

# **User Manual**

## **Infusion Pump for Veterinary Use**

Triumph VIP Infusion Pump

Version: V1.0

# Preface

## 1 Application Scope

Applicable to Triumph VIP series infusion pumps of Triumph Medical.

This User Manual describes the product's most complete configuration, for more detailed information, please contact Triumph Medical.

## 2 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 and use the product in a correct way. Please carefully keep the User Manual for future use.

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

- (1) Use the equipment according to this User Manual.
- (2) The equipment can only be disassembled, assembled, replaced, tested, improved and repaired by Triumph Medical
- (3) All components and accessories as well as consumables for repairing are provided by Triumph Medical.

## 3 Paraphrase

- 【】 means mechanical button
- 『』 means touch button
- () further Information
- means inapplicable
- √ means accordant
- means operation steps

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

**KVO:** Keep vein open, prevent blood back to the Infusion set.

**Anti-bolus:** Motor automatically reverses when there is high pressure.

**Accessories:** suitable for using with the equipment in order to achieve the expected purpose, or provide convenience for achieving the expected purpose.

## 4 Description on Revision of User Manual

This manual may be revised from time to time as per product improvements are made, etc. All revisions will be documented in the new version of the instructions.

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# 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 Triumph Medical. Additionally, the adhesion or intrusion of fluid/drug may possibly cause the equipment to fault and malfunction. Therefore, please clean the equipment after use, and store it correctly.
- 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 infusion pump and may possibly cause performance drop or damage of the inside components.
- Please correctly install the infusion set according to the infusion indication direction of this equipment, ensure that infusion set is placed smooth and straight cross the creep device.
- If the sound level of the alarm signal is lower than the environmental noise, the operator may not hear the alarm.
- Please do not only depend on alarm system 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 infusion set is twisted, the filter or needle is obstructed, or blood in the needle which may obstruct the infusion, the pressure in the infusion set will rise. When removing such occlusion, it may possibly cause a "bolus infusion" (temporary excess infusion) to the animal. The correct method is to tightly hold or clamp the infusion set near the puncturing position, then open the door to drop the pressure in the infusion set. Then loosen the infusion set, solve the reason of occlusion, and restart infusion.
- This equipment injects fluid/drug through extruding the infusion set, but it can't detect the leakage if the infusion set is cut off or broken. Therefore, please periodically check it to avoid above fault during the working period.
- During infusion, please periodically check the dripping state of the fluid and the fluid/drug in the intravenous infusion bag/container, so as to ensure the pump is working correctly during infusion. This equipment doesn't directly measure the quantity of the infusion fluid, therefore. It is possible that this equipment can't detect the free infusion flow under extreme special conditions.

- This equipment has an occlusion detection function for detecting and alarming when the infusion needle deviates from the position in the vein or the needle is not correctly punctured in the vein.
- 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 Triumph Medical.
- To avoid risk of electric shock, this equipment must only be connected to a supply main with protective earth.

## 1.2 Cautions



- Before its first use after purchase, or if the equipment is not used for a long period, please charge the equipment with AC power supply. If it is not fully charged, under a power failure, the equipment may not continue to work with built-in battery power supply.
- Under general conditions, please use AC power supply as much as possible since it can prolong the service life of the battery to a certain degree. When using AC power supply, ensure that the grounding wire is reliably connected with the ground, and only the AC power cord attached with this equipment shall be used. Please pay attention to the plug position of the power cord to ensure that you can disconnect it at any time. The built-in battery can only be used as an assistant power supply when the AC power supply can't reliably connect with the ground and is not under normal conditions (power failure or in-transport infusion).
- Before connecting this equipment with the power supply, please keep the power socket and plug dry. The power voltage and frequency must meet the requirements listed on the equipment label or in this User Manual.
- The equipment is equipped with an audible and visual alarm system, the red and yellow alarm indicators will light on by turn, and the speaker makes the “beep” sound.
- Please keep the equipment at a certain distance from the AC power socket to prevent the chemical liquid from splashing or dripping into the socket and causing short circuit fault.
- 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 a sharp object (such as pencil tip and nail), otherwise, it may possibly cause early damage to the button or surface film.
- Please do not use the same infusion set over 8 hours at the same pumping position. Infusion set may distort after using for a long time and cause a flow rate error. It is suggested to replace the pumping position or directly replace the infusion set once every 8 hours.

- Please tightly close the flow rate adjuster of the infusion set before taking out the infusion set to avoid infusion free flow.
- Under the condition of low flow rate infusion, please pay special attention for an occlusion. The lower the infusion flow rate, the longer the time of detecting an occlusion, and it in turn may possibly cause a long- time infusion stoppage during this period.
- If the equipment suffered from dropping or impacting, please stop using it immediately, and contact Triumph Medical. The inside components of the equipment may possibly be damaged even if the appearance is not damaged and abnormality is not occurred when working.
- When using this pump, other infusion control equipment cannot be installed on the same infusion tube. Otherwise, it may cause errors.

## 1.3 Dialogue Windows

Dialogue window mainly includes operation select, operation confirm, information.

## 1.4 Symbols

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

Table 1.4-1

Marks	Description	Marks	Description
	Lot Number		Protective earth
	Attention, consult accompanying documents		Alternating Current
	Both direct and alternating current		Input and output
	Environment-friendly use period (20 years)		Handle with harmless method
	Date of Manufacture		Manufacturer
	Bell, cancel temporary		Selection; affirmative acknowledgement; success; ACK
	Serial Number	IP34	Ingress Protection (Prevent solid objects larger than 2.5mm in diameter and water intrusion from splashing in all directions)

# Chapter2 Overview

## 2.1 Application Scope

### 2.1.1 Expected Purpose

This product is used for constant speed intravenous infusion in a hospital.

### 2.1.2 Expected Working Environment

Including but not limited to: The Operation room, surgery table in an Animal hospital/or Pet clinic.

## 2.2 Working Principle

This equipment can drive a pump to extrude the infusion set for accurately controlled infusion drops or infusion flow rate with the motor. It is capable of guaranteeing infusion of drug fluids safely in the vein of animals with even rate and accurate dosage.

## 2.3 Structure and Performance

### 2.3.1 Structure and Performance

The infusion pump is mainly composed of the main unit and built-in battery, which can be subdivided into shell assembly, main control module, power module, display module, operation module, drive module, monitoring module and alarm module.

This equipment provides several infusion modes, such as rate mode, time mode, body weight mode, drug library mode, and sequence mode. Additionally, it also has functions such as history records, drug library, Anti-bolus, alarm and so on.

### 2.3.2 Accessories

Power Cord, Pole Clamp.

