RWD

R419 Intelligent Animal Ventilator

User Manual A

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Contents

1-Introduction

1.1 Overview

Thank you first for choosing the R419 Intelligent Animal Ventilator produced by the RWD Life Science Co., Ltd (hereinafter referred to as the RWD)!

For better use of this product, please read the supplied instructions carefully before the initial installation and use of this product.

RWD Life Science Co., Ltd. is endeavored to improve the product function and service quality. RWD reserves the right to change or alter the contents of user manual without prior notice.

If you would like the latest product information, you are welcome to call us or visit our website (http://www.rwdstco.com/). If you find any discrepancy between the instruments and this manual during the practical use of our product, or if you have any questions or suggestions, you are welcome to contact us.

1.2 Safety

In order to avoid the harm to the experimental animal or operator and the damages to the ventilator, please refer to Chapter "*2-System Safety*".

If you have any questions or suggestions related to safety, please contact our company for after-sales service support.

This device is only used for clinical or scientific research of animals and is not allowed to be used on humans!

The Intelligent Animal Ventilator should only be operated by trained personel.

1.3 Product Features

- The appearance is simple, light and elegantly colored, compact layout, and an overall small size. It can be equipped with a respiratory anesthesia machine bracket, which is flexible and convenient to operate;
- Three modes are available: Volume Control Mode (VCV), Pressure Control Mode (PIP-CV), and Apnea Mode (APNEA);
- Equipped with two different sized bellows (300 ml and 1500 ml) suitable for animals weighing less than 100kg;
- Display specifications: 5-inch LCD color display is simple, intuitive, and easy to operate, with real-time readings of monitored data;
- Intelligent input: imports the commonly used animal breathing parameters into the database, input the weight, and it automatically outputs the recommended breathing parameter values;
- Breathing parameter storage and recall;
- Real-time display of breathing-related curve parameters, which is intuitive and

visual;

- Auditory alarm, with text message prompts, improving human-machine interaction, and reducing human error;
- It is powered by an internal rechargeable battery and will run for more than 4 hours while unplugged.

1.4 Introduction of device's main components

Fig 1

No.	Parts	Description
1	Bellows cover	To isolate fresh gas from driving gas
2	Folded bag	Inputs fresh oxygen and anesthetic gas into the lungs of the animal
3	Base	To connect device and bellows
4	Display screen	To display device operation information and set parameters
5	Battery indicator	When powered by the battery, this indicator will be on.
6	External power indicator	After the equipment is connected to an external power source, this indicator will be on.
7	INSP.HOLD Button	Refers to inspiration hold button. An inspiration will be held while this button is pressed.
8	Power switch button	Press button and hold for 1 second to start the equipment. When you hear the equipment prompt tone, the equipment is turned on, and will enter the self-calibration interface. Pressing the button for 3 seconds will off the equipment.

Fig 2

No.	Components	Description
1	Fresh gas port	To anaesthesia machine
2	anaesthetic wastes exhaust port	To gas filtration tank
3	17mm port	To the port of the driving gas
4	Port of gas source	Oxygen source (or air)
5	Port of pressure sensor	To 22mm port
6	Air outlet	Discharge waste gas of the driving gas
7	Port of the driving gas	To 17mm port
8	Power adapter interface	Power input port

1.5 Specification

Specification	Description
Dimension	253mm×224mm×112mm
Weight	3.22kg
Respiratory rate	2~60 bpm
I:E	1:1.0~1:4.0
Tidal volume	20~1500ml
Peak inspiratory pressure	5~35 cmH_2O
Trigger pressure	-9.0 ~ -1.0 cmH_2O
Patient weight range	≤100.0kg
Touch screen	5 inch, 800 × 480

2-System Safety

2.1 Safety Instructions

For safety, please pay attention to the following items:

- Please read the user's manual carefully.
- Operating conditions of R419 Intelligent Animal Veterinary Ventilator: Temperature: 0℃～40℃, humidity:15%~95% (non-condensing),atmospheric pressure: 70kPa ～ 110kPa
- Storage conditions of R419 Intelligent Animal Veterinary Ventilator: Temperature: -20℃～45℃, relative humidity : ≤95%, atmospheric pressure: 70kPa ～ 110kPa

⚠ Warning:

When high pressure oxygen meets combustible materials (lubricating grease, motor oil, alcohol, etc.), it may cause an explosion:

- Keep the equipment and all connections absolutely free of oil and grease.
- It is strictly forbidden to smoke near the ventilator and/or ignite an open flame.
- When installing and replacing the oxygen cylinder, use your hand as much as possible to tighten all the connections on the oxygen cylinder and pressure relief valve. If you need to use tools, do not use excessive force, it may cause damage to the threads and sealing materials and may result in gas leakage.
- Take measures to prevent the oxygen cylinder from tipping over. If the oxygen cylinder falls over, the pressure relief valve may be damaged and cause an explosion.

⚠ Important:

- Always open the pressure relief valve on the oxygen cylinder slowly to prevent the surge of pressure from impacting the valve fittings inside the ventilator.
- Always check the pressure of the oxygen cylinder. Do not completely exhaust the oxygen in it, humidity in the surrounding air may invade it and cause parts to rust.

⚠ Attention:

- Animals and the ventilator must be continuously observed during use.
- The breathing circuit interconnected with the anesthesia machine needs to be remain unobstructed and easy to observe. Avoid operations that may result in covering or affecting their function (e.g. improper location of the animal).
- A large number of quality assurance measures have been taken in the development of the equipment software, and the risk due to software defects is minimal.
- Take measures to protect the rubber components from ultraviolet light and prolonged direct sunlight, to avoid embrittlement of these parts.

2.2 Cautions

- Before operating this equipment, the operator should meticulously read this user's manual and fully understand its contents.
- Before using this equipment, please carefully check all connectors to ensure adequate

gas-tightness and to avoid any leakage.

- Equipment malfunctions caused by improper cleaning, maintenance or operation will be considered the user's responsibility.
- If someone disassembles the equipment's main body without authorization, RWD shall stop providing any quality assurance or technical maintenance service to this equipment. If the user has any technical questions, please contact the authorized person or the RWD for support.

⚠ **Risk of electric shock:** Laypeople are prohibited from removing the cover or panel of the equipment and removing the built-in rechargeable battery.

⚠ **DANGER:** The use of flammable or explosive gases as a gas source for the equipment is prohibited.

2.3 Safety Instructions

The use of this equipment is limited to persons with relevant expertise in respiration and anaesthesia or persons trained by the manufacturer.

Keep the equipment away from water, with good ventilation and relatively consistent air pressure, temperature and humidity. It should not be exposed to direct sunlight or places with gases or chemicals that are corrosive, flammable or explosive. During placement or handling of the equipment, operators should prevent the equipment from being inclined, vibrated or squeezed. Pay attention to the voltage, current and frequency of the connected power source, and make sure that the grounding terminal is normal. Avoid overloading the equipment.

⚠ Warning ! ! !

The R419 Intelligent Animal Veterinary Ventilator should self-calibrate when started. If self-calibration cannot be done, it means there may be some kind of circuit breakdown or internal pipe leakage. In that case the user should turn off the equipment power and make sure the gas source pressure is between 41-87 psi, the breathing circuit connection is correct, and the flow rate of the anesthesia machine is appropriate (note that the breathing circuit is connected to the breathing bag at this time, and the evaporating tank of the anesthesia machine is closed). Then, turn on the equipment for self-calibration after the folded bag in the bellows of the ventilator rises to the top of the bellows. If self-calibration fails again, please contact your supplier or the RWD after-sales service department for further support.

Warning!

It is forbidden to use the oxygen flush button on the anesthesia machine during the inspiration phase of the breathing cycle. It may cause severe lung rupture in the animal. During the inspiration phase, the drain valve in the control unit is closed, so the oxygen flow is added to the breathing machine's air supply flow, and the only direction of the airflow is to the lungs of the experimental animal.

2.4 Warranty

- The warranty of this equipment starts from the day it leaves the factory. If the equipment cannot be used normally due to problems such as materials and/or process defects, the company undertakes after-sales service such as maintenance and/or part replacement.

- Any damage caused by improper use is not covered by the warranty. If repair or replacement of parts is required, the cost will be borne by the user.
- If the equipment that has been returned for repair has been dismantled without the authorization of RWD before arriving at RWD, the company does not provide after-sales service such as warranty, free maintenance or parts replacement.
- The warranty statement (including its restrictions) is exclusively issued by RWD and covers all other warranties.

