspection, otherwise, it may possibly cause unpredictable harm if it works with fault.

If the equipment is on fire/burns for unknown reason, or has other abnormal conditions, the user shall immediately cut off power supply and contact our customer service department.



Note:

The distance between the operator of the syringe pump and the pump should not exceed 0.5m, so as not to affect the operator to correctly identify the alarm.

The visual alarm signal is 4 meters away, the alarm indicator or analog alarm indication area is visible to the naked eye; the visual alarm information is 1 meter away, and the alarm string or alarm icon is visible to the naked eye.

Chapter10 Maintenance

10.1 Cleaning, disinfecting and sterilizing

-  Warning:
 - Please cut off power supply and unplug the DC /AC power wire before cleaning the equipment.
 - During cleaning and disinfecting, please keep the equipment horizontal and upwards to protect the equipment and accessories from fluid.

10.1.1 Cleaning

- (1) The daily maintenance is mainly to clean the housing and pump body. It is inevitable that fluid/drug may flow in the equipment during infusion. Some fluid drug may corrode the pump and cause working fault. After infusion, please timely clean the equipment, wipe it with moist and clean soft fabric, and then naturally dry it.
- (2) When cleaning the equipment interface, please wipe it with dry and soft fabric, confirm the interface is dry before using.
- (3) Please do not soak the equipment in water. Although this equipment has certain waterproof function, when fluid splashes on the equipment, please check if it works normally, perform insulation and electric leakage test if needed.

10.1.2 Disinfecting

- (1) Disinfecting may possibly cause harm of certain degree to the equipment, it is suggested to disinfect the equipment if it is needed.
- Please disinfect the equipment with common disinfecting agent such as 50% sodium hypochlorite, cidex 2% glutaraldehyde + activating agent, 70% ethanol, 70% isopropyl alcohol and so on. Please follow the instructions of the disinfecting agent.
- (2) After disinfecting, wet the soft fabric with warm water, dry the fabric and then wipe the equipment with it.
- (3) Do not sterilize the equipment with high pressure steam sterilizer, do not dry the equipment with dryer or similar product.

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

10.2 Periodical maintenance

-  Notes:
 - The medical mechanism shall set up complete maintenance plan, otherwise, it may possibly cause the equipment malfunction or fault, and may possibly hurt the physical

safety.

- In order to ensure the safe use and prolong the service life of the equipment, it is suggested to periodically maintain and check it once every 6 months. Some items shall be maintained by the user, and some items shall be maintained by the dealer of the equipment.
- Please timely contact our company if the equipment is found defective.

10.2.1 Check the Appearance

- 1) The appearance of the equipment shall be clean and under good condition without crack and water leakage.
- 2) The buttons are flexible and effective without invalid phenomenon; the sensitivity of the touch screen is normal,
- 3) The slider of the syringe pump is flexible in movement, and the clamp is ok.
- 4) The power wire is under good condition and installed tightly.
- 5) After connecting with external power supply, check if the AC indicator of the equipment AC indicator lights on normally.
- 6) Adopt the accessories designated by our company.
- 7) The environment meets the requirements.

10.2.2 Performance Check

- 1) Self-test and normal infusion function.
- 2) Alarm function normal
- 3) Battery performance.

10.2.3 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.

Maintenance Items	Cycle
Safety check according to IEC 60601-1	Once every 2 years, please check after replacing the printed circuit board assembly or the equipment is dropped or knocked.
Preventive system maintenance items (pressure calibrate, sensor calibrate, pump)	Once every 2 years, when the occlusion alarm, or infusion accuracy is doubt to be abnormal
Brand of user-defined syringe,infusion accuracy calibration	Using the equipment for the first time, syringe brand using for the first time, reusing the equipment after stopping for a very long period.

10.3 Add new brand and Calibration

In the 『System』 submenu, click 『Maintenance』 to enter into brand setting interface, create the consumables brand, delete and calibrate the brand.

 Warning: ● It is suggested to contact our company or local dealer, and customize and calibrate it by professional technician, otherwise, it can't guarantee the infusion accuracy.

 Note: ● The built-in brand of the system shall not be deleted.

Add new brand

 Note: ● If the actual using syringe brand is not listed in the system built-in brand, please select the syringe brand from User 1 to User 4 in this interface.