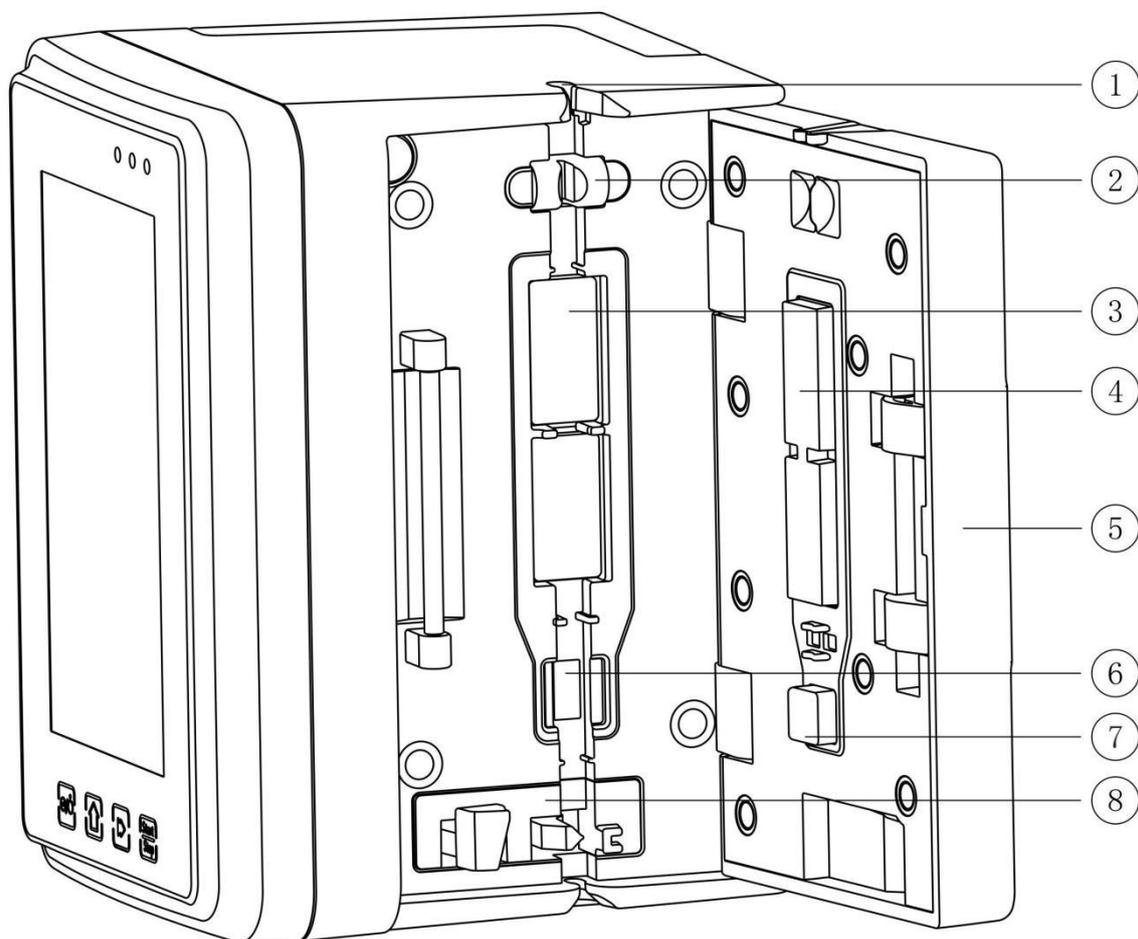
## 2.4 Product Specification

Safety Classification	
Ingress Protection	IP34 (Prevent solid objects larger than 2.5mm in diameter and water intrusion from splashing in all directions)
Working mode	Continuous
Classification	Portable equipment, non-portable infusion pump
Specification Parameters	
Infusion set specification	10~60 drops
System Accuracy	± 5%
Drip Infusion Rate Accuracy	± 10% or ± 1drops/min
Infusion Rate	0.10-1500ml/h
Drip mode range	1~500drops/min
Bolus Rate	0.1-1500ml/h
Bolus preset	0.1-60ml
KVO Rate	0-5.00ml/h
Micro mode setting range	100-1500ml/h
Minimum flow rate increment	0.01ml/h
VTBI	0-9999.99ml, minimum step is 0.01ml
Total Volume Infused	0.01-9999.99ml, minimum step is 0.01ml
Time Range	1min-99hrs59min
Fuse Type	slow fuse 2A 250V
Dimensions	105(W)*109(D)*142(H) mm (Pole Clamp not included)
Weight	1.4kg
Power Supply	
AC power supply	100-240V 50/60Hz
Input power	20VA
DC power supply	DC 12V
Battery Specifications	Specification: 7.4V 2500mAh Charging time: single battery less than 2hrs, two batteries less than 4hrs (under OFF status). Working time: single battery over 4.5hrs, two batteries over 9hrs. (after completely

	charging battery/batteries, when the environment temperature is 25°C and flow rate is 25ml/h, the constantly working time)
Alarm	
Alarm signal sound pressure level	When the sound is set at lowest level, alarm signal sound pressure level $\geq 45\text{dB(A)}$ When the sound is set at highest level, alarm signal sound pressure level $\leq 80\text{dB(A)}$
Alarm information	VTBI near end, VTBI infused, Occlusion (Pressure high), Battery nearly empty, Battery empty, No battery inserted, No external power supply, Pump idle alarm, Standby time expired, KVO finished, Air bubble, Door Open
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°C (2) humidity: 20-90%, non-condensable (3) atmospheric pressure: 57-106kPa
Transport & Storage	(1) temperature: -20-55°C (2) humidity: 10-95%, non-condensable (3) atmospheric pressure: 50-106kPa