3-Unpacking and Assembly

1) Inspect the packing for any signs of damage that may have occurred during shipping, if damage has occurred, make a damage claim to the carrier and contact with RWD or your local dealer immediately.
2) Remove all components from the shipping carton. Save all boxes and packing materials for future shipments.
3) Check the packing list to ensure all components ordered are included. Ifthere is any doubt or you need help, contact RWD or your local dealer immediately.

Packing list：

- Device body ----------1
- 300ml Bellows and bellows cover ----------1
- 1500 ml Bellows and bellows cover ---------- 1
- 1.2 m Bellows pipe ---------- 1
  （For connecting ventilators and gas filter cans）
- 0.9m Reusable threaded pipe ---------- 1
  （Used to connect anesthesia machines and ventilators, can be steam sterilized）
- Airway pressure connection pipe - Luer-22mm connector ---------- 1
- Rubber booster tube（ID : 15mm） ----------1
- 30-22mm Bellows joint ----------1
- Power cable---------- 1

  Power Adapter ---------- 1
- Warranty card ----------1
- User manual ---------- 1

Note: If your order contains other gadgets, it may also be packed at the same time. Please refer to the waybill.

3.1 Notice for Use

Before using this equipment, please make sure to read the user's manual carefully!

This equipment is designed to perform the functions referred to in this manual. Please use and operate the equipment according to the relevant instructions in the manual. This equipment should be checked and maintained periodically to ensure its reliable operation.

It is suggested you stop the use of the equipment and change the parts produced by our company or the companies authorized by our company, if the following situations occur to any component: Damage to all or part of the equipment, excessive wear, service life termination caused by contamination or other reasons.

Use of any equipment that has stopped functioning normally should be stopped immediately. The user should not change the equipment in any form. It is the responsibility of the user if the equipment is not used in accordance with our company's user's manual, or if the user changes or makes unauthorized repairs to the equipment, or if said changes or repairs results in damages to experimental animals or properties (including the equipment itself).

3.2 Installation

i. Check that the control host (main body) is intact and all interfaces on the rear panel, to ensure that the air supply port (SUPPLYGAS), the driving gas port (DRIVING GAS), and the exhaust port (EXHAUST) are not blocked;
ii. Check that the bellows and bellows cover are intact and that there is no debris inside bellows;
iii. Install the bellows and bellows cover. Make sure the corrugated sheath at the bottom of the bellows around the mounting ring of the control host, gently holds the outer edge

of the bellows disc (top of the bellows), lift it up and down, and repeat several times to smooth out the ripples on the bellows. Then replace the bellows cover and gently press and rotate the bellows cover clockwise until it snaps into the bayonet at the base. The bellows and bellows cover are now installed.

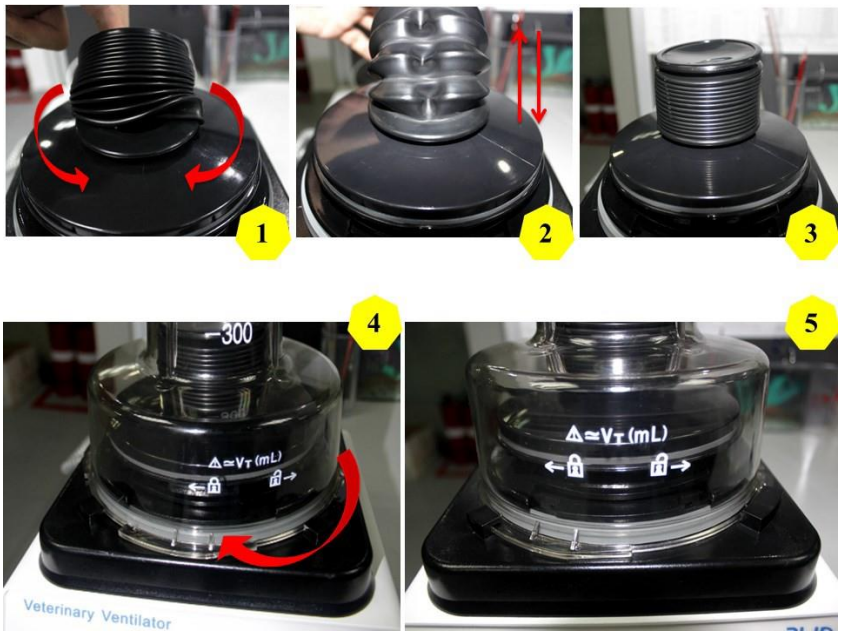


Fig 3

iv. Connect the pipes of the driving gas. Use a rubber boosting tube to connect the 17mm port of the bellows base to the driving gas port (DRIVING GAS) on the control unit;

Fig 4

v. Install the breathing circuit port. Connect the airway pressure connection pipe (Luer taper) on the side of the airway pressure connection pipe - Luer -22mm connector to the port of pressure sensor (PRESSURE TRANSDUCER) of the control unit, tighten it, and then install the 22mm connector (transparent) onto the 22mm port of the bellows base;

Fig 5

vi. Connect the ventilator to the anesthesia system. Remove the breathing bag from the anesthesia machine and connect the 22mm port on the bellows base to the breathing bag interface of the anesthesia machine with a threaded pipe;

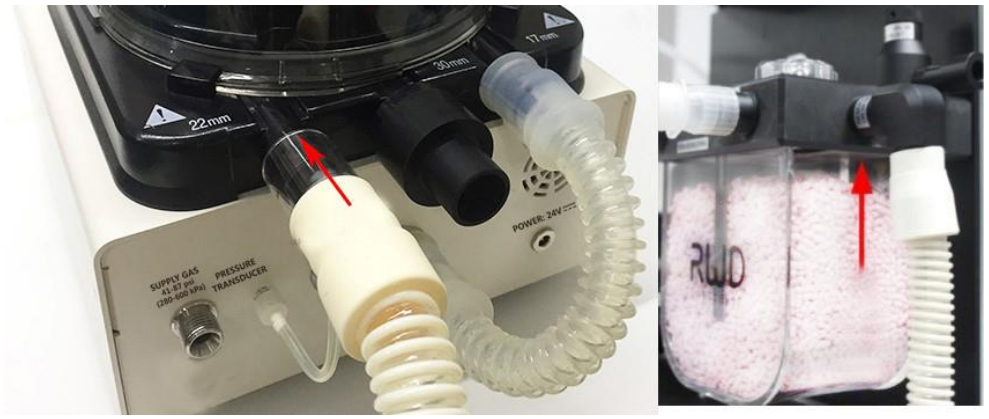


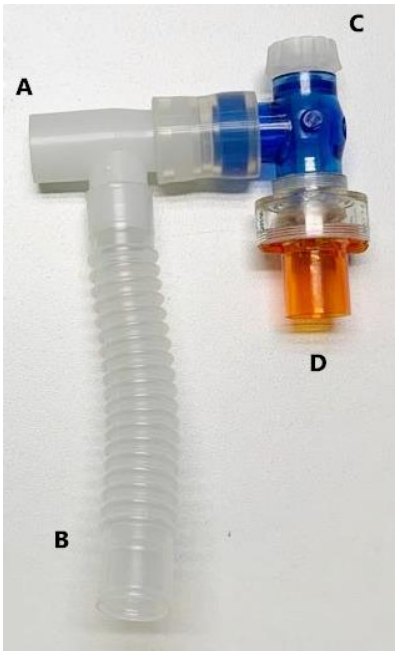
Fig 6

vii. Connect the ventilator to the gas recovery system. Connect the 22mm bellows connector to the 30mm port on the bellows base and connect to the gas filtering tank using the bellows.

Fig 7

viii. Connect the gas supply system. Use an oxygen tube and a three-way valve to connect the pressure relief valve of oxygen cylinder (gas output pressure should range from 41 to 87psi) to the air supply port (SUPPLY GAS) on the ventilator. The other outlet of three-way valve is connected to the air interface of the anesthesia system.

3.3 Mechanical Ventilation PEEP Valve (Optional configuration)



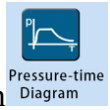
PEEP (Positive Expiratory End Pressure) valve is a popular device for ventilators. With PEEP, the ventilator can effectively control the Positive end-expiratory Pressure of the patient. This product is uni-directional PEEP valve. The airflow direction is the same as the expiratory direction, and the PEEP pressure varies with the position. PEEP pressures can be monitored during use.