Calibrating Steps:

Automatic:

- 1) Select syringe brand name (user 1 ~ user 4)
- 2) Select syringe size
- 3) Install syringe, pull the syringe piston beyond size scale line a little, or press and hold on [bolus], push the piston to the corresponding size line.
- 4) Press [start], begin calibration
- 5) Calibration completed.

Manual:

- 1) Select syringe brand.
- 2) Select syringe size
- 3) Click and input the data values of “Outer diameter”, “Full range length”, “Empty space” and some other parameters to complete the calibration

10.4 Repair

 Warning: The maintenance of the equipment and the replacement of the components shall be carried out by professionals recognized by the company. Special attention shall be paid to the detection of the power supply when the power module is replaced. Observe whether there is a false alarm, connect the AC power supply, and the battery is charged normally.

10.4.1 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 overall test for the equipment. Our company may provide the circuit diagram and components list to the authorized repair technician if needed.

10.4.2 Maintenance for Long Term Store

If the equipment won't be used for a long period, put the equipment back into the package, and store it in the shade, cool and dry place without direct sunlight.

The following operations are necessary for using it again:

1. Verify the flow rate accuracy to avoid unconformity between the syringe apparatus parameters in the equipment and the actual parameters after it hasn't be used for a long period or caused by other reasons, otherwise, it may cause infusion error, influence the therapeutic effects and even cause medical negligence.
2. Perform occlusion alarm test.
3. Test the battery discharging and charging duration to confirm that the battery is also usable.

10.5 Equipment Components/Accessories

 **Warning:** • Only the components and accessories designated by our company shall be adopted, otherwise, it may possibly damage the equipment or drop the equipment performance.

Variety	Name
Equipment Components	Pole clamp
	Power wire
	Handle

10.6 Production Date

Please refer to the label of the product.

10.7 Recycling

The normal service life of this equipment is 10 years, and depends on the use frequency and maintenance. The equipment must be rejected after reaching the service life, please contact the manufacturer or the dealer to get more detailed information.

1. The obsolete equipment may be returned to the original dealer or manufacturer.
2. The used lithium-ion polymer battery has the same treatment method, or according to the applicable laws and regulations.
3. Please handle according to the equipment rejecting flow of your medical mechanism.

Chapter11 Battery

This equipment is equipped with charging lithium-ion polymer battery to ensure the normal infusion when the equipment is moved or the external power supply is cut off.

When connecting external power supply, no matter the equipment is started or not, it can charge the battery. In case only built-in battery is adopted for supplying power, and when the remained battery is less than 20%, please connect the equipment with external power supply to charge the battery.



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

11.1 Check the Battery Performance

The performance of the built-in battery may drop according to the using duration, it is suggested to check the battery once a month.

- (1) Disconnect the equipment from the animal, and stop all infusion.
- (2) Supply public power to the equipment to charge the battery for 5h at least.
- (3) Supply power for the syringe pump only with battery, perfuse at the rate of 5ml/h, test the time till the battery runs down and the equipment is turned off.

- If the infusion time exceeds 10h, the battery keeps at good state.
- If the infusion time exceeds 7h but less than 10h, the battery starts deterioration, but it can be used temporarily.
- If the infusion time is less than 7h, the battery is reaching the service life, please replace the battery.

11.2 Replaced the Battery

It is better to replace the battery once every 2 years, it is suggested to replace the battery by the dealer or manufacturer.



Warning:

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

Chapter12 After Sale Service

This product enjoys 1-year free warranty after purchase. The warranty period is from the installation date listed on the “Warranty Card”. The “Warranty Card” is the only voucher for calculating the warranty period, in order to maintain your benefit, please carefully fill into and keep the “Warranty Card”, and hand over the copy for the company to the installation technician.

The damages of the equipment caused by the following shall not enjoy free warranty service.

1. Fault caused by incorrect operation, unauthorized refitting or repair.
2. The 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.

For the damages or faults mentioned above, our company provides repair services but chargeable according to the repair cost.