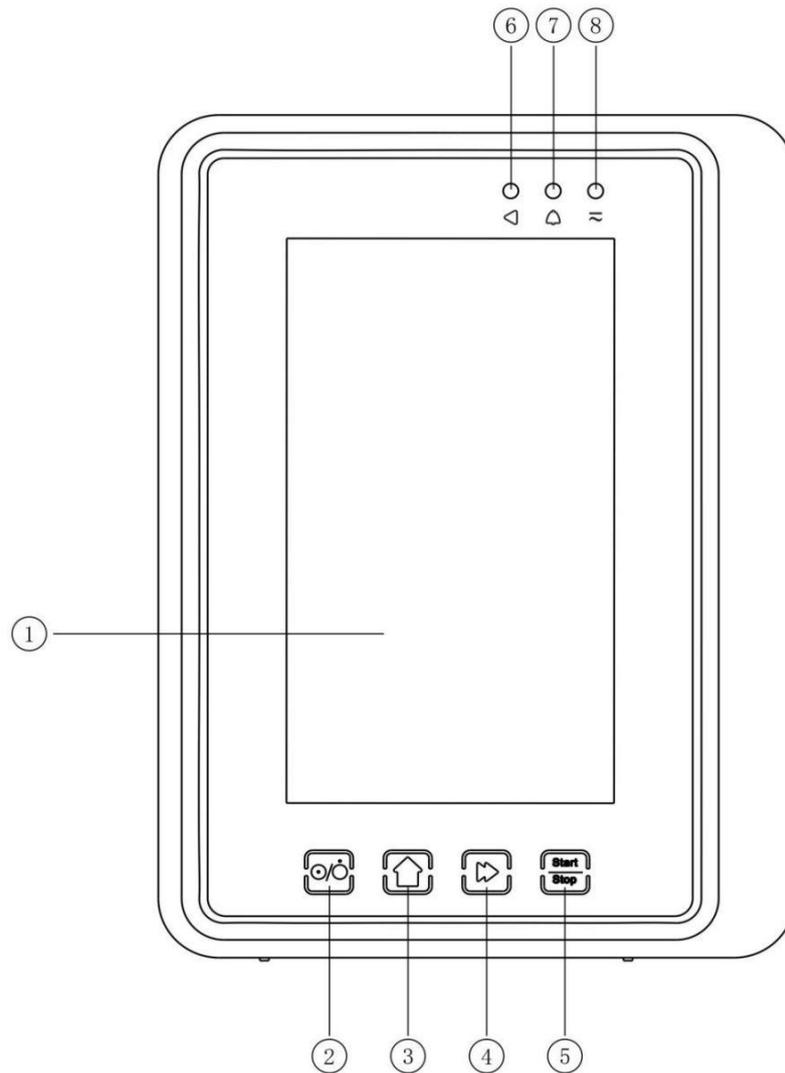
## Chapter3 Appearance

### 3.1 Front View



- ① Tubing guide
- ② Pump door air bubble sensor (for air bubble detection in the infusion line)
- ③ Pump tablets
- ④⑦ Pressure Plate
- ⑤ Pump door
- ⑥ Pressure sensor (for occlusion detection)
- ⑧ Anti-free flow clamp

## 3.2 Operation Panel



① Touch Screen

② **【Power】**

Pump power switch, short pressing the power button to enter the shutdown setting interface, the user can set shutdown, standby (time) or cancel.

Long pressing the power button until the screen turns off.

③ **【Home】**

Enter system home page.

④ **【Bolus/Purge】**

⑤ **【Start/stop】**

⑥ Running indicate light

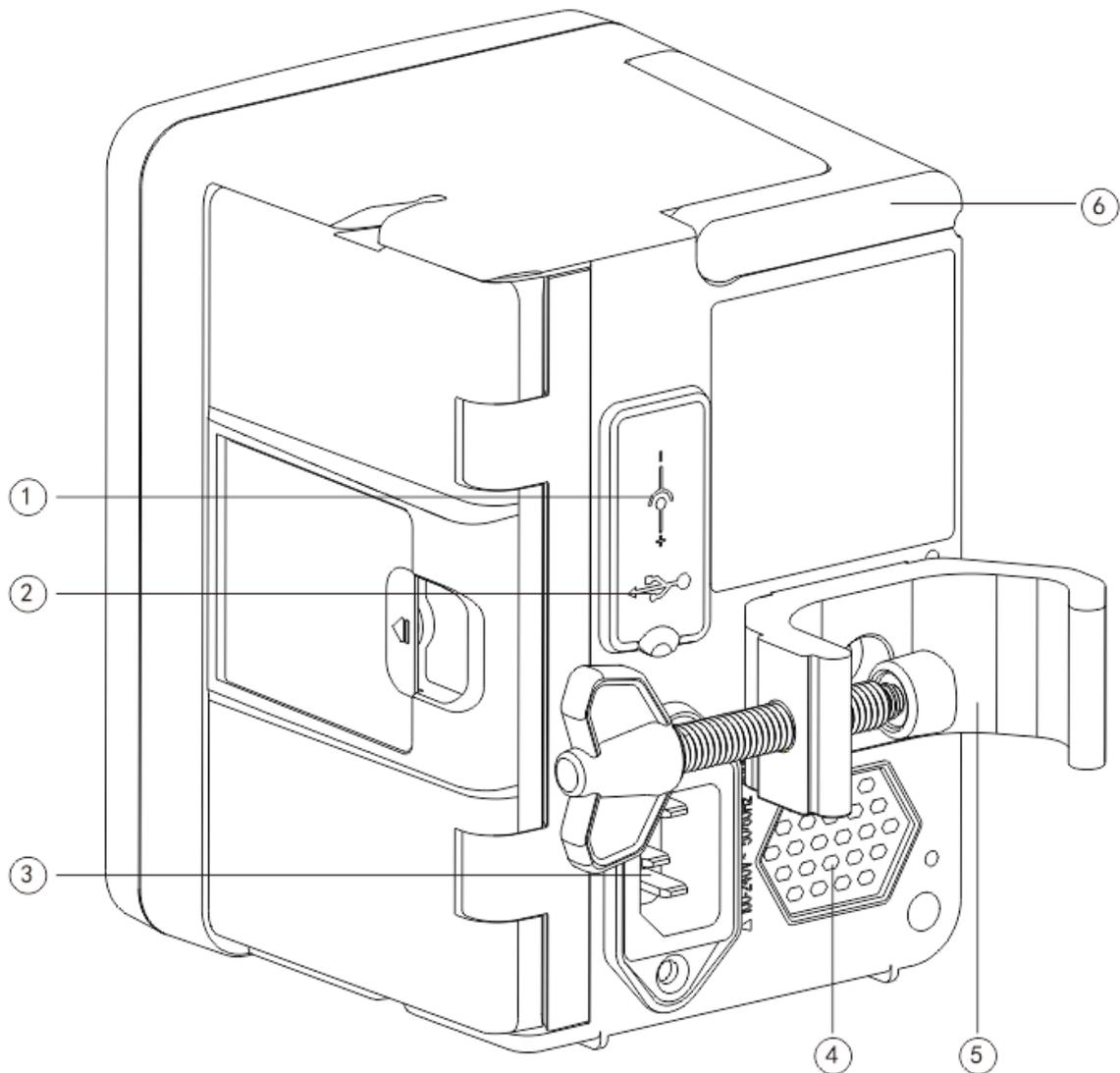
⑦ Alarm indicator light

While pump alarms, indicator light flashes, with different frequency and color to show different alarm levels, more information please **refer to Chapter 10.1**

⑧ AC indicate light

When connected with AC power supply, AC indicator light is on.

### 3.3 Rear View



① DC Input Port, external 12V DC power supply

② Multi-function USB Port

③ A/C Adapter Port, external 100-240V 50/60Hz AC power supply

④ Loudspeaker

⑤ Pole Clamp, using for fixing the equipment on the infusion stand

⑥ Handle

# Chapter4 Installation

## 4.1 Unpacking and Checking

- (1) Please check the appearance before unpacking, if broken, please contact Triumph Medical.
- (2) Please carefully open the package to avoid damaging the equipment and relevant accessories.
- (3) After unpacking, please check the objects according to the packaging list, if there are insufficient or damaged accessories, please contact Triumph Medical.
- (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 when disposing items.