- Adjustable pressure range: 3~20cmH2O
- Clearly marked flow direction arrows
- Transparent
- Material: polycarbonate, polypropylene, silica rubber, stainless steel
- Packing method: individually

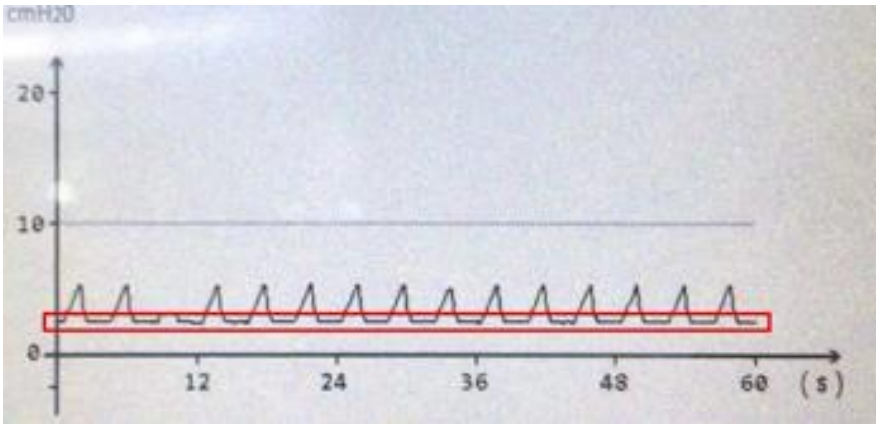
PEEP valve connection mode shown as below:

Interface B of PEEP valve is connected to the exhaust port of the ventilator, interface A is connected to port 30mm on the bellows base, and interface D in orange is installed

and connected to the exhaust pipe downward in the direction shown.

User can adjust the PEEP pressure by rotating the knob C. See the pressure-time diagram 

in the sub-main interface described in section 4.1. Click the icon to enter the following interface, simulate animal lungs with a breathing bag, and make the mechanical ventilation enabled， the PEEP pressure can be observed on the pressure-time diagram page.



The regular steady state pressure in the pressure-time diagram is PEEP pressure, see as the position marked with the red frame, the PEEP pressure in the diagram is about 3cmH_2O.

4-Operating Instruction

4.1 Power-On self-calibration/test

1) Connect the gas source pipes of the anesthesia machine and the R419 intelligent ventilator, turn on the gas source switch, adjust the pressure output of the decompression meter to 50 psi (0.344 MPa recommended value), and confirm that the volatilization tank switch of anesthesia machine is adjusted to “0” position;
2) Connect the breathing circuit according to Section 3.2, open the anesthesia machine flowmeter, and adjust the flow rate to about 1 L/min. When the folded bag of R419 Veterinary Ventilator bellows rises to the top of the transparent cover, press and hold the power switch for 1 second to start the equipment. The equipment will give a click sound and enter the self-calibration interface. Self-calibration will test the power source voltage, battery voltage, air source pressure, airway pressure and sensor.

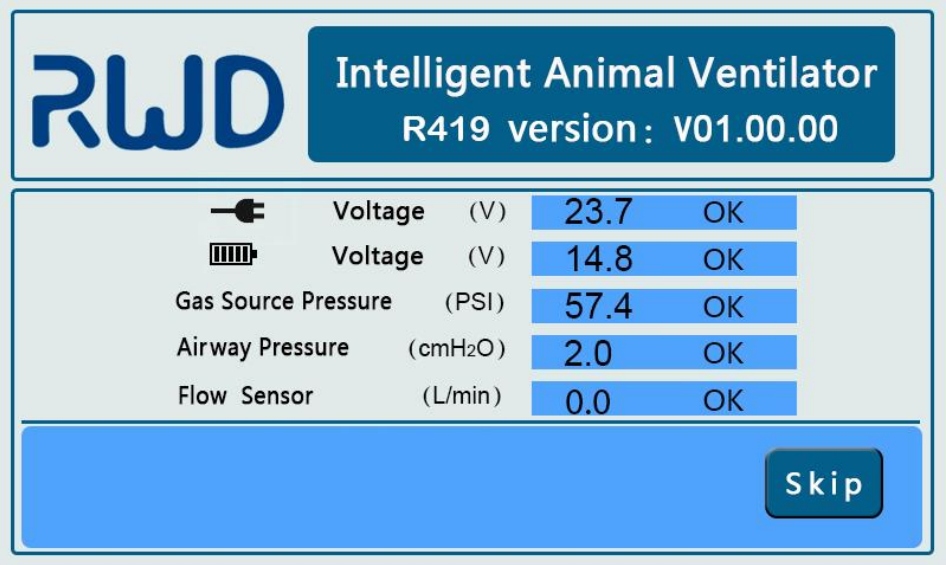


Fig 8

3) After the self-calibration passes, the interface automatically enters the main interface after 3 seconds;

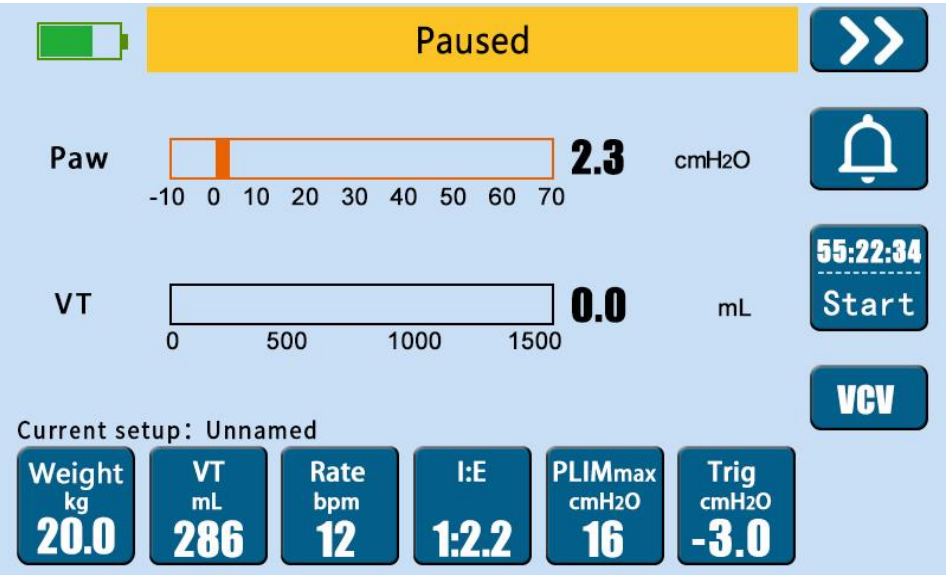


Fig 9

After the R419 Intelligent Animal Veterinary Ventilator enters the main interface, users can set the breathing parameters such as the inspiration/ expiration ratio and airway pressure upper limit alarm. Press  to enter sub-main interface for setting the system parameters, shown as below.

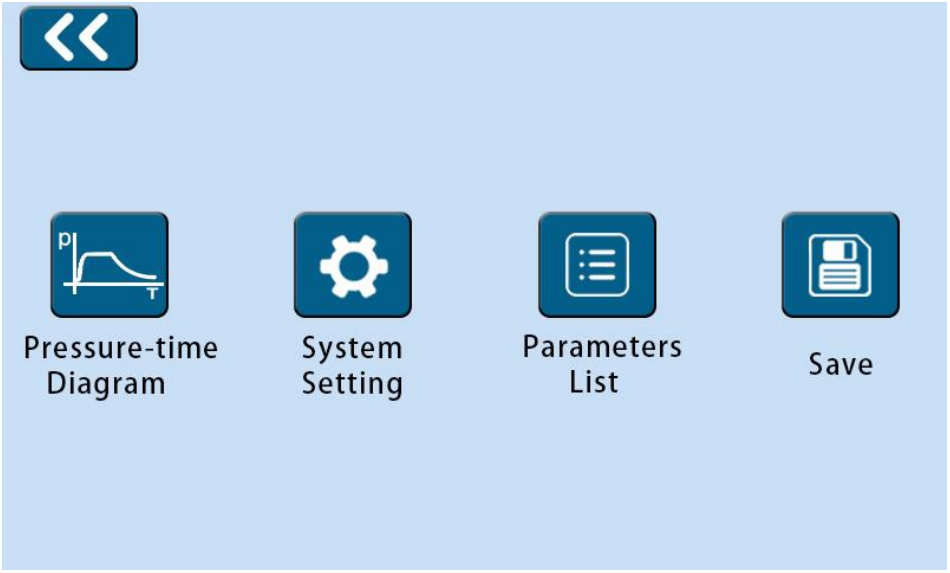


Fig 10

4.2 Leakage Detecting

Operation method:

