TA80V Veterinary Anesthesia Workstation

User Manual

Only for veterinary use

STATEMENT

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Manufacturer's responsibility:

The Company shall be deemed responsible for the safety, reliability and performance of the equipment only if:

- Assembly operations, expansion, returning, improvement and maintenance are carried out by our approved personnel;
- The supporting electrical equipment and the 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 in the home, only in a pet facility!

⚠ Warning Failure to achieve an effective and satisfactory maintenance program by the facility having responsibility for the use of this equipment could result in abnormal equipment failure and could endanger patient health.

Upon request and in accordance with the agreement, the Company will provide block diagrams, additional instructions on calibration methods, and other information to assist the User in having the parts of the equipment specified by the Company to be repaired by the User serviced by the appropriate technician.

Guarantee:

The Company guarantees that the parts and accessories of the host machine will be free from production process and raw material failures for one year from the date of shipment under normal use and maintenance; other parts are guaranteed for three months; consumables are not covered by the warranty. The Company's obligation under this warranty is for maintenance only.

Free obligations:

- The Company's obligations under this warranty do not include freight, other charges;
- The Company is not responsible for direct, indirect or final damage and delays caused by improper use, replacement of parts not authorized by the Company, or repair of the machine by persons not authorized by the Company.
- This guarantee does not apply to the following matters:

  Non-normal use.

  Machines that are not maintained or have been damaged;

  Our original serial number labels or manufacturing marks have been removed or replaced.

  Products from other manufacturers.

Safety, reliability and operational status:

We are not responsible for the safety, reliability, or operating conditions of the equipment in the event of any of the following conditions:

- Components are disassembled, stretched, and recommissioned.
- The user is not using it properly in accordance with this manual.
- The environment in which the equipment is used or stored does not meet the requirements of this manual.

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If you do need to return a product to us, please follow the steps below:

1 Obtaining the right to return goods

Contact our Customer Service Department with the serial number of the product, which is labeled on the equipment casing. Returns will not be accepted if the serial number is not legible. When returning the product, please indicate the serial number of the product and briefly describe the reason for return.

2 Freight

Equipment shipped to our company for repair, the user shall bear the customs, transportation and insurance costs incurred.

Welcome to use our products!

For proper and effective use of this product, the user must read this manual carefully before using the product.

The user must fully understand and strictly comply with this manual when using this product.

This product is intended for use only as described in this manual.

Repairs and census of this product should only be carried out by trained and specialized service personnel.

Users in the process of using any situation, can be to the company inquiries, we will provide you with enthusiastic service.

Product specifications are subject to change without notice.

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CONTENT

1 Foreword

1.1 About TA80V Veterinary Anesthesia Workstation

TA80V is a Easy-Moved, integrated, and intuitive anesthesia delivery system. Ventilators not only provide mechanical ventilation for animal patients during surgery, but also monitor and display different parameters in animal patients.

The ventilator used in this system is controlled by a microprocessor and is equipped with parameters and waveform monitoring, capacity mode, and other optional functions. The ventilator used in the system has a built-in turbine without an external high-pressure gas source, controlled by a microprocessor, and equipped with parameters and waveform monitoring, VCV,PCV,SPONT mode, and other functions.

Existing optional features may not be included in the instructions in this manual. The system can also attach other devices to the top level or the middle platform. For details of the existing local system, please consult the local office.

⚠Warning The user of this machine should be a dedicated anesthesiologist and should be trained in the use of the TA80V anesthesia machine.

⚠Warning TA80V can not be used in the MRI environment.

1.1.1 Range of application

The standard configuration of this system is suitable for animal patients above 0.5 Kg.

The TA80V veterinary anesthesia machine is mainly used in animal hospital operating rooms, and can also be used in animal hospital emergency rooms, animal scientific research and other places where anesthesia is required.

1.1.2 contraindication

No contraindications are found in this product.

1.2 Symbols are used on this manual or equipment

⚠ Warnings and notes indicate potential hazardous conditions for not following this manual instructions.

⚠ Warning indication of conditions that may cause injury to the operator or animal patient.

⚠ Note the conditions that may cause damage to the equipment.

Other symbols are used on the device or in the manual in place of written instructions. Not all of these symbols appear on the equipment or in the manual. These symbols include:

I	Turn on (power supply)		Animal Equipment
O	Turn off (power supply)		Mute
~	AC Power		Mechanical Ventilation
⎓	DC Power		Dangerous voltage
	Protective grounding		Input
	Equipotential		Output
→	One-way movement	↔	Two-way movement
	Lock		Unlock
	Inhaled airflow		Exhaled airflow
	Take the top reading of the buoy	**SN**	Serial number
Close Drain	Drain valve operation guide	O_2+	Oxygen flush
	Air bag position/manual ventilation		

2 Anesthesia System Control

2.1 Anesthesia System

⚠Warning Flammable anesthetics such as ether and cyclopropane must not be used in the anesthesia system. Only the following non-flammable anesthetics are permitted for use in anesthesia systems.

Desflurane, sevoflurane, enflurane, and isoflurane have been found to be nonflammable anesthetics.

⚠Warning Desflurane, sevoflurane, enflurane, and isoflurane have been found to be nonflammable anesthetics.

⚠Warning Never use antistatic or conductive breathing tubes and masks. Use of such breathing tubes or masks in close proximity to high-frequency surgical equipment may cause burns.

⚠Warning Accidental leakage or spilling of anesthetic and other liquids on the roof may cause internal device failure or safety accidents.

⚠Warning When the anesthesia machine is in normal use, the tilt angle must not exceed 10 degrees.

2.1.1 Parts Introduction

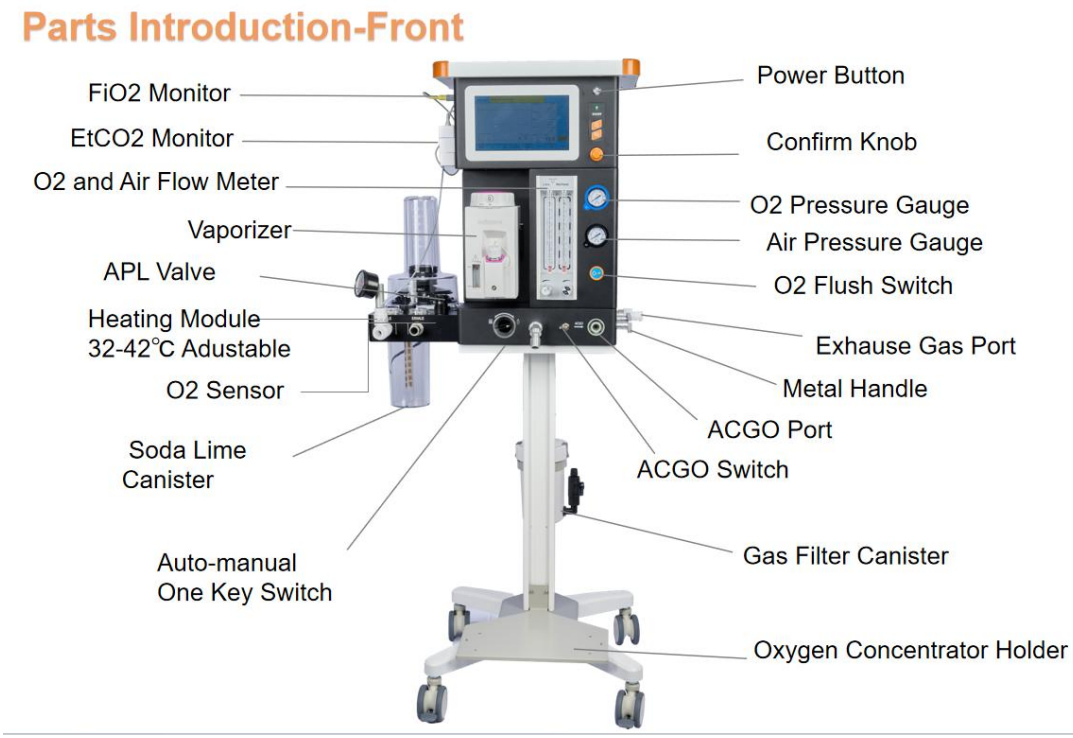


Figure 2-1 Front view of TA80V

Parts Introduction-Back

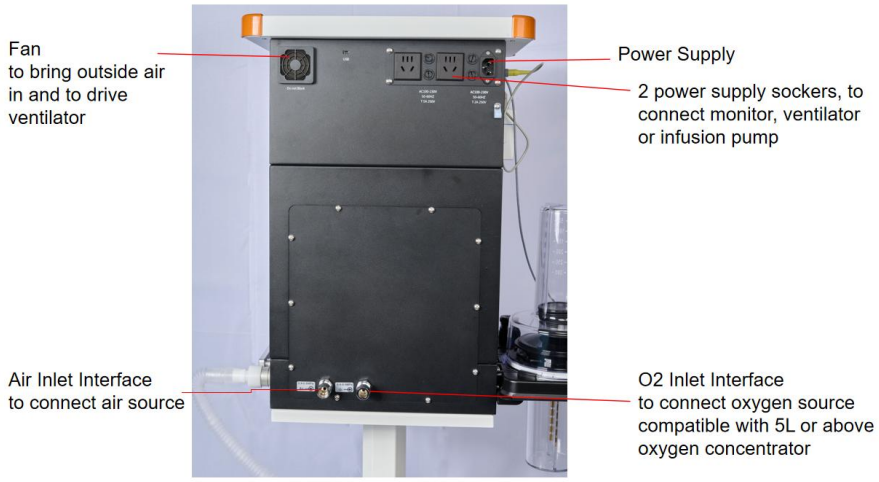
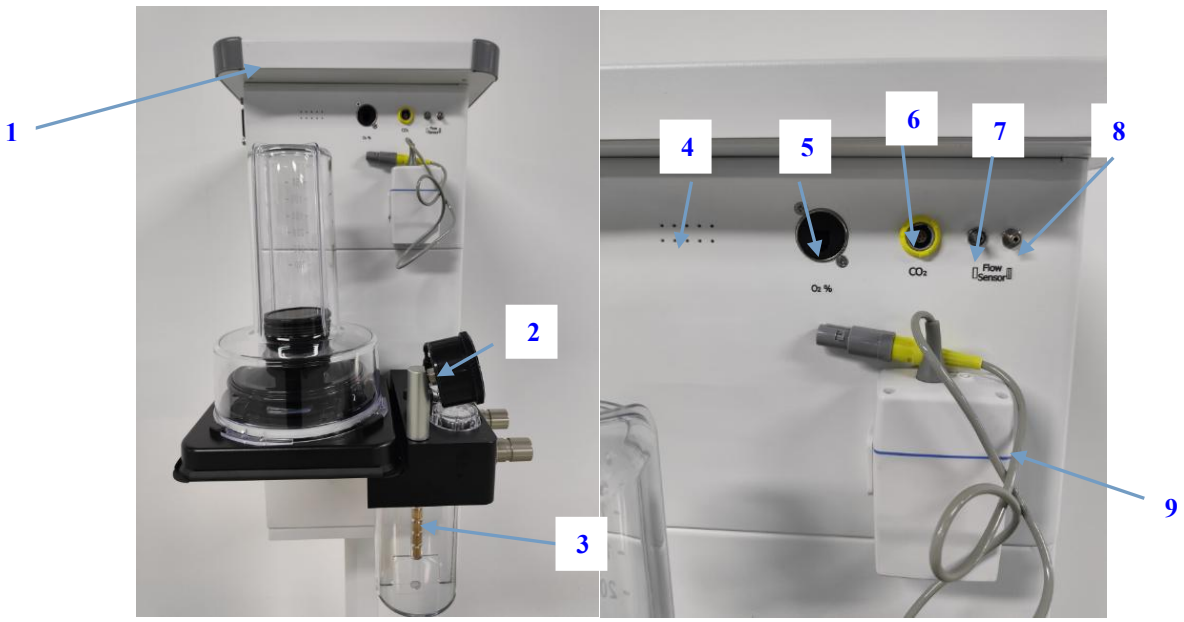


Figure 2-2 Back view of TA80V

- Figure Figure 2-3 shows the various controls located on the front side of the TA80V.

Item		Icon	Instruction
1	Caster (including brakes)		Push lock. Lift up to unlock..
2	Flow control		Turn the control knob counterclockwise to increase flow and clockwise to decrease flow. When reading the flow meter, read the reading from the top of the float.
3	Oxygen flush		Press the O2 rapid oxygen supply button to provide high flow oxygen to the system.
4	ACGO switch		Turn the switch toward (towards its right) the ACGO port, the fresh gas will be output through the ACGO interface, and comes into Non-rebreathing Circuit. It is quite essential for small animals.
5	Auto-Manual switch		Turning clockwise, pointing to Manual, directly below the hand control interface, you can connect the manual airbag ventilation at the hand control interface. Turn counterclockwise to point to Auto, the working state is ventilator-controlled state, and the ventilator provides the air source to work.



- Figure Figure 2-3 TA80V Left-side view

1. Anesthesia machine top cover 2.Pressure gauge 3. Soda Lime Canister 4. Speaker port
5. Oxygen sensor interface 6. ETCO2 module interface
7.Flow sensor interface (connected with white pipe)
8. Flow sensor interface (connected to the blue tube, close to the animal patient end)
9. CO2 module adapter

2.2 Anesthesia and Respiratory System Components

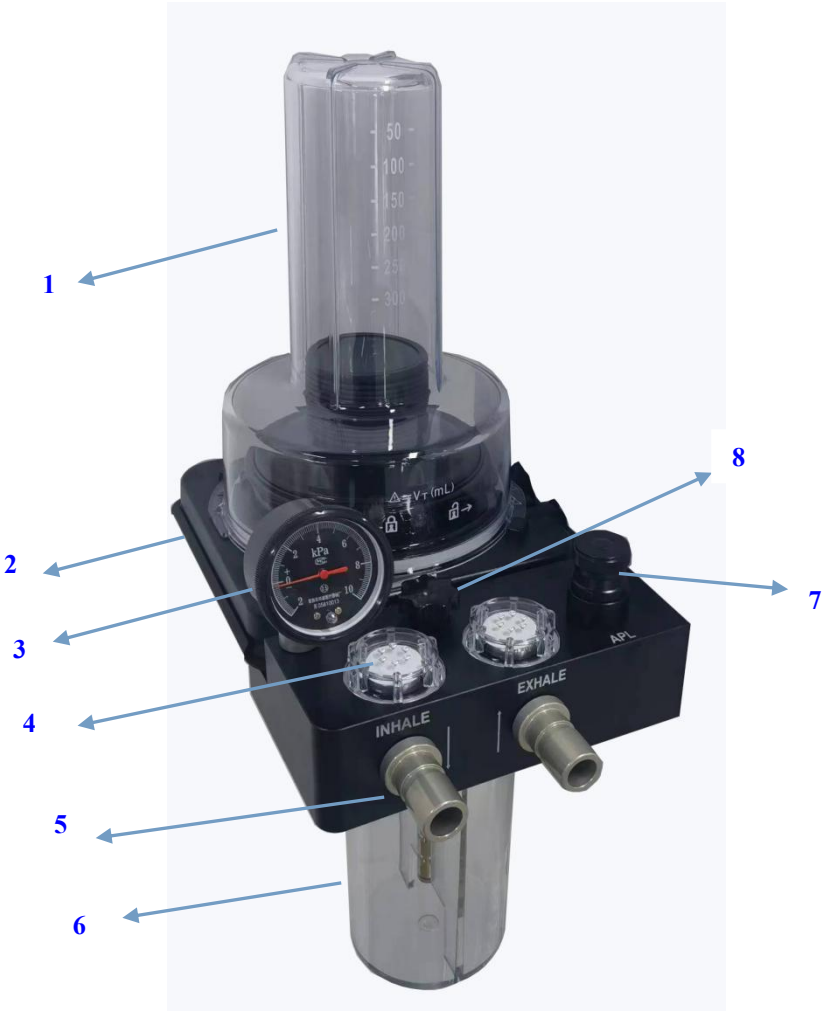


Figure 2-4 Respiratory system components

1	bellows	2	Bellow tray
3	Airway pressure gauge	4	Inhale one-way valve
5	Exhale one-way valve	6	CO2 Absorption canister
7	APL (adjustable pressure limit)	8	Soda Lime Canister lock

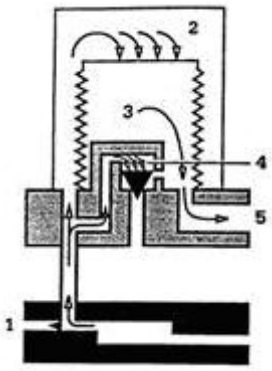
- Figure 2-3 shows the functional control of each component of the respiratory system.

project		graphic	explain
1	APL Valve		During manual ventilation, adjust the pressure limits of the respiratory system. Adjustment range: 0.19 ～ 6kPa

2.2.1 Bellow Integrated Interface

⚠Warning It is prohibited to connect the exhaust system interface directly to the negative pressure system. Otherwise, it will cause air leakage in the breathing circuit

Tip: When the exhaust gas exhaust system uses φ22mm pipeline, the adapter can be used to connect the exhaust system and the bellow.