## 4.2 Installation

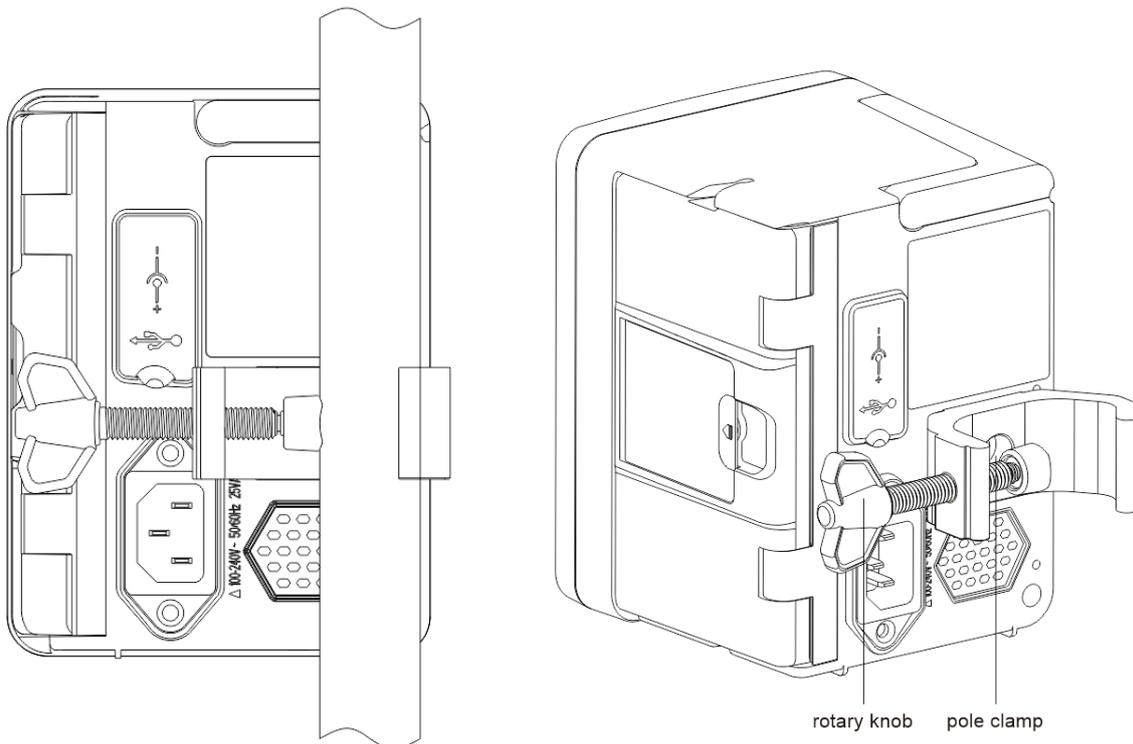


Warning:

- This equipment shall be installed per instructions of this manual.
  
- When connecting this equipment with other electric devices to form a combination with special function, if the combination can't be confirmed dangerous or not, please contact Triumph Medical or an electrical expert of the 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 an environment which satisfies guidelines from this manual.

## 4.2.1 Install the Infusion Pump

- (1) Rotate the pole clamp screw(knob) and unscrew it to leave space.
- (2) Lock the Pole Clamp on the infusion stand, adjust the position of the infusion pump, tighten the pole clamp to fix the infusion pump on the infusion stand (as shown in drawing). Hold the infusion pump when tightening the fixing clamp; carefully let go of it after tightening to avoid it from 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, take out the pole clamp and adjust the direction, then tighten the bolt.



# Chapter5 Use Preparation & Cautions

## 5.1 Use Preparation

If the equipment is new, reusing after storing for a long period, or reusing after repair, please check it to ensure before use:

- The equipment's appearance is clean and under good condition without cracks and leakage.
- The moving components are smooth and effective; the buttons are effective.
- The touch screen can be operated smoothly and effectively.
- The power cord 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 the built-in battery is adopted for supplying power, please charge it fully before using, and check the battery state frequently.
- Carefully read the Warnings, Cautions and Operation Steps listed in this User Manual.

## 5.2 Operation Cautions



Cautions:

- Avoid direct sunlight, high temperature and high humidity.
- The parameters can only be set or changed by trained and professional personnel.
- Infusion accuracy or abnormal work of the equipment may be compromised 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

- ☐ Mount the infusion pump on the IV stand: **refer to Chapter 4.2.1**
- ☐ Power on: press  button to power on and the machine completes a self-inspection, **refer to Chapter 6.2.2**
- ☐ Install Infusion set: **refer to Chapter 6.2.3**
- ☐ Confirm Infusion set brand name: Select infusion set brand
- ☐ Remove air bubble from the line: **refer to Chapter 6.2.4**
- ☐ Select infusion mode: Select infusion modes according to requirement
- ☐ Set infusion parameters: set infusion parameters according to requirement
- ☐ Connect the infusion set with the animal
- ☐ Start infusion: press , start infusion
- ☐ Finish infusion: **refer to Chapter 6.2.8**
- ☐ Remove the Infusion set: **refer to Chapter 6.2.10**
- ☐ Power off or Standby: **refer to Chapter 6.2.11**

## 6.2 Infusion Operation

### 6.2.1 Equipment Installation

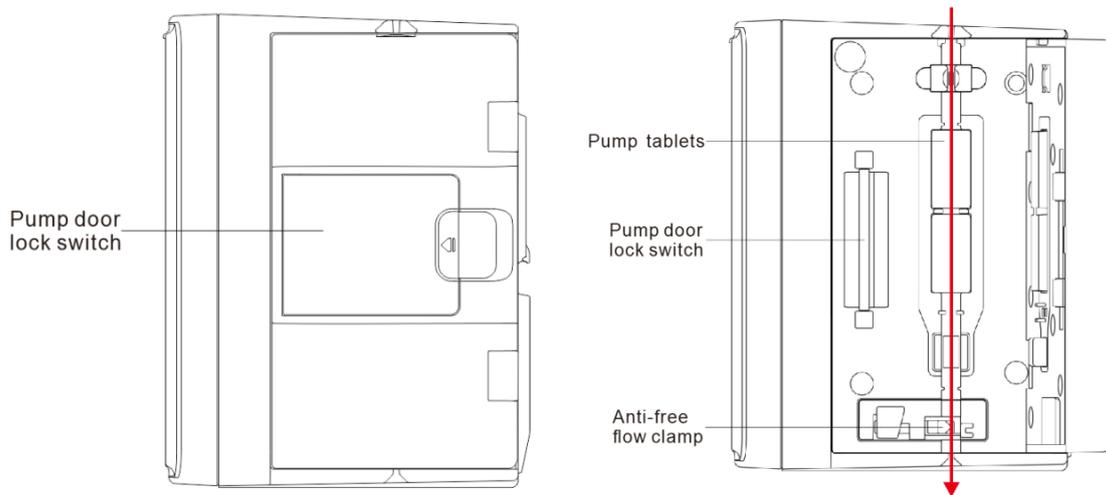
Mount the device on the infusion stand according to **Chapter 4.2.1**, connect with AC power supply, check the AC indicator lights. Battery will start to charge once AC power is connected.

