User Manual

Veterinary Anesthesia Ventilator

Model：BAM-5 Pro Turbo

This machine is for veterinary and scientific use only

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Declaration

All contents of this manual are believed to be correct. The company does not bear legal responsibility for printing errors in the manual, as well as all damages caused by installation errors and improper operation. Our company does not provide other parties with the privileges granted by the patent law. The company does not bear legal responsibility for the legal consequences caused by the violation of the patent law and the rights of any third party.

Any user must read this article carefully before using the company's products. This article tells the user the operating steps that must be carefully observed during use, the possible abnormal operation, and the danger of injury to the equipment or human body. In the event of any abnormal phenomena or dangers and injuries to persons and machines caused by operations that must be avoided as specified in this article, our company does not assume responsibility for safety, reliability and performance guarantees! Our company will not give free repairs to such failures!

The content contained in the manual can be changed without notice.

Responsibilities of the manufacturer:

The company only considers responsible for the safety, reliability and performance of the equipment under the following circumstances, namely:

The assembly operation, expansion, re-adjustment, improvement and maintenance are carried out by personnel approved by the company;

□The supporting electrical equipment and application environment meet the requirements of national standards, industry standards and this manual;

The equipment is used in accordance with the operating instructions.

⚠**Attention**

This device cannot be used at home

⚠**Warning**

If the organization responsible for using this equipment cannot implement an effective and satisfactory maintenance plan, it will cause abnormal equipment failure and may endanger personal health.

The company will provide the principle block diagram for a fee when the user requests it, and also explain the calibration method and other information to help the user to repair the parts of the equipment that the company stipulates that the user can repair by the appropriate technical personnel.

Guarantee:

Manufacturing process and raw materials:

The company guarantees that the parts and accessories of the Main will be free from production process and raw material failures within one year from the date of shipment under normal use and maintenance conditions; other parts are guaranteed for 3 months; consumables are not covered by

the warranty. The company's obligation under this guarantee is only for maintenance.

Free obligation:

The company’s obligations under this guarantee do not include freight and other costs;

The company is not responsible for the direct, indirect or final damage and delay caused by improper use, replacement of parts that are not approved by the company, or repair of the machine by non-authorized personnel.

This guarantee does not apply to the following:

Non-normal use;

Machines that have not been maintained or have been damaged;

The company’s original serial number label or manufacturing mark is torn off or replaced;

Products of other manufacturers.

The user did not use it correctly in accordance with this manual.

The use environment or storage environment of the equipment does not meet the requirements of this manual.

Return:

If you really need to return the goods to our company, please follow the steps below:

1 Obtain the right of return

Contact the customer service department of our company and inform the product serial number. This serial number has been marked on the equipment shell. If the serial number is not clearly identifiable, returns will not be accepted. When returning the product, please indicate the serial number of the product and briefly describe the reason for the return.

2 Shipping

When the equipment is shipped to our company for maintenance, the user shall bear the transportation and insurance costs incurred (for machines not sold in mainland China, customs and other costs are also included).

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Usage notice

Welcome to use our products!

In order to use this product correctly and effectively, users must read this manual carefully before using this product.

When using this product, users must fully understand and strictly abide by this manual.

This product is only suitable for the purposes described in this manual.

Repairs and general surveys of this product can only be carried out by trained professional maintenance personnel.

If there is any situation in the process of use, users can consult our company, and we will provide you with warm service.

Product specifications are subject to change without notice.

Index

1 Preface

1.1 About the machine

the machine is a small breathing control system used with anesthesia machine. It can provide mechanical ventilation for animals during surgery, and can monitor and display different parameters of animals.

The ventilator used in this system has a built-in turbine, does not require an external high-pressure gas source, is controlled by a microprocessor, and is equipped with parameter and waveform monitoring, volume mode and other optional functions.

The existing optional functions may not all be included in the description of this manual. The system can also attach other equipment on the top or middle platform. For details of the existing local system, please check with the local office.

⚠**warning** The user of this product should be a full-time anesthesiologist and have received training in the use of The machine anesthesia machine.

⚠**Warning** the machine is not suitable for use in magnetic resonance environment.

1.1.1 Scope of use

This standard configuration of this system is suitable for animals above 1Kg.Ventilator settings range from 2-100kg, with animals below 2kg achieved in pressure mode by lowering inspiratory pressure.

the machine anesthesia ventilator is mainly used in animal operating rooms, or where anesthesia is required for veterinary.

1.1.2 Contraindications

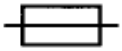
There are currently no contraindications found for this product.

1.2 Symbols meaning on this Manual or System

⚠Warning and⚠ Attention means possible accidents will occur if operation don`t meet this Manual. Please strictly follow this Manual.

Other symbols are also used on the equipment or in the manual to replace the text description. Not all of these symbols appear in the equipment or manual.

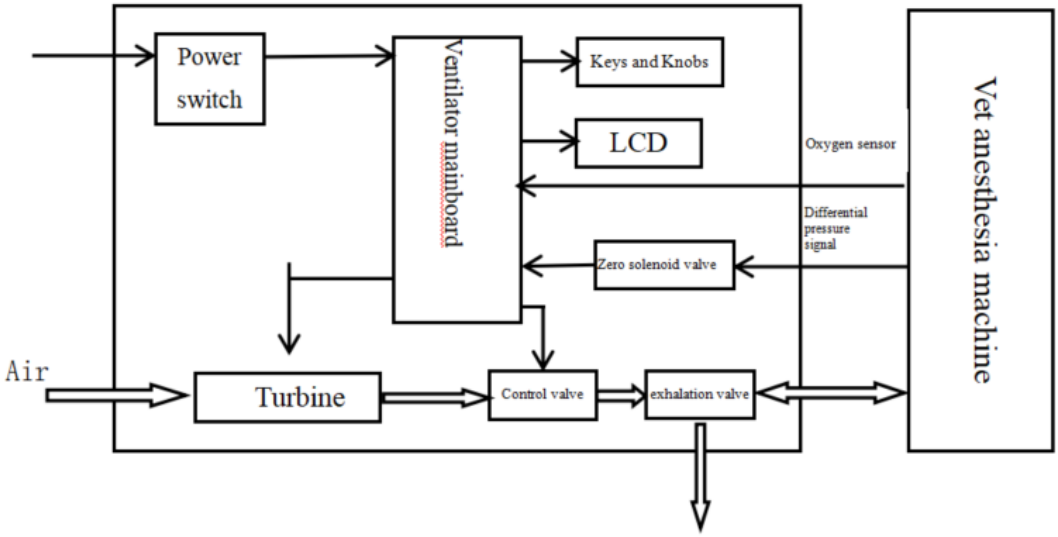
I	On (power)		Class B equipment
O	Off (power)	⚠	Note that GB/T 16273.1-1996
~	Direct current	⚠⚠	Note, please refer to the product description and GB 9706.28-2006

	Direct current		Dangerous voltage
	Protective grounding		enter
	Equipotential		Output
	One-way movement		Two-way movement
	Suction airflow		Exhaled airflow
	Fuse	**SN**	Serial number
	Unlock		lock
	Production Date		Manufacturer, address

2 Composition of anesthesia ventilator system

2.1 Principle block diagram

The principle block diagram of The the machine anesthesia ventilator (Figure 2-1)



2-1 Anesthesia ventilator block diagram

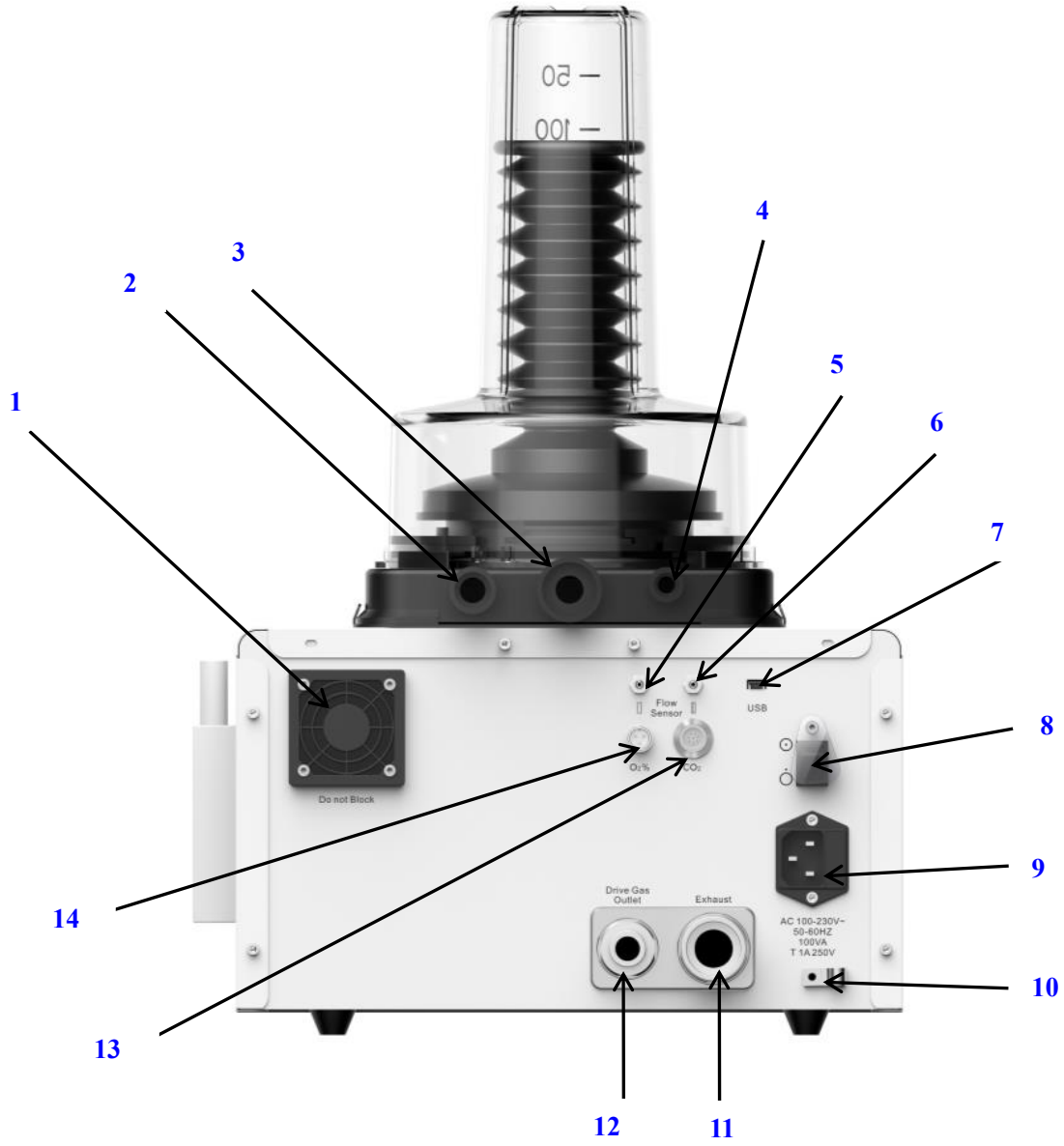
2.2 Main composition

2-2 Front view of The machine anesthesia ventilator

2- Bellows integration 1- Ventilator

1 . Ventilator: The structure of the ventilator. Carrying the parts required by the ventilator, there are four supports and a fixing hole at the bottom, and the ventilator can be fixed on a bracket with casters for easy movement.

2. Bellows integration: The bellows is machine-controlled (when ventilator is working) instead of manual ball, which can accurately control the tidal volume.



2-3 the machine Anesthesia ventilator back view

1- Air inlet port	2- Respiratory system port	3-Exhaust gas port
4- Bellow power gas interface	5- Differential pressure interface (near animal end)	6- Differential pressure interface (far animal end)
7 - USB upgrade port	8- Power switch	9- Power interface
10-Cable clip	11- Exhaust air outlet	12- Power gas outlet port
13- CO2 interface	14- Oxygen cell interface	

introduction of main interface functions

1.Exhaust emission interface: the excess exhaust gas in the breathing circuit can be discharged through this port, which can be connected with the purification device through this port, or directly

connected to the outside by pipeline.
2.Respiratory system interface: the ventilator is connected with the machine control entrance of the external circuit of the anesthesia machine through this port to realize the respiratory management under the machine control state.
3.USB upgrade interface: the ventilator software can be upgraded through this interface.
4.Air inlet port：External air enters the internal turbine through this port and must not be blocked.
5.Nameplate
6.Power gas outlet port：This port is controlled by the ventilator to change the power gas from the air source into power gas that can be used by the bellows, and then connect to the power gas inlet of the bellows to realize breathing.
7.Exhaust air outlet：The excess exhaled air in the breathing circuit is expelled from this port.
8.Cable clip：Fix the power cord to prevent falling off and the danger of power failure.
9. Power interface：This port is the power inlet of the whole ventilator, and it is connected to the network power with a power cable.
10.Power switch
11.Differential pressure interface (near animal end)：Interface to connect the differential pressure flow rate sensor closer to the animal
12.Differential pressure interface (far animal end)：Connect the differential pressure flow rate sensor to the interface slightly away from the animal
13.Oxygen cell interface：Connection with oxygen sensor cable
14.Bellow power gas interface：Connect with the power gas outlet of the ventilator to provide usable power gas for the bellows.

2.3 The composition of the bellows

The bellows are divided into big animal bellows and small animal bellows. *Big animal > 20 kg and small animal < 20 kg*

2-4 bellows

1. Big animal bellows cover
2. Large folding bag
3. Connect to breathing circuit
4. Exhaust gas discharge port
5. Power gas interface
6. Small animal bellows cover
7. Small folding bag

⚠ Bellows cover: Tidal volume scale line is marked on the side. Lock the bellows cover clockwise and open the bellows cover counterclockwise.

2-5(a)

2-5(b)

Large folded bag: the part of each drop is the tidal volume of each animal. You can directly observe this capsule, and use the data indicated by this capsule as the reference value, and compare it with the detection value on the screen. The two values should be close. Through this bag, you can also observe airway obstruction or air leakage in the breathing circuit. If it drops too fast or cannot rise, check whether the breathing circuit is leaking. Connect the large folding bag by hand when replacing

it. FIG. 2-5 (b)

⚠ Connecting the breathing circuit: This port is connected to the manual bladder interface on the anesthesia machine through a threaded hose. Outer diameter is 22m

⚠ Exhaust gas discharge port: It can be connected to an exhaust pipe to remove exhaust gas outdoors.

⚠ Power gas port: This port is connected to the power gas outlet on the back of the portable ventilator through a threaded hose. Outer diameter is 17mm

Small bellows assembly illustrated

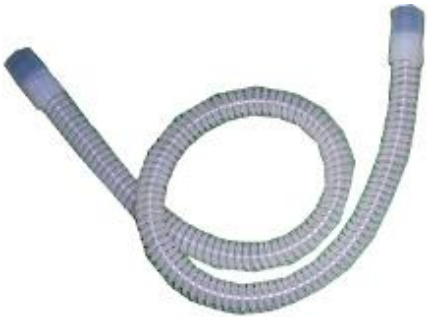
2-6(a)

2-6(b)

2-6(c)

2.4 Accessories

2-7(a) Differential pressure flow sensor



2-7(b) Bellows and absorber connect pipe

2-7(d) Power gas pipe

2-7(e) Oxygen sensor and cable（optional）

Optional oxygen sensor one end is connected to the socket at the back of the ventilator (connector Fig. 2-3 NO.14) and another end is connected to the inhalation port of the anesthesia machine, which requires an adapter (Fig 2-8).

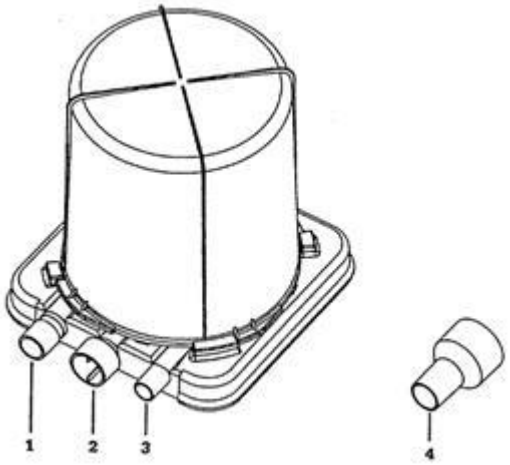
2-8 The another end is connected to the inhalation port of the anesthesia machine.

2.5 Connection diagram

2-9 Connection diagram

2.6 Bellows integrated interface

The various interfaces integrated by the bellows are shown in Figure 2-10

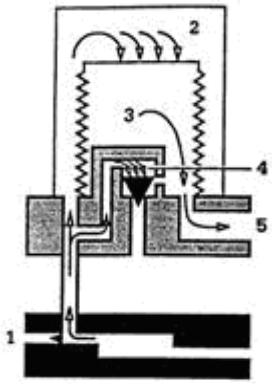


2-10 Bellows integrated interface

1. Breathing system interface 2. Exhaust exhaust system interface 3. Drive gas interface 4. Adapter

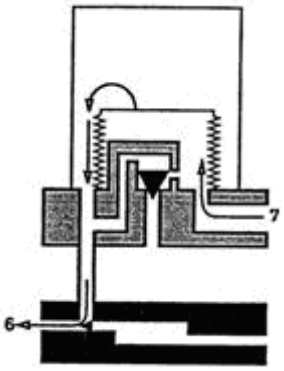
⚠**Warning** The exhaust system is prohibited directly interface with the negative pressure system. Otherwise, it will cause air leakage in the breathing circuit.