After connecting the ventilator to anesthesia machine, adjust the flowmeter to 0.3L/min, adjust the upper pressure limit 

displayed on the main interface of the ventilator to 30cmH_2O , click to start, after several breathing cycles, the real-time tidal volume（VT）reaches the set value, then press the HOLD button until the airway pressure value rises or falls slowly. Rising means the air tightness is good. If it is falling, no more than 3 cmH_2O within 10 seconds, the air-tightness is still considered adequate. If the drop in pressure exceeds these values, there may be a problem with air leakage or tube circuitry. After having checked that the tube is tightly connected, and the airway pressure still drops more than 3 cmH_2O in less than 10 seconds, then there is a leak in the ventilator. It is recommended that the user follows the above steps to regularly check the ventilator, to avoid affecting its operation.

4.3 Mode Setting

Click any mode to enter the parameter editing interface. Click on the parameter editing interface to select any ventilation mode.

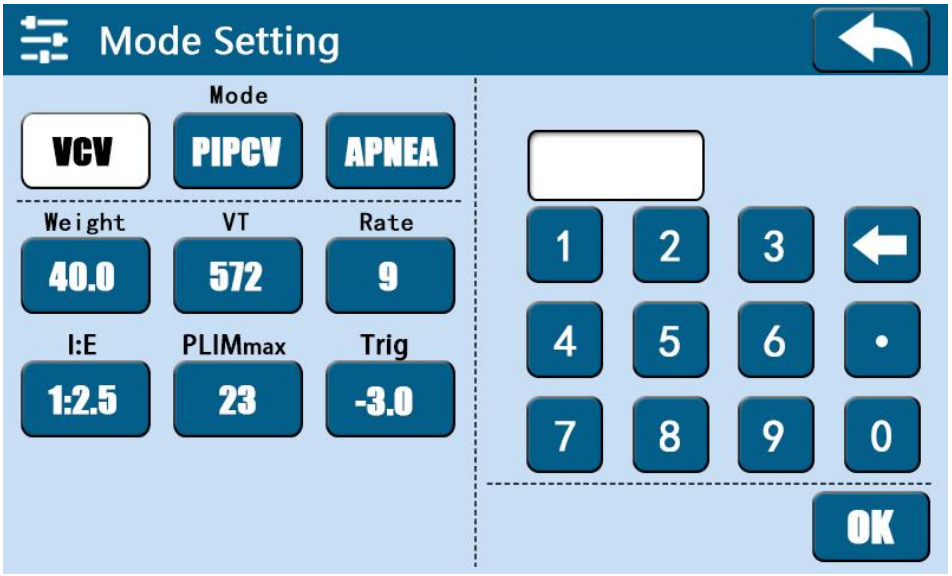


Fig 11

Volume Control Mode (VCV): With tidal volume (VT) as the reference standard, the inspiration process is complete when the volume of gas inhaled by the animal reaches the set tidal volume;

Pressure Control Mode (PIP-CV): With peak inspiratory pressure (PIP) as the reference standard, the inspiration process is complete when the gas inhaled by the animal reaches the set peak inspiration pressure;

Apnea Mode (APNEA): Selecting this mode will allow the animal to spontaneously breath; when the animal does not breath for a pre-set period of time, the air supply starts immediately, and delivers the pre-set assisted ventilation. This process will cease when the animal begins to spontaneously breath again. If the user observes that the animal has begun to spontaneously breath, and assisted ventilation is no longer necessary, the user can stop the ventilator and end assisted ventilation.

4.4 Weight Setting

After selecting this mode, enter the animal's weight. The system automatically matches the recommended parameters in accordance with the entered weight. The adjustment range of the weight input is 2.0~100.0 kg, and the input step is 0.1 kg.

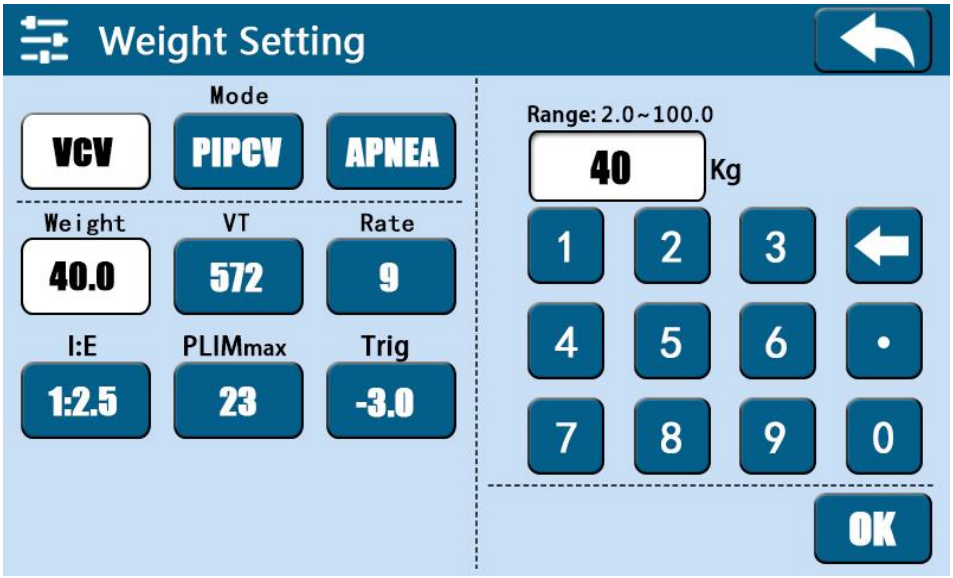


Fig 12

4.5 Setting of Breathing Parameters

Users can also enter other parameters according to need:

VT: During ventilation, the inspiratory volume is controlled in real time with reference to the set tidal volume (VCV). When the tidal volume setting is reached, the inspiration is over. The adjustment range of tidal volume is 20 ~1500 mL.

Flow: The device ventilation mode is selected as PIP-CV. The intelligent input automatically matches the flow rate. The user can also adjust the ventilation speed of the flow control device. The flow adjustment range is 1~85L/min.

Rate: When the breathing rate controls ventilation, the equipment breathes according to the set breathing rate, and the breathing rate can be adjusted within a range from 2 to 60 bpm.

PIP: The equipment ventilation mode is selected as PIP-CV. Refer to the set PIP to control the airway pressure in real time during the inspiration. When the peak inspiratory pressure setting value is reached, the gas supply ends. The PIP adjustment range is 5~35 cmH_2O.

I:E: In VCV/APNEA ventilation mode, the equipment controls ventilation according to the set inspiration/ expiration ratio. The parameter range of the inspiration/ expiration ratio is 1:1.0~1:4.0.

PLIMmax: When ventilation is performed in VCV/APNEA mode, the inspiration volume during inspiration, is controlled in real time in reference to the set tidal volume. When the tidal volume pre-set value is reached, the inspiration is complete, and the upper pressure limit is used as the airway pressure during inspiration for over-pressure protection with real-time monitoring in the animal VCV mode. When the airway pressure reaches the upper pressure limit, and the inspiration volume does not reach the set tidal volume, the ventilator sounds an alarm and automatically adjusts and enters the exhalation state in advance. The upper limit of the maximum pressure is 10~60 cmH_2O.

Trig: The trigger pressure adjustment range in VCV/PIP-CV/APNEA mode is -9 ~ -1 cmH_2O, the adjustment step length is 1 cmH_2O. Adjusting to 0 will turn off the trigger pressure setting, and OFF will be displayed. Ventilation is completely controlled by the ventilator; APNEA mode prohibits the trigger pressure from being off and the parameter cannot be set to 0.

APN.T: ‘Waiting time’ is the time from when a complete spontaneous breath is taken in

APNEA mode, to the start of the next inhalation, referring to the time point when the trigger pressure is reached by the last spontaneous breath. After the set waiting time is reached, the ventilation control will start, and the waiting time adjustment range is 15~30 seconds.