### 6.2.2 Starting and Self-test

- (1) Press  button to 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 the self-test, pump enters into rate mode interface.

 **Warning:** ● If self-test failed, pump cannot be operated properly or is damaged, it cannot be used for animal infusion, please contact the Triumph Medical.

### 6.2.3 Infusion set Installation



- 1) Connect the IV set with the infusion bottle.
- 2) Extrude the drip chamber, when the fluid has reached 1/2 position of the drip chamber, open the adjuster.
- 3) Fill fluid/drug to the injection needle to remove air, then close the adjuster.
- 4) Pull the lock switch in the middle of the pump door from the lower side, then open the door.
- 5) Push the anti-free flow clamp up to open it.
- 6) Install the infusion set in the infusion set slot according to the direction indicator as shown in above drawing, press the infusion set in the pump inwards to make it attach to the peristaltic pump.
- 7) Manually push the pump door, it will make a “click” sound after it is correctly closed.
- 8) Click 『Settings』 → 『Commonly used tube brand』, select infusion set brand.

#### Warning:

- It is suggested to use the infusion set brand defaulted in the pump.
- Please confirm that the infusion set brand and specification displayed on the display screen is accordant with the actual one in use.
- Contact Triumph Medical if you are unsure if you are selecting the correct infusion set brand. Selecting the wrong infusion set brand could compromise the accuracy and possibly cause injury to the patient.

### 6.2.4 Purge Air

There are two ways to set parameters for purging air: manual purge and automatic purge. Users can choose the method according to their needs, and the purge total volume is not calculated in the Total Volume Infused.

- (1) Manual purge: long pressing [Bolus] button , the device will purge air according to the default flow rate of the system, release it and return to the setting parameter interface.
- (2) Automatic purge: Under the parameters setting interface, Press 【Bolus】  button on the

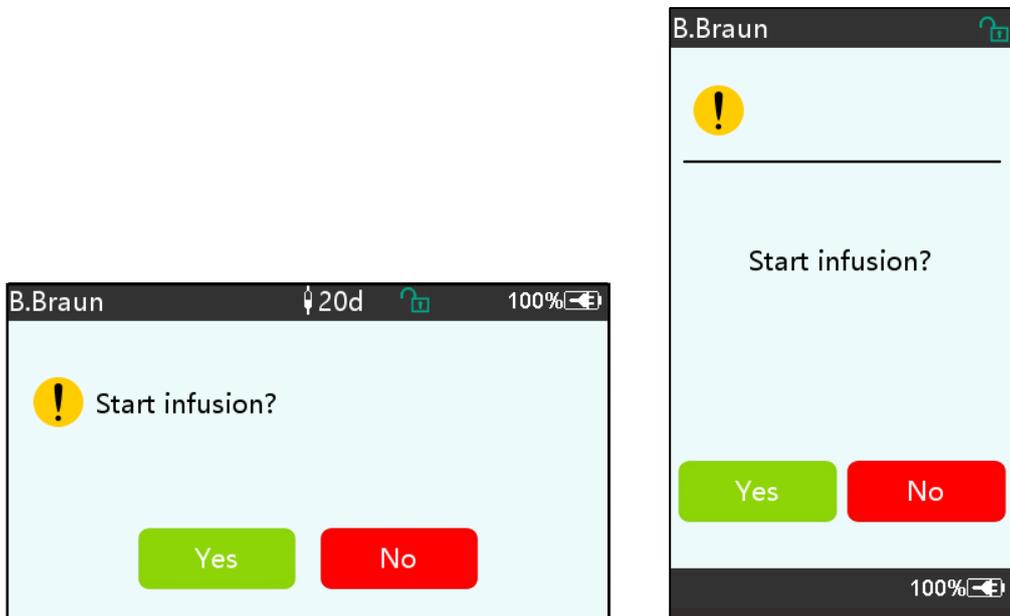
display and select "Yes" in the pop-up prompt box, until the air bubbles in the infusion line are eliminated, click "Stop" .

 Cautions:

- Before purging air, double check to confirm the infusion set is **not connected** with the animal.
- Purge rate is the max rate, when purge volume  $\geq 5\text{ml}$ , purge will automatically stop.

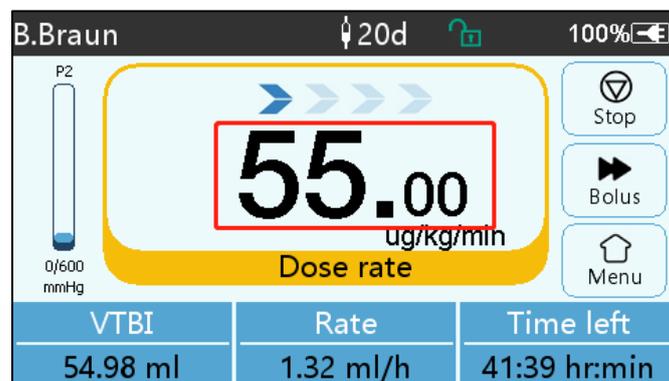
## 6.2.5 Start Infusion

Connect Infusion set to animal, confirm infusion parameters, Press **【Start】** button , click  in the pop-up prompt interface, start infusion.



## 6.2.6 Changing the Rate During infusion

During the infusion process, the flow rate/ dose rate can be changed without stopping in any infusion modes.

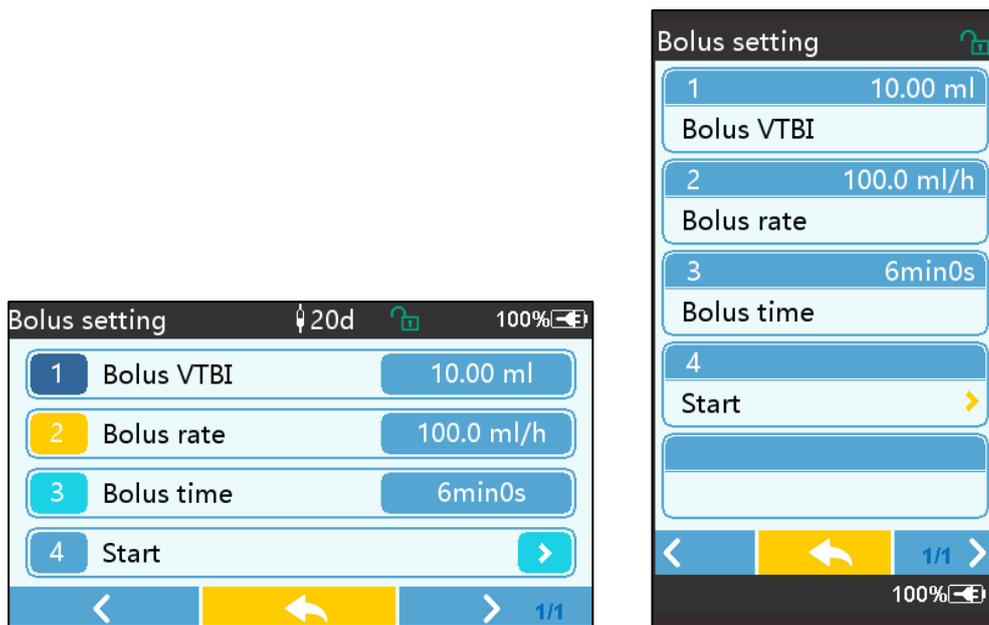


## 6.2.7 Bolus Application

During operation, the bolus functions have two operation modes: Manual bolus and Automatic bolus.