2.6.1 Breathing cycle



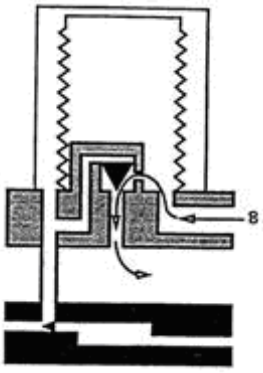
Initial inspiratory

1. Exhalation valve
2. Driving gas
3. Pet patient breathing circuit gas
4. Pressure relief valve
5. To breathing circuit



Initial exhalation

6. Driving gas
7. breathing circuit



End-expiratory

8.Excessive loop gas

3 Introduction of anesthesia ventilator

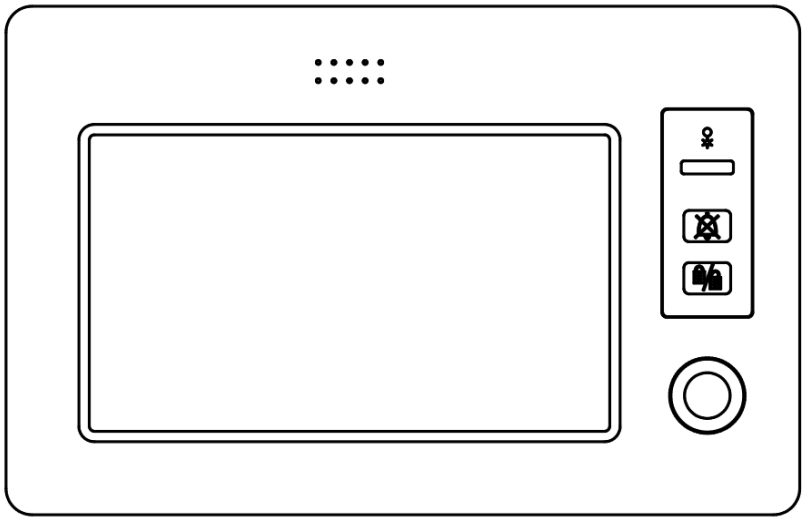
⚠**warning** The anesthesia ventilator meets the requirements of ISO 8835-5.

⚠**warning** The conditions for monitoring respiratory parameters in this system are: ambient temperature: 29°C; gas temperature: 30°C; air humidity: 30%; gas: oxygen.

⚠**warning** When using an oxygen sensor in an animal circuit, if the temperature of the sensor is lower than or equal to the dew point temperature of the breathing gas, water vapor may condense on the surface of the sensor. In this way, the displayed value of O2 concentration in the loop may be lower than the actual value.

3.1 Front panel of anesthesia ventilator

The front panel consists of a display screen, function keys, indicators and knobs, as shown in 3-1



3-1 Anesthesia ventilator's front panel

3.1.1 Button function and basic operation

	Mute	Press this key to silence the alarm for 120 seconds.
	Lock	Press this key, all operations of the ventilator except mute are prohibited; press this key again for 2 seconds to release the prohibition.

3.1.2 Indicator light

		Connect to the power supply, turn on the power

☼	Power Indicator	switch, the ventilator is powered on, and this indicator light is on.
▭	Alarm indicator (red and yellow)	When a senior alarm occurs, this indicator flashes red; when mid-level alarm occurs, the yellow light is flashing.

3.1.3 Knob

The knob is used to select menu items and change settings. It can be rotated clockwise or counterclockwise, and can be pressed like a button. Through the knob, you can realize the operation of the screen and menu.

The color-changing (yellow) cursor on the screen that moves with the rotation of the knob. You can perform operations wherever the cursor can stay.

Methods of operation:

□* Move the cursor to an item to be operated

□* Press the knob

□ *One of the following situations will occur in the system:The cursor background color is displayed in contrast color, indicating that the content in the box can be changed with the rotation of the knob;A drop-down menu appears/closes on the screen, or a dialog box pops up, or the original menu is replaced by a new menu;

□ * Press again to save the setting.

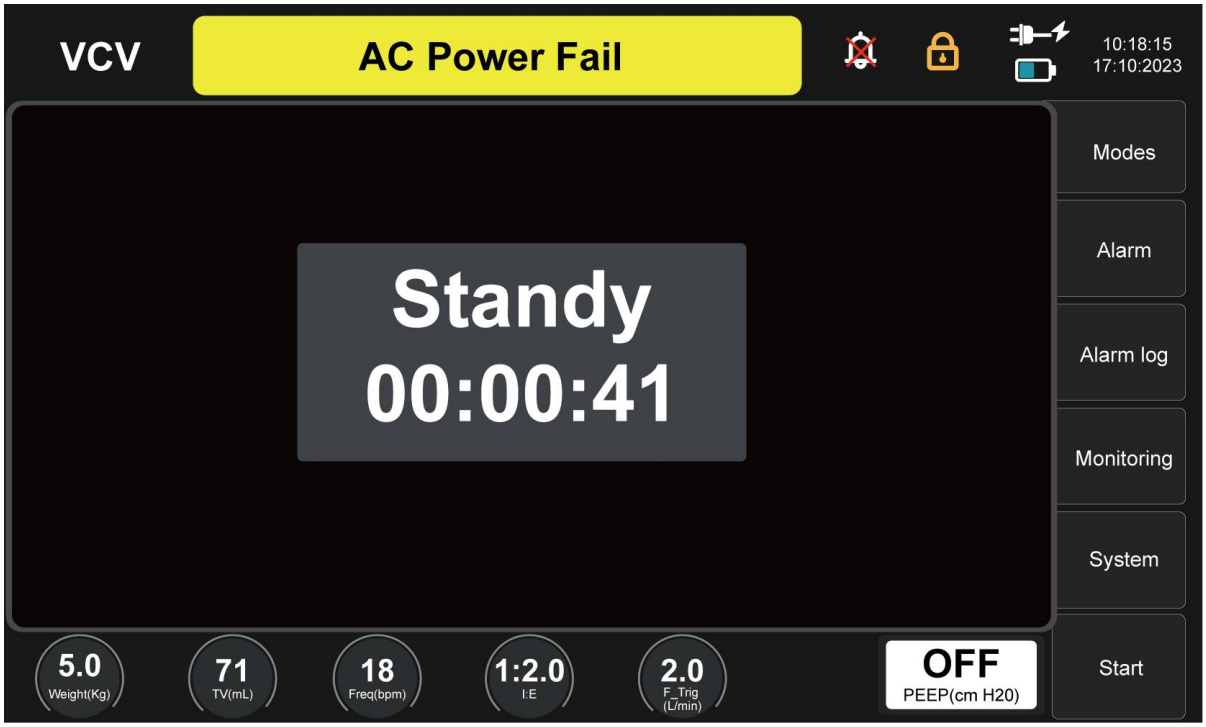
□ *The screen of this ventilator is a touch screen, which can be operated with the touch screen and the knob

3.2 Screen display

The ventilation parameter monitoring, settings and information prompts of the entire ventilator are displayed on the entire TFT screen

3.2.1 Standby interface

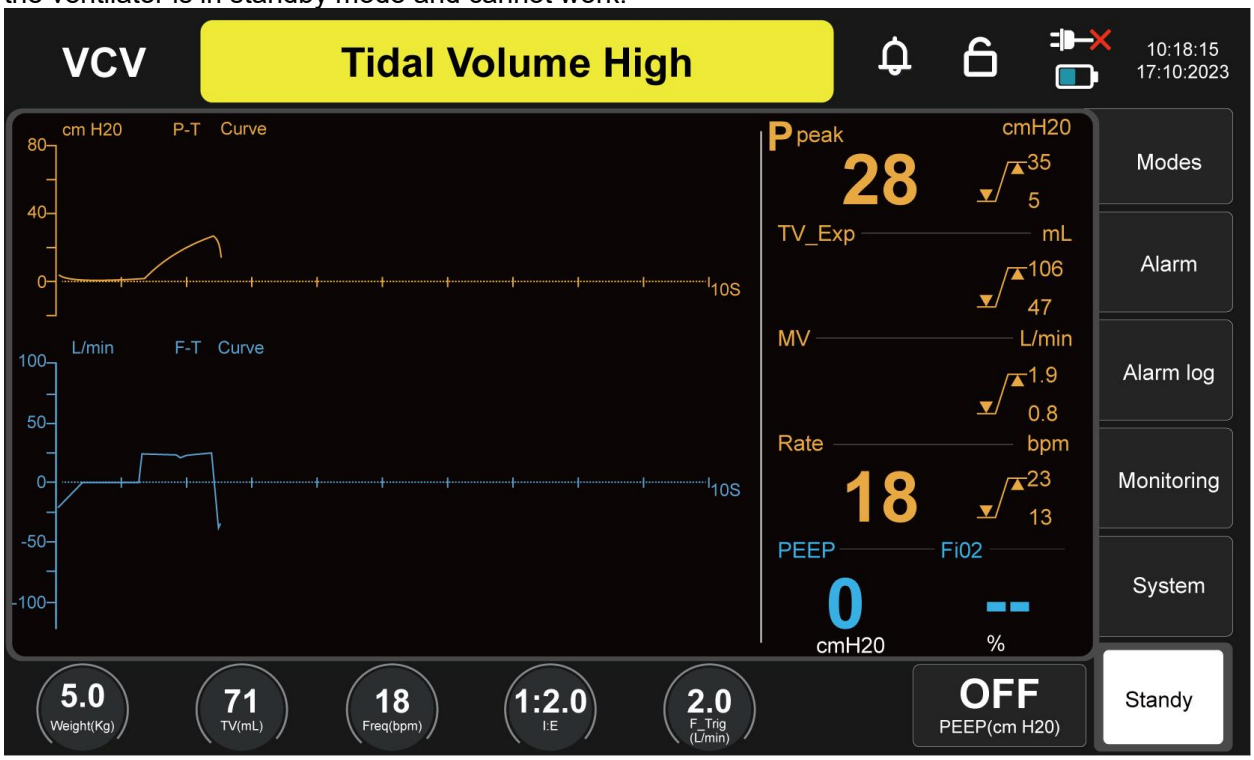
Figure 3-1 is the standby interface. The menu area on the right side of the screen, the lower side is the parameter area, the upper part is the alarm information prompt, the power information prompt and the ventilation mode display, and the standby time is displayed in the middle. When a menu pops up, it will cover the middle area.



3-1 standby interface

3.2.2 working interface

Touch the Start in the standby interface to enter the work interface, as shown in Figure 3-11. Touch the Standby in the working interface to return to the standby interface. In the standby interface, the ventilator is in standby mode and cannot work.



3-10 workinginterface

3.2.3 Parameter setting area

The parameter setting area is located at the bottom of the screen, and different parameters are displayed according to different breathing modes; there are tidal volume (TV), respiratory frequency (Freq), inspiratory-expiratory ratio (I:E),trigger sensitivity (Trigger), end-tidal pressure (PEEP), inspiratory pressure (PInsp). The parameter setting is completed by the touch screen and the operation of the shuttle button. Touch the parameter button to be modified. The parameter area is recessed. When the shuttle button is used to modify the required value, you need to press the shuttle button to confirm. At this time, the ventilator will press the modified parameter Perform ventilation. It can also be done by the knob alone.

3.2.4 Curve display area

The left side of the middle white area is the curve display area. According to the settings, P-t, F-t; P-t, F-t, V-t; P-t, P-V, F-V; F-t, P-V, F-V can be displayed at the same time.

3.2.5 Monitoring parameter area

The right side of the middle white area is the monitoring parameter area. The black font displays the monitored peak pressure (Ppeak), expiratory tidal volume (TV_Exp), ventilation (MV), respiratory rate (Freq), end-expiratory pressure (PEEP), and inhaled oxygen Concentration (FiO2). The small blue font displays the upper and lower limits of the corresponding parameter alarm.

3.2.6 Information prompt area

The top side is the information prompt area, which displays the current breathing mode, alarm information, alarm sound status, lock status, AC power and system time from left to right.

Information prompt area

1	Current working mode
2	All alarm information is displayed cyclically. Advanced

	alarm, the background color is red; Intermediate alarm, the background color is yellow; Normal alarm, the background color is the same as the color of the information bar.
3	Display  when mute, the number below is the end time of mute
4	Keyboard and screen lock, after locking （  ） all operations except mute are prohibited
5	AC power supply indication.  indicates the status of AC power supply. When the circle in front is orange, it means AC power supply, otherwise, it means AC power failure. (Note:Normal model with battery, turbo model without battery)
6	system time

3.2.7 Menu Function Select Area

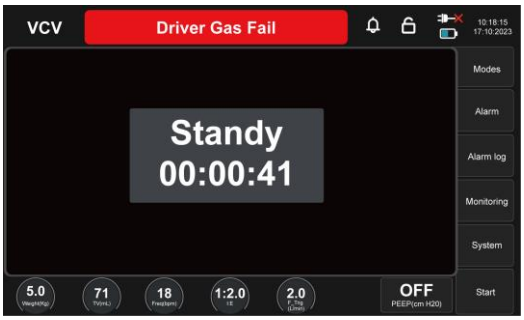
The rightmost is the menu function selection area. From top to bottom, there are 6 menus including breathing mode, alarm setting, alarm information, monitoring parameters, system setting and standby power-on switch.

4 Operation and Guide

4.1 Start the system

Step 1 Connect power
Connect the power cord to the wall outlet. When connected to AC power, the AC power indicator on the display is in a green state.

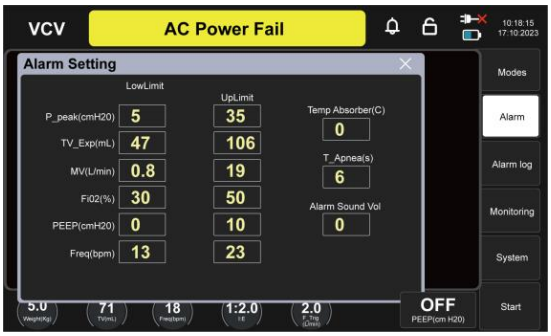
Step 2
Press the button to turn on the display, enter the LOGO screen , and then enter the standby interface (Figure 4-2).



4-1 Standby interface

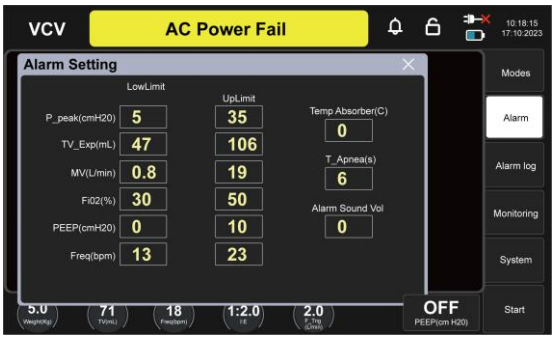
4.1.1 Alarm limits setting
Step1

Touch the "Alarm Settings" button, and the corresponding menu will appear on the screen



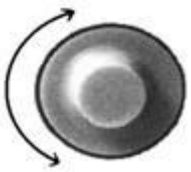
Step 2

Touch the parameter button to be adjusted, and the corresponding parameter will change color



Step 3

Turn the knob to adjust its value.



Step 4

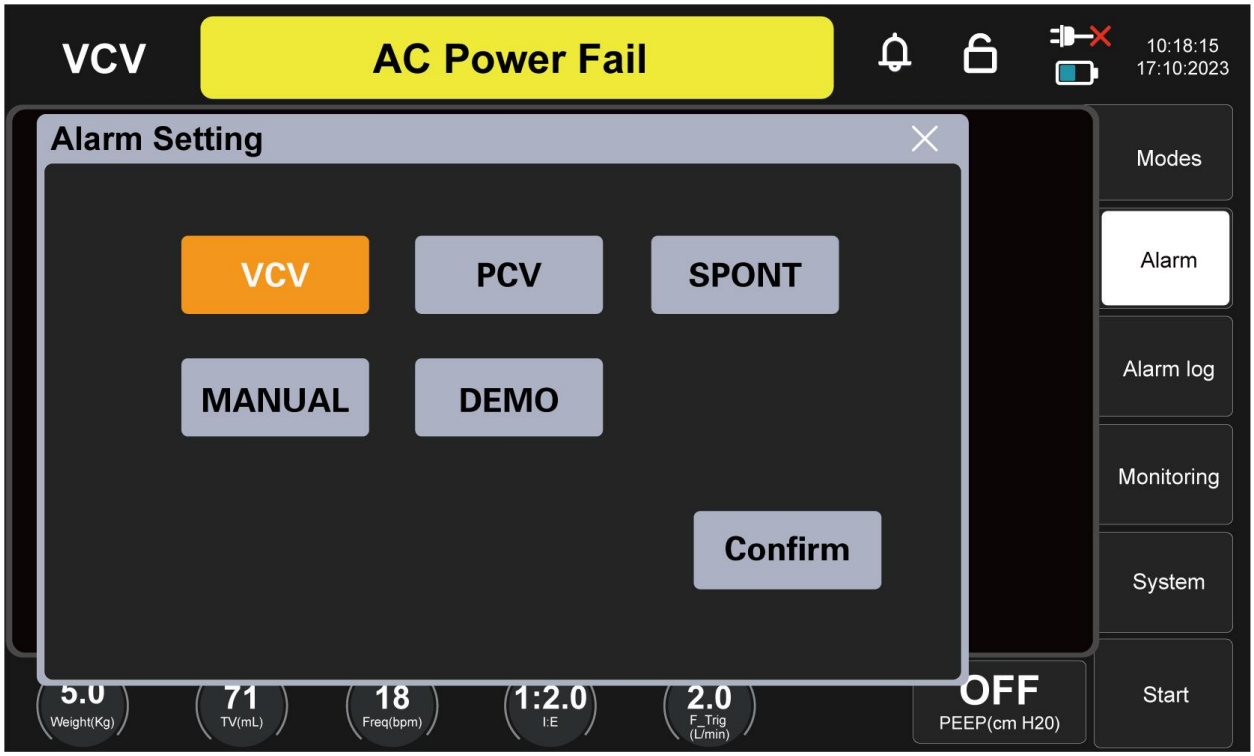
Press the knob to save the changes.continue to set other options or exit the menu

4.1.2 Ventilation mode setting

The ventilation mode is displayed in the upper left corner of the screen.