The real waiting time must be greater than or equal to the set waiting time.

⚠ Note: In VCV/APNEA mode, when any one of the three parameters of tidal volume, breathing rate and/or inspiration/ expiration ratio is set, the system's total flow range in real time must be within 1~85L/min, otherwise the system will display a prompt message, and the parameters will not be available.

4.6 Add, Call, Delete and Adjust Parameters

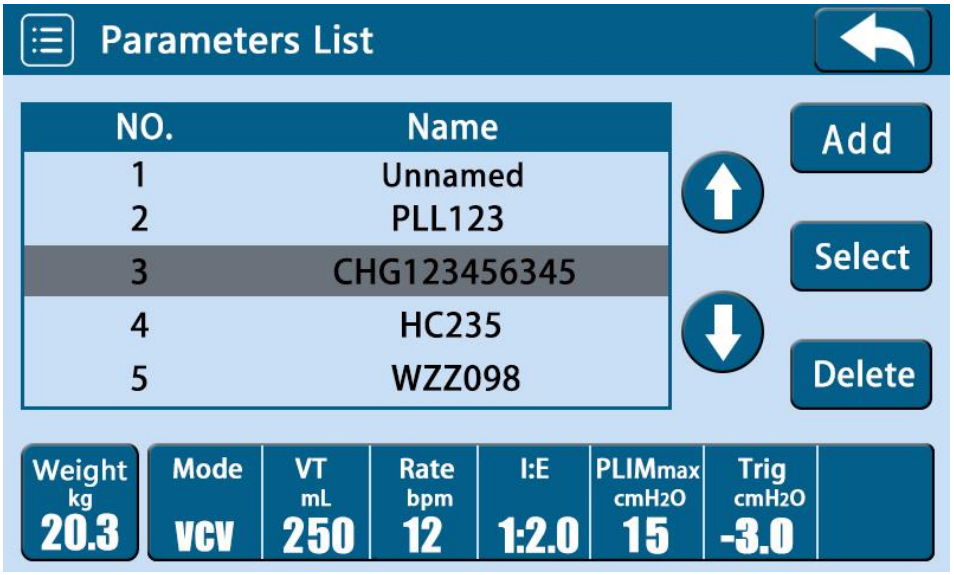


Fig 13

4.6.1 Add Parameters

1) Click the [New] button to enter the new interface for naming. After naming is complete, click "OK" to enter the parameter editing interface, or click [Return] to go back to the parameter list interface;
2) Enter the parameter editing interface, a default intelligent parameter group including a weight of 20 kg will display. Confirm whether to adjust each parameter according to need. Click [OK] to enter the parameter list interface. The [Parameters List] has one new name in the parameter group; click "Return" to enter the parameter list interface. The newly named parameter is at the back part of the group list in the parameter list interface, but the parameter value still maintains the default value of 20kg intelligent input; the shading is located on the new parameter group by default;
3) When the parameter list interface has saved 20 parameter groups, click the [New] button, and the pop-up prompt "The 20 sets of parameters have been saved, please delete some for new ones!", will display, then click the [OK] button to exit the pop-up box.

4.6.2 Call Parameters

1) Click a parameter number in the naming area of the [Parameter List] interface to pre-select this parameter group, and click the [Select] button to select this parameter group in the main interface;

2) If other parameters are selected when the equipment is in the process of ventilation, the current breathing cycle will not be forcibly interrupted. The selected procedures are performed after the current breathing cycle ends;

4.6.3 Delete Parameters

1) Click a parameter number in the naming area of the [Parameter List] interface to pre-select this parameter group. You can check this parameter group in the parameter display area;
2) Click “Delete” to delete the parameter group, and the prompt box “Are you sure you want to delete these parameters?” will display. Click [Yes] to delete, and the next parameter group in line will be moved up into its place, but the shading position will remain unchanged. After deleting the last parameter group, the check box will move up; click [No] to return to the [Parameter List] interface;

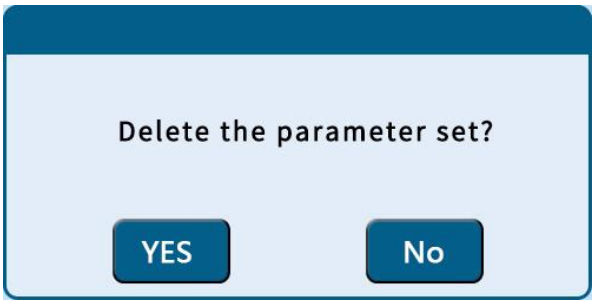


Fig 14

3) After deleting the last named parameter group in the parameter list interface, the [Delete] button is disabled;
4) The “Unnamed” parameter group cannot be deleted, it is optional, and the [Delete] button is disabled;
5) The main interface uses the parameter group ABC, the parameter list interface pre-deletes the parameter group, and displays the prompt "It is in use and cannot be deleted” Click the OK button to exit the pop-up box;

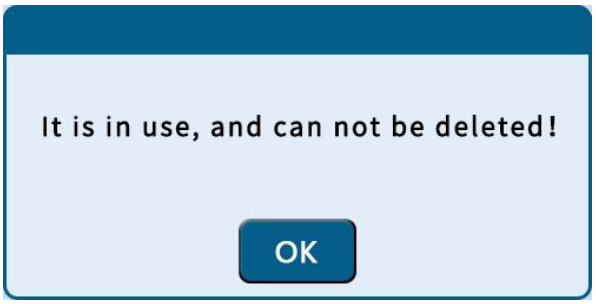


Fig 15

4.6.4 Adjust Parameters

1) Parameter list interface: Click the parameter to adjust, confirm the adjustment and return to the parameter list interface; the parameter will change under the same name;
2) Main interface: Click on the parameter to adjust, confirm the adjustment and return to the main interface. After the parameter has been adjusted, it will temporarily be stored as [unnamed]. The previously unnamed cached parameters are replaced with the most recently adjusted parameters. The parameters named before adjustment and stored in the [Parameter List] interface will not be affected;

3) After adjusting the parameters during ventilation, the newly adjusted parameters will be executed during the next inspiration phase, and the current breathing cycle will not forcibly interrupted.

4.7 System Setting

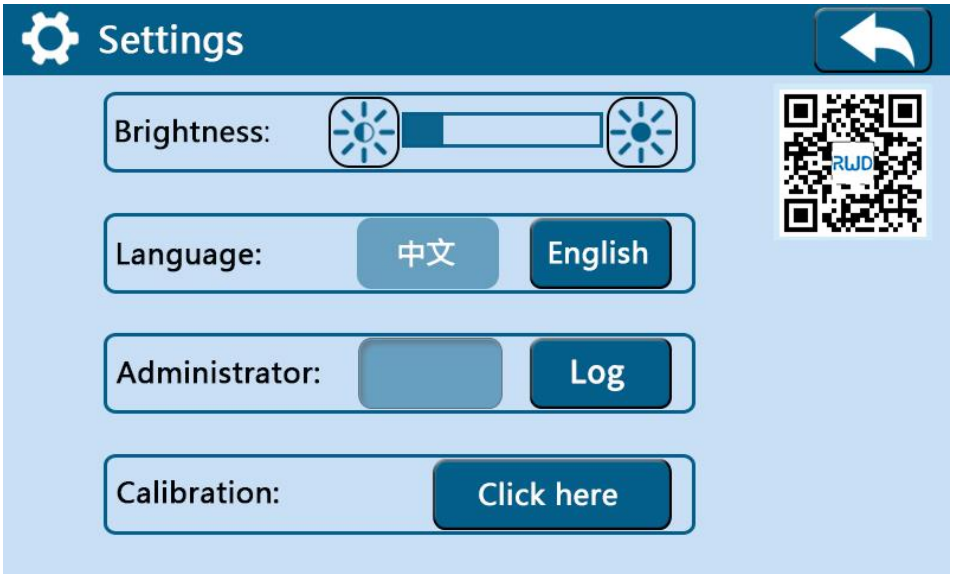


Fig 16

4.7.1 Brightness Control

1) Click & to adjust the backlight brightness.
2) When the device is powered by the internal battery, the current display brightness will be 80% of the set brightness;
3) The brightness of the equipment when switched on will be consistent with the brightness before the last shutdown;

4.7.2 Chinese-English shift

1) Click 【中文】 to switch the system language to Chinese, or [English] to switch the system language to English.