(1) **Manual bolus:** long pressing the **【Bolus】** button on the product panel, pump will work at the max flow rate (refer to **Chapter 2.5**), once releasing the button, the pump will go back to the previous infusion rate.

(2) **Automatic bolus:** Under the running interface, click the **『Bolus』** button on the touch screen, set two parameters among bolus infusion volume, rate and time, click **『Start』**. It will beep at every 1ml infused. After bolus infusion is finished, it will go back to the previous infusion rate.



## 6.2.8 Infusion Completion

When remaining infusion time is near preset volume to be infused completion time, pump will alarm. If the alarm is ignored, the system will keep alarming until it completes the VTBI infusion, for more information please refer to **Chapter 8.1.10**

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

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

Please refer **Chapter 8.1.4** to set KVO rate.

## 6.2.9 Stop Infusion

During infusion, click , infusion stop. It will return to the parameter setting interface and display Total Volume Infused and adjustable parameters.

## 6.2.10 Remove the Infusion Set

Disconnect the infusion set from the animal, and open the pump door manually, the liquid can still be stopped normally with Anti-free flow clamp, and the infusion set can be removed after the anti-free flow clamp is opened.

Replace Infusion set, please follow the steps of **Chapter 6.2.3**.

## 6.2.11 Power off or Standby

Method 1: hold the  **【Power】** Button till the screen is OFF, the equipment is OFF.

Method 2: Press  **【Power】** Button to enter into the power OFF interface.

(1) Power off the equipment: click the 『Power off』 icon, the equipment is turned OFF.

(2) Standby: click the 『Standby』 icon to enter into standby time setting interface, set the standby time. Under standby state, the screen brightness will be at its lowest, after standby, the screen brightness will be recovered.

(3) Cancel: click 『Cancel』, return to the interface before the OFF setting.

 Note:

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

## 6.2.12 Replace Infusion Set/Infusion Container

★ Please replace the infusion set assembly according to the following steps:

- Close the flow rate adjuster of the infusion set assembly, open the infusion pump door, and then remove the infusion set assembly.

- According to the manual Chapter 6.2.3, prefill and install the new infusion set assembly.

- Operate to restart infusion according to the above infusion steps if needed.

★ Please replace the fluid/drug container according to the following steps:

- Close the flow rate adjuster of the infusion set assembly.

- Remove the fluid/drug container from the infusion set assembly.

- Connect the infusion set with the new fluid/drug container.

- Restart infusion according to the above steps of replacing infusion set assembly.

 Warning: • The infusion set will distort if it works for a long period and result in inaccuracies or flow rate error. It's suggested to replace the pump position or infusion set after working for 8h.

## 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 an active state.

Click 『Settings』 icon in the main interface to enter sub-menu, find the 『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 8.1.3 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 infusion set specification.

(3) If VTBI (Volume to be infused) is set the pump will infuse all the fluid/drug in the IV set/bag

### 7.2 Infusion Mode Setting

After starting the equipment and self-test, the equipment automatically enters into the rate mode parameters setting interface, to select other mode, click 『Menu』 icon  to enter into the main interface, click 『Modes』 icon to enter into the mode selection menu interface, and select a preset infusion mode.

#### 7.2.1 Rate/Time Mode

Under Rate mode, it allows the user to set two parameters: Rate and VTBI (Volume to be infused) set these two parameters, and the system will automatically calculate the third parameter, if the VTBI is 0, then the equipment works at the set rate till the pump is stopped with an alarm.

Under Time mode, it allows the user to set VTBI (Volume to be infused) and Time, the system will automatically calculate the speed,  $\text{speed} = \text{Volume(ml)} / \text{time(min)}$

#### 7.2.2 Body Weight Mode

Under this mode, set the weight (body weight), Active agent (Drug amount), Conc. unit (concentration unit), Volume (fluid volume), Conc., Dose rate, Dose unit, VTBI.

The system will automatically calculate the flow rate according to related formula  $\{\text{dose rate} \times \text{weight}\} / \{\text{active agent (drug amount)} / \text{Volume(fluid volume)}\}$ , and automatically calculate the time according to  $(\text{VTBI}) / (\text{flow rate})$ .

#### 7.2.3 Drug Library Mode

Under this mode, Select Drug, set the Weight (body weight), Conc. Unit (concentration unit), Dose and VTBI (Volume to be infused). The speed will automatically be calculated according to parameters. Drug Library Editable (see below in System Settings)

## 7.2.4 Sequence Mode

Sequence mode is to infuse according to a set sequence after programming the rate and time of different sets of sequences. Up to 10 different sequence groups can be programmed

# Chapter8 System Setting

## 8.1 Settings

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

### 8.1.1 Infusion Set admin brands

After installing the infusion set, select the correct infusion set brand

 • The infusion set of different brands may possibly cause flow rate deviation, when using an IV SET please confirm if the displayed information in the interface is accordant with the actual infusion set in use.

### 8.1.2 Cage No.

Not Applicable.

### 8.1.3 Drug Library

Click on the preset drug name, the selected drug will be reflected in infusion mode parameters.  
To remove drug name from infusion mode parameters, select “none” in drug library. To Edit drugs, go to Settings – Drug Library – DrugLib maintenance – Enter Password 8888 – Edit/Add/Delete 2 different groups of drugs. Default Groups labeled “Commonly Used” and “Others”. There are 32 total spots available for drugs, 16 in each group.

### 8.1.4 KVO Rate

Click 『KVO rate』, input the numerical value, after confirming, click 『OK』.  
Please refer to Chapter 2.5 for the adjustable KVO range.

### 8.1.5 Bolus Rate

Set the default Bolus rate. Please refer to **Chapter 2.5** for the range of bolus rate.

### 8.1.6 Occlusion Pressure

Click 『Occlusion pressure』 to enter into occlusion pressure level setting interface, move the long box to the preset level, 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 a low level, it is possible that the system will report an 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 set, and raise the occlusion pressure if needed.
- When the occlusion pressure is set at a high level, it may possibly cause the animal to be uncomfortable, after raising the occlusion pressure, please carefully observe the condition of the animal, and immediately take measure if there's any abnormality.
- Under an equipment fault state, the max pressure generated by the infusion set is 300kPa. Under single fault state, the max infusion volume is 2ml.

