RWD

RWD Life Science Co.,Ltd

R620-S1 General Animal Anesthesia Machine

User Manual D

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Contents

1-Introduction

1.1 Overview

Firstly, thank you sincerely for selecting the R620-S1 animal anesthesia machine made by RWD Life Science.

Please read this instruction manual and all other auxiliary materials carefully before installing and using the product.

RWD has always been dedicated to improving product function and service quality, and reserves the right to revise the product itself and contents described in the instruction manual at any time without advanced notice.

If you find the supplied goods do not match the contents described in the manual, or have any questions about our products and/or services, you are welcome to contact us. For the latest information, please visit our web site (http://www.rwdstco.com/) or contact us immediately.

This manual is applicable to

- R620-S1IP Veterinary Anesthesia Machine - Isoflurane, Pour Fill, Cage Mount
- R620-S1IP Veterinary Anesthesia Machine - Isoflurane, Pour Fill, Selectatec
- R620-S1IE Veterinary Anesthesia Machine - Isoflurane, Easy Fill, Cage Mount
- R620-S1IE Veterinary Anesthesia Machine - Isoflurane, Easy Fill, Selectatec
- R620-S1SP Veterinary Anesthesia Machine - Sevoflurane, Pour Fill, Cage Mount
- R620-S1SP Veterinary Anesthesia Machine - Sevoflurane, Pour Fill, Selectatec
- R620-S1SE Veterinary Anesthesia Machine - Sevoflurane, Easy Fill, Cage Mount
- R620-S1SE Veterinary Anesthesia Machine - Sevoflurane, Easy Fill, Selectatec

This anesthesia system should be only used for veterinary clinical and research, NOT used for human clinical.

1.2 Safety

Operation of anesthesia systems involve oxygen gas pressure and the use of potentially hazardous materials. In order to avoid injury to patients or operators or damage to the anesthesia system, please read ***Section 2 –Safety*** carefully before performing any of the procedures contained in this manual. If you have any safety questions or comments, please contact us for support.

This veterinary anesthesia system should only be operated by veterinary professionals qualified to administer anesthesia.

1.3 Product features

- Standard closed circuit breathing loop design
- Applicable to cats, dogs, monkeys, pigs and other animals weighing 100kg or less
- Two options are available: semi- open and closed anesthesia modes;
- The adjustable oxygen flow meter ranges from 0.1 to 4 L/min
- The oxygen flush function replaces the system with pure oxygen at a speed of 10L/min
- APL automatic pressure relief and occlusion valve features protect the patient from damage caused by excessive pressure
- CO_2 absorbing canister (2100 ml) is installed in the front of the machine to easily observe and disassemble for changing;
- Newly designed vaporizer provides enough flow of anesthetic gas for animal. Supports both Cage Mount and Selectatec
- The concentration of anesthetic gas from the vaporizer can be adjusted from 0 to 5 % (Isoflurane) and 0 to 8% (Sevoflurane), without fluctuation caused by temperature, flow rate and/or pressure. The safety locking device prevents accidental volatilization of anesthetic agent;
- Dual-channel flowmeter is optional
- Compact and easy to clean

1.4 Facility requirements

Table 1-1 provides the facility requirements necessary to ensure reliable operation and safety of the anesthesia system.

Table 1-1 Facility Requirements

	Description
Working area	Large enough to accommodate the anesthesia system.
Environment	Storage temperature: -10 - 55 ℃
	Operating temperature: 10-35 ℃
	Relative humidity: 5-90 % RH, non-condensing

1.5 System standard features

Figure 1-2 Device body of R620-S1

No.	Parts	Description
1	Main support	Solid metal support for assembly of following components.
2	O2 flowmeter	Control the oxygen flow rate. Turn the O2 flowmeter control valve to regulate the oxygen flow between 0.1~4 L/min. Another flowmeter assembly can be added for constructing a dual-flowmeter system.
3	Handle	Used to control and move the device
4	Pressure gauge	Measures and displays the pressure of gas mixture in breathing circuit. **Note: pressure should be monitored during anaesthesia. Pressure exceeding 30cmH2O May cause lung injury or death.**
5	Breathing circuit blocking plug	Used for holding the endotracheal tube/ mask connector. The plug also blocks the breathing circuit, when needed for system leak detection, adjusting system pressure and flushing circuit.