4.7.3 Calibration

1）Click Click here to enter the interface as shown in the figure below **(Note: be sure to unplug the threaded pipe shown in Figure 18 before calibration)**, and click the “Clear” button on the right side of “Airway Pressure sensor”. (We recommended this to be cleared monthly)

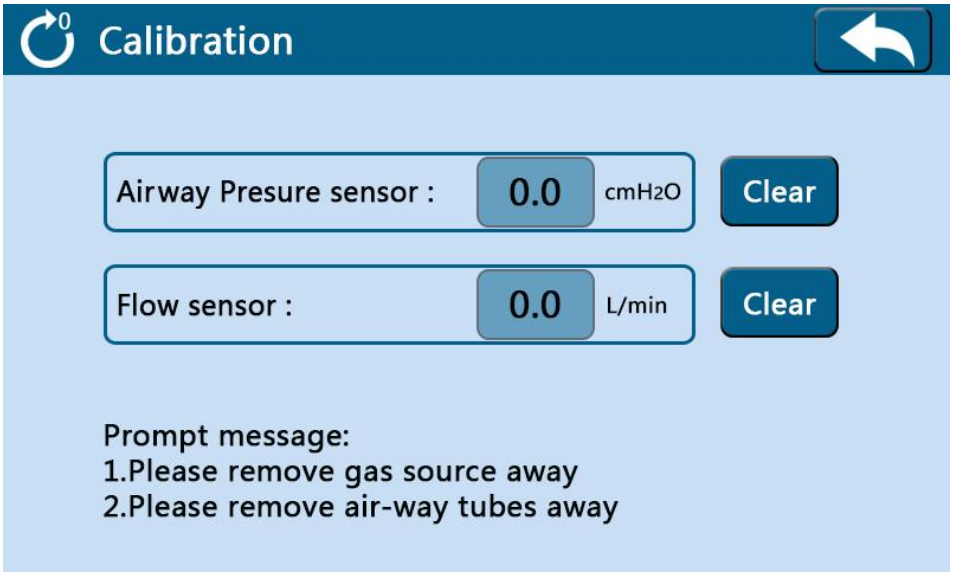


Fig 17

Fig 18

4.8 Alarm Information and Processing

4.8.1 Alarm Prompt of High Airway Pressure

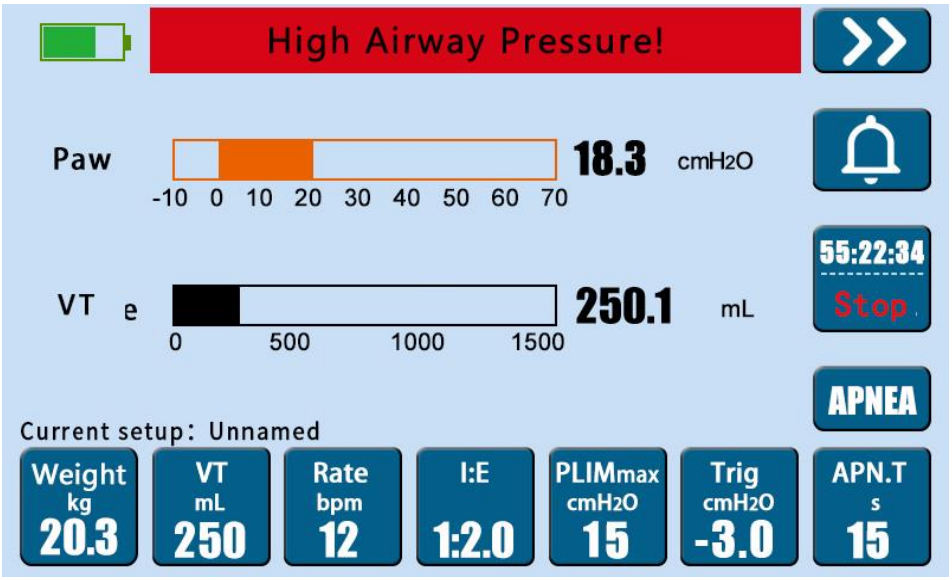


Fig 19

a. The information bar shows "High Airway Pressure!" indicating that the airway pressure is excessive. A continuous auditory alarm "beep" will sound. At this point, the ventilator will automatically end ventilation, keeping the airway pressure value within the set value range, and it will then enter the ventilation cycle. When the airway pressure returns to the set value range, this alarm message and status will be automatically cancelled. When an alarm occurs, check the breathing circuit immediately to confirm that it is connected correctly, the tidal volume is correct, and confirm whether the set Maximum Pressure Limit (PLIMmax) is suitable for the animal or the animal's current state.

b. When the airway pressure is too low, the device starts to sound an alarm. If the current airway pressure is lower than 2 cmH_2O, check the breathing circuit immediately to see whether the breathing circuit is damaged or leaking. The flowmeter of the anesthesia machine is normally open.

c. This alarm message can appear in both states of "standby or normal operation".

To find the cause of the leak:

1. Prepare a soapy water solution with a perfume-free soap.
2. Use this solution to wet all threaded connectors and hose connectors. Bubbles will form where there are leaks in the system.
3. Remove the pressure from the system: to do this the oxygen cylinder must be turn off. Turn the host (main body of equipment) on for a while until the pressure gauge on the oxygen cylinder reads "0". Then shut down the host again.
4. If there is a leak, replace the damaged part.
5. Then recheck for air tightness and leaks.
6. If the leak cannot be eliminated, it must be repaired.

⚠ Note: Before the ventilator is used again, be sure to have a professional physician set the appropriate airway pressure according to the animal. If the VT setting value is too low, the animal will not be able to inhale sufficiently. If the VT setting value is too high, the animal's chest and lungs will over-inflate, causing chest and lung injury.

It is recommended to operate this equipment under the guidance of a physician, pre-set the approximate airway pressure value, observe the animal's chest and lung undulation and blood oxygen saturation, blood gas and other breathing parameters, and that those values are within the ideal range. If there is a deviation, then make a subtle adjustments.

4.8.2 Alarm Prompt of "High / Low Gas Source Pressure"

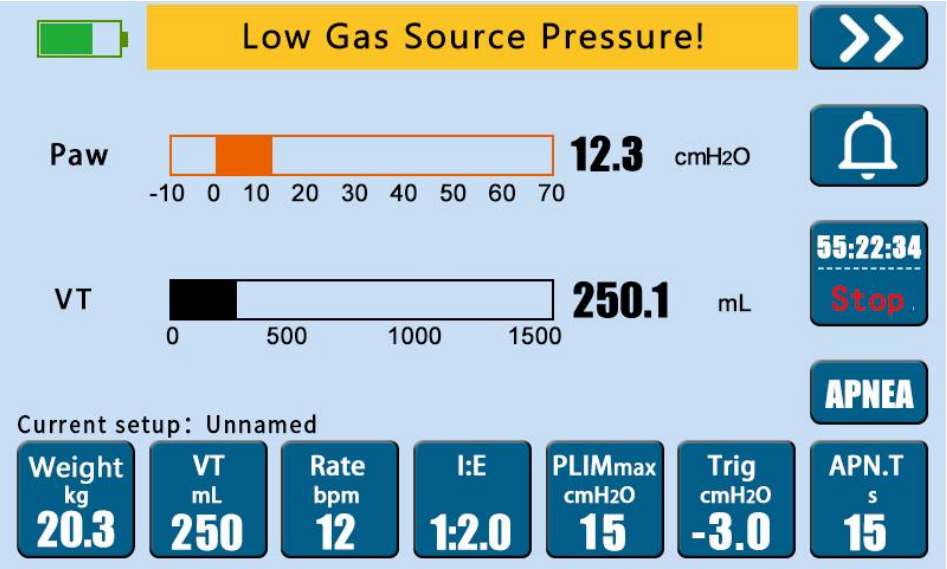


Fig 20

b. The information bar displays “Low Gas Source Pressure!” and “High Gas Source Pressure!”, accompanied by a continuous alarm sound, indicating that the air supply pressure is too low/high! Please check the oxygen cylinder or the central air supply source immediately, confirm that the air supply connection is properly connected, and the joint is not loose or leaking, and adjust the output pressure of the oxygen cylinder relief valve or the central air supply source to 41 ~87psi, and make sure the cylinder pressure is not less than 50bar (about 5MPa) to ensure sufficient working time.

c. This alarm message can appear in both states of “standby” or “normal” operation

⚠ Note: Please slowly open the gas valve of the oxygen cylinder. The cylinder pressure can now be viewed on the pressure gauge of the pressure relief valve. For example, a 200 bar reading indicates that the cylinder is sufficient, and a 100 bar reading indicates that only half of the cylinder is available.