Applicable Model: Triumph SP12 Occlusion Pressure Level: 4 levels							
Level	Pressure Intensity (mmHg)	Level	Pressure Intensity (mmHg)	Level	Pressure Intensity (mmHg)	Level	Pressure Intensity (mmHg)
1	50	2	300	3	600	4	900

### 8.1.7 Pressure Unit

Click 『Pressure unit』 to enter into the pressure unit select setting interface, four units are available: mmHg, kPa, bar, PSI, click the preset unit option.

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

Unit Mark	Unit Conversion
kPa	1 kPa=7.5mmHg=0.145psi=0.01bar
PSI	1psi=51.713mmHg=6.895kpa=0.069bar
Bar	1bar=787.5mmHg=15.225psi=105kPa

### 8.1.8 Bubbles Size

Click 『Bubbles size』 to enter into the air bubble size setting interface, move the long box to the preset level, confirm and then click 『OK』 .

The air bubble detector has 8 levels. It is suggested to select suitable level according to the actual requirement.

 Note: ● Please select suitable air bubble detector level according to different vets and drugs.

Air Bubble detector level	Alarm Threshold Value
Level 1	10ul
Level 2	50ul
Level 3	100ul
Level 4	200ul
Level 5	300ul
Level 6	450ul
Level 7	600ul
Level 8	800ul

### 8.1.9 Pump idle Alert

Click 『Pump idle alert』 to enter into the time for reminder alarm setting interface, click the preset time option to set the reminder alarm time.

Pump Idle Alert refers to the alarm that will be prompted if there is no key operation within the preset idle alert time when the device is in the non-infusion and non-alarm state. Pump idle alert time Settable to: 2min、 5min、 10min、 15min、 20,min、 30min.

### 8.1.10 Finish Pre-Alarm

Time for pre-alarm refers to the time of activating near completion alarm when the fluid/drug infused volume is nearly reaching the preset value.

Click 『Finish pre-alarm』 to enter into the time for pre-alarm setting interface, click the preset time option, to set the finish pre-alarm time. Finish pre-alarm time Settable to: 2min、 5min、 10min、 15min、 20min、 30min

### 8.1.11 Micro Mode

Click 『Micro mode』 to enter into micro mode setting interface. ON/OFF is optional in this function Optional. Under the ON mode, set the rate limit, then the infusion rate under any infusion mode is not allowed to exceed this limit. Micro mode setting:100~1500ml/h, minimum step is: 1ml/h

### 8.1.12 Reset Total Volume

Click『Reset total volume』, the interface displays the operation confirming prompt box, click 『Yes』 to confirm reset, otherwise, please click 『No』

## 8.2 General

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

### 8.2.1 Rotate Screen

Click 『Rotate Screen ON/OFF』 , when selecting ON, the screen will rotate freely in landscape or

vertical direction.

## 8.2.2 Date & Time

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

When setting the date and time, directly input the numerical value in the input method interface. For example, to preset date “2018-08-31”, input “20180831”; 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 Brightness

Click 『Brightness』 to enter into the display brightness setting interface. The brightness has 10 levels.

## 8.2.4 Sound

Click 『Sound』 to enter into the sound parameters setting interface, the volume has 10 levels. The lowest volume is  $\geq 45\text{dB}$ , and the highest volume is  $\leq 80\text{dB}$ . Move the long box to the preset value, after confirming, click 『OK』

## 8.2.5 Screen Lock

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

Automatic lock screen time can be set at 15s, 30s, 1min, 2min, 5min, 10min or 30min 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.

Unlock: directly click 『Cancel』 in the lock screen interface.

 Note: • The equipment will automatically unlock if there's high Level alarm.

## 8.2.6 Night Mode

Click 『Night mode』 to enter into night mode switch setting interface to set the start and end time of the night mode and the night brightness, at night, the system automatically adjusts the brightness to the User defined value.

## 8.2.7 Battery capacity display

Turn it on to show the battery life in the upper right corner of the screen, and turn it off to show the percentage of remaining battery life.

# 8.3 System

Click 『System』 under the menu interface, enter the system information setting interface

## 8.3.1 Language

This equipment supports simplified Chinese, English, etc.

### **8.3.2 Factory Default**

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

### **8.3.3 Version**

Check the software version. and serial number of the equipment in this interface.

### **8.3.4 Maintenance**

This interface is used by Triumph Medical to maintain and calibrate the equipment.

### **8.3.5 Maintenance Period**

This interface is used by Triumph Medical to maintain and calibrate the equipment.

### **8.3.6 Last Maintenance Date**

This interface is used by Triumph Medical to maintain and calibrate the equipment.

## **Chapter9 Other Functions**

### **9.1 History Entries**

Click 『Records』 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 (permanent preservation). When it is full, the new records will cover the old records with first in first out principle.

### **9.2 Last Therapies**

Click 『Last Therapies』 in the main interface to enter therapy records query interface.

(1) This interface shows the last 20 therapies. Users can select one therapy record for the new infusion. After selected check the infusion parameters, confirm and start infusion.

(2) When it is full, the new records will cover the old records with first in first out principle.

### **9.3 Anti-bolus**

When an occlusion alarm is triggered, the system will automatically process the anti-bolus feature.

When this happens, the pump will withdraw the amount of blocking fluid and reduce the pressure to avoid a large impact dose to the animal after the occlusion is eliminated.

# Chapter10 Alarm Prompt and Troubleshooting

## 10.1 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, middle and low. Please refer to table below for details:

Alarm Level	Sound Signal Interval	Light color /flash frequency
High alarm	10s	Red indicator flashes /2.0±0.6Hz
Middle alarm	15s	Yellow indicator flashes / 0.6±0.2Hz
Low alarm	20s	Yellow indicator lights on

If there's an alarm, the system will display the alarm interface, if the alarm level is high, click 『OK』, stop the alarm, and exit the alarm interface, if the alarm level is middle or low, click 『OK』, the sound signal will stop, and exit the alarm interface.

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

 Warning: Some alarm threshold values of this equipment can be set by the user, for example: occlusion pressure, air bubble alarm, pump idle, VTBI infused pre-alarm, alarm sound volume and so on, the user shall confirm the parameters when set the alarm threshold value, otherwise, it may possibly influence the alarm function or infusion safety.

## 10.2 Multilevel Alarm Rules

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

**Table 10.2-1**

Multilevel Alarm	Rules
Several alarms of different levels generate simultaneously	Display the alarms of highest level with sound, light and text, report middle alarm after eliminating all alarms of highest level
Several alarms of same level generate simultaneously	Alarm circularly by turns, the time interval is 1s

When alarming, the corresponding alarm information will display on the title of the screen. Refer to Appendix B for more information.

## 10.3 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 B for the alarm solution.

## 10.4 Fault Analysis and Solution

When there's a fault, the infusion pump screen will display the fault alarm information, this item is an alarm of high level. Please eliminate the fault alarm according to the prompt. If it can't be eliminated, please stop the equipment, contact Triumph Medical 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 a fault.