Touch " 

" , the following mode selection menu shown in Figure 4-3.



4-3 Mode selection interface

Touch the mode button you want to switch, and then touch the "Confirm" to switch to the corresponding mode, or you can use the knob to operate.

4.1.3 Ventilator control values setting

The setting parameters of the anesthesia ventilator are at the bottom of the screen

1.VCV

Weight(Kg)	TV(mL)	Freq(bpm)	I:E	F_Trig(L/min)	- -	PEEP(cmH2O)
5.0	71	18	1:2.0	2.0		OFF

2.PCV

Weight(Kg)	PInsp(cmH2O)	Freq(bpm)	I:E	F_Trig(L/min)	- -	PEEP(cmH2O)
5.0	12	18	1:2.0	2.0		OFF

3.SPONT

Weight(Kg)	PS(cmH2O)	F_Trig(L/min)	TV(mL)	Freq(bpm)	I:E	PEEP(cmH2O)
5.0	12	2.0	71	18	1:2.0	OFF

4.Manual ; in manual mode, the ventilator only serves a monitoring function and can adjust weight, but does not actually control breathing, in manual mode, the animal is breathing on its own, and the ventilator does not control the animal's breathing at all.

Weight(Kg)	TV(mL)	Freq(bpm)	I:E	F_Trig(L/min)	- -	PEEP(cmH2O)
5.0	71	18	1:2.0	2.0		OFF

5.Standby; You can set different breathing modes and adjust parameters

Please refer to section 4.1.1 for the setting steps

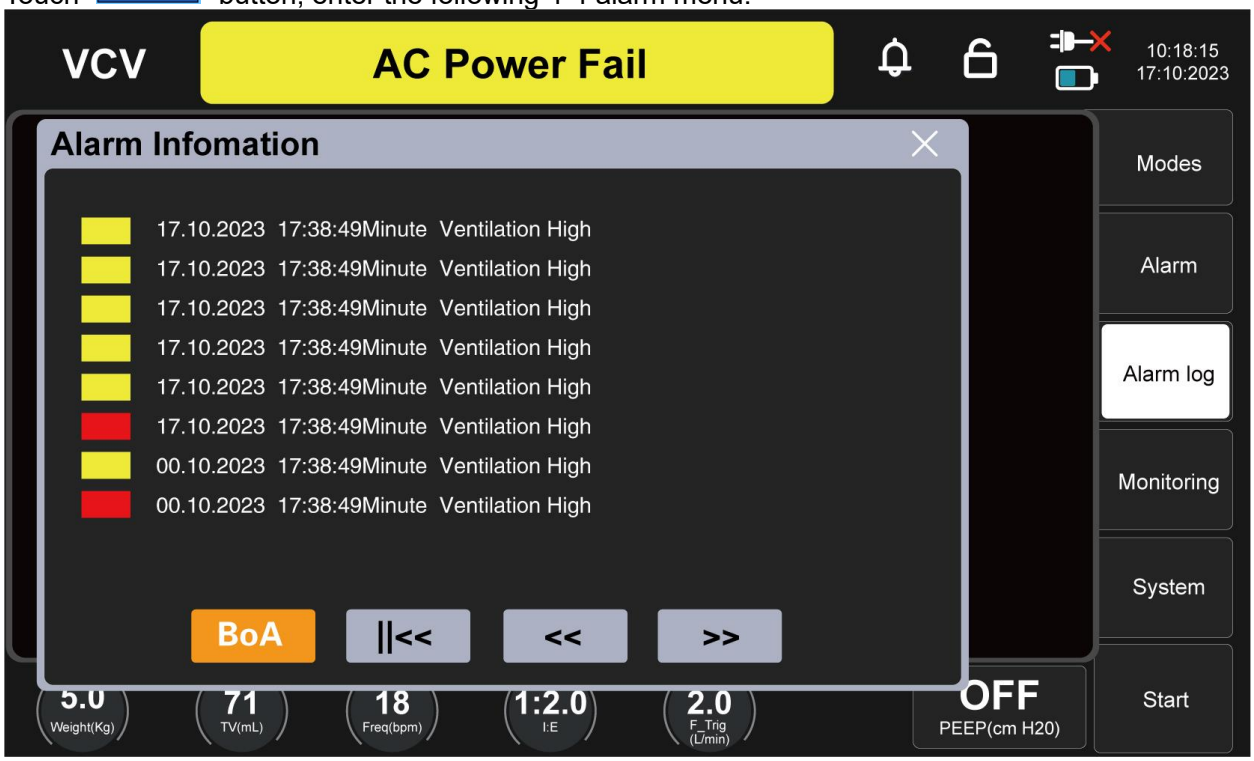
⚠Attention

When reading the tidal volume value, the monitoring value of the ventilator is used as an accurate value, and the bellows is only used as a trend observation, There are exceptions such as: the sensor probe is blocked by water, the electrical appliance is seriously faulted or out of control. At this time, the bellows can be temporarily used as an emergency for the tidal volume value.

4.2 other settings

4.2.1. View alarm records

Touch "Alarm log" button, enter the following 4-4 alarm menu.



4-4 Alarm information menu

The color at the top of the alarm record indicates the level of the alarm; the time when the alarm is recorded at the back; and the last is the content of the alarm information.

Empty	Remove all alarm records
||<<	Go to the first part of the record
<<	Page forward
>>	Page backward

4.2.2 View the total monitoring parameters

Ppeak (Peak Pressure): 28 cmH_2O

The maximum pressure reached in the airways during inspiration. High values may indicate airway resistance or reduced lung compliance.

Pflat (Plateau Pressure):

The pressure measured during a brief pause at the end of inspiration. Reflects alveolar pressure and lung compliance. A high plateau pressure can suggest lung stiffness.

Pmean (Mean Airway Pressure):

The average pressure in the airways over the entire respiratory cycle. A value of 0 suggests the ventilator may not be actively delivering breaths (e.g., standby or disconnected).

PEEP (Positive End-Expiratory Pressure):

The pressure maintained in the lungs at the end of expiration to prevent alveolar collapse. A value of 0 means no PEEP is applied.

MV (Minute Volume): L/min

The total volume of gas delivered by the ventilator per minute (TV × Frequency). Indicates overall ventilation support.

MV_Spont (Spontaneous Minute Volume):

The volume of gas breathed by the animal spontaneously (without ventilator assistance). A value of 0 suggests no spontaneous breathing efforts.

TV_Exp (Expiratory Tidal Volume):

The volume of gas exhaled by the animal in one breath. Slightly lower than TV_Insp due to potential leaks or gas exchange.

TV_Insp (Inspiratory Tidal Volume): 400 mL

The volume of gas delivered by the ventilator during inspiration.

Freq (Ventilator Frequency): bpm（beat per minute）

The number of mechanical breaths delivered by the ventilator per minute.

I:E Ratio (Inspiratory to Expiratory Ratio): 1:2.0

The duration of inspiration (1) compared to expiration (2). A ratio of 1:2 is common to allow adequate exhalation time.

Freq_Spont (Spontaneous Breathing Frequency):

The animal’s own respiratory rate. A value of 0 indicates no spontaneous breaths detected.

FIO_2 (Fraction of Inspired Oxygen): -- %

The oxygen concentration delivered. "--" suggests the value is not currently measured or displayed.

Press_Driver (Driver Pressure): "Gas Supply Input Pressure"

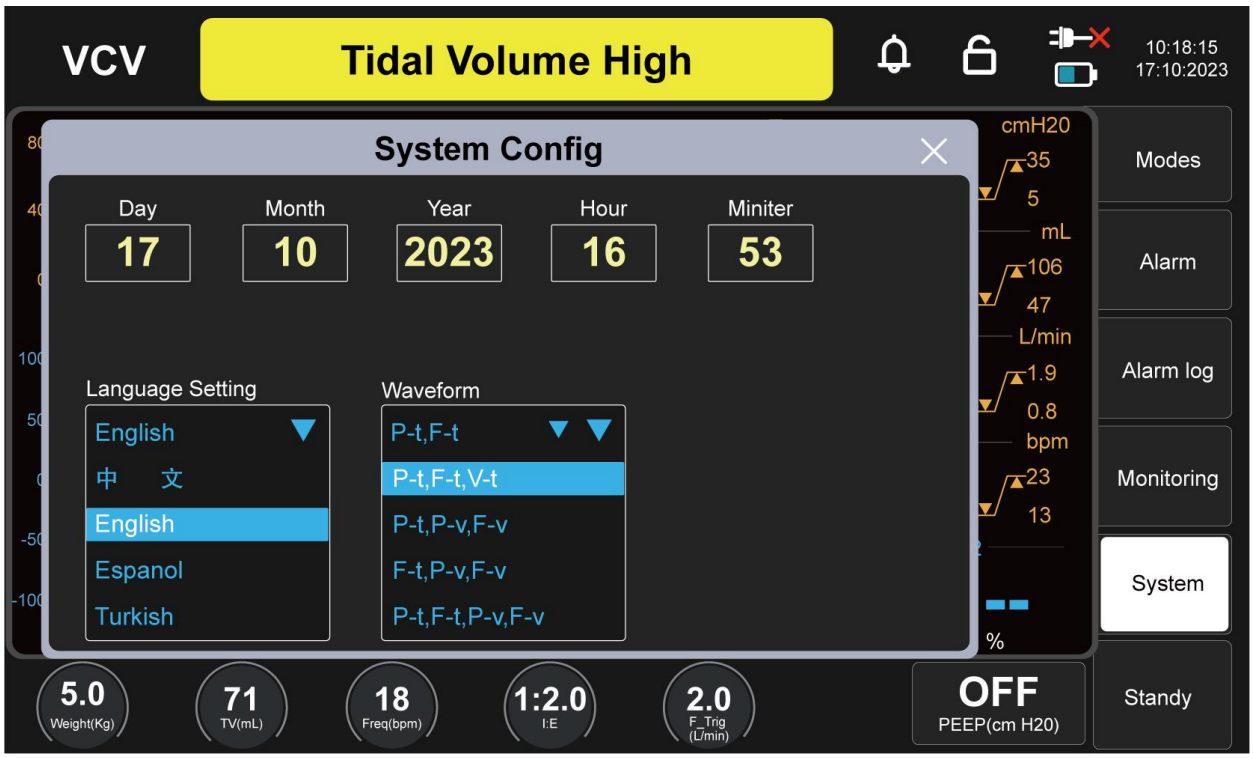
Touch the " 

" to view all monitoring information.

4.2.3 View system data

Touch the " 

" button to enter the system setting menu as shown in Figure 4-5 below



4-5 System setting menu

Touch the "System Data" button to enter the system menu to view the various voltage and sensor of the ventilator.

4.2.4 Date and time setting

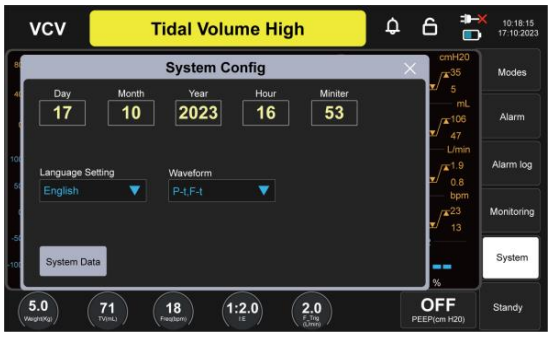
Touch the "System" to enter the system setting menu; the time can be adjusted by touching and the knob to complete the time setting.

4.2.5 Language settings

The system can be set to Chinese , English , Spanish。

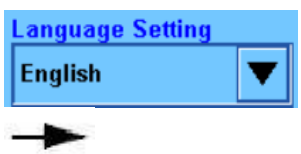
Step1

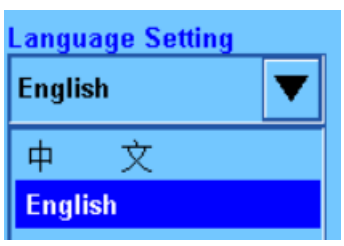
Touch the "System" button to close the password menu and enter the system setting menu.



Step 2

Touch the "Language Setting" and drop-down





Step 3

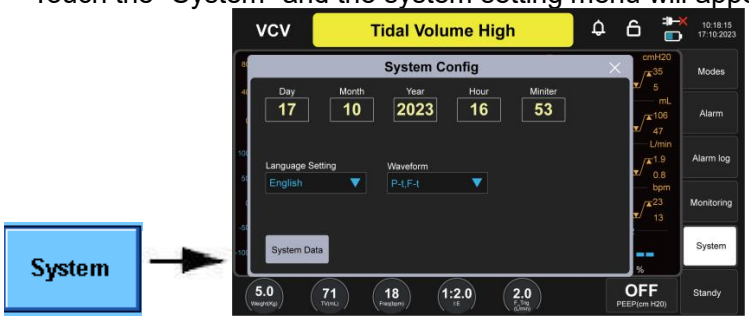
Click on the desired language to complete the setup.

4.2.6 Waveform setting

The system waveform can be set in 4 combinations (P-t, F-t; P-t, F-t, V-t; P-t, P-V, F-V; F-t, P-V, F-V).

Step1

Touch the "System" and the system setting menu will appear on the screen.



Step 2

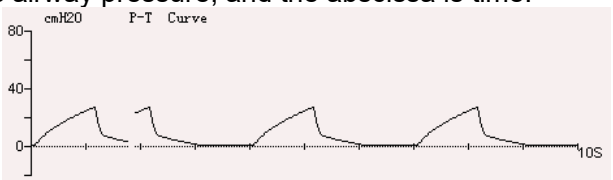
Touch the "Waveform" drop-down menu.

Step3 Click the combination needed to complete the set.

4.3 Waveform

1.Pressure- time waveform （Paw-t）:

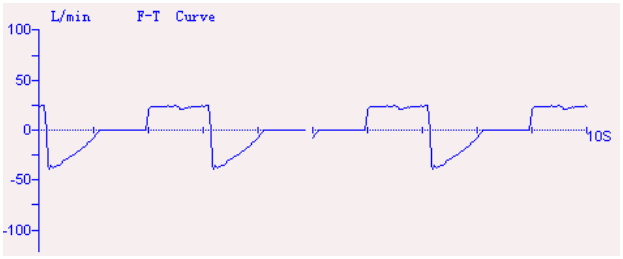
The ordinate represents airway pressure, and the abscissa is time.



4-6 Pressure-Time waveform

2 .Flow time waveform(Flow-t)

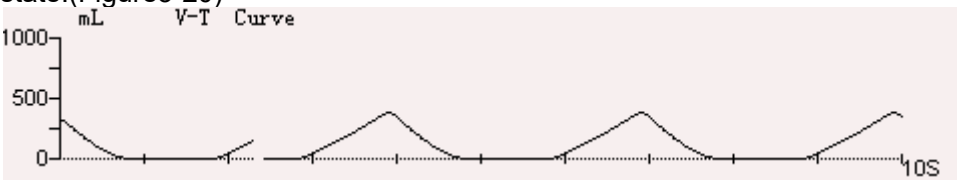
Above the time axis, it represents the positive inhalation direction; below the time axis, it represents the negative exhalation phase. The flow rate is 0L/min, which means that there is no gas flow rate in the airway.



4-7 Flow- Time waveform

3. Tidal volume-Time waveform

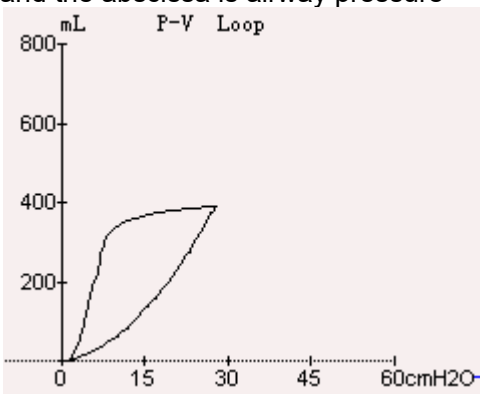
The ordinate is the tidal volume, and the waveform displayed during the breathing phase is in a sawtooth state.(Figure3-20)



4-8 Tidal volume –Time waveform

4.Pressure- volume loop

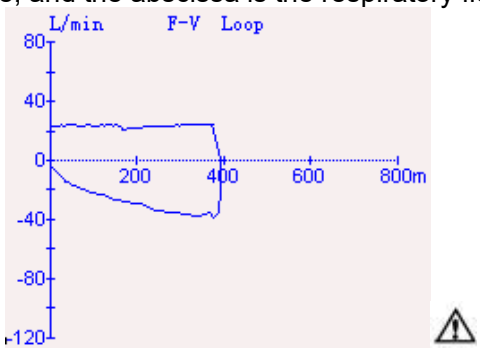
The ordinate is tidal volume, and the abscissa is airway pressure



4-9 Pressure- volume loop

5. Flow-volume loop(F-V)

The ordinate is the tidal volume, and the abscissa is the respiratory flow rate



4-10Flow-volume loop

5 Pre-operation test

5.1 Test steps before operation for the machine

Test interval The pre-operation test should be carried out in the following cases;

Between each animal use.