⚠ Note: When the cylinder pressure is less than 50 bar, the oxygen cylinder should be replaced to ensure sufficient working time. After turning on the gas valve on the oxygen cylinder, turn it off again and observe the pressure gauge indicator on the pressure relief valve. If the pointer position remains the same, the system is airtight. If the pointer continues to drop, there is a leak.

4.8.3 Alarm Prompt of “Low Flow”

a. The information bar shows “Low Flow”, accompanied by a continuous auditory alarm. During the PIP-CV ventilation mode, if a lower [Flow] and a higher [PIP] were set, it may cause the entire breathing circuit to inhale for a long time, unable to reach the set PIP. Please immediately check that the [Flow] and [PIP] settings are appropriate for the current ventilation mode.

4.8.4 Alarm Prompt of Breathing Tubes Blocked

a. The information bar displays “Tubes Blocked!” with an auditory alarm. At this point, the folded bag of ventilator bellows collapses to the bottom, and the ventilator will

forcibly compress the folded bag of bellows to output gas, which is abnormal.

The ventilator will be automatically held now, please check the breathing circuit immediately, and confirm that the breathing circuit is connected correctly, including if it is falling off or loose. Check whether the anesthesia breathing pipe is blocked or bent, and if the flow meter of anesthesia machine correctly adjusts the output of gas flow.

Before running the equipment again, be sure to raise the folded bag of ventilator bellows to the top of the bellows!

b. This alarm message appears in the "normal operation" state.

⚠ Warning: Do not operate when the folded bag of ventilator bellows does not rise to the top of the bellows! Running in this state for a long time may cause damage to the equipment.

4.8.5 Alarm prompt of is Low Battery

a. When the battery capacity status is displayed as 0, the message bar displays “Low Battery!”, accompanied by a continuous auditory alarm, the capacity graph will flash. The equipment will automatically shut down after 15 minutes!

b. This alarm message can appear in both states of “standby” or “normal” operation.

c. Note: The battery will work normally for about 4 hours after being fully charged, but the backup battery should only be used for a sudden power failure or emergency. If there is a sudden power failure, please complete the current operation or use for a limited time.

⚠

Attention:

1. Indicates the battery capacity status, which is displayed in 5 levels;
2. It will flash red when the battery capacity is less than 1 grid and no external power source is connected.
3. When the equipment is in the non-self-calibration interface and the power capacity is 0 grid and no external power is connected, the equipment will automatically shut down after 15 minutes of operation!
4. When the equipment is in the self-calibration interface and the battery capacity is 0 grid and the equipment does not enter the main interface, the equipment will turn off for safety after 3 minutes of standby!

4.8.6 Alarm Prompt of Over-temperature

a. The information bar shows “High Temperature!” and accompanied by an auditory alarm.

b. When the temperature of the chip is restored to 58 °C or below, the alarm will stop.

4.8.7 Alarm prompts for Circuit abnormality

a. The information bar shows "Electric Circuit Fault!” The current interface parameters are all stopped, and the air supply is stopped.

b. The alarm continues and the interface remains in the running state. The user can click the [Stop] button to confirm the current alarm. The system will recognize the action and interrupt the alarm tone.

4.8.8 Message Prompt of “Inspiration hold”

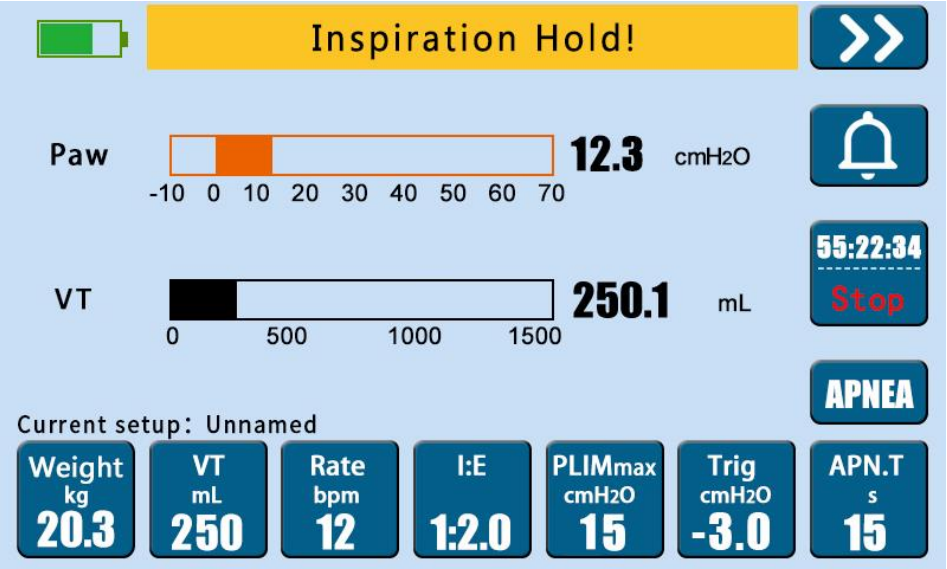


Fig 21

a. During normal operation (VCV/PIP-CV mode), if you need to perform an inspiration hold, press and hold the INSP.HOLD button. After the ventilator completes the current breathing cycle, it will hold the inspiration in the next breathing cycle. At this time, the folded bag of ventilator bellows will stop at the set tidal volume/PIP output position, allowing the animal to fill the chest to the desired pressure and maintain pressure without exhaling, until the button is released.

b. During the inspiration hold, the message bar displays “Inspiration Hold!” indicating that the inspiration is paused! It is accompanied with an auditory alarm.

c. This message appears in the "normal work" state.

⚠ Note: Do not over-expand the lungs of the animal. Excessive lung expansion can cause damage to the lungs! It is recommended to pre-set an appropriate PIP value before applying an inspiration hold and to complete the hold in the shortest time.

5-Cleaning and Maintenance

5.1 Product Cleaning

The majority of the ventilator is not in direct contact with anesthetic gases, so only a dry cloth is required for cleaning. Cleaning the surface of the ventilator: The surface can be wiped with a clean, soft, damp cloth. Neutral cleaning agents can be used to remove stubborn stains.

Warning!

Use only water and a neutral detergent to clean the bellows and bellows cover. Wipe with a soft cloth. Do not use a rough cloth or a scented cleaning agent. Be careful not to use ethanol for cleaning.

Cleaning the bellows cover: Rotate the bellows cover counterclockwise until the buckle is completely exposed (this step requires a large external force due to the action of the sealing ring), and lift the bellows cover vertically. Since the bellows cover is not in direct contact with anesthetic gases, it is only necessary to wipe it with a clean, damp cloth, or dip in a neutral detergent and rinse with water. High temperature steam cannot be used to sterilize the bellows cover. High temperature steam will cause the bellows cover to deform to the point of being unusable. **Be careful not to use ethanol for cleaning.**

5.2 Battery Maintenance

5.2.1 Battery Performance Maintenance

During battery use, it should be optimized periodically to maintain its service life. It is recommended to perform a maintenance on the battery every 3 months of storage. Please follow the steps below:

1) Take out the equipment and stabilize it for 2 hours or more at room temperature of 5 °C ~ 30 °C;

2) Turn on the external power source and charge the battery for 6~8 hours;

3) Reposition the equipment.

5.2.2. Check battery performance

Battery performance may decrease over time. Under normal circumstances, a fully charged battery will work for 4 hours. If the battery's power supply is less than 4 hours, consider replacing the battery or contact the after-sales personnel.

Note: The service life of the battery depends on the frequency and time of use. If the battery is properly maintained and stored, the service life of the lithium battery is about 3 years. Improper usage may shorten battery life. We recommend replacing the lithium battery every 3 years.

5.3 Recycling Batteries

If the battery is significantly damaged, or if the battery capacity is exhausted, replace it and recycle it properly. When disposing of used batteries, the corresponding regulations should be followed.

Warning!