If the equipment is on fire/burns for unknown reasons, or has other abnormal conditions, the user shall immediately cut off power supply and contact Triumph Medical.

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

## Chapter11 Maintenance

### 11.1 Cleaning

- (1) The daily maintenance is mainly to clean the shell 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 a working fault. After infusion, please timely clean the equipment, First wipe it with 75% alcohol, then clean with a damp soft cloth, and then dry it naturally.
- (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 a certain waterproof function, when fluid splashes on the equipment, please check if it works normally, perform insulation and electric leakage test if needed.

### 11.2 Periodical maintenance



Notes:

- The user should set up a complete maintenance plan, otherwise, it may possibly cause the equipment to malfunction or fault.
- 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 12 months. Some items shall be maintained by the user, and some items shall be maintained by Triumph Medical.
- Please contact Triumph Medical if the equipment is found defective.

## 11.2.1 Appearance Check

- (1) The appearance of the equipment shall be clean and under good condition without cracks and water leakage.
- (2) The buttons are flexible and effective without invalid phenomenon; the sensitivity of the touch screen is normal.
- (3) The infusion pump door should be smoothly opened and closed. The anti-free flow clamp mechanism is under good condition.
- (4) The power cord is under good condition and can be installed tightly.
- (5) After connecting with external power supply, check whether the AC indicator light is on.
- (6) Adopt the accessories designated by Triumph Medical.
- (7) The environment meets the requirements of this user manual

## 11.2.2 Performance Check

- (1) Self-test and infusion function works.
- (2) Alarm function works well
- (3) Battery performance.

## 11.2.3 Maintenance Plan

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

Maintenance Items	Cycle
Safety checks	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 1 year, when the occlusion alarm, air bubble alarm, or infusion accuracy is doubt to be abnormal
Infusion accuracy	Using the equipment for the first time, using a new infusion brand, reusing the equipment after not being used for a long time.

## 11.3 Calibration

Calibration is performed by Triumph Medical.

## 11.4 Repair

### 11.4.1 Normal Repair Process

Please contact Triumph Medical to repair if there's any fault. Do not disassemble and repair the equipment.

## 11.4.2 Maintenance for Long Term Store

If the equipment won't be used for a long period, please take out the battery, and pack it with the equipment. Store it in a cool and dry place without direct sunlight.

The following operations are necessary for using it again:

1. Verify the flow rate accuracy to avoid nonconformity between the infusion set 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 air bubble and occlusion alarm test.
3. Test the battery discharging and charging duration to confirm that the battery is also usable.

## 11.5 Equipment Components/Accessories

 Warning: • Only the components and accessories designated by Triumph Medical shall be adopted, otherwise, it may possibly damage the equipment or decrease the equipment performance.

Variety	Name	Part Number
Accessories	Power Cord	TRI-RTPC-23
	Pole clamp	TRI-UPC-23

## 11.6 Production Date

Please refer to the label of the product.

## **11.7 Recycling**

The normal service life of this equipment is 10 years, and depends on the frequency of use and maintenance. The equipment must be rejected after reaching the service life, please contact Triumph Medical if you need assistance.

1. The obsolete equipment may be returned to Triumph Medical.
2. The used lithium-ion polymer battery has the same treatment method, or according to the local applicable laws and regulations for batteries.
3. Please follow your local medical equipment scrap process.
4. Recycling must comply with local laws and regulations.

# Chapter12 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 the external power supply, no matter if the equipment is started or not, it can charge the battery. When charging, the equipment screen displays the battery charging indication icon . In case only the 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 designed by Triumph Medical.

## 12.1 Check Battery Performance

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

- (1) Disconnect the equipment from the animal, and stop all infusions.
  - (2) Supply AC power to the equipment to charge the battery for 5h at least.
  - (3) Supply power for the infusion pump only with battery, infusion at the rate of 25ml/h, test the time till the battery runs down and the equipment is turned off.
- If the infusion time exceeds 7h, the battery keeps at good state.
  - If the infusion time exceeds 5h but less than 7h, the battery starts deterioration, but it can be used temporarily.
  - If the infusion time is less than 5h, the battery is reaching the service life, please replace the battery.

## 12.2 Replace Battery

Contact Triumph Medical

## **Chapter13 After Sale Service**

This product has two-year free warranty after purchase. The warranty period is from the purchasing date. The damages of the equipment caused by the following do not qualify for warranty service.

1. Fault caused by incorrect operation, unauthorized refitting or repair.
2. The damages caused by incorrect operation during 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, Triumph Medical provides repair services but can be chargeable.

**Manufacturer:** Triumph Medical Services LLC.

888-388-3344

## Chapter14 Appendix

### Appendix A Alarm and Solution

NO.	Alarm Type	Alarm Level	Reason	Solution
1	VTBI near end	Low	During infusion, the remaining time reaches or is less than the set nearing completion time	This alarm can't be eliminated, and waits till infusion completes
2	VTBI infused	High	The preset value infusion Completion	Press <b>【Stop】</b> button to stop alarm
3	Pressure high	High	1. Line occlusion during infusion	Manually remove the reason of occlusion, Press <b>【Start】</b> button to continue infusion

			2. Fluid/drug in the actual infusion set has high viscosity, but the system occlusion level is set too low	Rise the alarm Level, Press <b>【Start】</b> button to continue infusion
			3. The pressure sensor is damaged	Please contact the dealer or manufacturer for repair
4	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 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.
5	Battery empty	High	1. When only the internal battery is used for power supply and the battery power is close to exhaustion, the alarm duration is not less than 3 minutes	Immediately connect with external power supply.
			2. Battery ageing or the equipment charging circuit is fault.	Please contact the dealer or manufacturer for repair.
6	No battery inserted	Low	Battery is removed	Keep connecting with external power supply, reinstall the battery
7	No external power supply	Low	Under ON state, AC power supply is adopted, but the AC power cord is dropped during the process	The alarm automatically eliminates after connecting the external power supply.
8	Battery and external power not in use	High	Battery is not inserted and AC power cord is not connected at the same time	Install battery or connect external power supply
9	Pump idle alert	Low	After installing infusion set, under non-working or alarm state, it is not operated within the set time of the system	Click any button to stop
10	Standby time expired	Middle	During standby, after reaching the standby time	Press <b>【Stop】</b> button to stop alarm
11	KVO finished	High	KVO working time reaches 30min, infusion pump stops working	Press <b>【Stop】</b> button to stop alarm

14	Air bubble	High	Air bubble in the infusion set	Press <b>【Stop】</b> button to stop alarm, disconnect the line from the animal, exhaust air with air exhaust function, or open the infusion pump door to manually remove the air bubbles
15	Door Open	High	During infusion, the infusion pump door is opened	Press the <b>【Stop】</b> button to eliminate this alarm.
16	System Error	High	Internal failure or software exception	Turn off and Restart, if the alarm still exists, please contact the dealer or manufacturer for repair

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



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