Chapter13 Appendix

Appendix A Start Up Graphs and Trumpet Curves

Appendix A. 1 Start-up Graphs

Brand: Double-Dove Size:50ml

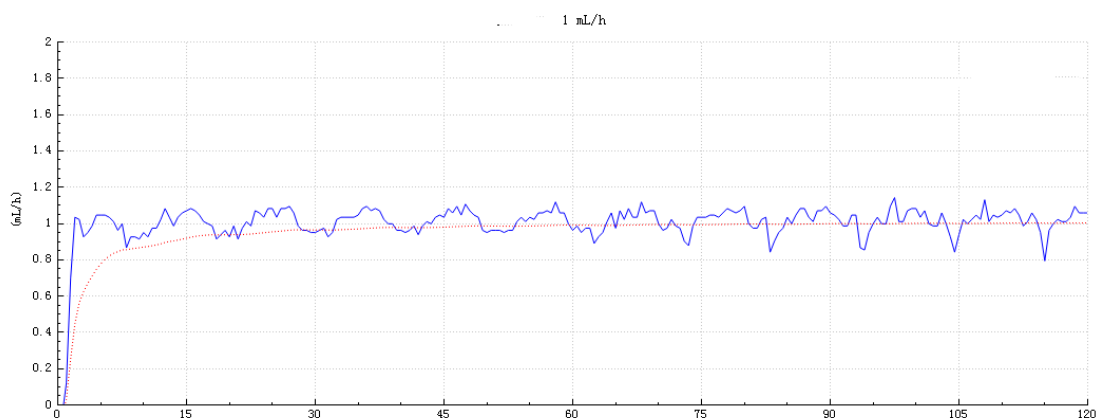
Number of sampling equipment: 3 sets

Number of sampling syringes: 3

Flow Rate: 1ml/h

Measurement Interval: $\Delta t = 0.5\text{min}$

Measurement duration: $T = 2\text{h}$



Graph 1 Start-up graph: Flow rate 1 (ml/h) against time (min) plotted from data gathered during the first 2 h of the test period

Brand: Double-Dove Size:50ml

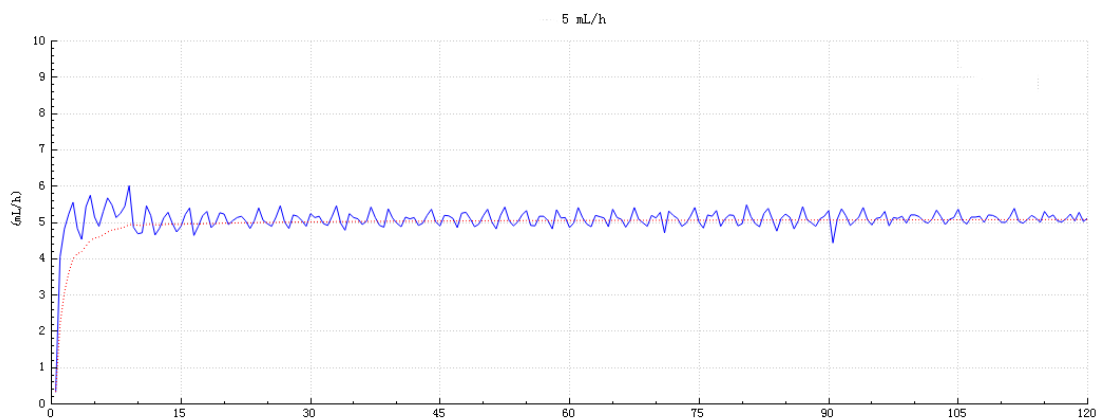
Number of sampling equipment: 3 sets

Number of sampling syringes: 3

Flow Rate: 5ml/h

Measurement Interval: $\Delta t = 0.5\text{min}$

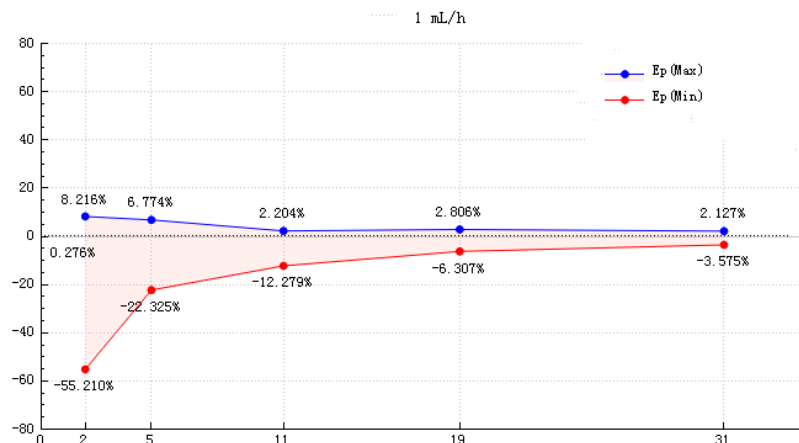
Measurement duration: $T = 2\text{h}$



Graph 2 Start-up graph: Flow rate 5 (ml/h) against time (min) plotted from data gathered during the first 2 h of the test period.