Initial inspiratory :

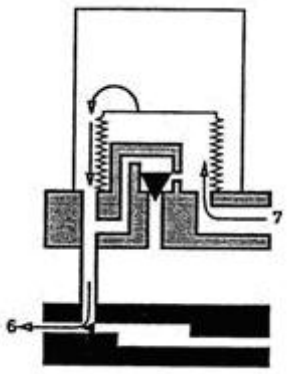
1 Exhalation valve

2 Drive gas

3 Animal breathing circuit gas

4 Pressure release valve

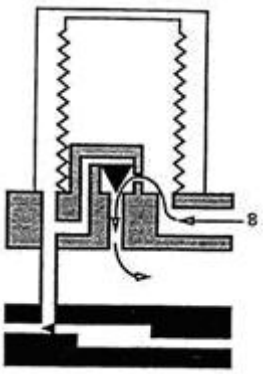
5 to the breathing circuit



Initial exhalation :

6 Drive gas

7 Breathing circuit



End-expiratory :

8 Excessive circuit gas

Figure 2-5 Breathing cycle

2.3 Vaporizer Control

If the anesthesia machine is equipped with a vaporizer provided by the manufacturer or intends to install a recommended vaporizer according to its instructions, the following instructions are required

1. There are detailed description of the anesthesia vaporizer performance, including the environmental humidity, environmental pressure, tilt, input flow rate to 8 L/min or the manufacturer's set range (the larger value of the two) and the influence of changes in the gas mixture composition.
2. When the anesthesia machine, and an anesthesia vaporizer not match, their performance decreases
3. Detecting the carrier gas recommended anesthesia vaporizer, and a gas flow rate of gas analysis, if the machine is recommended to use some kind of anesthesia ventilator, to be detected on the anesthesia vaporizer, the ventilator setting conditions.
4. If the anesthesia vaporizer cannot be calibrated within the first scale range on "OFF" and "0", the anesthesia vaporizer cannot and should not use this range.
5. The volume of the anesthetic agent in the anesthesia vaporizer from the lowest level to the highest level.

For more detailed information about the anesthesia vaporizer, please refer to the anesthesia vaporizer operation and maintenance manual

⚠Attention The vaporizer used with the TA80V anesthesia system shall comply with ISO 8835-4.

2.4 Anesthesia Ventilator Control

⚠**Attention** Anesthesia ventilator meets the requirements of ISO 8835-5

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

⚠**Attention** 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

2.4.1 Front Panel of the Anesthesia Ventilator

The front panel consists of a display screen, function keys, indicator lights and knobs, as shown in 2-6.

Figure 2-6 The front panel of the anesthesia ventilator

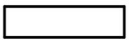
2.4.2 Switch Button

	Ventilator switch	Press this button to turn on the ventilator; press again to off and stop working.

2.4.3 Key Function and Basic Operation

	Mute key	Press this key to mute the alarm for 120 seconds.
	Screen lock	Press this key to turn off screen touch; press and hold this key again for 2 seconds to release the ban.

2.4.4 Indicator Light

	Power Indicator	Connect the power supply, turn on the power switch, the ventilator is powered on, and the indicator light turns on.
	Alarm indicator light (red and yellow color)	When a high-level alarm occurs, the indicator light flashes red; medium-level alarm occurs, light flashes yellow.

2.4.5 Knob

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

A color-changing (yellow) cursor that moves on the screen as the knob is turned. Operations can be performed wherever the cursor can stay.

Operation:

- Move the cursor to an item you want to operate
- Press the knob
- One of the following situations will occur in the system:

  The cursor background color contrast display indicates that the content in the box can change with the rotation of the knob;

  A drop-down menu appears/closes on the screen, a dialog box pops up, or the original menu is replaced by a new menu;
- Press again to save settings.
- The screen of this ventilator is a touch screen, which can be operated with the screen and the knob.

2.4.6 Screen Display

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

2.4.6.1 Standby Interface

Figure 2-7 shows the standby interface. In 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, power information prompt and ventilation mode display, and the standby time is displayed in the middle. When a menu pops up, the middle area will be covered.

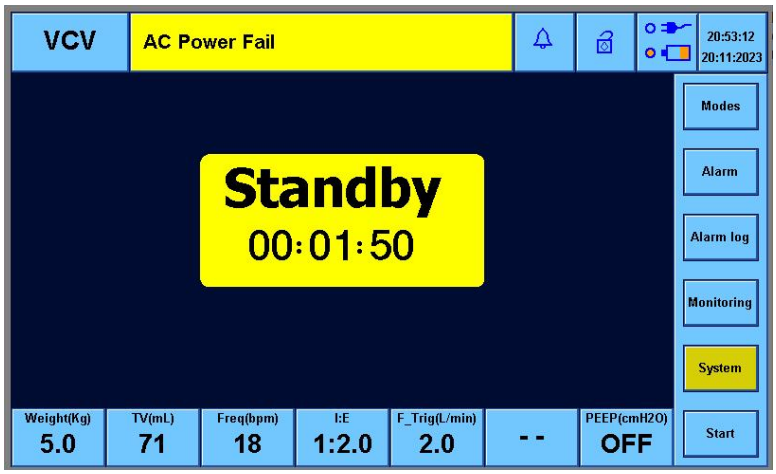


Figure 2-7 Standby screen

2.4.6.2 Work Interface

Touch the 

in the standby interface to enter the work interface, as shown in Figure 2-8. Touch the 

in the working interface to return to the standby interface. In the standby interface, the ventilator is in standby mode and cannot work.

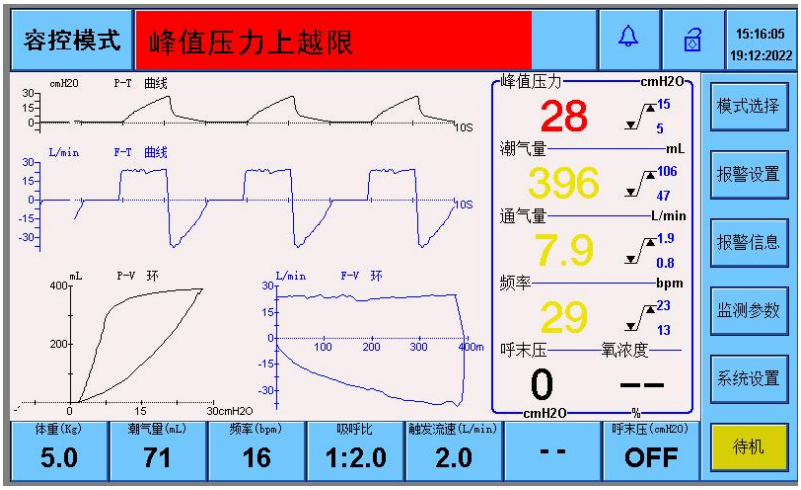


Figure 2-8. The working interface

2.4.6.3 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), breath-hold time (Hold), trigger sensitivity (Trigger), end-tidal pressure (PEEP), inspiratory time (T_Insp), 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.

2.4.6.4 The 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.

2.4.6.5 Monitoring Parameter Areas

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.

2.4.6.6 Information Tip 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.

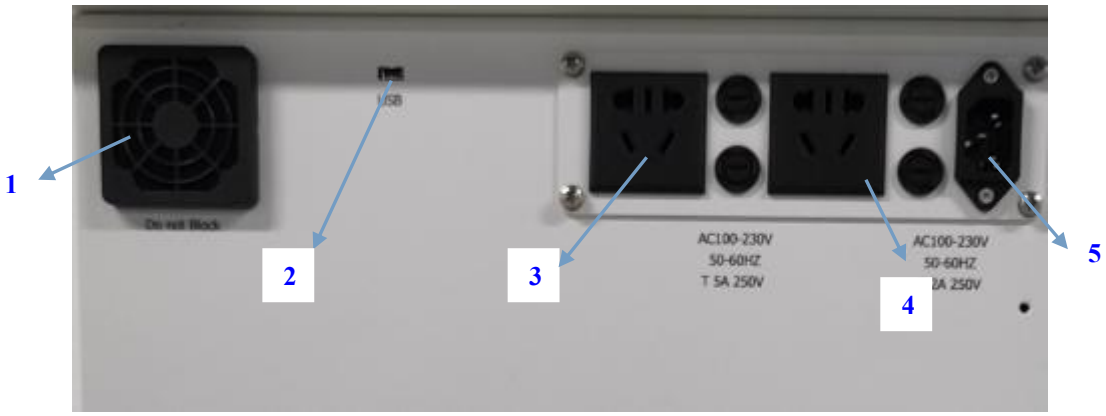
Figure 2-9 Information prompt area

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 Silent, the number below is the end time of Silent
4	Keyboard and screen lock, after locking （  ） all operations except Silent are prohibited
5	System time

2.4.6.7 Menu Selection 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.

2.4.7 Rear Panel of the Anesthesia Ventilator



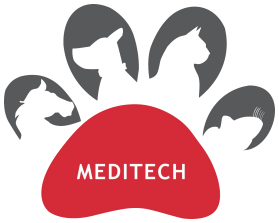
- Figure 2-10 Back of panel

1 Fan, brings outside air into ventilator
2 Mini USB Interface (software upgrade)
3 Backup power outlet
4 Backup power outlet
5 AC power interface

3 Operation and Guide

3.1 Start-up System

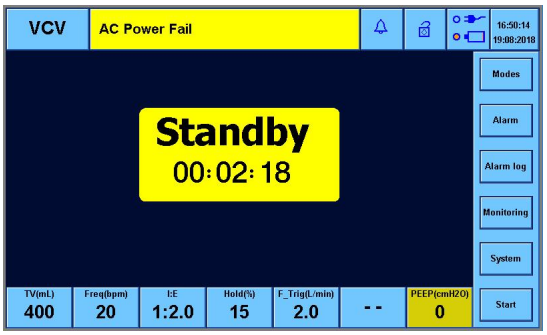
Step 1.Connect the power cord to the power outlet. When connected to AC power, the AC power indicator on the display is in a green state.



- Figure 3-1: A LOGO picture

Step 2: Power it on

Press the button to turn on the display, enter the LOGO screen (Figure 3-1), and then enter the standby interface (Figure 3-2).

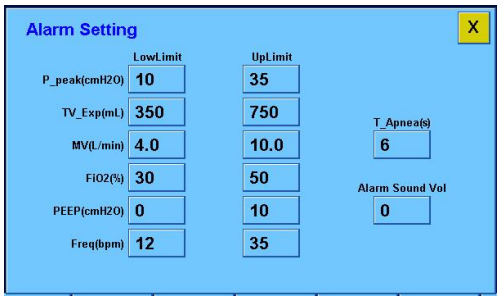


- Figure 3-2. Standby interface

3.1.1 Set Alarm Limits

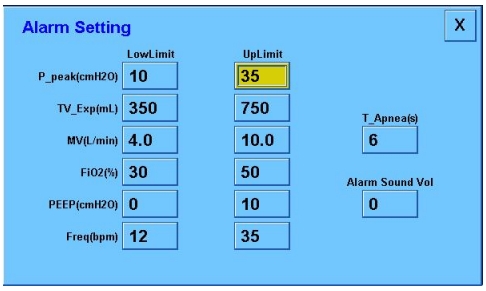
Step 1

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



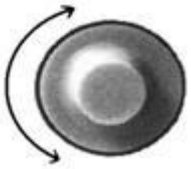
Step 2

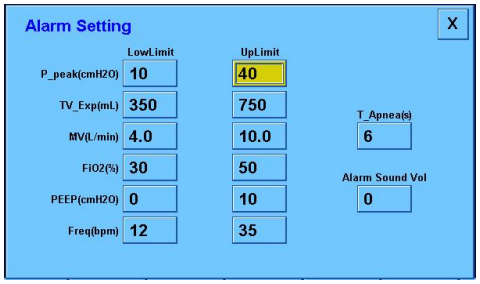
Touch the parameter button , and the corresponding parameter will change color and dent.



Step 3

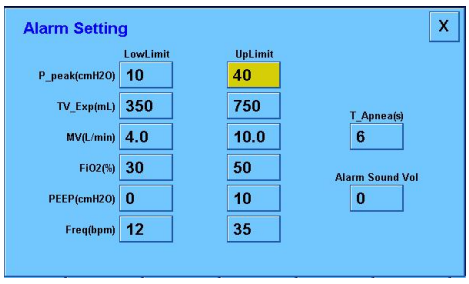
Rotate the knob to adjust its value.





Step 4

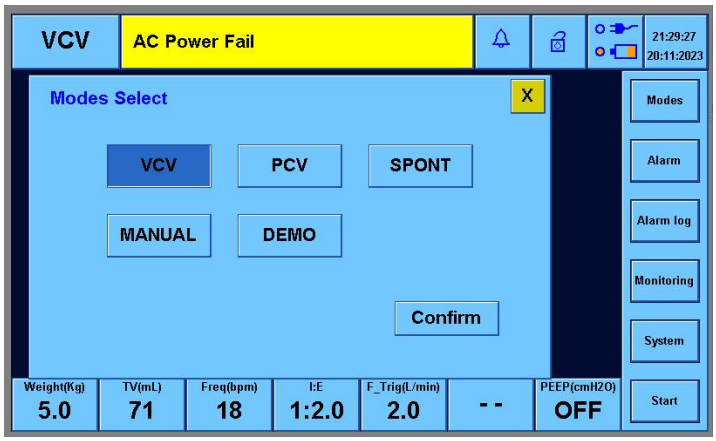
Press the knob to save the changed result. You can continue to set other options or exit the menu.



3.1.2 Ventilation Mode Setting

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

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



- Figure 3-3 The 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.

3.1.3 Ventilator Control Parameter Setting

The anesthesia ventilator setting parameters are on the lower side of the screen

1. VCV mode:

2. PCV mode:

3. SPONT mode:

4. MANUAL mode: Parameters can be adjusted in VCV mode, but do not work in Manual mode

5. Standby Mode: You can set different ventilation modes and adjust parameters

Set please refer to section 4.1.1.

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

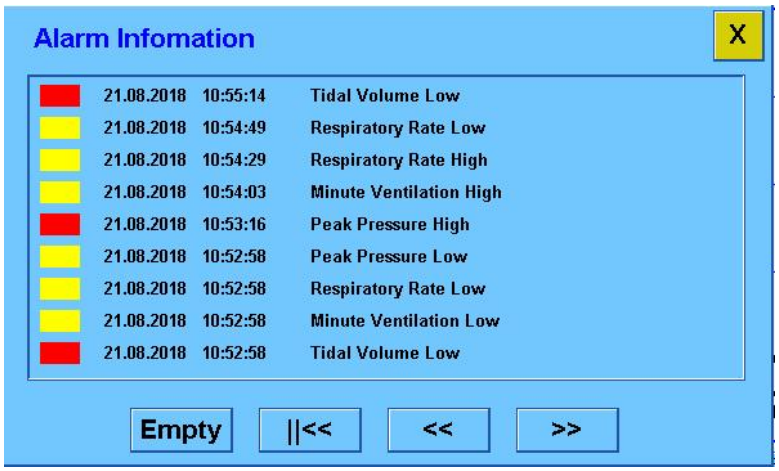
probe is blocked by water, the electrical appliance is seriously faulted or out of control. At this time, the bellows can be temporarily used as an emergency for the tidal volume value.