After repair or maintenance, proceed as required.

⚠Warning Do not use this system until you have read and understood the operation and maintenance manuals of each component.

- All system connections
- All warnings and precautions
- How to use each system component
- Test method for each system component
- Before you use the system, you should:
- Complete all tests in this section
- Test all other system components

If the test system fails, do not use the system. Ask an authorized service representative to repair the equipment.

5.1.1 System checking

⚠ Make sure that the pipe is connected correctly and intact.

1.The equipment is intact.
2.All components are connected correctly.
3.The connection and pressure of the pipeline gas supply system are correct.
4.Connect the power cord to the wall outlet. After the AC power supply is connected, the power indicator light is on.If the power indicator is off, it means that the system has no power supply. Change to another socket, close the power supply short-circuit device or replace the connection power cord.
5.Make sure the breathing circuit and sampling probe is not stagnant water.

5.2 Alarm testing

1.Connect the simulated lung to the animal connector.
2.Set the manual/machine control switch to the "machine control" position.
3.Turn on the power switch.
4.Set control options:

Ventilation mode：	VCV mode （select from the screen）
Ventilator：	Tidal volume: 500ml Respiratory rate: 12 I：E ratio: 1: 2 Maximum peak pressure: 40cmH2O
Anesthesia machine：	All gases: off Press the rapid oxygen supply button to inflate the bellows.。

5.Turn the manual/machine control switch to "manual" and then to the "machine control" position.

Make sure:
- Mechanical ventilation is activated.
- The ventilator displays the correct data.
- The bellows can rise and fall during mechanical ventilation.6 Ensure:

6.Make sure
- The end-expiratory pressure is less than 3cmH2O.
- The ventilator displays the correct data.
- The bellows rises and falls during mechanical ventilation.

7.O2 monitor Testing
- Remove the O2 sensor from the circuit and confirm that the O2 in the indoor air measured by the sensor is about 21%.
- Put the O2 sensor back into the loop.
- After 2 minutes in pure O2, make sure that the O2 measured by the sensor is approximately 100%.

8.Low airway pressure alarm testing
- Remove the simulated lung from the animal connection circuit.
- Other alarms occur, such as low minute ventilation alarms.
- Ensure that a low airway pressure alarm occurs.

9.Turn off the power switch.

6 Installation and connection

6.1 Gas and electrical connection

⚠**Warning** The failure of the central air supply system may cause a device connected to it or even all connected devices to stop working at the same time.

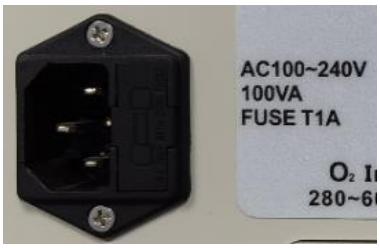
⚠**Attention** Only medical air source can be used. Other types of gas sources may contain water, oil or other contaminants.

⚠**Attention** Disconnect the gas source connection after use to prevent contamination of the pipeline system.

⚠**Warning** The anesthesia system has provided O2, N2O and Air connection methods. Moreover, the pipe connections of these two gases have their own different sizes to ensure that the operator will not misuse. The front of the anesthesia machine is equipped with a continuous pressure monitoring device that can monitor each gas connected to the centralized gas supply through the pipeline.

6.2 AC power inlet

As can be seen from the figure, the AC power requirement is 100-230VAC 50/60Hz, and the maximum allowable current is 1A. The specification of the fuse is 250V1A φ5X20 (F). The power cord is fixed to the case with a clip to prevent the power cord from accidentally falling off.



6-1

See 7.5 for the replacement of the fuse.

6.3 USB port

6-2

There is a Mini USB port on the back of the ventilator, which is used to upgrade the ventilator's software

6.4 Pipeline inlet

6-3

As shown in the figure, The left side is drive gas outlet interface, and right is the exhaust air interface.

6.5 Oxygen sensor interface

6-4

Connect the oxygen sensor cable.

6.6 Flow rate sampling interface

6-5

Connect the two sampling tubes of the flow sensor, the right port is connected to the tube near the animal, and the left port is connected to the far end of the animal.（left white，right blue）

7 Maintenance and disinfection

Warning

- Please observe the applicable safety precautions
- Please carefully read the material safety data sheet of each cleaning agent.
- Please carefully read the operation and maintenance manuals of all disinfection equipment.
- Please wear safety gloves and glasses. If the oxygen sensor is damaged, it may leak and cause combustion (containing potassium oxychloride).
- Do not breathe fumes.

Attention

In order to prevent damage

- If you have any questions about the cleaning agent, please refer to the data provided by the manufacturer.
- Do not use organic, halogenated or petroleum-based solvents, anesthetics, glass cleaners, acetone or other harsh cleaners.
- Do not use abrasive cleaning agents (such as steel wool, silver polish or cleaning agents).
- Keep all liquids away from electronic parts.
- Do not allow liquid to flow into the equipment housing.
- Do not soak the synthetic rubber parts for more than 15 minutes. This can cause swelling or accelerated aging.
- Only the parts marked with 134℃ are pressure-resistant and heat-resistant parts.
- The pH value of the cleaning solution must be 7.0 to 10.5.

Special requirements

- Clean the O2 sensor with a damp cloth. Do not immerse the sensor in liquid for cleaning.
- Please disassemble the bellows components for cleaning. Otherwise, drying will take a long time. Hang the bellows upside down (unfold) to dry.

Warning

Do not use talc, zinc stearate, calcium carbonate, corn starch or similar materials to prevent stickiness. These materials may enter the lungs or airways of pet patients, causing irritation or injury.

Attention

Do not immerse the loop oxygen sensor connector in liquid.
Do not place the loop oxygen sensor in heat pressure treatment.
Do not clean the inner surface of the oxygen sensor. Wipe the outer surface with a damp cloth.
Check whether the parts are damaged. Replace if necessary.

7.1 Cleaning and disinfection before first use

Whole machine	Moist soft cloth with a water-soluble disinfectant used to clean the ventilator panel and surface
Breathing circuit parts	see 6-2
Absorption loop	Cleaning and disinfection
Absorption loop	Cleaning and disinfection

7.2 Parts of breathing circuit

Threaded tube , mask,Y type tee, right angle, elbow, airbag	This is a one-time design without disinfection. Waste should be recycled.These consumables should be replaced with medical grade non-toxic, odorless, and the same size products.
Reusable threaded tube and air bag	Soak with disinfectant
T type tee	Soak with disinfectant
Flow sampling probe and flow sampling tube	Every time a pet patient is replaced, it should be rinsed with soapy water first, and then placed in a fumigation box for disinfection after the water is dried.

7.3 Bellows integration

This section is about the disassembly, assembly, cleaning and disinfection of the integrated bellows. Read and understand this section thoroughly before starting disassembly, assembly, cleaning and disinfection. Otherwise, the equipment will not work normally, and patients may be endangered.

⚠**Warning** Only the material of the bellows folding bag is latex.

7.3.1 Disassembling the bellows assembly

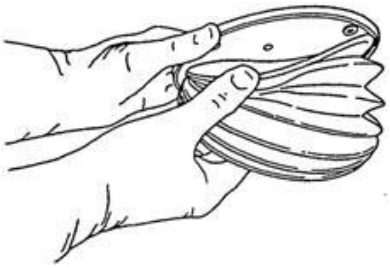
The following are the steps to disassemble the bellows integration (the assembly steps are the opposite):

Loosen the screws on the integrated bracket of the bellows and remove the integrated bellows.

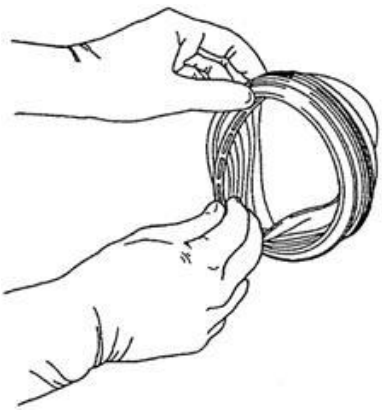
Rotate counterclockwise and remove the bellows cover.

Separate the fold bag from the tray.

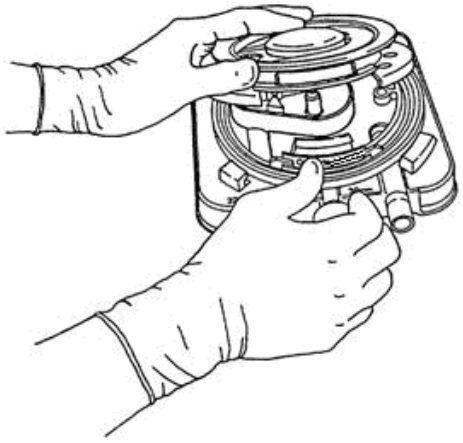
Disengage the top disc of the folding capsule.



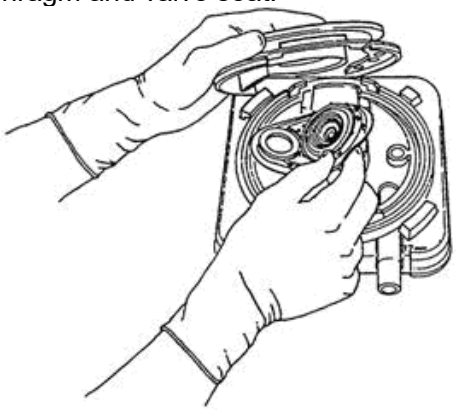
Take out the ring in the top ring of the folded bag.



Push the lock to the center and remove the tray.

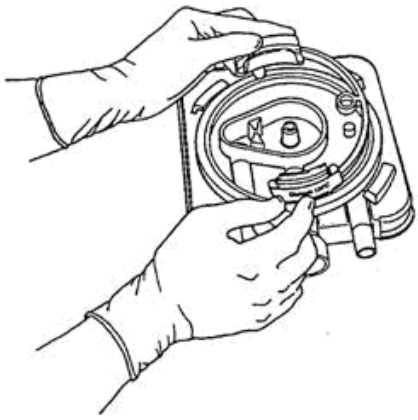


Take out the relief valve diaphragm and valve seat.

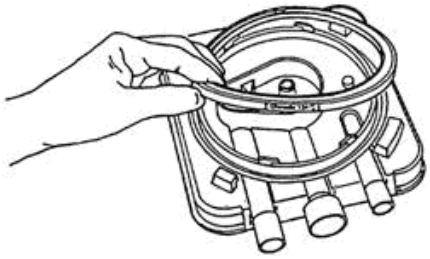


⚠**Warning** Never disassemble the pressure relief valve. This can cause damage to the base or diaphragm and injury to animals.

Push to the center and remove the lock spring



Remove the sealing ring.



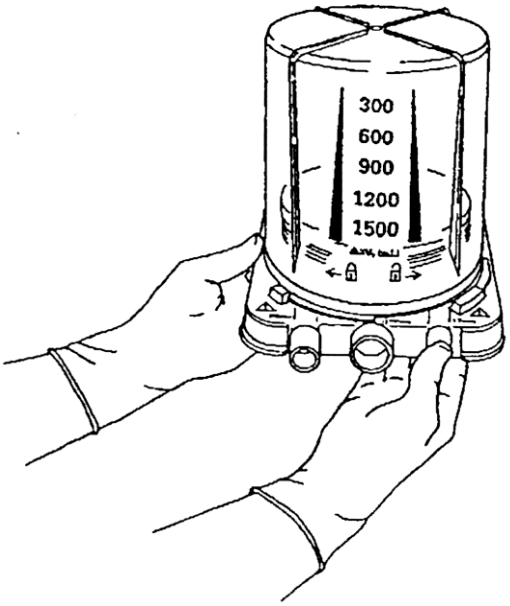
7.3.2 Integrated function test of the bellows

⚠**Warning**: Do not block the interface with small objects to slip into the breathing circuit.

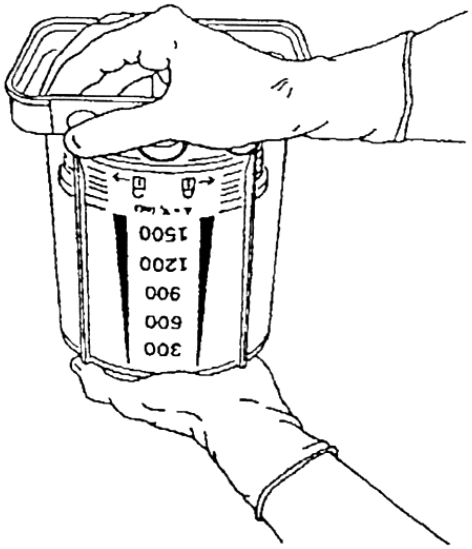
⚠**Warning**: This function test should be carried out before use.

The purpose of this functional test is to confirm the responsibility of the assembler to ensure that all components are installed correctly. This test is not a substitute for system test. If the bellows integration meets the test requirements, it can be installed, otherwise, it must be disassembled again, inspected and replaced with damaged parts, and then assembled and tested.

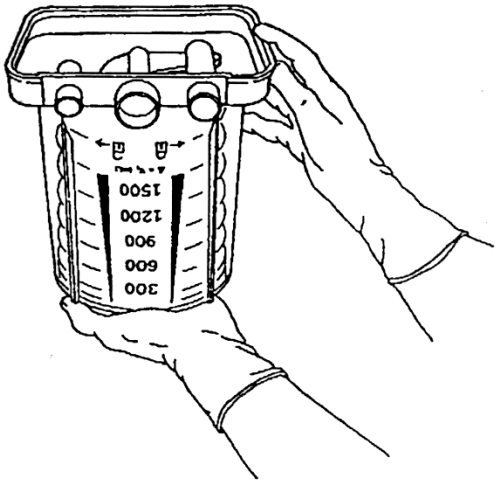
Before installation, the hand-held bellows is integrated, vertically upwards, blocking the driving gas interface.



Inverte bellows integration. The descending speed of the top of the folded bag is not more than 100mL/min. If the limit is exceeded, the possible reasons are: improper blockage of the driving gas interface, incorrect installation of the folding bag or sealing ring, and damage to other components.

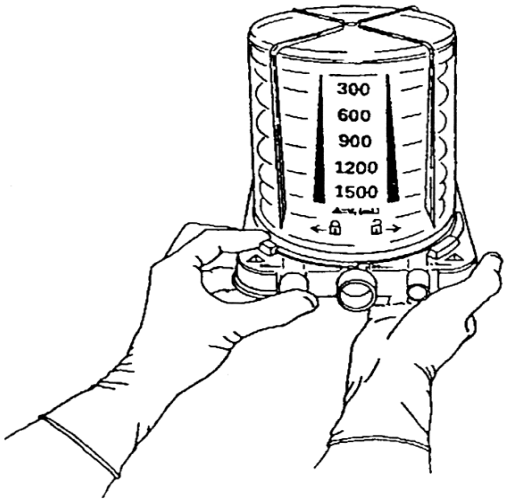


Open the driving gas interface, fully expand the folding bag, and then block the respiratory system interface.

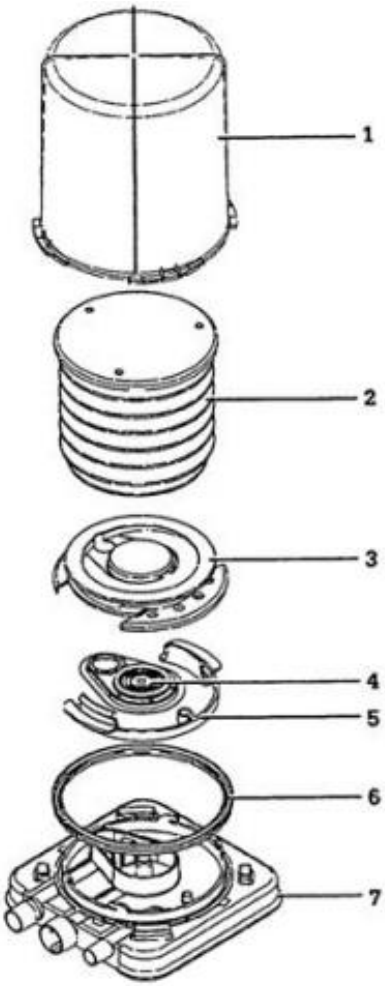


Flip the integrated bellows to make it vertically upward.

The rate of descent of the top of the folded bag is not more than 100 mL/min. If the limit is exceeded, it may be due to improper installation of the foldable bag or relief valve, or damage to other components. Figure 15



7.3.3 List of bellows components



1.Bellows cover	5.Lock spring
2.Folding bag	6.Sealing ring
3.Tray	7.Base
4.Relief valve	

7.3.4 Cleaning and disinfection

Disinfection is carried out according to the method recommended by the manufacturer of the sterilizer

Cleaning

1. Remove the bellows assembly.

⚠**Warning**

Do not separate the relief valve diaphragm and valve seat

2.In order to protect the components. The washing force should be light, and the recommended

mild detergent for rubber and plastic without enzymes is added to the hot water.