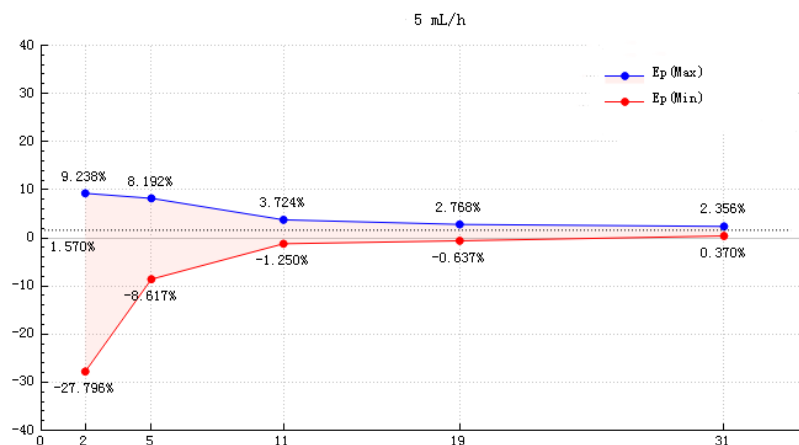
Appendix A.2 Trumpet Curves

Brand: Double-Dove Size:50ml
 Number of sampling equipment: 3 sets
 Number of sampling syringes: 3
 Flow Rate: 1ml/h
 Measurement Interval: $\Delta t = 0.5\text{min}$
 Measurement duration: $T = 2\text{h}$



Graph 3 Trumpet curve: Percentage variation E_p 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: Double-Dove Size:50ml
 Number of sampling equipment: 3 sets
 Number of sampling syringes: 3
 Flow Rate:5ml/h
 Measurement Interval: $\Delta t = 0.5\text{min}$
 Measurement duration: $T = 2\text{h}$



Graph 4 Trumpet curve: Percentage variation E_p 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

Appendix B Occlusion Response Property

occlusion time and bolus relation:

Flow Rate (ml/h)	Occlusion Pressure (mmHg)		Time to occlusion alarm(min)	Max bolus (ml)
0.1	Low	150	3h32min30sec	0.047
	High	900	38h17min09sec	0.102
1	Low	150	0h38min40sec	0.046
	High	900	2h11min0sec	0.085
5	Low	150	0h13min55sec	0.053
	High	900	0h29min46sec	0.077

Notes: The alarm pressure intensity error for EN-S3Vet is $\pm 15\%$ or $\pm 100\text{mmHg}$, the higher value shall be taken.



Notes:

- Conditions for testing above data: Syringe Brand: Double-Dove Size:50ml
- The occlusion alarm pressure, alarm delay time and bolus are influenced by the test conditions , temperature and line length.
(The increase in line length will lead to the increase of 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 length and higher temperature have 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 if the test conditions are different.

Appendix C Alarm and Solution

Alarm Type	Alarm Level	Alarm delay	Reason	Solution
VTBI infused	High	<1s	The preset value infusion Completion	Press 【Stop】 button to stop alarm
KVO finished	High	<1s	KVO working time reaches 30min, syringe pump stops working	Press 【Stop】 button to stop alarm
Check syringe	High	<1s	Syringe drop off during infusion	Reinstall the syringe
Syringe empty	High	<1s	The liquid medicine in the syringe is empty.	Press 【Stop】 button to stop the alarm can be eliminated
Pressure high	High	<1s	1. Line occlusion during infusion	Click 『Mute』 to silence, Manually remove the reason of occlusion, Press 【Start】 button to continue infusion
			2. Fluid/drug in the actual infusion line has high viscosity, but the system occlusion level is set too low	Rise the alarm Level, Press 【Start】 button to continue infusion
			3. The pressure sensor is damaged	Please contact the dealer or manufacturer for repair
Battery empty	High	<1s	When power is supplied by the built-in battery only, under low battery, the alarm duration is >30min	Immediately connect with external power supply.
			2. Battery ageing or the equipment charging circuit is fault.	Please contact the dealer or manufacturer for repair.
System error	High	<3s (Set 100ml/h operation, analog sensor open circuit)	If system self-check fail or internal fault, system error alarm will give with code number.	Restart device to check whether alarm eliminated, if still exist, contact maintenance personnel.
Syringe near empty	Medium	<1s	The syringe is near empty status which is calculated by checking the liquid medicine remaining in the syringe by current flow rate.	This alarm can not be eliminated, waiting to syringe empty.