3.2 Other Settings

3.2.1 3.2.1 Check the Alarm Records

Touch the " 

" button and enter the alarm information menu as shown in Figure 3-4 below.



- Figure 3-4 Alarm information menu

The red and yellow color at the front of the alarm record indicates the level of the alarm; the time when the alarm occurred is recorded at the back; and the content of the alarm information is at the end.

Empty all the alarm records

Go to the front part of the record

Page forward

Page backward

3.2.2 View the Total Monitoring Parameters

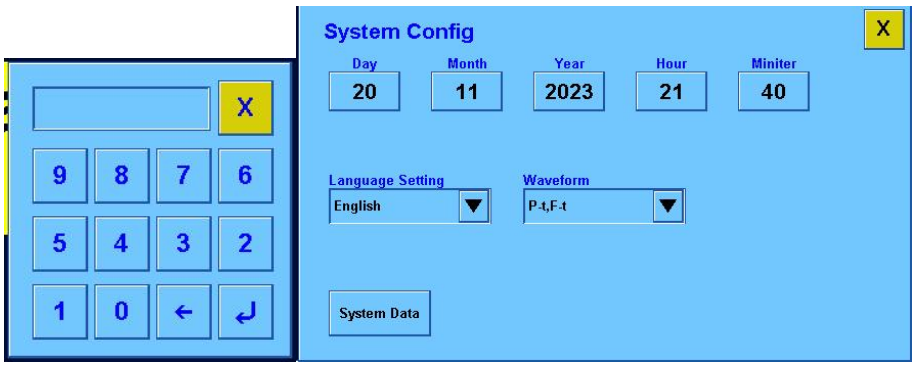
Touch the " 

" to view all monitoring information.

3.2.3 View the System Data

Touch the " 

" button to enter the system setting menu as shown in Figure 3-5 below



- Figure 3-5 System Setup menu

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

3.2.4 Date and Time Setting

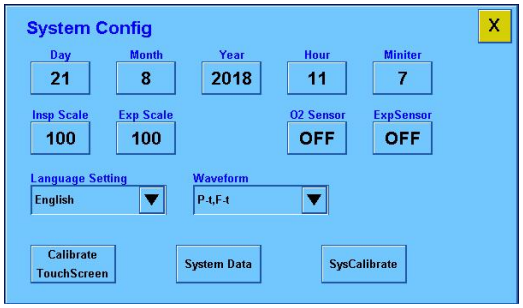
Touch the "System" to enter the system setting menu; the time can be adjusted by touching and the knob to complete the time setting.

3.2.5 Language Setting

This system language can be set to Chinese or English.

Step 1

Step1 Touch the "System" and the system setting menu will appear on the screen



Step 2

Touch "Language Setting" drop-down menu..

Step 3

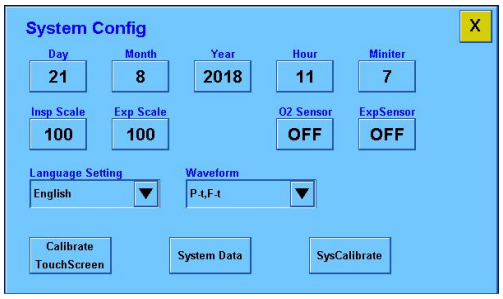
Click the desired language to complete the setting

3.2.6 Set Up the Waveform

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).

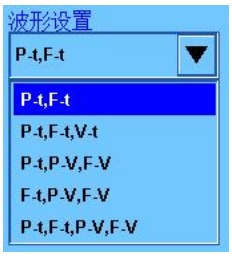
Step 1

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).



Step 2

Touch the "Waveform" drop-down menu.



Step 3

Step3 Click the combination needed to complete the set.

3.3 Waveform

1 Pressure time waveform (Paw-t):

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

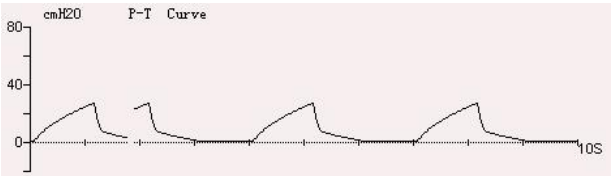


Figure 3-6. Pressure-time waveform

2 Pressure- time waveform （Paw-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.

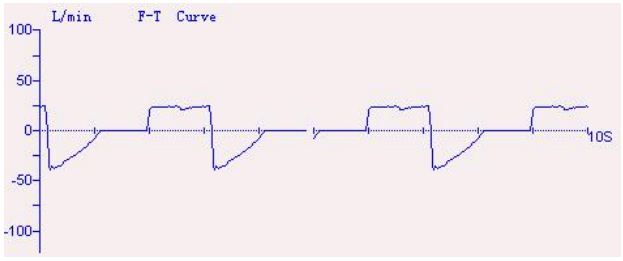


Figure 3-7. Flow rate-time waveform

3 Tidal volume time waveform (V-t):

The ordinate is the tidal volume, and the waveform displayed during the breathing phase is in a sawtooth state.(See Figure 3-8)

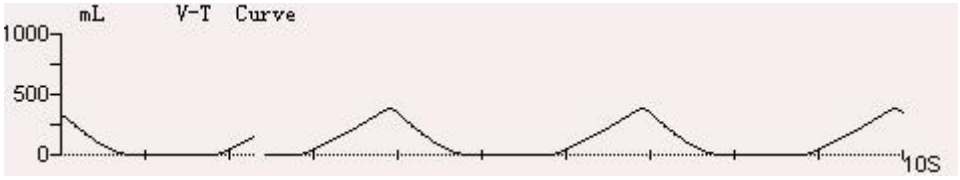
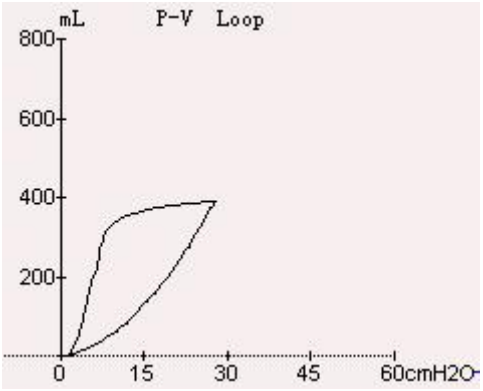


Figure 38. Volume-time waveform

4 Pressure- volume loop

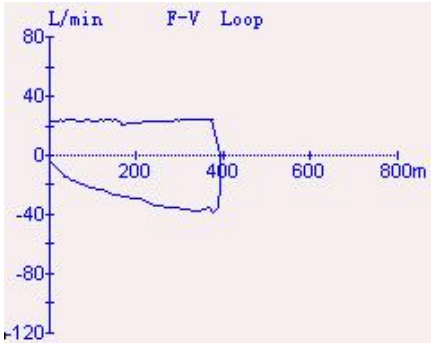
The ordinate is tidal volume, and the abscissa is airway pressure



-Figure 3-9 Pressure-volume loop

5 Flow rate -volume loop(F-V):

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



-Figure 3-10 Pressure-Volume loop

4 Pre-operation Test

4.1 TA80V Pre-operation Test Steps

Test Interval

The pre-operation test should be carried out in the following cases:

Everyday before the first pet patient uses it .

Between each pet patient use.

After repair or maintenance, proceed as required.

Everyday before the first animal patient uses it .	**Each animal patient before use**
Check the system:	Respiratory System Test:
Power failure alarm test:	ventilator test:
Gas supply pipeline testing:	
Flow control test:	
Installation and testing of evaporator:	
Alarm test:	
Respiratory system testing:	
Ventilator test:	

⚠Warning

Please do not use this system before reading and understanding 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, please do not use the system. Ask an authorized service representative to repair the equipment

4.1.1 System Checking

⚠Warning Ensure that the breathing circuit is properly connected and remains intact.

Ensure:

1. The equipment is in good condition.
2. All parts are connected correctly.
3. The breathing circuit is connected correctly, intact and the breathing system contains sufficient absorbent.
4. The anesthesia vaporizer is locked in place and contains enough anesthetic agent.
5. The connection and pressure of the pipeline gas supply system are correct.
6. The required emergency equipment is ready and in good condition.
7. Equipment for airway maintenance, organ intubation, and artificial ventilation are all ready and in good condition.
8. Applicable anesthesia and emergency medicines are ready.
9. Ensure that the casters are not loose, and the brakes are locked and will not move.
10. 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.
11. Make sure that there is no accumulation of water in the breathing tube and sampling probe.

4.1.2 Power Supply Fault Alarm Test

1. Turn on the switch, and the ventilator is powered on.
2. After the standby has been running for 5 minutes, unplug the power cord.
3. Make sure that there is a power failure alarm (with sound).
4. Reconnect the power cord.
5. Make sure that the alarm has been eliminated.

4.2 Gas Supply Pipeline Test

⚠Warning

The user should confirm that the gas source is connected correctly, the gas circuit is free from disconnection, leakage, or wrong connection, and the pressure indication is correct. If there is any abnormality, stop using it and check the connection.

Disconnect the ducted air supply connection. If the pipe pressure gauge reads other than zero:

- Connect to O2 supply
- Set flow control to mid-range
- Make sure the Air pressure gauge is reset to zero
- Cut off O2 supply
- Make sure the O2 pressure gauge is reset to zero. As the pressure decreases, a low O2 supply alarm should occur

4.3 Flow Control Monitoring

⚠Warning No O_2 Monitor, please follow the method "No O"$_2$Monitor " Steps 1 to 13

With O_2 Monitor, please follow the words " O"$_2$Monitor " Steps 1 to 13

4.3.1 No O_2 Monitor

⚠Warning

The linkage system cannot replace the O2 monitoring device. Fresh gas contains sufficient O2 and does not necessarily avoid the presence of hypoxic mixtures in the breathing circuit.

Improper gas mixtures can cause harm to animals. If the linkage system cannot provide an appropriate ratio of O2 and Air, the system should not be used.

The following steps test the linkage system for serious malfunctions, but do not confirm whether the calibration is correct.

⚠Attention

The gas flow switch should be rotated slowly. When it exceeds the maximum or minimum flow range indicated by the flow meter, do not rotate it forcefully to avoid damage to the control valve and control failure.

To conduct the flow control test, it shall:

1 Connect the pipeline for gas supply

2 Turn all flow controls clockwise and back to all (minimum flow)

3 Turn on the power switch

4 If ventilator fault alarm occurs, the system should not be used

5 Ensure:

- There is no gas flow rate display in all the flow tubes
- Steps 6 and 7 are used to test the Air system only

⚠Warning

During steps 6 to 7, keep the linkage system in working condition:
Adjust only the test controls (Air in step 6 and O2 in step 7)
Adjust the flow in sequence (Air first and then O2)
If you adjusted the test control too far, set the flow control to its closest position and perform the step again

6 Test the flow increase of the linkage system; it shall:

- Turn the Air and O2 clockwise flow control, and go to the end (minimum flow).
- Turn the Air flow control slowly in the counterclockwise direction.
- Set the Air flow control to the flow rate shown in the table.O_2Flow rate must be greater than the minimum limit value.

Set the Air flow to (L/min):	**O_2Flow must be more than (L/min):**
1.5	0.5
3.0	1.0
6.0	2.0

9.0	3.0

7 Test the flow reduction of the linkage system, which shall:

Set O2 flow to (L/min):	Air flow must be less than (L/min):
2.0	6.0
1.0	3.0
0.5	1.5

8 Adjust the full flow rate of all gases to ensure that the float of the flow tube moves freely

9 Off O_2 pipeline supply

10 Ensure:

- A whistle alarm occurs when O2 supply pressure is low
- Stop air flow Air and O2, O2 air flow finally stops

11 Turn all flow controls clockwise and to the end (minimum flow)

12 Connect O2 pipeline supply again

13 Turn off the power switch

4.3.2 With O_2 Monitor

⚠Warning

The linkage system cannot replace the O2 monitoring device. Fresh gas contains sufficient O2 and does not necessarily avoid the presence of hypoxic mixtures in the breathing circuit.

Improper gas mixtures can cause harm to animals. If the linkage system cannot provide an appropriate ratio of O2 and Air, the system should not be used.

⚠Attention Before continuing the test, first test the O2 detection device according to step 8 of "4.6 Alarm Test"

To conduct the flow control test, it shall:

1 Connect the pipeline for gas supply.

2 Turn all flow controls clockwise and back to all (minimum flow).

3 Turn on the power switch.

4 The system should not be used if other ventilator fault alarms occur.

5 Ensure:

- All flow tubes have no gas flow rate display.
- Steps 6 and 7 are used to test the Air system only.

⚠Warning

During steps 6 to 7, keep the linkage system in working condition:

Adjust only the test controls (Air in step 6 and O2 in step 7)

Adjust the flow in sequence (Air first and then O2)

The O2 sensor used in steps 6 and 7 must be calibrated correctly

6 Test the flow increase of the linkage system; it shall:
- Turn the Air and O2 flow controls clockwise and all the way (minimum flow)
- Turn the Air flow control slowly in the counterclockwise direction
- Make sure the O2 flow is increasing. The measured O2 concentration must be ≥25% during the entire process

7 Test the flow increase of the linkage system; it shall:
- Set the Air flow to 9.0 L/min
- The O2 flow is set to 3 L/min or greater
- Turn slowly clockwise to O_2 flow control
- Ensure that the Air flow is decreasing. The measured O2 concentration must be ≥25% during the entire process

8 Adjust the full flow rate of all gases to ensure that the float of the flow tube moves freely

9 Disconnect the O2 pipe supply

10 Make sure:
- Whistle alarm occurs when O2 supply pressure is low.
- Stop airflow Air and O2. The O2 flow finally stops.

11 Turn all flow controls clockwise and all the way to (minimum flow)

12 Connect the O2 pipe supply again.

13 Turn off the power switch.

4.4 Vaporizer Installation and Test

For the installation and performance testing of the vaporizer, please refer to the vaporizer instruction manual for details.

4.5 Alarm Test

1 Connect the simulated lung to the animal breathing circuit

2 Set Auto-Manual switch to Auto

3 Turn on the power

4 Set the control options:

Ventilation mode:	VCV mode (Select from the screen)
Ventilator part:	Tidal volume: 700ml Breathing rate: 12 I: E ratio: 1:2 Peak peak limit: 40 cmH_2O
Anesthesia Machine part:	All gas: off Press the oxygen flush button to inflate the bellows.

5 Turn the Auto-Manual switch to Manual and then to the Auto. Make sure:

- Mechanical ventilation starts
- The ventilator displays the correct data
- Bellows rises and fall during mechanical ventilation

6 Set O_2 flow control to 5 L/min

7 Make sure:

- End-expiratory pressure was less than 3 cmH_2O
- The ventilator displays the correct data
- bellows rises and fall during mechanical ventilation

8 O_2 monitor testing:

- Remove the O2 sensor form the absorber, confirm the O2 in the indoor air measured by the sensor is about 21%.
- Install the O2 sensor on the absorber
- After 2 minutes in pure O2, make sure the sensor measures approximately 100% O2

9 Test low airway pressure alarm::

- Disconnect the simulated lung from the animal circuit
- Other alarms occur, such as low minute ventilation alarm
- Ensure low airway pressure alarm occurs

10 Turn off the power switch

4.6 Respiratory System Test

Please refer to the operator manual used.