⚠**Attention**

When drying the folded pouch, it should be hung and fully unfolded. Otherwise, it may cause adhesion of the folded sac.

4. After it has completely dried, check whether the parts are damaged, and then perform assembly and functional tests.
5. Connect the bellows integration, ventilator and breathing system.
6. Perform a pre-use inspection of the system.

Disinfect

In general, cleaning and disinfection should be carried out simultaneously. The following is only a brief description of common methods that can be used for integrated disinfection of the bellows integration.

Disinfection of general pet patients after use

After pet patients use it, they should first wash the inside and outside with soapy water, rinse and dry it repeatedly with clean water. Then, after soaking the plastic and rubber utensils in 70-80% ethanol for half an hour, take them out with a sterile transfer forceps, store them in a clean container, and repeat the sterilization before the next use. Metal, glass and other parts can be sterilized by high-pressure steam. The high-pressure steam cooker is used to increase the steam pressure, and the temperature in it will also increase, so that the bacterial protein will solidify quickly and the sterilization effect will be rapid and reliable. For example, under 1.05kg/cm2 and steam pressure, the temperature can be increased to 121°C and maintained for 15-20 minutes to kill all bacteria and most of the spores.

Disinfection of pet patients with special infections or infections after use

Including open tuberculosis, lung abscess, Pseudomonas aeruginosa infection, tetanus, gas gangrene, or infectious hepatitis. After use, all integrated parts of the bellows must be thoroughly disinfected in two steps: preliminary treatment and thorough treatment.

1) Preliminary treatment: According to the principle of isolation treatment. Place all the integrated parts of the bellows that have been used during the operation in the operating room. After the operation, perform the following preliminary treatments: soak the integrated parts of the bellows with 1:1000 neo-germide or 1-5% cresol for 30 minutes.

2) Thorough treatment: After the above-mentioned preliminary treatment, the integrated parts of the bellows are thoroughly disinfected:

a) Wash with soapy water, rinse with clean water repeatedly, and dry;

b) When conditions permit, it is best to fumigate the parts that are in direct contact with pet patients with formaldehyde or ethylene oxide, or use soaking and disinfection respectively. For example, parts used by pet patients with open tuberculosis should be soaked in 3% cresol for 30 minutes; pet patients with tetanus should be soaked with 0.2% potassium permanganate for 30 minutes; parts used by pet patients with gas gangrene, Soak the parts with 0.1% chlorhexidine for 30 minutes; soak the parts in pet patients with pulmonary purulent infection with 0.1% neocerin for 60 minutes; soak the parts in pet patients with Pseudomonas aeruginosa infection with 0.1% neocerin for 2 hours;

c) After taking out the soaked objects, they need to be rinsed repeatedly with clean water and dried for later use;

d) The parts that are not in direct contact with pet patients should be rubbed and rinsed repeatedly with 1 to 3% phenol solution or soapy water and clean water. If necessary, irradiate with ultraviolet light for 30 minutes.

7.3.5 Regular maintenance

⚠ **Warning** When it is being used on a patient, do not perform any tests and repairs to avoid endangering the patient.

The following inspections should be performed every 30 days to ensure that the parts that fail due to use, daily cleaning, etc., are replaced in time.

Visual inspection

Detach the bellows to integrate with the anesthesia machine.
Disassemble the integrated bellows.

⚠**Warning** Never separate the relief valve diaphragm and valve seat.
Check each part carefully to determine whether there are cracks, curls, dissolution, swelling, and other physical changes, and replace if necessary.and then conduct a leak test.

8 User Maintenance

⚠**Warning** In order to prevent fire

- Please use approved lubricants for anesthesia or oxygen equipment.
- Do not use lubricants containing oil or grease. Lubricants containing oil or grease may burn or explode when oxygen reaches a certain concentration.
- All covers used on the system must be antistatic (conductive) materials. Static electricity may cause a fire.

⚠ **Warning**

Please follow the disinfection control and safety regulations, because the used equipment may contain blood and body fluids.

⚠ **Warning**

Moving parts and detachable parts can be pinched or crushed. Be careful when moving or replacing system components.

⚠ **Warning**

In the process of handling the product, be sure to avoid impact and vibration of the flowmeter, otherwise the glass tube will be broken.

⚠ **Warning**

Disposal of waste equipment (such as batteries and LCD screens) that cause certain environmental hazards must be carried out in accordance with relevant local regulations and requirements.

8.1 Maintenance principles

Do not use faulty equipment. Let an authorized service representative of the company complete all necessary repairs. After the repair is completed, the equipment should be tested to ensure that the equipment functions normally and conforms to the manufacturer's specifications.

In order to ensure the reliable function of the equipment, all maintenance or equipment repair work should be completed by authorized service representatives of the company. If this is not possible, qualified, well-trained personnel with experience in repairing such equipment can also complete the replacement and maintenance of the parts listed in this manual.

8.2 Maintenance overview and schedule

This timetable is based on the typical situation of using 2000 hours per year as the minimum maintenance frequency. If the actual use time per year is longer than the typical situation, then your equipment should be maintained more frequently.

8.2.1 User Maintenance

Maintenance that users should do	Maintenance
Everyday	Clean external surfaces

Every week	Air oxygen concentration calibration (loop O2 sensor) Ventilate the system and open the flow meter to make the buoy move flexibly to prevent blockage or adhesion.
Every month	Leak test of the bellows integration (see 6.5.2 for the method) Pure oxygen oxygen concentration calibration (loop O2 sensor)
During cleaning and installation	Check if the parts are damaged, replace or repair if necessary
Carry out as required	When the flow velocity waveform is abnormal, calibrate the flow sensor. Replace the loop O2 sensor (under typical use, the sensor performance meets the requirements within 1 year). Open the drain valve and replace the absorbent in the absorption tank.

8.2.2 Maintenance interval

The whole machine	The recommended maintenance interval for this anesthesia machine is 5 years.

8.3 Maintenance of the respiratory system

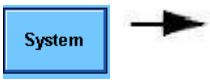
If parts are found to be broken, deformed or worn, they should be replaced when cleaning the respiratory system

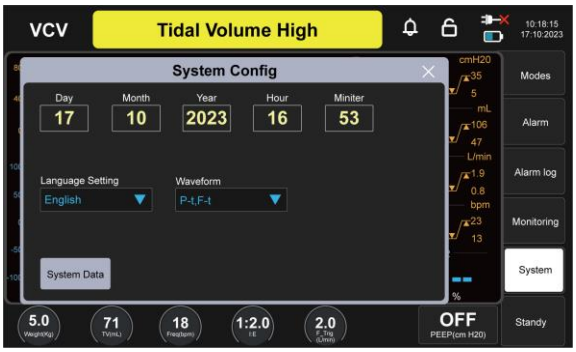
8.3.1 Zero point calibration of pressure sensor

If the zero point drift of the pressure sensor is found to be too large, please calibrate the zero point of the pressure sensor. Pressure sensors include airway pressure sensors and driving gas pressure sensors.

Step 1

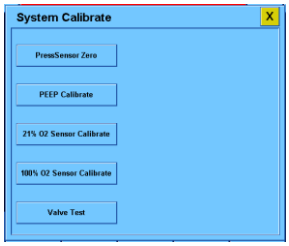
First switch to "Standby" mode, touch the "System Settings" button, and enter the password "201809" to view the menu.





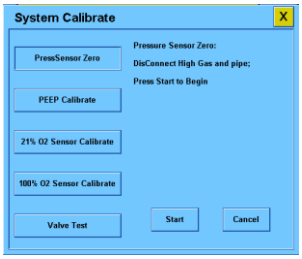
Step2

Touch the " SysCalibrate" button to view the menu.



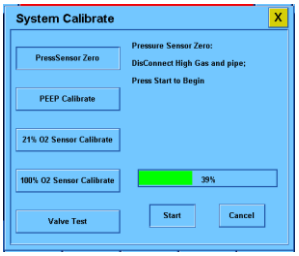
Step3

Touch the "Pressure Sensor Zero Calibration" button. Pay attention to the prompt information, disconnect all air sources, and empty the remaining air in the machine through a flow meter, and the animal circuit is connected to the atmosphere.



Step4

Touch the "Start" button, a progress bar shows the calibration.



Step 5

After the verification is completed, a message indicating whether the verification is successful or not will be displayed; touch the button to return to complete the zero point

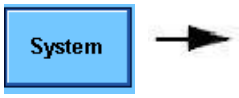
calibration.

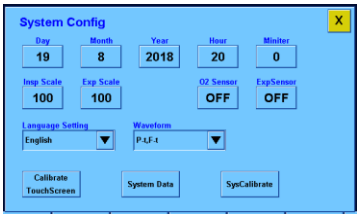
8.3.2 PEEP calibration

In the process of use or test, if the difference between the measured peep and the set peep value is still too large (2cmh2o), please calibrate the peep. During calibration, it is necessary to turn on the compensation flow to 3L / min and ensure that the bellows is intact without air leakage, then block the animal interface on the animal tee to make the bellows reach the top, and then perform the following process.

Step1

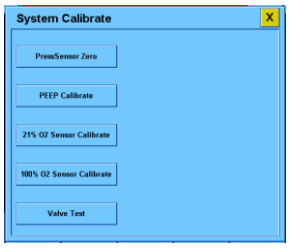
First switch to "Standby" mode, touch the "System Settings" button, and enter the password "201809" to view the menu.





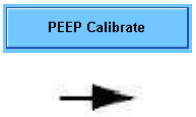
Step 2

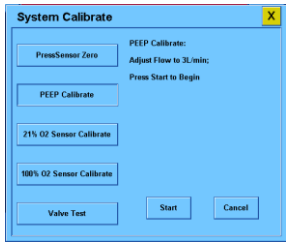
Touch the "System Verification" to view the menu.



Step3

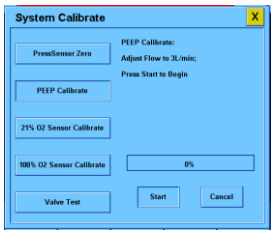
Touch the "PEEP Calibration" . Pay attention to the prompt information.





Step4

Touch the "Start", a progress bar shows the calibration.



Step5

After the verification is completed, a message indicating whether the verification is successful or not will be displayed; touch the button to return to complete the PEEP calibration.

8.3.3 Replacement of O2 sensor

⚠**Warning** Please observe the relevant regulations on biohazards when disposing of the sensor. Do not burn it.

Replacement steps:

1. Unplug the O2 sensor cable connector from the O2 sensor.
2. Pull out the O2 sensor from the T-type tee. Install the replacement O2 sensor. Reconnect the O2 sensor cable.

8.3.4 Calibration of O2 sensor

⚠**Warning**

- When the system is connected to an animal, please do not perform the calibration process.
- When calibrating the O2 sensor, the ambient pressure must be the same as the ambient pressure used for oxygen delivery monitoring in the animal circuit.
- If the pressure during operation is different from the corrected pressure, the monitoring accuracy of the readings may exceed the specified range.

8.3.4.1 Calibration of air oxygen sensor

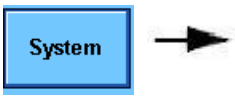
⚠**Warning** When the system is connected to an animal, please do not perform the calibration process.

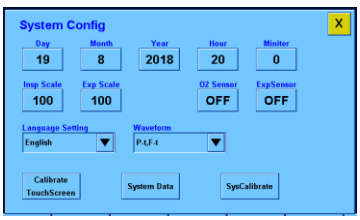
This process requires at least two minutes.

Before the pure oxygen concentration check, the air oxygen concentration check must be done first.

Step1

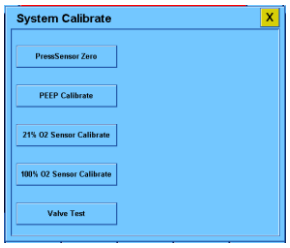
First switch to "Standby" mode, touch the "System Settings" button, and enter the password "201809" to view the menu.





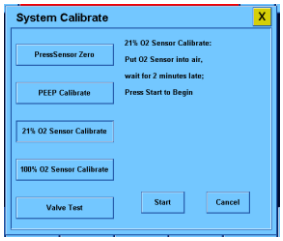
Step2

Touch the "System Verification" button to view the menu.



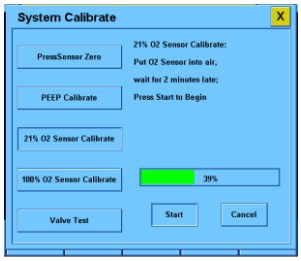
Step3

Touch the "Oxygen sensor calibration" . Pay attention to the prompt information. At this time, you need to place the oxygen sensor in the air and wait at least 2 minutes.



Step4

Touch the "Start", a progress bar shows the calibration.



Step5

After the calibration is completed, a message indicating whether the calibration is successful or not will be displayed; touch the button to return to complete the air oxygen sensor calibration. If the calibration is unsuccessful, you can replace the oxygen sensor and perform the air oxygen sensor calibration again.

8.3.4.2 Pure oxygen sensor calibration

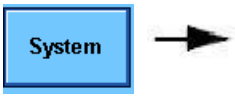
This process can take up to three minutes. Before you select the pure oxygen oxygen concentration check, you must complete the air oxygen concentration check.

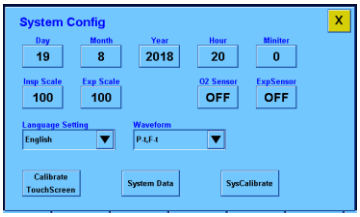
⚠**Warning** When the system is connected to an animal, please do not perform the calibration process.

Before the pure oxygen oxygen concentration check, the air oxygen concentration check must be done first.

Step1

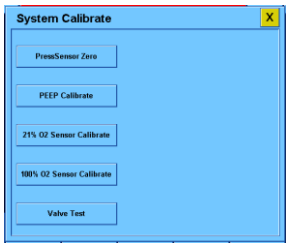
First switch to "Standby" mode, touch the "System Settings" , and enter the password "201809" to view the menu.





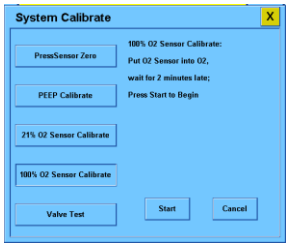
Step2

Touch the "System Verification" button to view the menu.



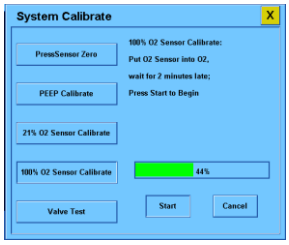
Step3

Touch the "Oxygen sensor calibration in pure oxygen" . Pay attention to the prompt information. At this time, you need to place the oxygen sensor in the pure oxygen loop and wait at least 2 minutes.



Step4

Touch the "Start", a progress bar shows calibration.



Step5

After the calibration is completed, a message indicating whether the calibration is successful or not will be displayed; touch the button to return to complete the calibration of the pure oxygen sensor. If the calibration is unsuccessful, you can

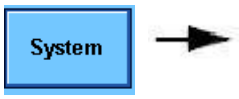
replace the oxygen sensor, perform the air oxygen sensor calibration again, and then perform the pure oxygen sensor calibration.

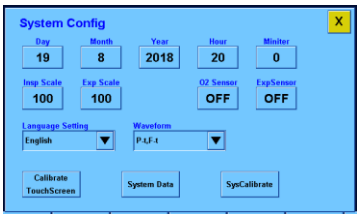
8.3.5 Calibration of flow sensor

The the machine flow sensor adopts differential pressure flow rate measurement. It can use the air resistance on the loop or the differential pressure air resistance purchased on the animal side for measurement, and different air resistance can be selected by setting. The settings are as follows.

Step 1

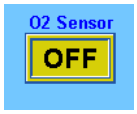
First switch to "Standby" mode, touch the "System Settings" , and enter the password "201809" to view the menu.





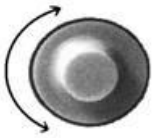
Step 2

Touch the "External Sensor" parameter button.。



Step 3

Turn the knob, clockwise is ON; counterclockwise is OFF, select ON when the air resistance is purchased, and OFF when the air resistance of the circuit is selected.



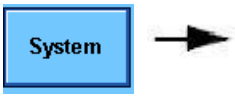
Step 4

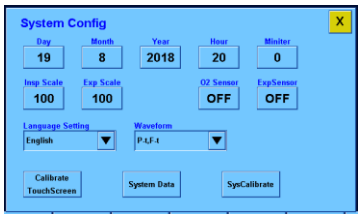
Press the knob to confirm the selection.

The flow sensor has an inhalation proportional coefficient and an expiratory proportional coefficient, which are used to calibrate the inhalation and expiration tidal volume. These two coefficients have been set before leaving the factory. If the circuit or air resistance is replaced or the tidal volume error is relatively large, it needs to be reset these two coefficients. The setting method is as follows.

Step 1

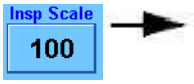
First switch to "Standby" mode, touch the "System Settings" button, and enter the password "201809" to view the menu.





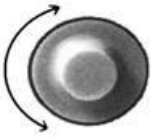
Step 2

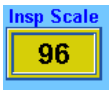
Touch the "Inspiratory Coefficient" parameter button.



Step 3

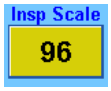
Turn the knob clockwise to increase; turn the counterclockwise to decrease.