Do not disassemble the battery, put it into fire, or short-circuit it. Burning, exploding, or leaking batteries can cause personal injury.

6-Troubleshooting

If there are other malfunctions in the ventilator, please refer to the "Troubleshooting Table" for potential solutions. If the fault still cannot be eliminated, please contact the relevant RWD personnel.

Fault description	Possible cause	Methods for Troubleshooting
When the ventilator is running, the sound of the valve tapping can be heard but it is not working, and the ventilator makes a buzzing sound when the animal is breaths.	1）No gas supply pressure 2）The inspiration adjustment knob is set at the minimum value 3）The air pressure at the input of the ventilator is excessively low	a. Check if the air supply line is folded or blocked. b. Insufficient air source pressure c. Adjust the inspiration capacity d. The gas source supply of the anesthesia machine does not meet the flow requirements, and a new gas supply source is required.
When the ventilator is turned on, the power indicator (green light) does not light up.	The power source is not connected	a. Plug in a suitable power socket b. Check the output c. Check the fuse
When the battery power is turned on, the battery indicator (green light) does not light up.	Battery failure	Contact the personnel of RWD
The ventilator sounds normal, but the tidal volume indication is incorrect.	There is a problem inside the ventilator	Contact the personnel of RWD
Bellows is separated from the mounting ring	The lower part of the bellows is damaged or not installed securely	Use a new bellows or reconnect
The ventilator operates normally, but the bellows are not filling	1)The breathing system leaks 2)Insufficient gas supply to the anesthesia machine system 3) The bellows are damaged 4)The bellows are not fully connected to the mounting ring 5)Anesthesia machine's safety valve is not completely closed	a. Check and update the pipeline b.Increase the Oxygen Flow of the anesthesia system c. Replace the bellows with a new one d.Reconnect the bellows to the mounting ring e. Check the safety valve of the anesthesia machine system and turn it off completely f.Check if all pipe and pipe connections for gas leaks
The device cannot be turned on after pressing the power switch	1) The power cord is not connected 2) The battery capacity is low 3)The power button is damaged	a. Check the connection of the power cord b. Contact the personnel of RWD

7-Return to factory for repair

It is forbidden to return the ventilator or related components to the company without authorization. Please contact RWD personnel to obtain the authorization before returning equipment or components.

If the equipment needs to be returned to the factory, please prepare and provide the following information:

a) Serial number and user manual of equipment
b) Problem description, return reason and request
c) Contact information of the relevant personnel of your company (telephone and detailed address)
d) If the equipment returned for repair involves fee issues, please provide the contact information (phone and detailed address) of a person authorized to make payments for your company.

⚠ Note: Please properly pack the equipment and components to be repaired so as to avoid secondary damage during transportation!

8-After-sale service

RWD Life Science Co., Ltd is headquartered in Nanshan District High-tech Park, Shenzhen. Since its establishment in 2002, it has always been committed to providing customers with high-quality services. Pursuing customer satisfaction is our consistent goal. The company has a strong after-sales service team and insists on providing customers with 24/7 service.

The company also has offices in 31 provinces and cities including Guangzhou, Shanghai, Chengdu, Nanjing, Hangzhou, Kunming, Xi'an, Taiyuan and Shandong. It has set up an after-sales service center in Beijing, and will establish after-sales service centers in other cities such as Shanghai, covering more cities. This initiative will respond quickly to customer service needs, minimizing losses caused by equipment failures.

In the meanwhile, passing through the unremitting endeavor of years, we have also established a friendly partnership with distributors across the country, created a national comprehensive after-sales service system, and maintained long-term stable cooperative relations with new and regular customers.

9-Technical parameters

Appendix 1. PIP-CV Parameter Setting Reference

WEIGHT (kg）	Freq (bpm)	Max airway pressure (cmH_2O)	Trig (cmH20)	Recommended flow
2	18	10	-2	2
2.5	18	10	-2	2
3	18	12	-2	2
3.5	18	12	-2	3
4	18	12	-2	3
4.5	18	12	-2	4
5	18	12	-2	4
5.5	12	12	-2	3
6	12	12	-2	3
6.5	12	12	-2	4
7	12	12	-2	4
7.5	12	12	-2	4
8	12	12	-2	4
8.5	12	12	-2	5
9	12	12	-2	5
9.5	12	12	-2	5
10	12	12	-2	6
11	12	13	-3	6
12	12	13	-3	7
13	12	13	-3	7
14	12	13	-3	8
15	12	13	-3	8
16	12	13	-3	9
17	12	13	-3	9
18	12	13	-3	10
19	12	13	-3	10
20	12	13	-3	11
21	12	16	-3	12
22	12	16	-3	12
23	12	16	-3	13
24	12	16	-3	13
25	12	16	-3	14
26	12	16	-3	14
27	12	16	-3	15
28	12	16	-3	15
29	12	16	-3	16

WEIGHT (kg）	Freq (bpm)	Max airway pressure (cmH_2O)	Trig (cmH20)	Recommended flow
30	12	16	-3	17
31	9	16	-3	14
32	9	16	-3	14
33	9	16	-3	15
34	9	16	-3	15
35	9	16	-3	16
36	9	18	-3	16
37	9	18	-3	17
38	9	18	-3	17
39	9	18	-3	18
40	9	18	-3	18
41	9	18	-3	19
42	9	18	-3	19
43	9	18	-3	19
44	9	18	-3	20
45	9	18	-3	20
46	9	18	-3	21
47	9	18	-3	21
48	9	18	-3	22
49	9	18	-3	22
50	9	18	-3	23
51	9	18	-3	23
52	9	18	-3	23
53	9	18	-3	23
54	9	20	-3	24
55	9	20	-3	24
56	9	20	-3	24
57	9	20	-3	25
58	9	20	-3	25
59	9	20	-3	26
60	9	20	-3	26
61	9	22	-3	26
62	9	22	-3	27
63	9	22	-3	27
64	9	22	-3	27
65	9	22	-3	28
66	9	22	-3	28
67	9	22	-3	28
68	9	22	-3	29

WEIGHT (kg）	Freq (bpm)	Max airway pressure (cmH_2O)	Trig (cmH20)	Recommended flow
69	9	22	-3	29
70	9	22	-3	29
71	9	22	-3	30
72	9	22	-3	30
73	9	22	-3	30
74	9	22	-3	31
75	9	22	-3	31
76	9	22	-3	31
77	9	22	-3	32
78	9	22	-3	32
79	9	22	-3	32
80	9	22	-3	33
81	9	22	-3	33
82	9	22	-3	34
83	9	22	-3	34
84	9	22	-3	34
85	9	22	-3	35
86	9	22	-3	35
87	9	22	-3	35
88	9	22	-3	36
89	9	22	-3	36
90	9	22	-3	36
91	9	22	-3	37
92	9	22	-3	37
93	9	22	-3	37
94	9	22	-3	38
95	9	22	-3	38
96	9	22	-3	38
97	9	22	-3	39
98	9	22	-3	39
99	9	22	-3	39
100	9	22	-3	40

Appendix 2. VCV Mode Breathing Parameter Setting Reference

WEIGHT (kg）	Freq (bpm)	airway pressure limit (cmH_2O)	Trig (cmH20)	I:E ratio	standard VT	measured VT
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
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

WEIGHT (kg）	Freq (bpm)	airway pressure limit (cmH_2O)	Trig (cmH20)	I:E ratio	standard VT	measured VT
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
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

WEIGHT (kg）	Freq (bpm)	airway pressure limit (cmH_2O)	Trig (cmH20)	I:E ratio	standard VT	measured VT
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
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

WEIGHT (kg）	Freq (bpm)	airway pressure limit (cmH_2O)	Trig (cmH20)	I:E ratio	standard VT	measured VT
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

Appendix 3. APNEA mode breathing parameter setting reference

WEIGHT (kg）	Freq (bpm)	airway pressure limit (cmH_2O)	Trig (cmH20)	I:E ratio	standard VT	measured VT	apnea 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
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

WEIGHT (kg）	Freq (bpm)	airway pressure limit (cmH_2O)	Trig (cmH20)	I:E ratio	standard VT	measured VT	apnea time （s）
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
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

WEIGHT (kg）	Freq (bpm)	airway pressure limit (cmH_2O)	Trig (cmH20)	I:E ratio	standard VT	measured VT	apnea time （s）
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
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

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