Make sure the check valve on the absorption circuit is working properly

- The expiratory one-way valve (1) rises during exhalation and falls at the beginning of inhalation.
- The inspiratory check valve (2) rises during inhalation and falls at the beginning of exhalation.

⚠Warning

Foreign objects in the respiratory system can block the flow of gas to the animal. This may r esult in fatal accidents:

Never use test plugs that are too small and can easily fall into the respiratory system

4.6.1 Check Oxygen Flush Supply Switch

Press the oxygen flush supply button, and there should be obvious air flow sound at the fresh gas outlet. After releasing the button, the button can automatically rebound and stop air supply.

4.6.2 Check Air Tightness

Switch the working mode of the animal anesthesia machine to "manual", adjust the airway pressure gauge to the "zero" position, turn the APL valve clockwise to the maximum scale position, connect the three-way Y-shaped joint of the mask to the simulated lung, and connect the manual skin bag Put it

on the interface of the extension tube, press the rapid oxygen supply button or turn on the flow meter, so that the indication of the airway pressure gauge reaches 3kPa, release the rapid oxygen supply button, close the flow meter, and observe for 20 seconds, the airway pressure gauge indicates The pressure drop value should not exceed 0.3kPa.

4.6.3 Test the APL Valve

Adjust the positions of switches and knobs according to the method of checking air tightness. Open the oxygen flow to 5L/min, adjust the APL valve so that the airway pressure gauge pressure is stable at different positions. When the airway pressure gauge pressure is stable, airflow should overflow from the APL valve exhaust hole.

⚠Warning Make sure there are no test plugs or other foreign objects in the respiratory system.

4.7 Ventilator Test

1 Connect the simulated lung to the animal breathing circuit

2 Set the manual / auto switch to Manual

3 Turn on the power switch

4 Set the control options:

Ventilation mode:	VCV mode (Select from the screen)
Ventilator:	Tidal volume: 700ml Breathing rate: 20 I: E breath ratio: 1:2 Peak peak limit: 40 cmH_2O
Anesthesia machine:	O_2 flow rate: less than 200ml All other gases: off

5 Set the manual / auto switch to auto

6 Press O2 oxygen supply to fill the bellows

7 Ensure:

- Mechanical ventilation starts
- No low air source pressure alarm occurs
- The ventilator displays the correct data
- Bellows rises and fall during mechanical ventilation

8 Set o2 flow to 5 L/min

9 Ensure:

- The end-expiratory pressure less than 3 cmH_2O
- The ventilator displays the correct data
- The bellows inflated and deflated during mechanical ventilation

10 Set the ventilator control and alarm limits to the appropriate clinical level

11 If the system is not used at the time, turn off the power switch

12 Make sure you have:

	The following equipment:	Airway maintenance Manual ventilation trachea cannula
	Applicable anesthetic and emergency medicines.	

System preparation:

- Turn off all of the vaporizer
- Open the APL valve
- Set the Auto/Manual switch to Manual
- Set all flow control switches to a minimum
- Ensure that the respiratory system is properly connected and remains intact

⚠Warning

Ensure that the respiratory system is properly connected and remains intact.

⚠Warning

Before connecting the device to the animal, flush the anesthesia machine with O2 at a flow rate of 5 L/min for at least one minute. This can remove unnecessary mixed gases and debris from the system.

⚠Warning

Anesthesia equipment must be connected to an exhaust gas system to discharge exhaust gas and prevent harm to the health of operating room staff. This requirement needs to be adhered to whether for testing or clinical applications.

5 Installation and Connection

⚠Attention Our company strongly recommends: O2 monitoring should be used on this equipment. Please refer to local standards for monitoring regulations.

⚠Attention In accordance with the European standard EN 740 and the international standard IEC 60601-2-13, this device shall use expiratory volume monitoring, O2 monitoring (according to EN 12598 or ISO 7767).

⚠Attention The European standard EN 740 and the international standard IEC 60601-2-13 also specify that when anesthetic vaporizers are used, anesthetic agent monitoring should be carried out (in accordance with ISO 21647:2004).

⚠Warning Exhaled air can have an impact on the operating room environment. When anesthetics remain untested for a long time, some unexpected dangers may arise. The operator should handle the exhaled gas in a timely manner as required and check other items. In this way, hazards and equipment failures should be reduced.

⚠Warning Always ensure that the pipeline gas supply hose and breathing circuit components are non-toxic and will not:

- Cause an allergic reaction in animal patients.
- Hazardous by-product produced in response to anesthetic gas or anesthetics.

⚠Warning To prevent incorrect values or equipment failure, use the cables, hoses and piping provided by us.

⚠Warning The drying absorber can be dangerous if there is an anesthetic. Appropriate precautions should be taken to ensure that the sodium lime in the absorber is not dry. After using the system, turn off all gas sources.

⚠Warning To avoid false alarm caused to high strength electric field:

- Place the electrosurgical lead away from the respiratory system and from the flow and oxygen sensors.
- Do not place the electrosurgical lead on any part of the anesthesia system.

⚠Warning To protect animal patients, when using electrosurgical equipment, they shall:

- Supervision ensures that all life support and monitoring equipment are operated correctly.
- In case the electrosurgical equipment cannot guarantee the safe use of the ventilator, the standby artificial ventilation equipment should be readily available.
- Do not use a conductive face mask or a hose.

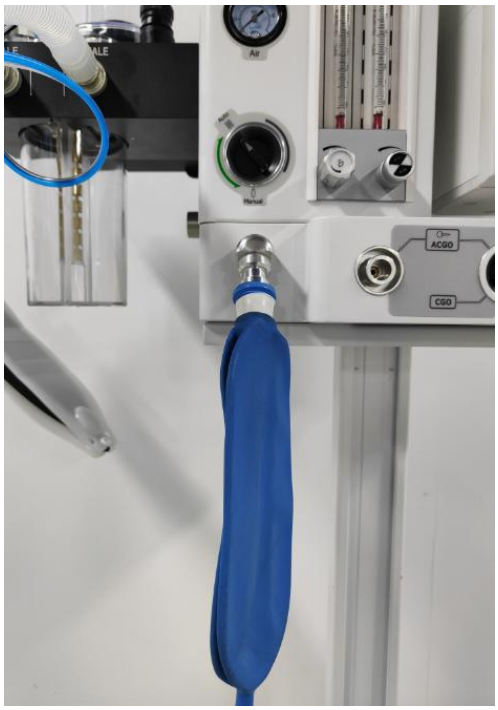
5.1 Installation of the Anestehsia & Respiratory System

Step 1: Installation of the soda lime canister

Put the soda lime into the absorption canister as required,and put the canister into the groove at the top smoothly (note: position the absorption tank bulge with the top groove), and rotate the plum wrench above the loop clockwise until the tightening does not leak.

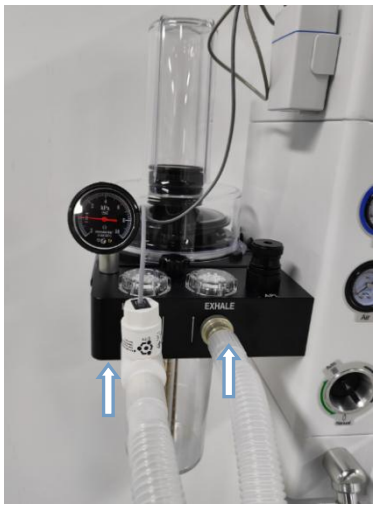
Step 2: Manual air bag installation

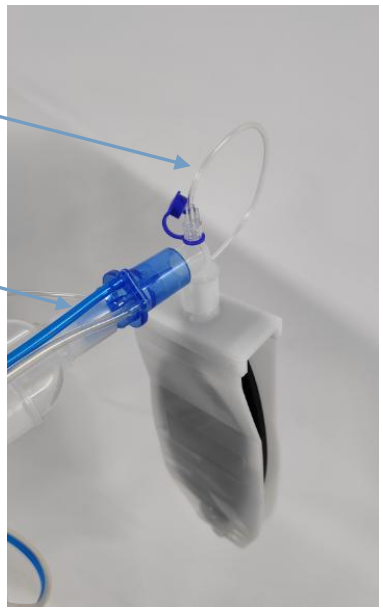
Install the air bag upward onto interface.



Step 3: Animal patient pipeline installation

Connect the animal breathing circuit to the inhalation and exhalation interfaces respectively, Then connect the flow sensor and the right-angle elbow to the tee joint. Finally, insert the sampling tube and CO2 sampling tube of the flow sensor into the flow rate detection interface on the side of the machine. Pay attention to the blue connection (near the animal end) P1, which is colorless and transparent. Connect to P2.





5.2 Replacement of Soda Lime Canister

⚠Warning Please observe the applicable safety regulations:

- If the anesthetic is chloroform or trichloroethylene, the absorption canister should not be used.
- Avoid exposing the skin or eyes to the substances in the absorption tank. In case of contact with the skin or eyes, please wash the affected department with water immediately and take medical measures.
- Do not replace the absorption tank during ventilation.
- Absorbants are replaced frequently to prevent the deposition of non-metabolic gases when the system is not working.
- After completing each case, check the absorber color. During no use, the color of the absorbent may be restored to its original color. See absorbent labeling for details on color changes.
- If the absorbent is completely dry, it will release carbon monoxide after contact with the anesthetic agent. For safety reasons, please replace the absorber.
- After opening the absorption tank, perform the respiratory system leak test in manual mode.

The absorption tank is a reusable absorption tank. A single absorption tank can hold 1,500 mL of the absorbent.

The absorption tank can only use air, oxygen, laughing gas, anofurane, isoflurane, desflurane and sevoflurane.

5.2.1 When Should Replace Soda Lime

The color gradient of the soda lime in the absorption tank indicates the absorption of carbon dioxide. The color variation of soda lime is shown only as an approximation. Use a carbon dioxide monitor to determine if the absorber tank should be replaced.

Once the absorbent changes color, it should be discarded. If left for several hours, soda lime will return to its original color, which will be misleading.

5.2.2 Remove Soda Lime Canister

The installation and removal methods of the absorption tank on the respiratory system are as follows:

Hold the absorber canister with one hand and turn the canister locking nut counterclockwise until the canister is removed

Filling of absorption tank

1. Remove the soda lime or calcium lime from the canister.
2. For cleaning and sterilization of the absorption tank, please refer to Section 6.3 of this manual.
3. After the absorption tank is dry, pour the soda lime or calcium lime into the absorption tank, wipe off the soda lime powder sprinkled on the edge, and install the absorption tank. Make sure the lid seals properly to prevent leaks and spills.

5.3 Connection of the Pipeline

⚠Attention The O2 monitor is installed at the inhalation port of the absorber.

5.4 Connection of Gas and Electrical

⚠Warning Failure of the central air supply system may cause one or even all connected devices to stop working at the same time.

⚠Attention Only use medical gas sources. Other types of gas sources may contain water, oil, or other contaminants.

⚠Attention Disconnect the gas source after use to prevent contamination of the piping system.

⚠Warning The anesthesia system provides O2 and Air connection methods. Moreover, the pipe connections of these two gases have different sizes to ensure that the operator does not operate incorrectly. The front of the anesthesia machine is equipped with a continuous pressure monitoring device for each gas connected through the lines to the centralized gas supply..

5.4.1 AC Power Inlet

As can be seen from the picture, the AC power requirement is 100-230VAC 50/60Hz, and the maximum allowable current is 2A. The specification of the fuse is 250V2A φ5X20 (F). The power cord is fixed on the casing with a clip to prevent the power cord from accidentally falling off.

The two sockets on the left are sockets for external devices, with a maximum allowable current of 5A.

Figure 5-1 AC power inlet

See 7.5 for the fuse replacement

5.4.2 USB Port

There is a MiniUSB interface on the back of the ventilator used to make software upgrades to the ventilator.

5.4.3 Gas Supply Inlet

The gas pipeline interface adopts a diameter limit method and is not interchangeable, effectively preventing the possibility of incorrect connection.

5.5 Connection to the Exhaust Gas Absorption System

There are two interfaces for exhaust emissions in this system:

1. APL valve (see code 9 in Figure 2-3)

2. Bellow exhaust outlet (see shown in code 2 in Figure 2-4)

Connection method: Use pipes to connect these two interfaces to the exhaust gas receiving system. Among them, the air box exhaust gas discharge port can be connected to the receiving system through the adapter (4).

6 Cleaning and Sterilization

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

- If want to clean the O_2 Sensor, wipe with a wet cloth. Do not immerse the sensor in a 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.

6.1 Cleaning and Disinfection Before the First Use

Whole unit	Moist soft cloth with a water-soluble disinfectant used to clean the ventilator panel and surface Can be sterilized by ultraviolet rays, and peracetic acid and formaldehyde fumigation are prohibited.
Breathing circuit and parts	See 6.2
Absorber	Cleaning and disinfection (see 6.4 for disinfection methods)
Bellow	Cleaning and disinfection (see 6.5.4 for disinfection methods)

6.2 Parts of the Breathing Circuit

Threaded tube , mask, Y connector, L connector, air bag	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, airbag	Soak with disinfectant
T connector	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.

6.3 Soda Lime Canister

Please refer to section 5.2.2 of this manual

- Cleaning mechanical with detergent or washing disinfectant .

Put the absorption tank in detergent or washing disinfectant and clean it with decontamination procedure
Put the absorption tank in the heating chamber, the maximum temperature is 80°C (176°F) or room temperature
If the detergent or washing disinfectant cannot achieve the purpose of disinfecting the equipment, our company recommends a higher level of disinfection

- Manual cleaning

Rinse the absorption tank in running water
Completely immerse the absorption tank in the water tank filled with water and detergent for about 3 minutes. The water temperature should be approximately 40°C (104°F)
Rinse the absorption tank in running water
Our company recommends: After manual cleaning, a higher level of disinfection must be carried out

- The third step: advanced disinfection

Before advanced disinfection, the absorption tank must be cleaned
The absorption tank can be placed under high temperature and high pressure vapor conditions. The highest recommended temperature is 134°C (273°F)
After drying, pour the soda lime into the absorption tank, and then lock the handle tightly. Wipe off the soda lime powder

6.4 CO2 Absorber

- Inhalation valve and exhalation valve

Rotate the valve cover counterclockwise to loosen it. Use a water-soluble disinfectant to soak sterile gauze to scrub the valve cover, valve cover sheet and valve opening. After drying the water, restore the cover sheet, and tighten the valve cover clockwise. . After installation, the air tightness and movement of the flap cover should be checked according to the debugging procedure. Be careful when cleaning, and do not break or crush the valve cover and cover sheet.

- CO2 absorber module

The disinfection method can be according to the conditions of the hospital, using fumigation (the temperature is preferably not more than 50 ℃), disinfectant soaking, etc.; if the disinfectant is soaked, after the disinfection is completed, the disinfected parts need to be blown dry with high-pressure air or oxygen.

6.5 Bellows

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

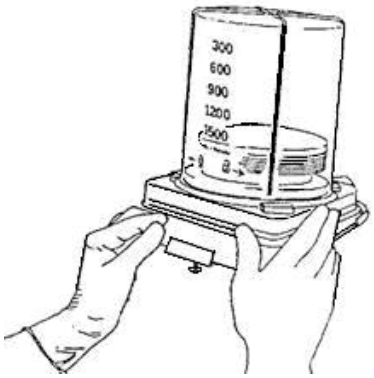
⚠Warning

Only the material of the bellows folding bag is latex.

6.5.1 Remove the Bellow Components

The following are the steps to remove the bellows integration (the assembly steps are the reverse):

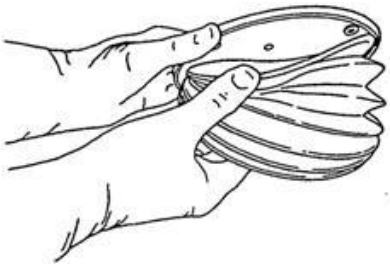
Release the screw on the bellows integration bracket and remove the bellows integration.