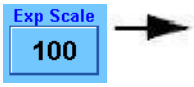
Step 4

Press the knob to set the inspiratory ratio coefficient.



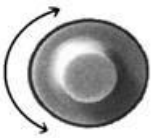
Step 5

Touch the "Expiration Coefficient" parameter button.



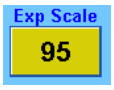
Step 6

Turn the knob clockwise to increase; turn the counterclockwise to decrease.



Step 7

Press the knob to set the inspiratory ratio coefficient.



The determination of the inspiratory proportional coefficient (InspScale)and the expiratory

proportional coefficient (ExpScale)is determined by the following steps.

1) First, set both the inspiratory proportional coefficient (InspScale) and the expiratory proportional coefficient (ExpScale) to 100.

2) Prepare the tidal volume tester. In VCV mode, set the frequency to 20bpm, the inspiration-to-expiration ratio to 1:2, PEEP to OFF, and Hold to 0; the bellows can reach the top at the end of expiration, and then close the flow compensation.

3) Set the tidal volume to 100mL, 200mL, 300mL, 500mL, and wait for the tidal volume to stabilize, then record the inspiratory tidal volume measured by the ventilator (TVinsp-100, TVinsp-200, TVinsp-300, TVinsp-500) and expiratory tidal volume (TVexp-100, TVexp-200, TVexp-300, TVexp-500) and tidal volume displayed by the tester (TV-100, TV-200, TV-300, TV-400, TV-500).

4) Calculation coefficient:

InspScale = （（TV-100/TVinsp-100）+（TV-200/TVinsp-200）+（TV-300/TVinsp-300）+（TV-500/TVinsp-500））/5；; round to the nearest integer.

ExpScale = ((TV-100/TVexp-100)+(TV-200/TVexp-200)+(TV-300/TVexp-300)+(TV-500/TVexp-500)/5; round to the nearest integer.

5) Reset the inhalation proportional coefficient and expiratory proportional coefficient of the ventilator according to the calculated values.

8.3.6 Turbine test

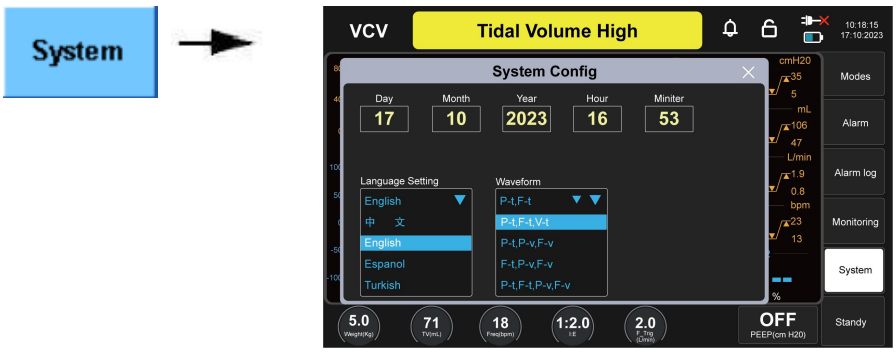
Warning When the system is connected to an animal, please do not perform the calibration process.

The turbine test is generally performed when the ventilator pressure is not high enough.

Before calibration, the system needs to be connected, and then the simulated lung should be removed. Remove the bellows folding bag, then install the bellows cover, and then perform the following operations.

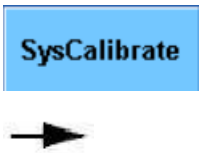
Step1

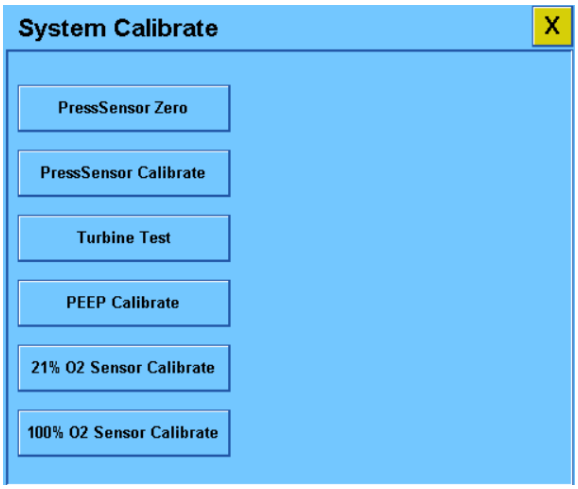
First switch to "Standby" mode, touch the "System Settings" button, and enter the password "201809" to view the menu.



Step2

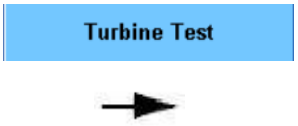
Touch the "System Verification" button to view the menu.

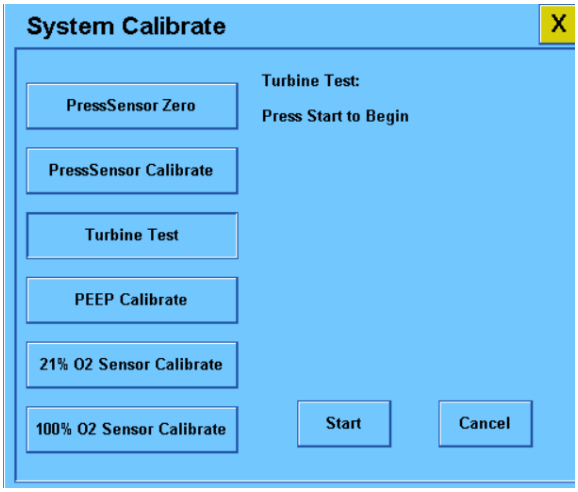




Step3

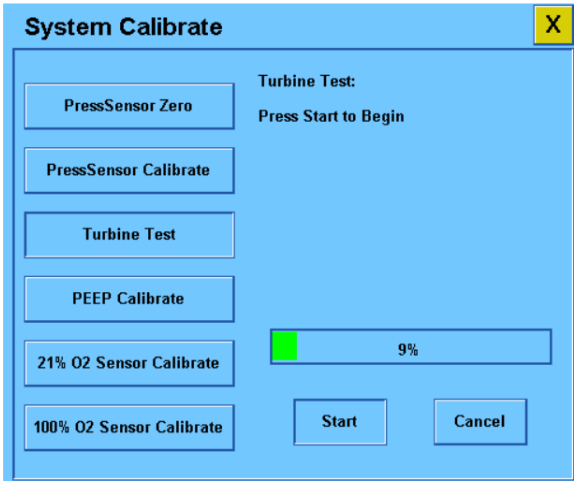
Touch the " Turbine test" .





Step4

Touch the "Start" , a progress bar shows the calibration.



Step5

After the calibration is completed, a message indicating whether the calibration is successful or not will be displayed; touch the button to return

8.4 Maintenance of oxygen sensor

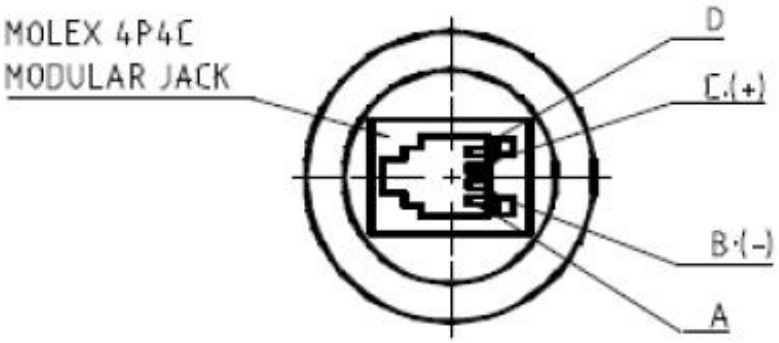
Perform regular corrections, and refer to section 8.2.1 for the time interval.

8.4.1 Main technical requirements of O2 sensor

The oxygen sensor is a consumable product. Users should pay attention to the expiration date of the sensor and use it in accordance with the characteristics and technical requirements provided by the manufacturer. The following are the main technical requirements of the O2 sensor used by the 6500.

Maximum input range of interface: 0－500mV DC

Interface form and definition: FCC-68 4-pin telephone plug (RJ11-4), see the figure below.



Typical input at 21% concentration: 5-20mV

Measurement accuracy and full-scale error: <1% (0-100%)

Working temperature: 0-40℃

Response time: no more than 20s

Service life: not less than 12 months (subject to actual product indicators)

Conform to standard: EN12598/ISO7767

8.4.2 Recommended model and its main characteristic parameters

Model	MOX-4
Response time (seconds)	15
Validity period (months)	12
Currently optional models	Yes

Note: For specific parameters, please refer to the latest technical data released by the manufacturer.

8.5 Replacement of fuse

⚠**Warning** Before replacing the fuse, the AC power must be disconnected. Otherwise, it will cause injury to personnel and even death.

⚠ **Warning T**he fuse of the same model and size must be replaced when replacing the fuse, t Otherwise, the equipment will be damaged.

⚠ **Warning** The fuse is a vulnerable part, which shall be replaced with appropriate force and speed.

1. The fuse located inside the power socket, its replacement steps are as follows:
1) Insert the screwdriver into the groove on the lower edge of the box cover with the fuse.
2) Pry up the screwdriver gently.
3) The cover of the fuse box pops out slightly.
4) Remove the fuse.
5) Insert a new fuse.
6) Close the cover of the fuse box.
7) Connect AC power.

2. For the fuse located above the power socket of the auxiliary network (see Figure 52), the replacement steps are as follows:
   1) Insert the screwdriver into the groove at the end of the fuse box.
   2) After rotating counterclockwise for 3-5 laps, gently pull out the fuse holder.
   3) Remove the fuse.
   4) Insert a new fuse.
   5) Gently push the fuse holder into the original position.
   6) Use a screwdriver to rotate clockwise 3-5 laps to fix it.

⚠ **Attention** Do not use excessive force or excessive force when rotating with a screwdriver,otherwise the fuse box will be damaged.

9 Alarm and fault diagnosis

Warning Persons without experience in repairing such equipment must never engage in repair work.

9.1 About alarm

Warning If an alarm occurs, the animal should be protected first, and then fault diagnosis or necessary maintenance procedures should be carried out.

The top area of the display shows alarm information.

Alarm information bar

High priority alarms need to be dealt with immediately

Priority	Alarm volume	Alarm mute	Alarm information	Alarm indicator
High	There are 5 alarm sounds, 2 of which are rapid, and the alarm period is 9 seconds.	120seconds	Red bottom loop display.	Red, flashing.
Middle	3 tones, the alarm period is 6 seconds.	120 seconds	Yellow bottom loop display.	Yellow, flashing.
Low	3 tones, the alarm period is 27 seconds.	120 seconds	Self-color low loop display	

Attention When the alarm is muted, the alarm becomes , and the sound of the alarm disappears. After 2 minutes, the alarm returns to its original state; if the condition of the alarm is not dealt with, the alarm will continue to sound.

9.2 Alarm information table

Attention Protect animals during use; repair malfunctions after use.

Attention The table does not include operating instructions

Display information	Alarm level	causes	Measures/Precautions	Solution
Airway pressure Is high	High	The airway pressure is higher than the upper limit set value. Tidal volume setting is too large. The patient's airway is	Reset the upper limit of airway pressure. Check the exhalation channel and deal with the blockage. Check the tidal volume	----

		blocked. The exhalation valve is blocked.	setting. Check the patient's airway and deal with the blockage.	
Low airway pressure	High	Tidal volume is below the set lower limit	Reset the lower limit of airway pressure; Check the parallel sampling tube.	----
Low tidal volume	High	The tidal volume is 0for 20 consecutive seconds.	Check the animals. Check the pipeline connection.	----
High tidal volume	High	The tidal volume is higher than the set upper limit.	Check whether the animal is breathing spontaneously. Check the ventilator and alarm settings	
High minute ventilation	High	The ventilation volume per minute is higher than the set upper limit.	Check whether the animal is breathing spontaneously. Check the ventilator and alarm settings.	----
Low minute ventilation	High	Minute ventilation is below the set lower limit. An air leak has occurred.	Reset the lower limit of minute ventilation. Check the animal side. Check the pipeline connection.	----
Apnea	High	There is no gas flow through within the set time.	Check the animals. Take manual mode. Check if the connection is broken.	----

9.3 Troubleshooting

Troubles	Causes	Solution
The power indicator does not light up	The power cable is not connected The power cable is damaged The socket to which the power cable is connected is out of power Fuse burned	Connect the power cable Replacing the power cable Change to another power outlet Replace the fuse
A power outlet is dead	Fuse burned	Replace the fuse
Airway pressure upper limit alarm	1Animal breathing circuit is blocked 2 Animal airway obstruction 3 The upper limit of airway	1 Check and correct the animal breathing circuit 2 Check the status of the animal

	pressure is low 4 Changes in ventilation parameters	3 Re-calibrate the alarm setting value 4 Recalculate ventilation parameters
Airway pressure lower limit alarm	1 Animal line is leaked 2 The alarm setting value is too high 3 Changes in animal compliance 4 Whether the pressure sampling tube falls off 5 Whether the pressure sampling tube is damaged	1 Check the leaking part of the pipeline 2 Reset the alarm value 3 Check the state of the animal 4 Check that the pressure sampling tube falls off 5 Check the pressure sampling tube for damage
Airway pressure gauge pointer does not indicate	1 No air flow through the pressure gauge 2 The pressure gauge is damaged 3 Air source is exhausted	1 Calibrate the pressure gauge 2 Replace the pressure gauge 3 Replace the air source
Tidal volume display is abnormal	1 The flow sensor plug is loose 2 The O-ring of the bellows base is damaged 3 Partial damage to the folded pouch 4 The relief valve is damaged	1 Reinsert the flow sensor 2 Reassemble the bellows integration 3 Replace the folding bag 4 Replace the relief valve piece
The folding bag is too expansive	1 Part of exhaust port is blocked. 2 The exhaust gas treatment system fails, resulting in excessive resistance or vacuum	1 Unblock the exhaust port 2 Maintain exhaust gas treatment system
The folding bag can not rise to the top (Gradually decreases)	1 The breathing circuit interface is off 2 The base of the bellows is damaged 3 Folding bag is broken or detached 4 Expiratory diaphragm is damaged	1 Reconnect the breathing circuit interface 2 Check and replace the bellows base 3 Check and replace the folding bag 4 Check and replace the exhalation diaphragm

10 Specifications and working principle

10.1 Physical technical specifications

All specifications are approximate values and may be changed at any time without notice

Attention
Do not place the machine in a shock environment.

Attention
Do not place heavy objects on the machine surface or drawer

System	Height：	39cm
	Width：	28cm
	Depth：	27cm
	Weight：	7kg
Ventilator monitor	9’ TFT LCD	

10.2 Environmental requirements

Temperature	Operate;	10 ~ 40℃
	Storage;	-20 ~ 55℃
Relative humidity	Operate;	No more than 80%, no condensation
	Storage;	No more than 93%, no condensation
Atmospheric pressure	Operate;	70 ~ 106kPa
	Storage;	50 ~ 106kPa
Altitude	Operate;	500 ~ 800mmHg （3565 ~ -440m）
	Storage; ：	375 ~ 800mmHg （5860 ~ -440m）

Warning
The equipment should be stored in a well-ventilated room without corrosive gas and strong magnetic field

Warning
When the storage conditions do not meet the environmental requirements, it should be placed under normal environmental conditions for more than 8 hours before using

10.3 System Technical Specifications

10.3.1 GB9706.1 Classification

the machine belongs to the following categories:

□
Class I equipment
□Type B equipment
□Ordinary equipment
□Mobile devices
□Continuous operation

10.4 Power supply

Supply voltage	100-230VAC 50/60Hz
input power	No more than 100VA
Maximum input current	5A
Inlet fuse	250V 1A φ5X20（F）
Ground impedance	No more than 0.1Ω

⚠**Warning** In the case of a defective ground wire, if the equipment is connected to the auxiliary main power socket, the animal leakage current may exceed the allowable range.

10.5 Electromagnetic compatibility

Unauthorized alteration or modification of this equipment without the explicit consent of the company may cause electromagnetic compatibility problems for this equipment or other equipment. Contact our company for help. The design and testing of this equipment comply with the following electromagnetic compatibility regulations.

⚠**Warning** Using mobile phones or other radio frequency radiation devices near the equipment may cause unexpected or abnormal operation problems. If there is a radio frequency radiation source nearby, the working condition of the equipment should be monitored.

The use of other electrical equipment on or near this system may cause interference. Before using the device on animals, please check whether the device is operating normally according to your configuration.

When connecting other devices with this machine, you must pay attention to the following items:

Do not place objects that do not meet the requirements of GB 9706.1-1995 within 1.5m from

animals.
If all objects (medical or non-medical electrical equipment) are connected to The machine with signal input/signal output cables, they must be powered by an isolation transformer for AC power or have an additional protective ground wire.
If the portable multi-purpose socket is used as the AC power source, the component must comply with the provisions of GB9706.1-1995. The component cannot be placed on the floor. It is not recommended to use more than one portable multi-purpose socket.
Do not connect non-medical electrical equipment directly to the AC outlet on the wall, but only use the AC power supply of the isolation transformer. Otherwise, under normal conditions and in the case of a single error, the leakage current of the equipment shell may exceed the allowable range of GB9706.1-1995. This may cause electric shock to animals or operators, which is unsafe.

⚠**Warning** Operators of medical electrical equipment are not allowed to touch non-medical electrical equipment and animals at the same time. It is unsafe to cause an animal or operator to get an electric shock this time.