Alarm Type	Alarm Level	Alarm delay	Reason	Solution
Standby time expired	Medium	<1s	During standby, after reaching the standby time	Press 【Stop】 button to stop alarm
VTBI near end	Low	<1s	During infusion, the remaining time of preset value reaches or is less than the set nearing completion time	This alarm can't be eliminated, and waits till infusion completes
Battery nearly empty	Low	<1s	1. When power is supplied only with the built-in battery, under low battery, the alarm duration is >30min	The alarm automatically eliminates after connecting the external power supply.
			2. Battery ageing or the equipment charging circuit is fault.	Please contact the dealer or manufacturer for repair.
No power supply	Low	<1s	Under ON state, AC power supply is adopted, but the AC power wire is dropped during the process	The alarm automatically eliminates after connecting the external power supply.
Reminder alarm	Low	<1s	After installing syringe tube , under non-working or alarm state, it is not operated within the set time of the system	Click any button to stop

Note: When alarm rings, click the **【Mute】** button to temporarily stop sound alarm for 2min.

Appendix D 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, and this unit can be affected by portable and mobile RF communications equipment.



Caution:

- 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 and that if adjacent or stacked use is necessary, this machine should be observed to verify normal operation in the configuration in which it will be used.



Warning:

The use of ACCESSORIES, transducers and cables other than those specified, with the exception of transducers and cables sold by the MANUFACTURER of the Syringe pump as replacement parts for internal components, may result in increased EMISSIONS or decreased IMMUNITY of the Syringe pump.

Guidance and manufacture's declaration – electromagnetic emission		
The Syringe pump is intended for use in the electromagnetic environment specified below. The customer or the user of the Syringe pump should assure that it is used in such an environment.		
Emission s test	Compliance	Electromagnetic environment – guidance
RF emissions CISPR 11	Group 1	The Syringe pump uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class A	The Syringe 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 Syringe pump is intended for use in the electromagnetic environment specified below. The customer or the user of the Syringe pump should assure 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 floor are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	±2 kV for power supply lines ±1 KV for input/output lines	±2kV for power supply lines	Mains power quality should be that of 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	Mains power quality should be that of 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	Mains power quality should be that of a typical commercial or hospital environment. If the user of the Syringe pump requires continued operation during power mains interruptions, it is recommended that the Syringe 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 typical location in a typical commercial or hospital environment.
NOTE UT is the a.c. mains voltage prior to application of the test level.			

Guidance and manufacture's declaration – electromagnetic immunity			
The Syringe pump is intended for use in the electromagnetic environment specified below. The customer or the user of Syringe pump should assure that it is used in such an environment.			
Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	10 Vrms	Portable and mobile RF communications equipment should be used no closer to any part of the Syringe pump, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance $d = 1.167$ $d = 1.167 \sqrt{P}$ 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). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, a 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: 
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.			
a Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the Syringe pump is used exceeds the applicable RE compliance level above the Syringe pump should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the Syringe 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 RF communications equipment and the Syringe pump .			
The Syringe pump is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the Syringe pump can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the Syringe pump as recommended below, according to the maximum output power of the communications equipment.			
Rated maximum output power of transmitter (W)	Separation distance according to frequency of 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 Data Set

Parameters	Default Setting	Parameters	Default Setting
KVO rate	1ml/h	Sound	Middle
Occlusion pressure	Middle	Screen lock	ON
Finish pre-alarm	2min	Nurse call	OFF
Reminder alarm	2min	Drug Library	OFF
Commonly used syringe brand	Double-Dove	Brightness	High



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