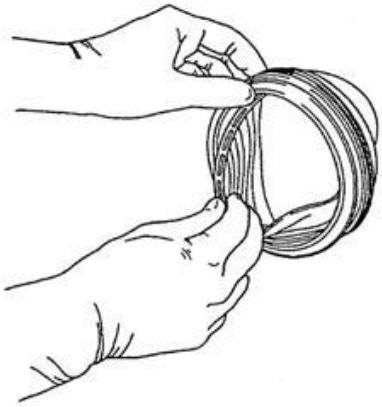
Rotate counterclockwise and remove the bellows cover.

Disengage the folding bag from the tray.

Remove the folded pouch from the top disc

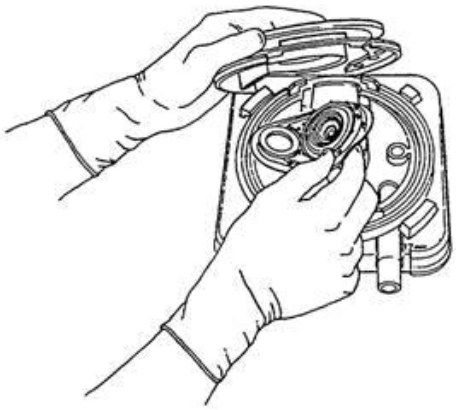


Take out the ring inside the top ring of the folded capsule.



Push the lock spring toward the center and remove the tray.

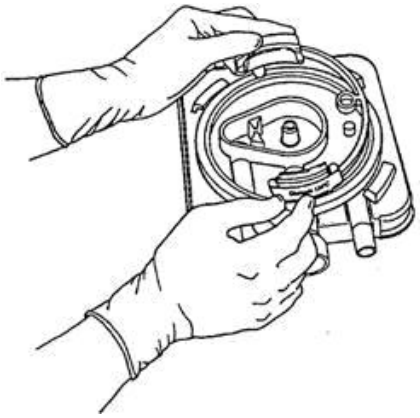
Take out the relief valve diaphragm and valve seat.



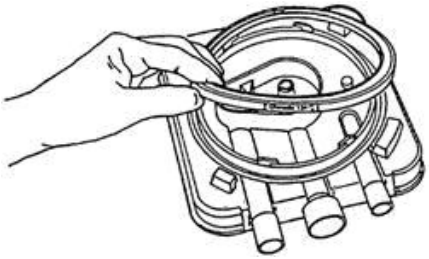
⚠Warning

Never disassemble the pressure relief valve. This can cause damage to the base or diaphragm and injure the animal.

Push toward the center and remove the lock spring.



Remove the seal ring.



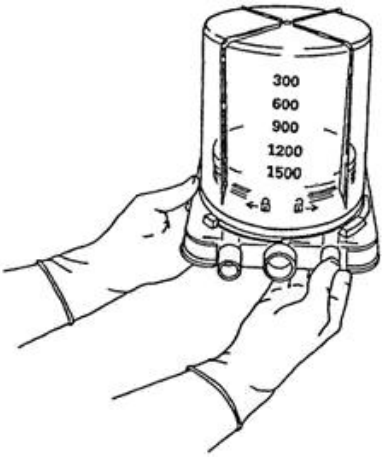
6.5.2 Bellow Integration Functional Test

⚠Warning Do not block the interface with small objects to prevent them from slipping into the breathing circuit.

⚠Warning This functional test should be performed before use.

This test ensures that all components are assembled correctly. This test is not a substitute for system testing. If the bellow integration meets the test requirements, it can be installed; otherwise, it must be disassembled again, check whether any parts are damaged, and replace them in time before assembly and testing.

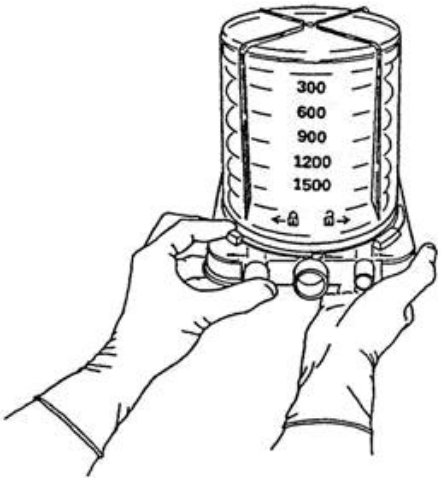
Before installation, hand-held bellows integration, vertical upwards, blocks the drive gas interface



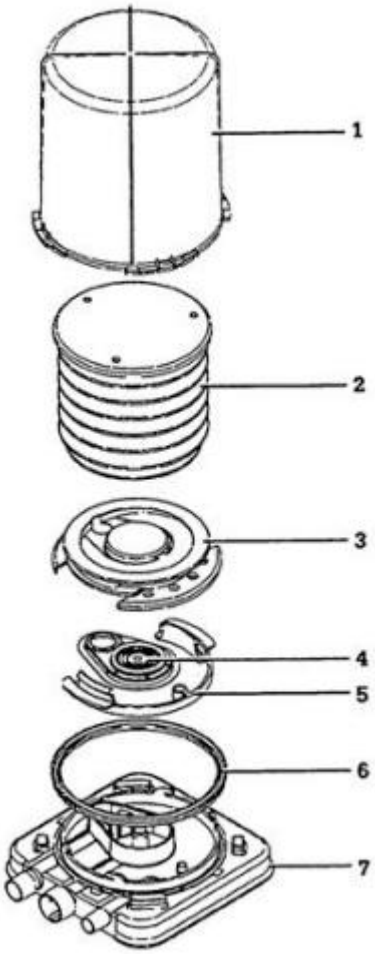
Inverted bellows integrated. The rate of descent of the top of the folded sac is not greater than 100mL/min. If the limit is exceeded, possible reasons include: the drive gas interface is not tightly blocked, the folding bag or sealing ring is incorrectly installed, or other components are damaged.

Open the drive gas interface, fold the capsule fully deployed, and then block the breathing interface.

Flip the bellows assembly so that it is vertically upwards. The rate of descent of the top of the folded sac is not greater than 100mL/min. If the limit is exceeded, it may be due to incorrect installation of the folding bag or relief valve, or damage to other components.



6.5.3 List of Bellow Components



1. Bellow cover
2. Folded bag
3. The tray
4. Overflow valve
5. Lock spring
6. Seal ring
7. The base

6.5.4 Cleaning and Disinfection

Clean and disinfect using methods recommended by the washer and sanitizer manufacturers.

Cleaning

1. Remove the bellows assembly.

⚠Warning Do not separate the relief valve diaphragm and valve seat

2. Prevent damage to components. Wash gently and in hot water with a mild, enzyme-free detergent recommended for rubber and plastics.

⚠Attention Do not soak for more than 15 minutes to prevent swelling or aging.

3. Rinse with clean hot water and dry

⚠Attention When drying the folded bag, it should be hung and fully unfolded. Otherwise, adhesive capsulitis may result

4. After completely drying, check the parts for damage, then proceed to assembly and functional testing
5. Connect the bellows integration, ventilator and respiratory syste.
6. Perform pre-use inspection of the system

Disinfection

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 animal 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.

6.5.5 Regular Maintenance

⚠Warning Do not perform any tests and repairs while it is being used on animal patients to avoid endangering pet patients.

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

Visual inspection

Disconnect the bellows integrated with the anesthesia machine.

Remove the bellows integration

⚠Warning Do not separate the relief valve diaphragm and valve seat

Carefully inspect each component to determine if cracks, curling, dissolution, swelling and other physical changes are present, replace if necessary, assemble, and then perform a leak test.

7 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.

7.1 Maintenance Principle

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.

Warning

Personnel without experience in repairing such equipment must never repair the machine

Parts produced or sold by our company should be used to replace damaged parts, and then tested to ensure that the equipment meets the manufacturer's specifications.

If you need service support, please contact your local service representative of our company. In all cases, repair costs will be charged at the price of replacement parts in the company’s current prices plus reasonable labor costs, except for repairs during the company’s warranty period.

7.2 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.

7.2.1 User Maintenance

Minimum maintenance	Maintenance
Everyday	Clean external surfaces
Every week	Air oxygen concentration calibration (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 (O2 sensor)
During cleaning and installation	Check if the parts are damaged, replace or repair if necessary
Maintenance as required	When the flow velocity waveform is abnormal, correct the flow sensor. Replace the O2 sensor (sensor performance meets requirements within 1 year under typical usage). Open the drain valve and replace the absorbent in the absorption tank.

7.2.2 Maintenance Cycle

Whole machine	This anesthesia machine recommended maintenance intervals for 5 years.
Components	Every five years to be fully tested anesthesia machine and parts replacement.
Vaporizer	The anesthesia vaporizer must be fully tested and replaced every 5 years
CO2 absorber	The absorption circuit must be fully tested and replaced every 5 years

7.3 Maintenance of the Respiratory System

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

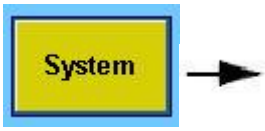
Please refer to the appropriate sections for reassembly and testing.

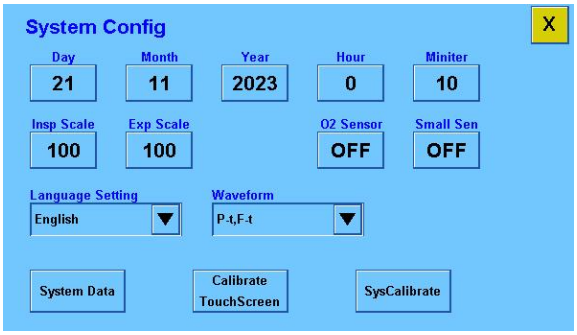
7.3.1 Pressure Sensor Zero-point Calibration

If the zero drift of the pressure sensor is too large, perform the zero calibration of the pressure sensor. Pressure sensors include airway pressure sensors and driving gas pressure sensors.

Step 1

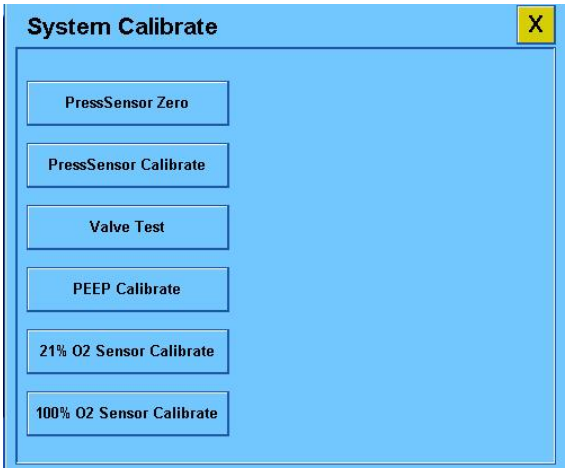
First switch to "Standby" , touch the "System " button to view the menu.





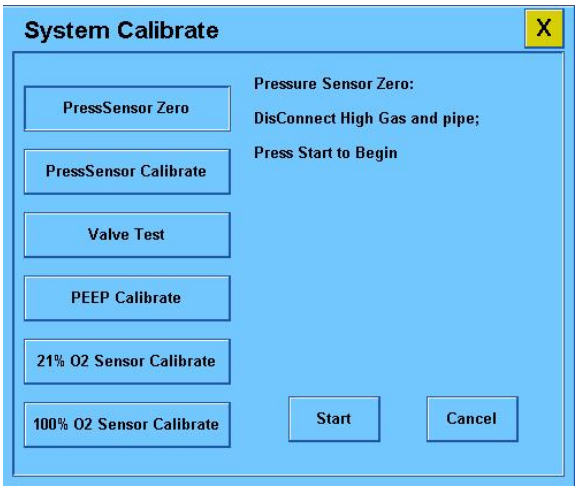
Step 2

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



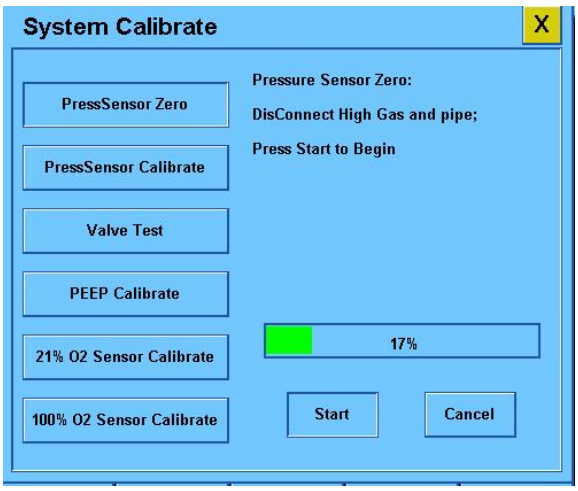
Step 3

Touch the Pressure Sensor Zero calibration " . Note the prompt information, disconnect all air sources, and empty the gas in the machine through the flow meter,and put the animal breathing circuit with the air.



Step 4

Touch the Start and a progress bar displays the calibration.



Step 5

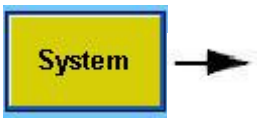
After the calibration finished, info indicating whether the verification is successful or not will be displayed; touch the button to return to complete the pressure zero calibration.

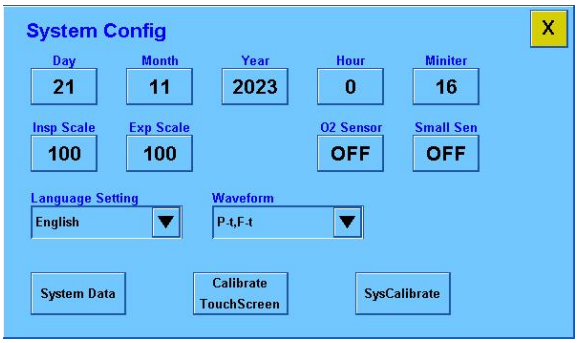
7.3.2 Pressure Sensor Calibration

During use or testing, if it is found that the measured PEEP is still too different from the set PEEP value (2cmH2O) after stabilization, please perform PEEP calibration. During calibration, you need to turn on the compensation flow to 3L/min, and ensure that the bellows is intact and has no air leakage. Then block the animal interface on the animal tee to make the bellows bag reach the top, and then perform the following process.

Step 1

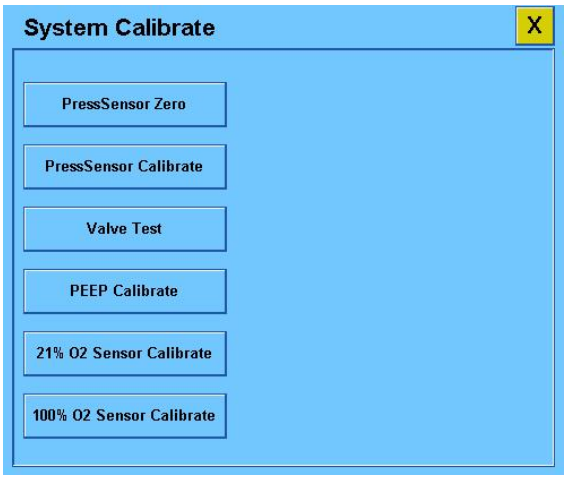
First switch to "Standby" , touch the "System " to view the menu.





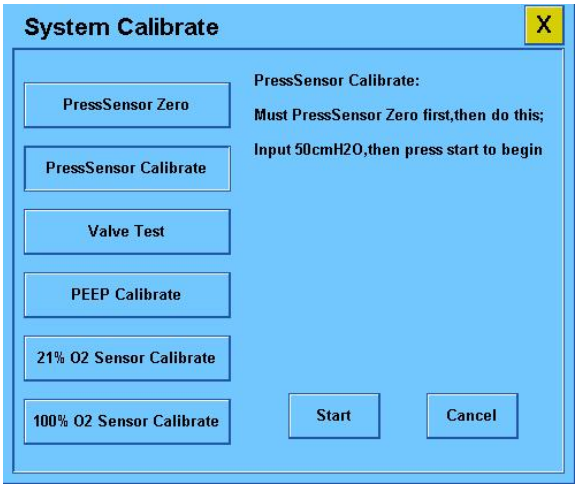
Step 2

Touch the "System calibrate" to view the menu.