10.5.1 Guidance on electromagnetic radiation and manufacturer's declaration

The The machine anesthesia workstation can be used in the following specific electromagnetic environment, and the user of the The machine anesthesia workstation should ensure that it is used in the following electromagnetic environment.

Radiation test	Compliance	Electromagnetic environment guidance
Radio frequency radiation CISPR 11	Group 1	The The machine anesthesia ventilator uses radio frequency energy only for internal functional purposes. Therefore, its radio frequency radiation is extremely low, and it is unlikely to cause interference to nearby electronic equipment.
Radio frequency radiation CISPR 11	Type B	The The machine anesthesia ventilator can be used in all equipment, including civilian facilities and those directly connected to the public low-voltage power supply network that supplies power to civilian facilities.
Harmonic radiation IEC 61000-3-2	Type A	
Voltage fluctuation/intermittent radiation IEC 61000-3-3	Yes	

Immunity test	IEC 60601 Test level	Compliance level	Electromagnetic environment guidance

Electrostatic discharge (ESD)	±6kV contact energization ± 8kV air	±6 kV contact energization ± 8 kV air	Floors should be wooden, cement or tiled floors. If the floor is covered with synthetic material, the relative humidity should be at least 30%.
Fast transient current/pulse IEC 61000-4-4	The power supply line is ±2kV Input/output line is ±1kV	The power supply line is ±2kV	The quality of the main power supply should conform to the representative commercial or animal environment.
Surge IEC 61000-4-5	1 kV differential mode 2 kV common mode	1 kV differential mode 2 kV common mode	The quality of the main power supply should conform to the representative commercial or animal environment.
Voltage drop, short-circuit interference and voltage fluctuation on the power supply input line IEC 61000-4-11	0.5 cycles is <5%UT (UT pressure drop is >95%) 40% UT for 5 cycles (UT pressure drop is 60%) 70% UT for 25 cycles (UT pressure drop is 30%) <5%UT for 5 seconds (UT pressure drop is >95%)	<5% UT for 0.5 cycles (UT pressure drop is >95%) 40% UT for 5 cycles (UT pressure drop is 60%) 70% UT for 25 cycles (UT pressure drop is 30%) <5%UT for 5 seconds (UT pressure drop is >95%)	The quality of the main power supply should conform to the representative commercial or animal environment. If the user of the The machine anesthesia ventilator needs to operate the device continuously during the main power interruption, it is recommended that you use an uninterruptible power supply.
Power frequency (50Hz) magnetic field IEC 61000-4-8	3A/m	3A/m	The power frequency magnetic field should have horizontal characteristics that represent the location in a commercial or animal environment.

Note: UT is the AC mains voltage before the test voltage is applied.

Immunity test	**IEC 60601 Test level**	Compliance level	Electromagnetic environment guidance
			Portable and mobile radio frequency communication equipment should not be used within the recommended isolation distance near any parts of the The machine anesthesia ventilator, including cables, which can be calculated according to the corresponding transmitter frequency formula.
			Recommended separation distance

Ground radio frequency IEC 61000-4-6	3 V_{rms} Beyond the ISM band is 150 kHz to 80 MHz	3 V	$d=\left[\frac{3.5}{V_1}\right]\sqrt{P}$
	10 V_{rms} Beyond the ISM band is 150 kHz to 80MHz	10V	$d=\left[\frac{12}{V_2}\right]\sqrt{P}$
Radiated radio frequencyIEC 61000-4-3	10 V/m 80 MHz to 2.5 GHz	10 V/m	$d=\left[\frac{12}{E_1}\right]\sqrt{P}$ 80 MHz to 800 MHz $d=\left[\frac{23}{E_1}\right]\sqrt{P}$ 800 MHz to 2.5 GHz Here, according to the data provided by the transmitter manufacturer: P is the rated maximum output power of the transmitter, unit: W (Watts) D is the recommended separation distance, unit: m (meter) The field strength of the fixed radio frequency transmitter obtained by electromagnetic field measurement should be lower than the corresponding level of each frequency range. When interference may occur in the vicinity of the equipment, the following symbols should be marked: 

Note 1 It is applicable in the high frequency range from 80MHz to 800MHz.
Note 2 These guidelines may not apply in all situations. Electromagnetic propagation will be affected by the absorption and reflection of buildings, objects and people.

a The ISM (industrial, scientific and medical) bands between 150kHz and 80MHz are 6.765MHz to 6.795MHz; 13.553MHz to 13.567MHz; 26.957MHz to 27.283MHz; and 40.66MHz to 40.70MHz.

b Establish the compliance level of the ISM band between 150kHz and 80MHz and the compliance level of the frequency range from 80MHz to 2.5GHz. The purpose is to reduce the possibility of causing interference if the mobile/portable communication device is accidentally brought into the animal area. For this reason, when calculating the recommended separation distance of transmitters in these frequency ranges, an additional factor of 10/3 is used.

c Stationary transmitters, such as wireless (cellular/cordless) telephones and terrestrial mobile radios, amateur radio, AM and FM radio broadcasts and TV broadcasts, have field strengths that cannot be accurately predicted in theory. To assess the electromagnetic environment of a fixed RF transmitter, an electromagnetic field measurement should be considered. If the field strength measured in the field where the system is located exceeds the above-mentioned applicable radio frequency compliance level, pay attention to observe the system to ensure that it is working properly. If an abnormal state is found, additional measures may be required, such as changing the direction or venue of the system.

d Above the frequency range of 150kHz to 80MHz, the field strength should be less than 3V/m.

10.5.2 Recommended separation distance

<table>
<tr><th colspan="4">Recommended separation distance between portable and mobile radio frequency communication equipment and The machine anesthesia ventilator</th></tr>
<tr><td colspan="4">The The machine anesthesia ventilator should be used in an electromagnetic environment with controlled radiation. Customers or users of The machine anesthesia ventilator can follow the suggestions below and keep a certain distance between portable and mobile radio frequency communication equipment and The machine anesthesia ventilator according to the maximum output power of the communication device to prevent electromagnetic interference.</td></tr>
<tr><td rowspan="2">Rated maximum output power of the transmitter (W)</td><td colspan="3">Separation distance according to the frequency of the transmitter Unit;Meter</td></tr>
<tr><td>150kHz to 80MHz
$d=\left[\frac{3.5}{V_1}\right]\sqrt{P}$</td><td>80MHz to 800MHz
$d=\left[\frac{3.5}{E_1}\right]\sqrt{P}$</td><td>800MHz to 2.5 GHz
$d=\left[\frac{7}{E_1}\right]\sqrt{P}$</td></tr>
<tr><td>0.01</td><td>0.12</td><td>0.12</td><td>0.23</td></tr>
<tr><td>0.1</td><td>0.37</td><td>0.37</td><td>0.74</td></tr>
<tr><td>1</td><td>1.17</td><td>1.17</td><td>2.33</td></tr>
<tr><td>10</td><td>3.69</td><td>3.69</td><td>7.38</td></tr>
<tr><td>100</td><td>11.67</td><td>11.67</td><td>23.33</td></tr>
<tr><td colspan="4">If the rated maximum output power of the transmitter exceeds the above range, the separation distance d (unit: meter) can be determined by the formula applicable to the frequency of the transmitter, where P is the rated maximum output power of the transmitter, according to the transmitter manufacturer’s regulations, The unit is W (watts).
Note 1 At 80MHz to 800MHz, the separation distance for the high frequency range applies.

Note 2 The ISM (industrial, scientific and medical) bands between 150kHz and 80MHz are 6.765MHz to 6.795MHz; 13.553MHz to 13.567MHz; 26.957MHz to 27.283MHz; and 40.66MHz to 40.70MHz.
Note 3 For the ISM frequency band between 150kHz and 80MHz and the frequency range from 80MHz to 2.5GHz, when calculating the recommended separation distance of transmitters in these frequency ranges, an additional factor of 10/3 is used for the purpose of mobile/portable communication equipment In the case of accidentally brought into the animal area, reduce the possibility of interference caused by the device.
Note 4 These guidelines may not apply to all situations. Electromagnetic propagation is affected by the absorption and reflection of buildings, objects and people</td></tr>
</table>

10.6 Technical specifications for anesthesia ventilator

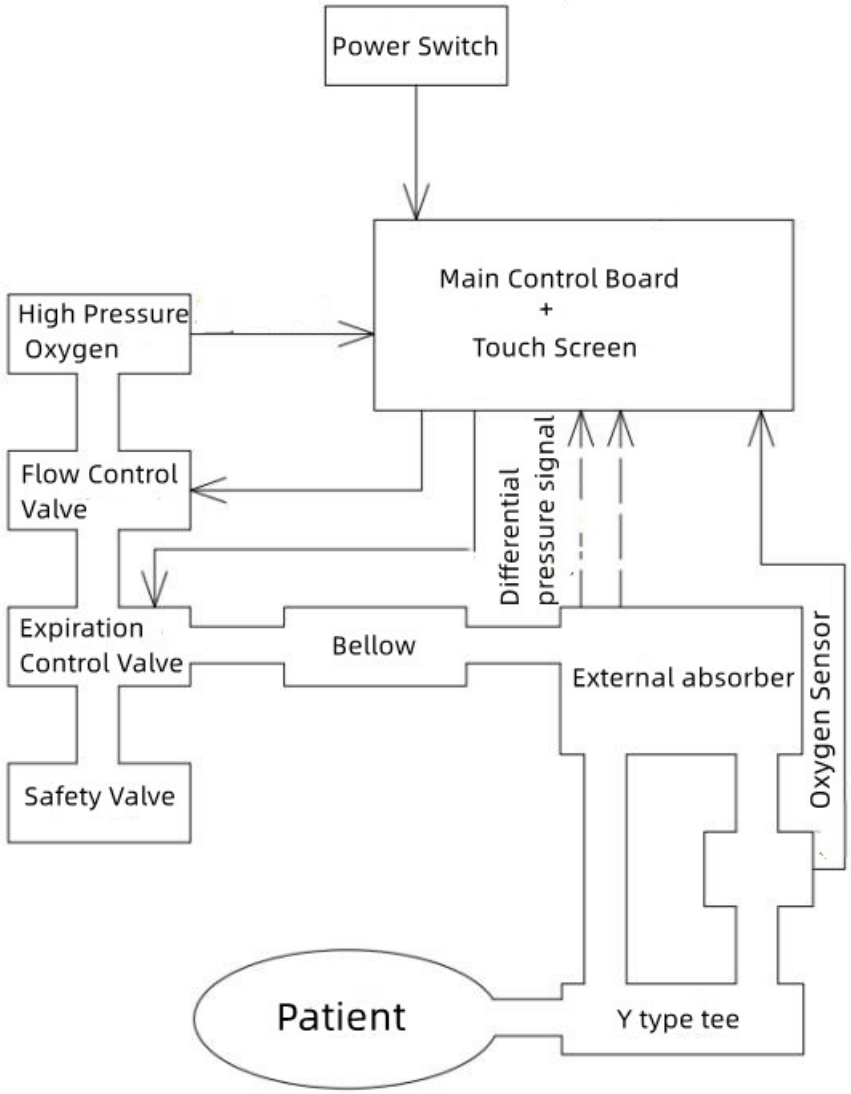
10.6.1 Working Principle of Ventilator

The simplified block diagram of the anesthesia ventilator is shown in the figure. In this figure, the block connected by the pipeline is the air circuit part of the main unit, and the block connected by the arrow is the electronic control part of the main unit.

After the air source enters, the pressure is monitored by the pressure sensor, and the flow control valve and

the exhalation control valve are controlled by adjusting the tidal volume setting value, respiration frequency, inhalation-expiration ratio or breath-holding time. For the sake of safety, a safety valve is designed in the airway. The safety valve is used to limit the maximum pressure of the animal's airway. It is generally set to 6kPa. When the airway pressure exceeds the safety pressure of the airway system, the safety valve opens and deflates. The air flow passes through the driving bellows circuit, so that the anesthesia circuit gas enters the animal body through the flow sampling probe, and is converted into a monitoring signal for the system, which can monitor the inspiratory tidal volume and adjust the output air flow value of the ventilator. Then in the expiration phase, the animal's exhaled air passes through the flow sensor and re-enters the anesthesia circuit, and through the feedback signal

from the flow sensor, the system can calculate the expiratory tidal volume and minute expiratory volume. This control process is controlled by the flow control valve and the exhalation control valve. When inhaling, the flow control valve opens and the exhalation control valve is closed; when exhaling, the opposite is true, that is, the flow control valve is closed, and the exhalation control valve is partially opened according to the set PEEP. The whole process is controlled by the electronic control system. In the electrical schematic diagram, the main control unit provides various beats of the whole machine, including inhalation time, flow control valve control signal and opening size, exhalation control valve control signal, sensor signal acquisition and processing, keyboard coding and Communication, power control. The amplification and driving unit provides sensor interface, pre-amplification, and actuation of actuators such as flow control valves and exhalation control valves. The panel part mainly completes the parameter setting. The power supply part mainly provides the power required for the normal operation of each part of the whole system.



10.6.2 Ventilator performance

Maximum safety pressure of gas system:	No more than 6kPa
System compliance:	No more than 4mL/100Pa.

Electrical safety：	Comply with GB 9706.1-2008 "Medical Electrical Equipment Part 1: General Safety Requirements" for Class I and Type B equipment.
Machine noise (normal work)：	No more than 65dB(A)。
Maximum ventilation volume per minute:：	No less than 20L/min20L/min

10.6.3 Ventilation mode setting

The system has the following ventilation modes: the parameters that can be set in each ventilation mode are different. as the picture shows.

Ventilation mode	parameter settings
VCV	Weight、TV、Freq、I：E、Trigger、PEEP
PCV	Weight、PInsp、Freq、I：E、Trigger、PEEP
SPONT	Weight、TV、Freq、I：E、Trigger
Manual	

10.6.4 Ventilation parameter setting

Ventilation parameters	Setting range	resolution
Weight	2~100 Kg	0.1 Kg
Tidal volume TV	20 ~ 1500mL	1mL
Breathing rate Freq	1 ~ 150bpm	1 bpm
Ratio of Inspiratory and expiratory I：E	9.9：1 ~ 1：9.9	0.1
Flow rate trigger sensitivity F_Trig	0.5 ~ 20L/min，OFF	0.5L/min
Pressure trigger sensitivity P_Trig	-1 ~ -20 cmH_2O，OFF	1 cmH_2O
End-tidal pressure PEEP	3~ 20 cmH_2O，OFF	1 cmH_2O
Inspiration time T_Insp	0.1 ~ 12s	0.1s
Inspiratory pressure PInsp	2~ 60 cmH_2O	1 cmH_2O

10.6.5 Pneumatics section

Gas composition	Air
Flow valve range：	3 ~ 100L/min
Output：	Pressure range：0 ~ 6kPa；Flow range：3 ~ 100L/min

10.6.6 Monitoring performance

Project	**range**	**Resolution**	**Accuracy**
Expiratory tidal volume TV_Exp	0~2500 mL	1 mL	±30 mL (less than 200 mL); ±15% (other)
Inspiratory tidal volume TV_Insp	0~2500 mL	1 mL	±30 mL (less than 200 mL); ±15% (other)
Ventilation volume MV	Display range0~99 L/min Scope of use0~25 L/min	1 L/min	±1 L/min (less than 5 L/min); ±15% (other)
Spontaneous ventilation volume MV_Spont	Display range0~99 L/min Scope of use0~25 L/min	1 L/min	±1 L/min (less than 5 L/min); ±15% (other)
Respiratory rate Freq	0~150 bpm	1 bpm	±2 bpm (less than 20 bpm); ±10% (other)
Spontaneous frequency Freq_Spont	0~150 bpm	1 bpm	±2 bpm (less than 20 bpm); ±10% (other)
Peak pressure Ppeak	0~80 cmH_2O	1 cmH_2O	±3 cmH_2O (less than 20 cmH_2O); ±15% (other)
Platform pressure Pplat	0~80 cmH_2O	1 cmH_2O	±3 cmH_2O (less than 20 cmH_2O); ±15% (other)
Mean pressure Pmean	0~80 cmH_2O	1 cmH_2O	±3 cmH_2O (less than 20 cmH_2O); ±15% (other)
Inhaled oxygen concentration FiO_2	15~100%	1%	±15%
End-tidal pressure PEEP	0~20 cmH_2O	1 cmH_2O	±2 cmH_2O (less than 10 cmH_2O); ±20% (other)
Inspiratory-expiratory ratio I:E	1:9.9~9.9:1	0.1	15%
Drive gas pressure Press_Drive	0~900 KPa	1KPa	±5KPa (less than50KPa); ±10% (other)
Paw-t Waveform graph：		Pressure monitoring range: 0~120 cmH2O; X axis: 0 to 10 seconds	
Flow-t Waveform graph：		Y-axis range: -180~180L/min; X-axis range: 0 to 10	

	seconds.
V-t Waveform graph：	Y-axis range: 0~2000mL; X-axis range: 0 to 10 seconds.