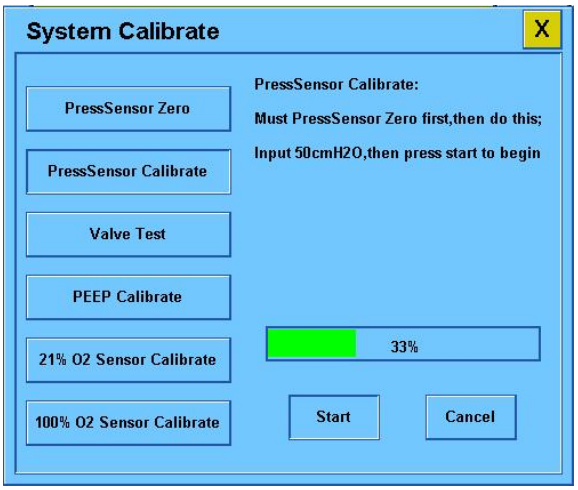
Step 3

Touch the Pressure Sensor calibration " . Note the prompt information.



Step 4

Touch the Start and a progress bar displays the calibration.



Step 5

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

7.3.3 O_2 Sensor Replacement

⚠Warning

Please do not perform the calibration process while the system is connected to the animal.

1. When calibrating the O2 sensor, the ambient pressure must be the same as that used for oxygen delivery monitoring in the animal circuit.
2. If the pressure during operation is different from the calibrated pressure, the monitoring accuracy of the readings may exceed the specified range.

7.3.4 O_2 Sensor Correction

⚠Warning

Do not perform the correction process when the system is connected to the animal patient.

check O_2The ambient pressure must be the same as that used for monitoring of oxygen delivery in the animal patient.

If the pressure during the operation is different from the formal pressure, the monitoring accuracy of the reading may be beyond the specified range.

7.3.4.1 21% Oxygen Sensor Calibrate

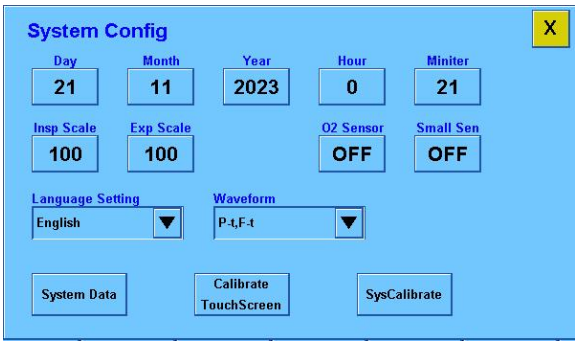
⚠Warning Do not perform the correction process when the system is connected to the animal patient.

The process takes a minimum of two minutes.

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

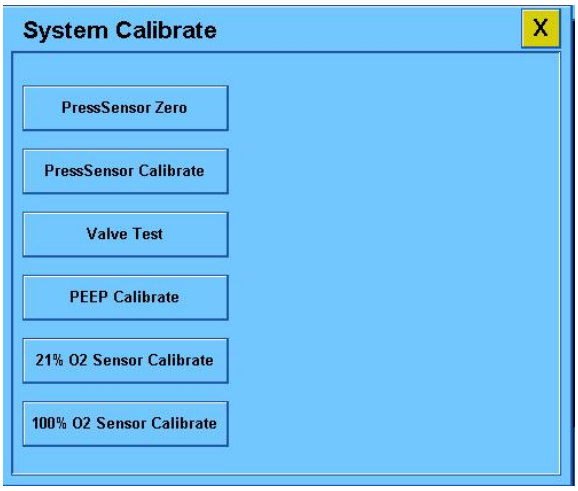
Step 1

First switch to "Standby" , touch the "System " to view the menu.



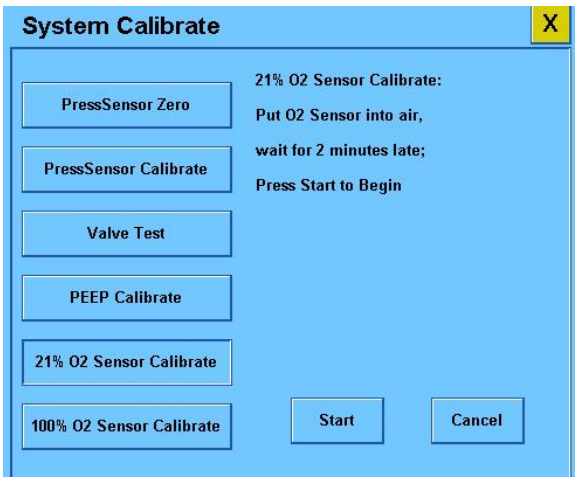
Step 2

Touch the "System calibrate" to view the menu.



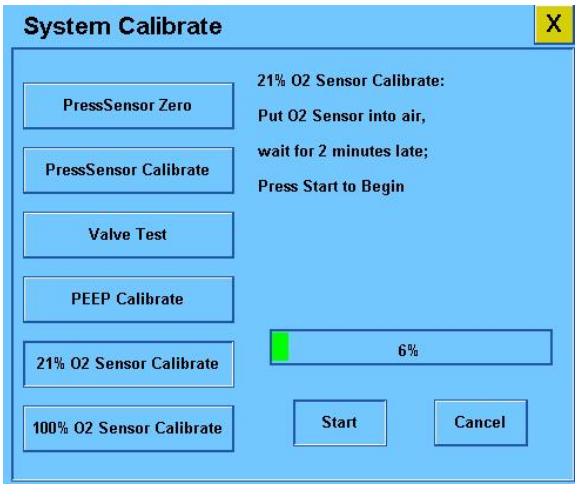
Step 3

Touch the "21% O2 sensor calibrate". Note the prompt to place the oxygen sensor in air for at least 2 minutes.



Step 4

Touch the Start and a progress bar displays the calibration.



Step 5

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 oxygen sensor in air. If the calibration is unsuccessful, you can replace the oxygen sensor and calibrate again

7.3.4.2 100% O2 Sensor Calibration

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

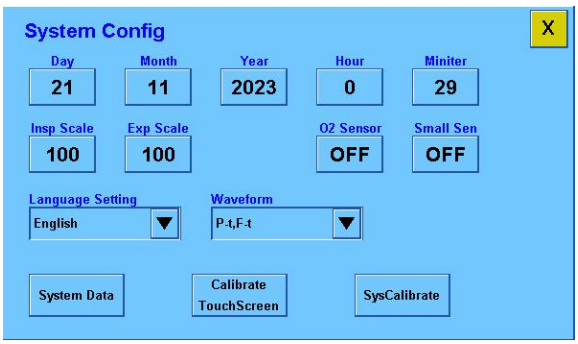
⚠Warning Please do not perform the calibration process while the system is connected to the animal

---

Before 100% oxygen concentration calibration, 21% O2 calibration must be done first.

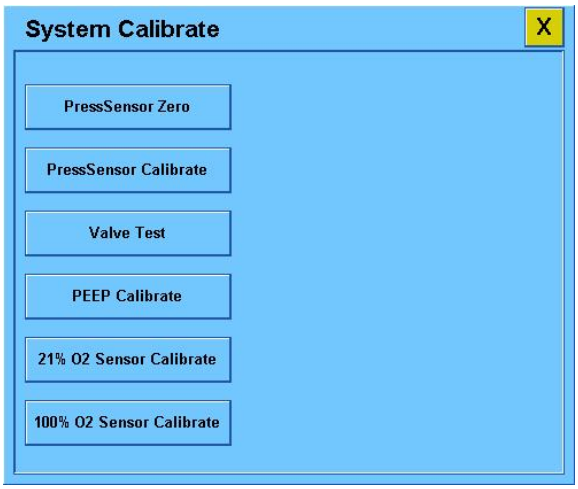
Step 1

First switch to "Standby" , touch the "System " to view the menu.



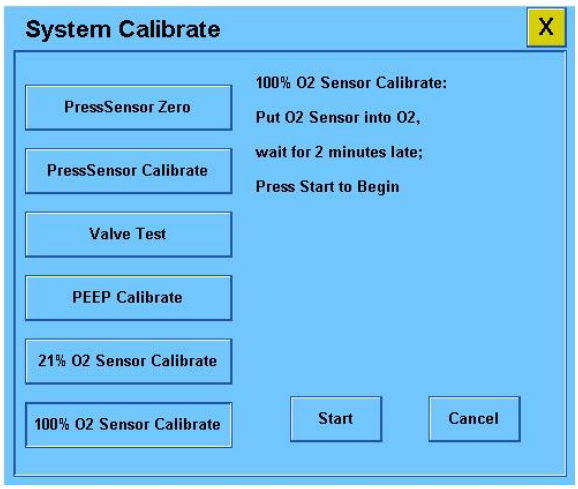
Step 2

Touch the "System calibrate" to view the menu.



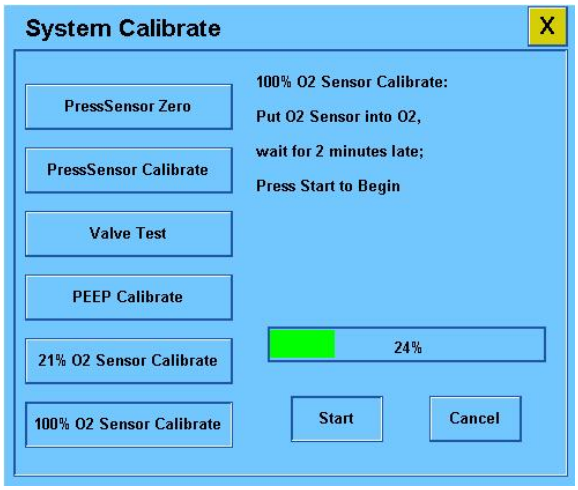
Step 3

Touch the "Oxygen Sensor" button. Note the prompt message to place the oxygen sensor in the pure oxygen circuit for at least 2 minutes.



Step 4

Touch the Start and a progress bar displays the calibration.



Step 5

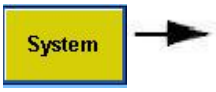
After the calibration is completed, a message indicating whether the calibration was successful or not will be displayed; touch the button to return to complete the pure oxygen sensor calibration. If the calibration is unsuccessful, you can replace the oxygen sensor, recalibrate the 21% oxygen, and then calibrate the 100% oxygen sensor.

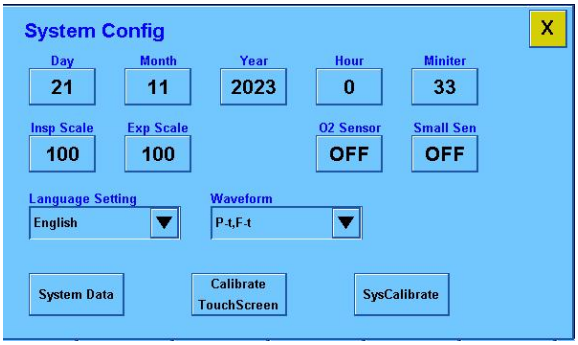
7.3.5 Flow Rate Sensor Correction

The TA80V flow sensor uses differential pressure flow rate measurement. It can use the air resistance on the loop or the differential pressure air resistance purchased at the animal end for measurement. Different air resistances can be selected through settings. The settings are as follows.

Step 1

First switch to "Standby" , touch the "System "to view the menu.



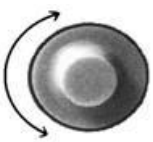


Step 2

Touch the Oxygen Sensor .

Step 3

Turn the knob clockwise to ON; counterclockwise to OFF. Select ON when using outsourced air resistance, and select OFF when using the air resistance provided by the absorber.



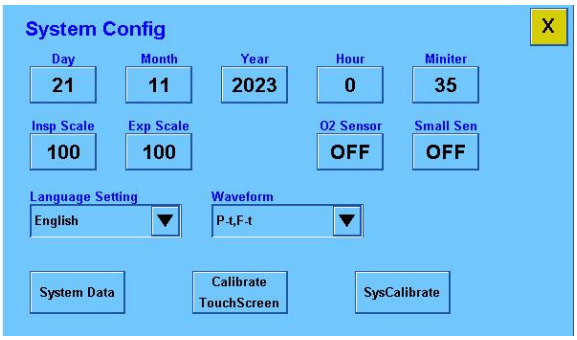
Step 4

Press the knob to confirm the selection.

The flow sensor has an inspiratory proportional coefficient and an expiratory proportional coefficient, which are used to calibrate the inhaled and exhaled tidal volumes. These two coefficients have been set before leaving the factory. If the circuit or air resistance is replaced, if the tidal volume error is relatively large, it is necessary to Reset these two coefficients. The setting method is as follows.

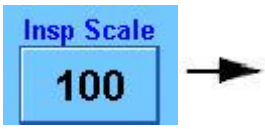
Step 1

First switch to "Standby" , touch the "System " to view the menu.



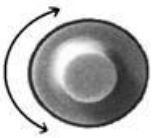
Step 2

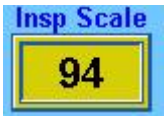
Touch the Insp scale .



Step 3

Turn the knob to increase clockwise; decrease counterclockwise.





Step 4

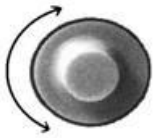
Press the knob to confirm.

Step 5

Touch the exp scale.

Step 6

Turn the knob to increase clockwise; decrease counterclockwise.



Step 7

Press the knob to confirm

The determination of the inspiratory proportion coefficient InspScale and the expiratory proportion coefficient ExpScale is determined by the following steps.

1. First, set both the inspiratory proportion coefficient InspScale and the expiratory proportion coefficient ExpScale to 100.
2. Prepare the tidal volume tester. In VCV mode, set the frequency to 20bpm, the inhalation-to-exhalation ratio to 1:2, PEEP to OFF, and Hold to 0; the bellows can reach the top at the end of expiration, and then turn off flow compensation.
3. Set the tidal volume to 200mL, 300mL, 500mL, 600mL, and 800mL respectively. After the tidal volume is stable, record the inspiratory tidal volume actually measured by the ventilator (TVinsp-200, TVinsp-300, TVinsp-500, TVinsp-600, TVinsp -800) and expiratory tidal volume (TVexp-200, TVexp-300, TVexp-500, TVexp-600, TVexp-800,) and the tidal volume displayed by the tester (TV-200, TV-300, TV-500, TV-600, TV-800).
4. Calculate coefficient:
5. InspScale = ((TV-200/TVinsp-200) + (TV-300/TVinsp-300) + (TV-500/TVinsp-500) + (TV-600/TVinsp-600) + (TV-800/TVinsp- 800))/5; rounded to an integer.
6. ExpScale = ((TV-200/TVexp-200) + (TV-300/TVexp-300) + (TV-500/TVexp-500) + (TV-600/TVexp-600) + (TV-800/TVexp- 800))/5; rounded to an integer.
7. Reset the inspiratory proportion coefficient and expiratory proportion coefficient of the ventilator according to the calculated values.

7.3.6 Calibration of the Flow Valve

⚠Warning Calibration of the flow valve requires factory-trained engineers to use special equipment. Users are not recommended to perform this operation.

7.4 Maintenance of the Oxygen Sensor

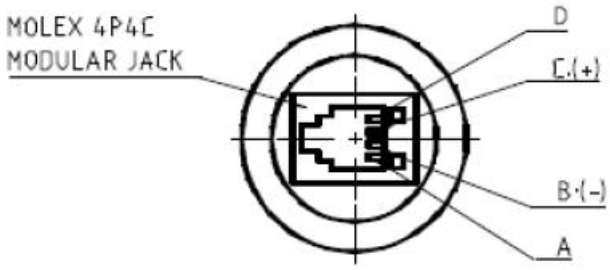
Make regular regularly, refer to section 7.2.1.

7.4.1 Main Technical Requirements of the O2 Sensor

The oxygen sensor is a consumable product. Users should pay attention to the validity period 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 for the O2 sensor used in TA80V.

Interface maximum input range: 0-500mV DC

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



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)

Comply with standards: EN12598/ISO7767

7.4.2 Recommended Model and Its Main Characteristic Parameters

model	MOX-4
manufacturer	City
Response Time (sec)	15
Validity period (month)	12
Currently optional models	yes

Note: The specific parameters shall refer to the latest technical data published by the manufacturer.

7.5 Replacement of Fuse

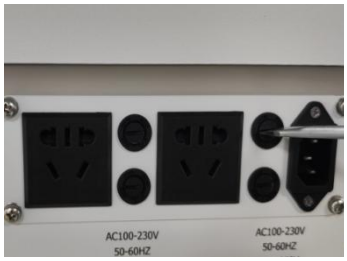
⚠ **Warning** Before replacing the fuse, the AC power must be disconnected. Otherwise, it will cause injury to personnel and even death.

⚠ **Warning** The 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. Fuses located behind the ventilator (see Figure 5-1) with replacement steps as follows:-

1) Insert the screwdriver into the groove at the end of the fuse box
2) Turn counterclockwise for 3-5 turns and then gently pull out the fuse holder
3) Remove the fuse
4) Install a new fuse
5) Gently push the fuse holder into its original position
6) Then use a screwdriver to turn it clockwise 3-5 times to fix it



⚠Attention When turning with a screwdriver, do not use excessive force or force, otherwise the fuse box may be damaged.

8 Alarm and Trouble-shooting

⚠Warning Personnel without experience in such equipment maintenance must never make maintenance work.

8.1 About the Alarm

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

Alarm information is displayed in the top area of the display

- Figure 8-1 Alarm information bar

High-priority alarms need to be handled immediately.

priority	The alarm volume	Alarm silent	Alarm information area prompts	alarm indicator
High	5 alarm sounds, 2 of which are rapid, and the alarm period is 9 seconds.	120 Seconds	The red-bottom cycle is shown.	Red, flashing.
Midle	3 tones, alarm period is 6 seconds.	120 Seconds	The yellow-bottom circulation is shown.	Yellow, flashing.
Low	2 tones, with an alarm period of 27 seconds.	120 Seconds	True color and low cycle display.	

⚠Attention When muted, the alarm bell changes to and the alarm sound disappears. After 2 minutes, the alarm bell returns to its original state; if the conditions for the alarm are not processed, the alarm sound will continue to sound..

8.2 Alarm Information Table

⚠Attention Protect animal patients during use; repair the fault after use.

⚠Attention This table does not include the operating instructions.

Display information	Alarm level	Causes	Measures / precautions	Repair
AC power failure	Middle	The cable not properly connected Power power outage blown fuse	Check whether the cable connection correct Check if the power supply interrupted Check if the fuse broken	If the fuse is broken, replace immediately.

High airway pressure	High	Airway pressure value is higher the upper limit set value. Tidal volume set at too large volume. The patient had a blocked airway. The expiration gas valve is blocked.	Reset upper airway pressure limit. Check the exhalation passage and deal with blockages. Check tidal volume setting. Check the patient's airway and treat obstructions.	----
Low airway pressure	High	No driven gas. Sampling tube is falling off or blocked. The breathing rate too low.	Reset the lower airway pressure limit; Check the sampling tube.	----
No tidal volume	High	The tidal volume monitored for 20 seconds is 0.	Check animal patients. Check the pipeline connections.	----
High tidal volume	High	The tidal volume is higher than the set upper limit.	Check whether the animal is breathing spontaneously. Check ventilator and alarm settings	----
High minute ventilation	High	The minute ventilation is higher the upper limit.	Check whether the animal is breathing spontaneously. Check ventilator and alarm settings	----
Low minute ventilation	High	Minute ventilation is lower the lower limit. Leakage occur.	Reset the lower minute ventilation limit. Check the animal end. Check pipe connections.	----
Apena	High	No airflow passes through within the set time	Check the animals. Switch to manual mode and make ventilation by hand. Check if the connection is broken.	----

8.3 Troubleshooting

8.3.1 Troubleshooting and analysis of the veterinary anesthesia machine

Troubles	Causes	Solution
Leak in breathing circuit	POP valve is not closed	Close the APL valve
	The soda lime tank is not installed tightly	Remove the soda lime particles at the interface of the soda lime tank
		Install again

	The threaded pipe is damaged or the joint is loose	Replace with new pipe or install again
	Inhalation and exhalation valve cover is not tightened	Retighten
	Manual/auto switch valve malfunction	Please contact our agent or us
Excessive pressure in the airway when manual ventilation	APL valve (pressure limiting valve) Regulated relief pressure is too large	Adjust to proper relief pressure
When the manual/auto control switch is set to manual, the airbag is inflated; to auto, the bellow inflated.	Manual/auto switch leakage	Please contact our agent or us
There is serious leakage in the respiratory system, and the location of the leakage is difficult to determine at the moment (in manual mode)	Improper air bag hose connection.	Make sure the air bag hose is connected to the air bag port (under the APL valve).

8.3.2 Troubleshooting and Analysis of The Anesthesia Ventilator

Troubles	Causes	Solution
The power indicator light not light up	Power cable not connected Power cable damaged The outlet to which the power cable is connected has no power. The fuse is broken	Connect the power cable Replace power cable Use another power outlet Replace fuse
A certain power socket is out of power	The fuse is broken	Replace fuse
Airway pressure upper limit alarm	1 Breathing circuit obstruction 2 Animal airway obstruction 3 The upper limit of airway pressure is set low 4 Changes in ventilation parameter	1 Check and correct the animal breathing circuit 2 Check the animal's status 3 Recalibrate the alarm setting value 4 Recalculate ventilation parameters
Airway pressure lower limit alarm	1 Air leakage in animal breathing circuit 2 The alarm setting value is too high 3 Changes in animal compliance	1 Check the pipeline for leaks 2 Reset the alarm value 3 Check the status of the animal 4 Check that the pressure

	4. The pressure sampling tube is detached 5. The pressure sampling tube is damaged.	sampling tube has fallen off 5 Check the pressure sampling pipe for damage
Airway pressure gauge pointer not move	1 No gas flow through the pressure gauge 2 The pressure gauge is damaged 3 Air source exhausted	1 Calibrate the pressure gauge 2 Replace the pressure gauge 3 Replace the gas source
Tidal volume display abnormality	1 The flow sensor plug is loose 2 The O-rings inside and outside the bellows base are damaged. 3 The folding bag is partially damaged 4 The relief valve is damaged	1 Reinsert the flow sensor 2 Reassemble the bellow integration 3 Replace the folding bag 4 Replace the relief valve plate
Overexpansion of folded bag	1 The exhaust port is partially blocked 2 The exhaust gas system fails and produces excessive resistance or vacuum.	1 Clear the exhaust port 2 Repair exhaust gas absorption system
The folding bag cannot rise to the top (gradually descends)	1 The breathing circuit interface is detached 2 The bellows base is damaged 3 The folding bag is damaged or detached 4 Exhalation diaphragm is damaged 5 O-ring damaged	1 Reconnect the breathing circuit 2 Check and replace the bellow base 3 Check and replace the folding bag 4 Check and replace the exhalation diaphragm 5 Check and replace O-rings

9 Specifications and Working Principle

9.1 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	Highth:	1310mm
	Width:	820mm
	Depth:	430mm
	Weight:	80kg
	Top frame load-bearing limit：	30kg
Caster	75mm (3in), with brakes on the front casters.	
Drawer	160mm height 380mm wide 320mm deep	
Ventilator monitor	9’ TFT LCD	
Pipeline pressure gauge	Range: 0 ~ 1MPa. Resolution: 0.02MPa. Accuracy: 2.5% of the full range.	
Yoke pressure gauge	Range: 0 ~ 25MPa. Resolution: 0.2MPa. Accuracy: 2.5% of the full range.	
Airway pressure gauge	Range: -2 ~ 10 kPa. Resolution: 200Pa. Accuracy: 2.5% of the full range.	

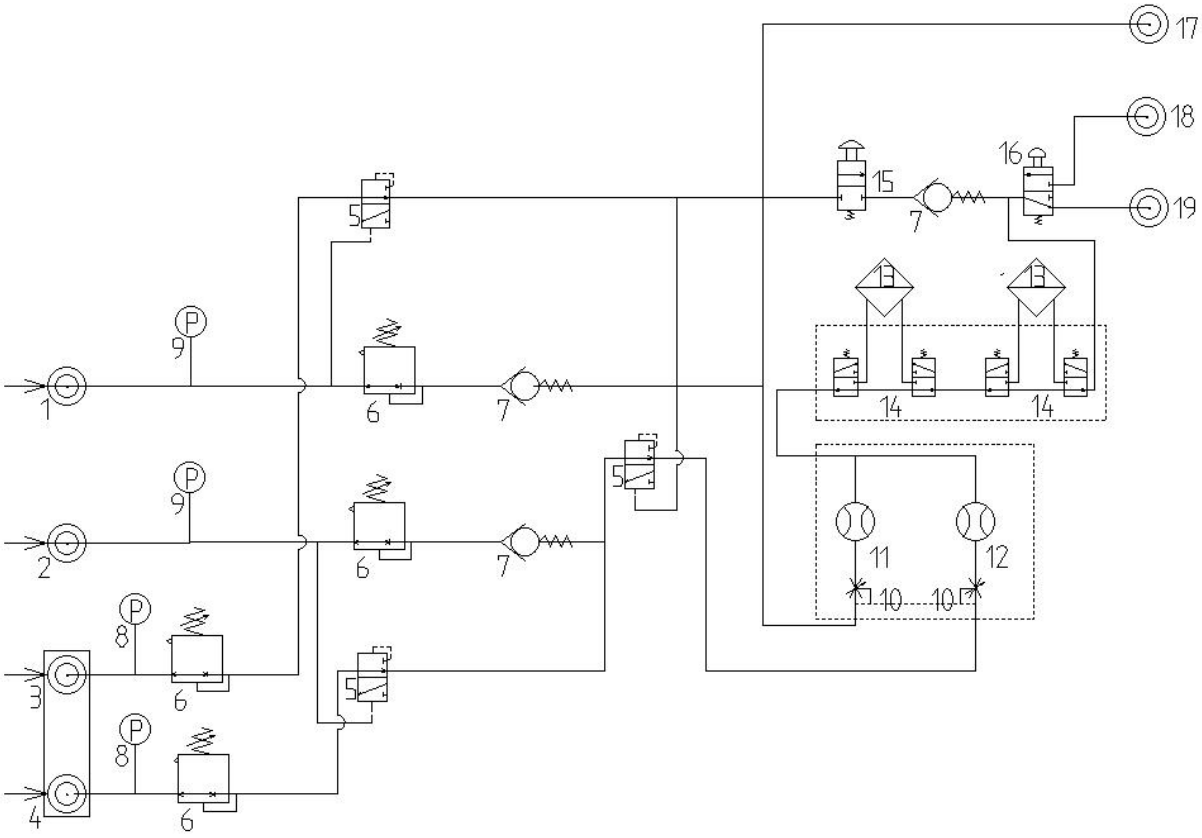
9.2 Environmental Requirements

Temperature	operate:	10 ~ 40℃
	Storage:	-20 ~ 55℃
Relative humidity	operate:	Not more than 80%, and no condensation
	Storage:	Not more than 93%, and no condensation
Atmospheric pressure	operate:	70 ~ 106kPa
	Storage:	50 ~ 106kPa
Altitude	operate:	500 ~ 800mmHg （3565 ~ -440m）
	Storage:	375 ~ 800mmHg （5860 ~ -440m）

⚠Attention The equipment should be stored in a well-ventilated room free from corrosive gases and strong magnetic fields.

⚠Attention When the storage conditions exceed the environmental requirements, when the storage state is transferred to the use state, it should be placed under the use environmental conditions for more than 8 hours before use.

9.3 Gas Circuit of System Drives



- Figure 9-1 Schematic diagram of the gas

1. O_2 pipe
2. AIR pipe
3. Yoke O_2 pipe
4. Yoke AIR Pipe
5. Gas switch
6. Pressure regulator
7. One-way valve
8. High pressure pressure gauge
9. Low pressure gauge
10. Oxygen-air linkage
11. Oxygen flow meter
12. Air flow meter
13. Vaporizer
14. Interlock device
15. Rapid oxygen supply valve
16. ACGO switch
17. Ventilator gas source outlet
18. ACGO output interface
19. Fresh gas outlet

9.4 System Technical Specifications

9.4.1 Gas Supply

Gas supply

Pipeline gas:	O_2、AIR
compression release valve:	300kPa
Pipeline connection:	Oxygen and O2 connections not interchangeable.
Pressure display:	Color label table
Pipe inlet pressure:	280-600kPa (41-87psi)

⚠Attention All systems gas supply must be of medical grade.

When the anesthesia system stops delivering gas, the pipeline supply pressure is 280-600 kPa.

9.4.2 Flow Rate

Gas supply

Gas	Scale
O_2	0.05-1 L/min
AIR	0.05-1 L/min

⚠Attention The linkage ensures that the O_2The output concentration is not less than 25%.

Accuracy: Under the conditions of 20℃ and 101.3kPa, for the flow rate between ±10% of full scale or 300mL/min (whichever is the larger value) to full scale, the accuracy is within ±10% of the indicated value. Accuracy below 10% of full scale or 300mL/min (whichever is greater) is Level 4. Accuracy will vary depending on breathing circuit pressure, barometric pressure or temperature. Under certain conditions, these changes can exceed the allowable error range.

O2 Flush supply: 35-75 L/min

O2 supply failure alarm and stop

	O_2pressure
O_2 Supply fault alarm:	50 ~ 220kPa
AIR stop:	20 ~ 200kPa

⚠Attention O2 supply failure alarm takes precedence over AIR cutoff.

9.5 Power Supply

Supply voltage	90-240VAC 47-63Hz
Input power	Not greater than 50VA
Maximum input current	5A
Inlet fuse	250V 1A φ 5X20（F）
Ground impedance	No more than 0.1 Ω

⚠Warning

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

9.6 Electromagnetic Compatibility

Any unauthorized changes or modifications to this equipment without the express consent of our company may cause electromagnetic compatibility problems with this equipment or other equipment. Contact our company for assistance. This equipment has been designed and tested to comply with the following regulations regarding electromagnetic compatibility.

⚠Warning Using a cell phone or other radio frequency radiating device near the equipment may cause unexpected or abnormal operating problems. If there are radio frequency radiation sources 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 with animals, check that the device is functioning properly according to your configuration.

When connecting other devices to TA80V, you must pay attention to the following matters:

Never place objects that do not meet the requirements of GB 9706.1-1995 within 1.5m of animals.

All objects (medical or non-medical electrical equipment) that are connected to TA80V using signal input/signal output cables must use an isolation transformer for AC power supply, or have an additional protective ground wire.

If a portable multi-purpose socket is used as the AC power supply, the component must comply with the regulations of GB9706.1-1995. The component cannot be placed on the floor. The use of more than one portable multi-purpose socket is not recommended.

Do not connect non-medical electrical equipment directly to an AC wall outlet, only use AC power from an isolation transformer. Otherwise, under normal circumstances and under a single error, the leakage current of the equipment shell may exceed the allowable range of GB9706.1-1995. This could cause electric shock to the animal or operator and is unsafe.

⚠Warning Operators of medical electrical equipment are not allowed to contact non-medical electrical equipment and animals at the same time. It is unsafe to cause electric shock to animals or operators.

9.6.1 Guidance and Manufacturer's Statements Regarding Electromagnetic Radiation

The TA80V veterinary anesthesia workstation can be used in the following specific electromagnetic environments, and users of the TA80V anesthesia workstation should ensure that it is used in the following electromagnetic environments.