10.6.7 Alarm performance

Alarm parameter	Setting range	Resolution
Upper pressure limit	0~ 60 cmH_2O	1 cmH_2O
Lower pressure limit	0~ 60 cmH_2O	1 cmH_2O
Upper tidal volume	0 ~ 1500mL	1mL
Lower tidal volume	0 ~ 1500mL	1mL
Upper ventilation limit	0 ~ 40 L/min	0.1 L/min
Lower ventilation limit	0 ~ 40 L/min	0.1 L/min
Upper limit of oxygen concentration	15 ~ 100%	1%
Lower limit of oxygen concentration	15 ~ 100%	1%
PEEP upper limit	0~ 25 cmH_2O	1 cmH_2O
PEEP lower limit	0~ 20 cmH_2O	1 cmH_2O
Upper frequency limit	1 ~ 150bpm	1 bpm
Lower frequency limit	1 ~ 150bpm	1 bpm
Suffocation time	3 ~ 20s	1s
Low driving pneumatic pressure	230±20 KPa	
Alarm volume	2~ 10	1

⚠Attention

The lower limit setting of the above parameters cannot be higher than its upper limit, and the upper limit setting cannot be lower than its lower limit.

10.7 Technical specifications for oxygen monitoring

Response time: No more than 15 seconds.

Sensor type: Chemical fuel cell.

The working principle of O2 monitor	The O2 monitor monitors and displays the O2 concentration in the animal circuit. The O2 sensor assembly contains an oxygen sensor that can generate a voltage commensurate with the oxygen partial pressure (concentration) on its detection surface. The O2 sensor is an electrochemical device (chemical battery). Oxygen diffuses into the device through a membrane, oxidizing the base metal electrode. The oxidation process generates an electric current, and the magnitude of the electric current is commensurate with the oxygen partial pressure indicated by the electrode sensing. The base metal electrode is gradually depleted during the oxidation process.The voltage of the sensor is affected by the temperature of the monitored gas mixture. The thermistor of the sensor surgery automatically compensates for temperature changes in the sensor. The O2 monitor uses signal processing and analysis circuits to convert the sensor signal into the corresponding oxygen percentage value. The system displays this value and compares it with the saved alarm limit value. If the value exceeds the limit value, the monitor will issue an alarm.

11 Appendix

11.1 Reference for setting breathing parameters in PCV mode

weight (Kg)	frequency (bpm)	Peak airway pressure (cmH2O)	Trigger pressure (cmH20)
2	18	10	-2
2.5	18	10	-2
3	18	12	-2
3.5	18	12	-2
4	18	12	-2
4.5	18	12	-2
5	18	12	-2
5.5	12	12	-2
6	12	12	-2
6.5	12	12	-2
7	12	12	-2
7.5	12	12	-2
8	12	12	-2
8.5	12	12	-2
9	12	12	-2
9.5	12	12	-2
10	12	12	-2
11	12	13	-3
12	12	13	-3
13	12	13	-3
14	12	13	-3
15	12	13	-3
16	12	13	-3
17	12	13	-3
18	12	13	-3
19	12	13	-3
20	12	13	-3
21	12	16	-3
22	12	16	-3
23	12	16	-3
24	12	16	-3
25	12	16	-3
26	12	16	-3
27	12	16	-3
28	12	16	-3
29	12	16	-3
30	12	16	-3

weight (Kg）	frequency (bpm)	Peak airway pressure (cmH2O)	Trigger pressure (cmH20)
31	9	16	-3
32	9	16	-3
33	9	16	-3
34	9	16	-3
35	9	16	-3
36	9	18	-3
37	9	18	-3
38	9	18	-3
39	9	18	-3
40	9	18	-3
41	9	18	-3
42	9	18	-3
43	9	18	-3
44	9	18	-3
45	9	18	-3
46	9	18	-3
47	9	18	-3
48	9	18	-3
49	9	18	-3
50	9	18	-3
51	9	18	-3
52	9	18	-3
53	9	18	-3
54	9	20	-3
55	9	20	-3
56	9	20	-3
57	9	20	-3
58	9	20	-3
59	9	20	-3
60	9	20	-3
61	9	22	-3
62	9	22	-3
63	9	22	-3
64	9	22	-3
65	9	22	-3
66	9	22	-3
67	9	22	-3
68	9	22	-3
69	9	22	-3
70	9	22	-3
71	9	22	-3
72	9	22	-3
73	9	22	-3
74	9	22	-3
75	9	22	-3
76	9	22	-3
77	9	22	-3
78	9	22	-3

weight (Kg）	frequency (bpm)	Peak airway pressure (cmH2O)	Trigger pressure (cmH20)
79	9	22	-3
80	9	22	-3
81	9	22	-3
82	9	22	-3
83	9	22	-3
84	9	22	-3
85	9	22	-3
86	9	22	-3
87	9	22	-3
88	9	22	-3
89	9	22	-3
90	9	22	-3
91	9	22	-3
92	9	22	-3
93	9	22	-3
94	9	22	-3
95	9	22	-3
96	9	22	-3
97	9	22	-3
98	9	22	-3
99	9	22	-3
100	9	22	-3

11.2 Reference for Breathing Parameter Setting in VCV Mode

weight (Kg）	frequency (bpm)	Peak airway pressure (cmH2O)	Trigger pressure (cmH20)	I：E	Tidal volume standard	Actual tidal volume （TV）
2	18	13	-2	1：2	14.3	29
2.5	18	13	-2	1：2	14.3	36
3	18	15	-2	1：2	14.3	43
3.5	18	15	-2	1：2	14.3	50
4	18	15	-2	1：2	14.3	57
4.5	18	15	-2	1：2	14.3	64
5	18	15	-2	1：2	14.3	72
5.5	12	15	-2	1：2.2	14.3	79
6	12	15	-2	1：2.2	14.3	86
6.5	12	15	-2	1：2.2	14.3	93
7	12	15	-2	1：2.2	14.3	100
7.5	12	15	-2	1：2.2	14.3	107
8	12	15	-2	1：2.2	14.3	114

weight (Kg）	frequency (bpm)	Peak airway pressure (cmH2O)	Trigger pressure (cmH20)	I：E	Tidal volume standard	Actual tidal volume （TV）
8.5	12	15	-2	1：2.2	14.3	122
9	12	15	-2	1：2.2	14.3	129
9.5	12	15	-2	1：2.2	14.3	136
10	12	15	-2	1：2.2	14.3	143
11	12	16	-3	1：2.2	14.3	157
12	12	16	-3	1：2.2	14.3	172
13	12	16	-3	1：2.2	14.3	186
14	12	16	-3	1：2.2	14.3	200
15	12	16	-3	1：2.2	14.3	215
16	12	16	-3	1：2.2	14.3	229
17	12	16	-3	1：2.2	14.3	243
18	12	16	-3	1：2.2	14.3	257
19	12	16	-3	1：2.2	14.3	272
20	12	16	-3	1：2.2	14.3	286
21	12	20	-3	1：2.2	14.3	300
22	12	20	-3	1：2.2	14.3	315
23	12	20	-3	1：2.2	14.3	329
24	12	20	-3	1：2.2	14.3	343
25	12	20	-3	1：2.2	14.3	358
26	12	20	-3	1：2.2	14.3	372
27	12	20	-3	1：2.2	14.3	386
28	12	20	-3	1：2.2	14.3	400
29	12	20	-3	1：2.2	14.3	415
30	12	20	-3	1：2.2	14.3	429
31	9	20	-3	1：2.5	14.3	443
32	9	20	-3	1：2.5	14.3	458
33	9	20	-3	1：2.5	14.3	472
34	9	20	-3	1：2.5	14.3	486
35	9	20	-3	1：2.5	14.3	501
36	9	23	-3	1：2.5	14.3	515
37	9	23	-3	1：2.5	14.3	529
38	9	23	-3	1：2.5	14.3	543
39	9	23	-3	1：2.5	14.3	558
40	9	23	-3	1：2.5	14.3	572
41	9	23	-3	1：2.5	14.3	586
42	9	23	-3	1：2.5	14.3	601
43	9	23	-3	1：2.5	14.3	615
44	9	23	-3	1：2.5	14.3	629
45	9	23	-3	1：2.5	14.3	644
46	9	23	-3	1：2.5	14.3	658
47	9	23	-3	1：2.5	14.3	672
48	9	23	-3	1：2.5	14.3	686

weight (Kg）	frequency (bpm)	Peak airway pressure (cmH2O)	Trigger pressure (cmH20)	I：E	Tidal volume standard	Actual tidal volume （TV）
49	9	23	-3	1：2.5	14.3	701
50	9	23	-3	1：2.5	14.3	715
51	9	23	-3	1：2.5	11	721
52	9	23	-3	1：2.5	11	732
53	9	23	-3	1：2.5	11	743
54	9	25	-3	1：2.5	11	754
55	9	25	-3	1：2.5	11	765
56	9	25	-3	1：2.5	11	776
57	9	25	-3	1：2.5	11	787
58	9	25	-3	1：2.5	11	798
59	9	25	-3	1：2.5	11	809
60	9	25	-3	1：2.5	11	820
61	9	28	-3	1：2.5	11	831
62	9	28	-3	1：2.5	11	842
63	9	28	-3	1：2.5	11	853
64	9	28	-3	1：2.5	11	864
65	9	28	-3	1：2.5	11	875
66	9	28	-3	1：2.5	11	886
67	9	28	-3	1：2.5	11	897
68	9	28	-3	1：2.5	11	908
69	9	28	-3	1：2.5	11	919
70	9	28	-3	1：2.5	11	930
71	9	28	-3	1：2.5	11	941
72	9	28	-3	1：2.5	11	952
73	9	28	-3	1：2.5	11	963
74	9	28	-3	1：2.5	11	974
75	9	28	-3	1：2.5	11	985
76	9	28	-3	1：2.5	11	996
77	9	28	-3	1：2.5	11	1007
78	9	28	-3	1：2.5	11	1018
79	9	28	-3	1：2.5	11	1029
80	9	28	-3	1：2.5	11	1040
81	9	28	-3	1：2.5	11	1051
82	9	28	-3	1：2.5	11	1062

weight (Kg）	frequency (bpm)	Peak airway pressure (cmH2O)	Trigger pressure (cmH20)	I：E	Tidal volume standard	Actual tidal volume （TV）
83	9	28	-3	1：2.5	11	1073
84	9	28	-3	1：2.5	11	1084
85	9	28	-3	1：2.5	11	1095
86	9	28	-3	1：2.5	11	1106
87	9	28	-3	1：2.5	11	1117
88	9	28	-3	1：2.5	11	1128
89	9	28	-3	1：2.5	11	1139
90	9	28	-3	1：2.5	11	1150
91	9	28	-3	1：2.5	11	1161
92	9	28	-3	1：2.5	11	1172
93	9	28	-3	1：2.5	11	1183
94	9	28	-3	1：2.5	11	1194
95	9	28	-3	1：2.5	11	1205
96	9	28	-3	1：2.5	11	1216
97	9	28	-3	1：2.5	11	1227
98	9	28	-3	1：2.5	11	1238
99	9	28	-3	1：2.5	11	1249
100	9	28	-3	1：2.5	11	1260

11.3 Breathing parameter setting reference of SPONT mode

weight (Kg）	frequency (bpm)	Peak airway pressure (cmH2O)	Trigger pressure (cmH20)	I:E	Tidal volume standard	Actual tidal volume （TV）	Suffocation time （s）
2	18	13	-2	1：2	14.3	29	15
2.5	18	13	-2	1：2	14.3	36	15
3	18	15	-2	1：2	14.3	43	15
3.5	18	15	-2	1：2	14.3	50	15
4	18	15	-2	1：2	14.3	57	15
4.5	18	15	-2	1：2	14.3	64	15

weight (Kg）	frequency (bpm)	Peak airway pressure (cmH2O)	Trigger pressure (cmH20)	I:E	Tidal volume standard	Actual tidal volume （TV）	Suffocation time （s）
5	18	15	-2	1：2	14.3	72	15
5.5	12	15	-2	1：2.2	14.3	79	15
6	12	15	-2	1：2.2	14.3	86	15
6.5	12	15	-2	1：2.2	14.3	93	15
7	12	15	-2	1：2.2	14.3	100	15
7.5	12	15	-2	1：2.2	14.3	107	15
8	12	15	-2	1：2.2	14.3	114	15
8.5	12	15	-2	1：2.2	14.3	122	15
9	12	15	-2	1：2.2	14.3	129	15
9.5	12	15	-2	1：2.2	14.3	136	15
10	12	15	-2	1：2.2	14.3	143	15
11	12	16	-3	1：2.2	14.3	157	15
12	12	16	-3	1：2.2	14.3	172	15
13	12	16	-3	1：2.2	14.3	186	15
14	12	16	-3	1：2.2	14.3	200	15
15	12	16	-3	1：2.2	14.3	215	15
16	12	16	-3	1：2.2	14.3	229	15
17	12	16	-3	1：2.2	14.3	243	15
18	12	16	-3	1：2.2	14.3	257	15
19	12	16	-3	1：2.2	14.3	272	15
20	12	16	-3	1：2.2	14.3	286	15
21	12	20	-3	1：2.2	14.3	300	15
22	12	20	-3	1：2.2	14.3	315	15
23	12	20	-3	1：2.2	14.3	329	15
24	12	20	-3	1：2.2	14.3	343	15
25	12	20	-3	1：2.2	14.3	358	15
26	12	20	-3	1：2.2	14.3	372	15
27	12	20	-3	1：2.2	14.3	386	15
28	12	20	-3	1：2.2	14.3	400	15
29	12	20	-3	1：2.2	14.3	415	15
30	12	20	-3	1：2.2	14.3	429	15
31	9	20	-3	1：2.5	14.3	443	15
32	9	20	-3	1：2.5	14.3	458	15
33	9	20	-3	1：2.5	14.3	472	15
34	9	20	-3	1：2.5	14.3	486	15
35	9	20	-3	1：2.5	14.3	501	15
36	9	23	-3	1：2.5	14.3	515	15
37	9	23	-3	1：2.5	14.3	529	15
38	9	23	-3	1：2.5	14.3	543	15
39	9	23	-3	1：2.5	14.3	558	15
40	9	23	-3	1：2.5	14.3	572	15
41	9	23	-3	1：2.5	14.3	586	15
42	9	23	-3	1：2.5	14.3	601	15
43	9	23	-3	1：2.5	14.3	615	15
44	9	23	-3	1：2.5	14.3	629	15

weight (Kg）	frequency (bpm)	Peak airway pressure (cmH2O)	Trigger pressure (cmH20)	I:E	Tidal volume standard	Actual tidal volume （TV）	Suffocation time （s）
45	9	23	-3	1：2.5	14.3	644	15
46	9	23	-3	1：2.5	14.3	658	15
47	9	23	-3	1：2.5	14.3	672	15
48	9	23	-3	1：2.5	14.3	686	15
49	9	23	-3	1：2.5	14.3	701	15
50	9	23	-3	1：2.5	14.3	715	15
51	9	23	-3	1：2.5	11	721	15
52	9	23	-3	1：2.5	11	732	15
53	9	23	-3	1：2.5	11	743	15
54	9	25	-3	1：2.5	11	754	15
55	9	25	-3	1：2.5	11	765	15
56	9	25	-3	1：2.5	11	776	15
57	9	25	-3	1：2.5	11	787	15
58	9	25	-3	1：2.5	11	798	15
59	9	25	-3	1：2.5	11	809	15
60	9	25	-3	1：2.5	11	820	15
61	9	28	-3	1：2.5	11	831	15
62	9	28	-3	1：2.5	11	842	15
63	9	28	-3	1：2.5	11	853	15
64	9	28	-3	1：2.5	11	864	15
65	9	28	-3	1：2.5	11	875	15
66	9	28	-3	1：2.5	11	886	15
67	9	28	-3	1：2.5	11	897	15
68	9	28	-3	1：2.5	11	908	15
69	9	28	-3	1：2.5	11	919	15
70	9	28	-3	1：2.5	11	930	15
71	9	28	-3	1：2.5	11	941	15
72	9	28	-3	1：2.5	11	952	15
73	9	28	-3	1：2.5	11	963	15
74	9	28	-3	1：2.5	11	974	15
75	9	28	-3	1：2.5	11	985	15
76	9	28	-3	1：2.5	11	996	15
77	9	28	-3	1：2.5	11	1007	15
78	9	28	-3	1：2.5	11	1018	15
79	9	28	-3	1：2.5	11	1029	15
80	9	28	-3	1：2.5	11	1040	15
81	9	28	-3	1：2.5	11	1051	15
82	9	28	-3	1：2.5	11	1062	15
83	9	28	-3	1：2.5	11	1073	15
84	9	28	-3	1：2.5	11	1084	15
85	9	28	-3	1：2.5	11	1095	15
86	9	28	-3	1：2.5	11	1106	15
87	9	28	-3	1：2.5	11	1117	15
88	9	28	-3	1：2.5	11	1128	15
89	9	28	-3	1：2.5	11	1139	15

weight (Kg）	frequency (bpm)	Peak airway pressure (cmH2O)	Trigger pressure (cmH20)	I:E	Tidal volume standard	Actual tidal volume （TV）	Suffocation time （s）
90	9	28	-3	1：2.5	11	1150	15
91	9	28	-3	1：2.5	11	1161	15
92	9	28	-3	1：2.5	11	1172	15
93	9	28	-3	1：2.5	11	1183	15
94	9	28	-3	1：2.5	11	1194	15
95	9	28	-3	1：2.5	11	1205	15
96	9	28	-3	1：2.5	11	1216	15
97	9	28	-3	1：2.5	11	1227	15
98	9	28	-3	1：2.5	11	1238	15
99	9	28	-3	1：2.5	11	1249	15
100	9	28	-3	1：2.5	11	1260	15