Radiation test	Conformity	Electromagnetic environment guidance
RF radiation CISPR 11	Group 1	The TA80V Veterinary Anesthesia Workstation uses radio frequency energy for internal functional purposes only. Therefore, its RF emissions are extremely low and are unlikely to cause interference to nearby electronic equipment.
RF radiation CISPR 11	B class	The TA80V Veterinary Anesthesia Workstation can be used in all installations, including domestic installations and installations directly connected to the public low-voltage power supply network that supplies domestic installations.
harmonic radiation IEC 61000-3-2	A class	
Voltage fluctuation / intermittent radiation IEC 61000-3-3	Pass	

Immune test	IEC 60601 Test level	Conformity level	Electromagnetic environment guidance
Electrostatic release (ESD) IEC 61000-4-2	±6kV Contact is energized ±8kV air	±6 kV Contact is energized ±8 kV of air	The flooring shall be wood, cement or tile. If the floor is covered with the synthetic material, the relative humidity shall be at least 30%.
Fast transient current / pulse IEC 61000-4-4	The power supply line is 2kV± The input / output line is 1kV±	The power supply line is 2kV±	The quality shall be representative commercial or hospital environment.
surge IEC 61000-4-5	±1 kV differential mode ±2 kV co-mode	±1 kV differential mode ±2 kV co-mode	The quality shall be representative commercial or hospital environment.
Voltage drop, short circuit interference and voltage variation on the power supply input line IEC 61000-4-11	The 0.5 cycles were <5%U_T (U_TPressure drop is> 95%) For 5 cycles of 40%U_T (U_TPressure drop of 60%) And 25 cycles for 70%U_T (U_TPressure drop of 30%) The 5 seconds is <5%U_T (U_TPressure drop is>	The 0.5 cycles were <5% U_T (U_TPressure drop is> 95%) For 5 cycles of 40%U_T (U_TPressure drop of 60%) And 25 cycles for 70%U_T (U_TPressure drop of 30%) The 5 seconds is <5%U_T (U_TPressure drop is>	The quality shall be representative commercial or hospital environment. If the user of the TA80V Anesthesia Station needs to continuously operate the device during the main power outage, you are advised to use UPS or battery power.

	95%)	95%)	
Power supply frequency (50Hz) magnetic field IEC 61000-4-8	3A/m	3A/m	The power frequency magnetic field shall have horizontal characteristics of representative position in the commercial or hospital environment.
explanatory note:U_TFor the AC main supply voltage before applying the test voltage.			

Immune test	IEC 60601 Test level	Conformity level	Electromagnetic environment guidance
			Portable and mobile RF communication equipment, including cables, near the TA80V anesthesia workstation shall not be used within the proposed isolation distance, which can be calculated according to the corresponding transmitter frequency formula.
			It is recommended to separate distances
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	$d=\left[\frac{12}{V_2}\right]\sqrt{P}$
Radiation RF IEC 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 in W (Watt) D is the recommended separation distance, in m (m) The field strength of the fixed RF transmitter obtained from the electromagnetic field measurement shall be below the consistent level of each frequency range. If interference may occur near the equipment, the following symbols shall be marked: 
Comment 1 At 80 MHz to 800 MHz, the high-frequency range applies. Comment 2 These guidelines may not be applicable to all situations. Electromagnetic propagation			

is 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 Establishing compliance levels for the ISM frequency band between 150 kHz and 80 MHz and for the frequency range 80 MHz to 2.5 GHz is intended to reduce the possibility of causing interference in the event that mobile/portable communications equipment is inadvertently introduced into animal areas. For this reason, an additional factor of 10/3 is used when calculating the recommended separation distances for transmitters in these frequency ranges.

c Field strengths from fixed transmitters such as wireless (cellular/cordless) telephones and land mobile radios, amateur radios, AM and FM radio broadcasts and television broadcasts cannot be theoretically predicted with precision. To assess the electromagnetic environment from fixed RF transmitters, electromagnetic field measurements should be considered. If the field strength measured at the system site exceeds the applicable RF compliance level above, the system should be observed to ensure that it is operating properly. If abnormal conditions are found, additional measures may need to be taken, such as changing the direction or location of the system.

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

9.6.2 Recommended to Separate Distances

Recommended separation distances between portable and mobile RF communications equipment and the TA80V Animal Anesthesia Workstation

The TA80V Veterinary anesthesia workstation should be used in a radiation-controlled electromagnetic environment. Customers or users of the TA80V Animal Anesthesia Workstation can follow the recommendations below to prevent electromagnetic interference by maintaining a certain distance between portable, mobile RF communications equipment and the TA80V Animal Anesthesia Workstation based on the maximum output power of the communication device.

Rated maximum output power of the transmitter (W)	**Separseparation distance according on the frequency of the transmitter in meters**		
	From 150kHz to 80 MHz $d = \left[\frac{3.5}{V_1}\right]\sqrt{P}$	**From 80 MHz to 800 MHz** $d = \left[\frac{3.5}{E_1}\right]\sqrt{P}$	**From 800 MHz to 2.5 GHz** $d = \left[\frac{7}{E_1}\right]\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.37	0.37	0.74
1	1.17	1.17	2.33
10	3.69	3.69	7.38
100	11.67	11.67	23.33

If the rated maximum output power of the transmitter exceeds the above range, the separation distance d (unit: meter) can be determined using the formula applicable to the transmitter frequency. Here, P is the rated maximum output power of the transmitter. According to the transmitter manufacturer's Specified, the unit is W (watt).

Note 1 From 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 150 kHz and 80 MHz and the frequency range 80 MHz and 2.5 GHz, an additional factor of 10/3 is applied when calculating the recommended separation distances for transmitters in these frequency ranges, for the purpose of ensuring that mobile/portable communications equipment Reduce the potential for the device to cause interference if it is inadvertently introduced into an animal area.

NOTE 4 These guidance information may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection by buildings, objects and people.

9.7 Technical Specification for the Respiratory System

Fresh gas compensation	Flow compensation range: 0 ~ 10L / min
	gas:O_2, AIR, air, and anesthetic
Absorbent:	1500ml absorption tank (single)
linkage:	Common gas outlet: Type ISO5356 type connector (standard 22mm outer diameter or 15mm inner diameter, tapered friction connector).
Respiratory system leak:	These values guarantee continuous pressure, higher than the expected pressure during mechanical ventilation. At the pressure of 3 kPa (0.4 psi), the leakage flow rate is 150ml / min.
Respiratory resistance	At a flow rate of 60 l / min, expiratory resistance is 0.6 kPa; inspiratory resistance is 0.6 kPa. At a flow rate of 30 l / minute, expiratory resistance: 2.2 kPa; inspiratory resistance: 2.2 kPa. To ensure compliance with the standards, the animal patient circuit with small flow resistance should be selected.
APL valve resistance	At the flow rate of 3 liters / minute, the flow resistance is: 0.05 ~ 3 kPa; At a flow rate of 30 l / min, the flow resistance is: 0.1 ~ 0.5 kPa.
Connector leak	(APL valve completely closed) leak flow of 50 ml/min.
One-way valve resistance	Dry state: 0.15 kPa
Pressure generated from the wet check valve: <0.14 kPa Pressure for opening the wet check valve: <0.1 kPa	
Absorption circuit compliance	<50ml/kpa

9.8 Technical Specification for the Anesthesia Ventilator

9.8.1 Working Principle of Anesthesia Ventilator

The simplified block diagram of the anesthesia ventilator is shown in Figure 9 2. In this figure, the blocks connected by pipelines are the air path part of the host, and the blocks connected by arrows are the electronic control part of the host.

After the air source enters, the pressure is monitored by a pressure sensor, and the flow control valve and expiration control valve are controlled by adjusting the tidal volume setting value, respiratory frequency, inhalation-to-exhalation ratio or breath-holding time. For safety reasons, 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 airflow drives the bellows circuit, causing the anesthesia circuit gas to enter the animal's body through the flow sampling probe, and is converted into a monitoring signal for the system, which can monitor the inspiratory tidal volume and be used to adjust the ventilator output airflow value. Then during the expiratory phase, the animal's exhaled gas re-enters the anesthesia circuit through the flow sensor, and through the signal fed back by 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 closes; when exhaling, it is just the opposite, that is, the flow control valve closes and the exhalation control valve opens according to the set PEEP part. The entire process is controlled by an electronic control system. In the electrical schematic diagram 9.2, the main control unit provides various rhythms of the entire machine, including inhalation time, control signal and opening size of the flow control valve, control signal of the exhalation control valve, and collection and processing of sensor signals. Keyboard coding and communications, power control. The amplification and drive unit provides sensor interfaces, preamplification, and driving of actuators such as flow control valves and exhalation control valves. The panel part mainly completes parameter settings. The power supply part mainly provides the power required for the normal operation of each part of the entire system.

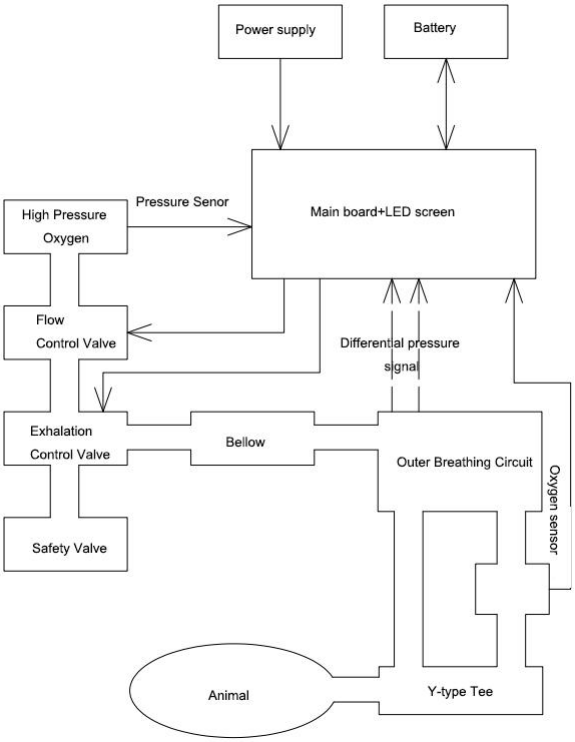


Figure 9-2. Connection Dagram of the anesthesia ventilator

9.8.2 Ventilator Performance

Maximum safety pressure of the gas circuit system:	No more than 6 kPa
System compliance:	No more than 4 mL / 100Pa.
Electrical safety:	Meet the relevant requirements of GB 9706.1-1995 Medical Electrical Equipment Part I: General Safety Requirements for Class I Type B equipment.
Noise of the whole machine (in normal operation):	No more than 65dB (A).
Maximum ventilation volume per minute:	No less than 18L / min

9.8.3 Ventilation Mode Setting

The system has the following ventilation modes: the parameters that can be set in each ventilation mode are also different. See table below.

Ventilation mode	Parameters Setting
VCV	Weight、TV、Freq、I：E、F_Trig、PEEP
PCV	Weight、PInsp、Freq、I：E、F_Trig、PEEP
SPONT	Weight、TV、Freq、I：E、F_Trig、
MANUAL	Weight、TV、Freq、I：E、F_Trig、PEEP
DEMO	Weight、TV、Freq、I：E、F_Trig、PEEP

9.8.4 The Ventilation Parameter Setting

Ventilation parameters	Setting range	Resolution
Weight	2-100kg	0.1kg
Tidal volume TV	50 ~ 1500mL	1mL
Breathing rate Freq	1 ~ 150bpm	1 bpm
Inspiratory to expiratory I:E	9.9：1 ~ 1：9.9	0.1
Air-holding time Hold	0 ~ 50%	1%
Flow rate trigger sensitivity F _ Trig	0.5 ~ 20L/min ，OFF	0.5L/min
Pressure-triggered sensitivity P _ Trig	-1 ~ -20 cmH 2O，OFF	1 cmH 2O
Ppressure PEEP	3~ 20 cmH 2O，OFF	1 cmH 2O
Inspiratory pressure PInsp	2~ 60 cmH 2O	1 cmH 2O

9.8.5 Gas Mechanics

Gas source:	Anesthesia system
Gas components:	O_2 or Air
Rated gas supply pressure:	300kPa
Pressure range at inlet:	280 ~ 600kPa
Flow valve range:	3 ~ 100L/min
output:	Pressure range: 0 ~ 6kPa; flow rate range: 3 ~ 100L / min

9.8.6 Monitoring Performance

Item	Range	Resolution	Accuracy
Exhaled tidal volume TV _ Exp	0~2500 mL	1 mL	± 30 mL (less than 200 mL); ± 15% (other)
Inhaled tidal volume, TV _ Insp	0~2500 mL	1 mL	± 30 mL (less than 200 mL); ± 15% (other)
Ventilation MV	Display range is from 0 to 99 L / min The use range is from 0 to 25 L / min	1 L/min	± 1 L/min (less than 5 L/min); ± 15% (other)
Spontaneous ventilation MV_Spont	Display range is from 0 to 99 L / min The use range is from 0 to 25 L / min	1 L/min	± 1 L/min (less than 5 L/min); ± 15% (other)
Breathing rate Freq	0~150 bpm	1 bpm	±2 bpm (below 20 bpm); ± 10% (other)
Spontaneous frequency Freq_Spont	0~150 bpm	1 bpm	±2 bpm (below 20 bpm); ± 10% (other)
Peak pressure of P peak	0~80 cmH_2O	1 cmH_2O	±3 cmH_2O (below 20 cmH_2±O); 15% (other)
Platform pressure, Pplat	0~80 cmH_2O	1 cmH_2O	±3 cmH_2O (below 20 cmH_2±O); 15% (other)
mean pressure Pmean	0~80 cmH_2O	1 cmH_2O	±3 cmH_2O (below 20 cmH_2±O); 15% (other)
Inhaled oxygen concentration of FiO_2	15~100%	1%	±15%
End tidal pressure PEEP	0~20 cmH_2O	1 cmH_2O	±2 cmH_2O (below 10 cmH_2±O); 20% (other)
Inspiratory to expiratory I:E	1:9.9~9.9:1	0.1	15%
Drive gas pressure Press_Drive	0~900 KPa	1KPa	±5 KPa (below 50 KPa); 10% (other)±
Paw-t waveform :		Pressure monitoring range: 0-80 cmH_2O; X-axis: 0 to 10 seconds	
Flow-t waveform :		Y-axis range: -120 ~ 100 L/min; X-axis range: 0 to 10 seconds.	
V-t waveform:		Y-axis range: 0 to 800 mL; X-axis range: 0 to 10 seconds.	

9.8.7 Alarm Performance

Alarm parameters	Setting range	Resolution
Upper pressure limit	0~ 60 cmH 2O	1 cmH 2O
Lower pressure limit	0~ 60 cmH 2O	1 cmH 2O
Upper limit of tidal volume	0 ~ 1500mL	1mL
Lower limit of tidal volume	0 ~ 1500mL	1mL
Upper limit of ventilation	0 ~ 40 L /min	.1 0L /min
Lower limit of ventilation	0 ~ 40 L /min	.1 0L /min
Upper limit of oxygen concentration	15 ~ 100%	1%
Lower 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
Absorber heating	32-42℃	1℃
Apena time	3 ~ 20s	1s
Drive pneumatic pressure is low	230±20 KPa	
The alarm volume	2~ 10	1

⚠Attention The lower limit of the above parameters cannot be set higher than the upper limit, and the upper limit cannot be set lower than the lower limit.

9.9 Technical Specification for Oxygen Monitoring

Response time:	No more than 15 seconds.
Sensor type:	Chemical fuel cells.
Expected battery life:	Normal operation period of 12 months.
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 generates a voltage on its sensing surface commensurate with the partial pressure (concentration) of oxygen. The O2 sensor is an electrochemical device (chemical cell). Oxygen diffuses into the device through a membrane, oxidizing the base metal electrode. This oxidation process generates a current that is commensurate with the partial pressure of oxygen indicated by

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 sensor's surgical thermistor automatically compensates for temperature changes within the sensor.
O2 monitors use signal processing and analysis circuitry to convert sensor signals into corresponding oxygen percentage values. 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.

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