No.	Parts	Description
6	O2 flush button	Press to deliver the oxygen directly to the breathing circuit. It is generally used to flush the anesthetic gas through the system or during an emergency.
7	Circuit switch	Pull the circuit switch to RB (re-Breathing), the available circuit of system is the rebreathing circuit (turn off the thumb switch in the non-rebreathing circuit to avoid waste gas running into the circuit). Pull the circuit switch to the direction of the NRB (Non-Re-Breathing), the available circuit of system is non-rebreathing circuit (turn off the APL valve to avoid waste gas running into the rebreathing circuit). **Note: when switching the circuit, please check whether the selected circuit is correct, the wrong circuit will cause asphyxiation or death of the animal.**
8	Rebreathing circuit port	Used for connecting to a breathing bag when using the anesthesia system in the rebreathing circuit configuration.
9	Vaporizer	It converts a liquid anesthetic agent into a vapor which is added to oxygen. The anesthetic vapor is measured in volume percent (vol %). A dial on top of the vaporizer allows the operator to select the amount of vapor administered to the animal. We suggest that this is calibrated regularly with RWD. The vaporizer is the most complicated and expensive part of the anesthesia system. Attention should be paid to its maintenance and operation. ⚠ Please use the correct anesthetic agent following the tag on the vaporizer. Misuse may cause the damage to the equipment and animal.
10	APL valve	The operator can determine the inspiratory pressure for ventilating the animal by adjusting the APL valve while observing the system's pressure gauge. The more the APL valve is closed, the higher the pressure will be. When the pressure of gas mixture exceeds the setting, the gas will be expired through the APL valve to keep the pressure stable. Usually, the outlet of the valve is connected to a gas filter canister. In case of emergency, press the knob on the valve to close it immediately. **Note: Do not completely close the APL valve otherwise during air tightness inspection and ventilator use, as closing may cause lung injury or death of animals.**

No.	Parts	Description
11	Inspiration & expiration valve module	The one-way valve is made with floatable diaphragms and nickel-plated brass valves. They are used to control the direction of gas flow circulation in the system. IT keeps exhaled gases from being inspired by the animal. The floatable diaphragms go up and down as animal breaths helping the operator to confirm respiratory status. **Note: If the diaphragms stops going up and down, check that the animal is breathing properly and that the circuit is smooth.**
12	Breathing bag mount	Used for connecting to a breathing bag when using the anesthesia system in a rebreathing circuit configuration.
13	Rebreathing circuit port	Used for connecting to a rebreathing circuit, which is generally applicable to animals over 7 kg.
14	CO_2 absorber canister	The absorbent canister is filled with a granular carbon dioxide absorbent material eg. Calcium lime. It uses a coaxial gas flow path to provide more efficient use of absorbent, while reducing flow resistance. The chemical reaction that takes place in the canister creates heat and humidity, which adds to the delivery of anesthesia to the animal.

2-Safety

2.1 Overview

This section provides basic safety information necessary for operating your R620-S1 anesthesia system. Please contact us for more support if you have any questions or comments.

2.2 Intended use

The anesthesia system is intended for veterinary use only. All operation and maintenance should follow the instruction of this manual.
Misuse of your system may result in injury to animals and/or operators or damage to property. Misuse includes:

- Using inappropriate gas or anesthetic agents
- Making unauthorized modifications to the equipment
- Operating the system using a gas pressure that exceeds the maximum ratings

Anesthesia systems should only be operated by veterinary Professionals; qualified to administer anesthesia to animals.

2.3 Description of safety symbols

The following types of symbols are included in this manual with notes that alert the reader to potential hazards.

Personal Safety Warning. This symbol appears in a shaded text block to warn you about actions that could cause personal injury or death.

Property Damage Caution. This symbol appears in a shaded text block to warn you about actions that could cause damage to the system or the facility.

2.4 Basic safety precautions and practices

This section provides requirements necessary to ensure safe and reliable operation of your R620-S1 anesthesia system.

2.4.1 Animal and operator safety

- Always keep a backup anesthesia delivery plan in case of emergency.
- Any person responsible for the installation or operation of the system should be thoroughly familiar with this operator's manual.
- To ensure proper function of your system, perform a pre-use checkout procedure in accordance with ***Section 4 – System setup*** and ***Section 5 – Operation***.
- The system must always be attended by a veterinarian or trained anesthesia technician.
- After the guarantee period, annual service inspections ensure proper operation and are

highly recommended. Only RWD-certified technicians should be permitted to service the system or replace internal parts.

- Keep open flames and combustibles (e.g., ether and acetone) away from the anesthesia system.
- Do not place any heavy items on the anesthesia system.
- Make sure that the oxygen hose does not cross walkways or aisles; as this may present a tripping hazard.
- Wearing personal protective equipment is recommended.
- Make sure the oxygen hose is securely connected to the system before starting a procedure.
- Make sure that any exhaled gas containing anesthetic is properly vented outside of the operating room. A waste gas evacuation system must be used.
- RWD recommends the use of an electrocardiograph, and equipment capable of monitoring the animal's pulse, oxygen (O_2) saturation, carbon dioxide (CO_2) level, and anesthetic agent level at all times when operating the system.
- Remove the system from use if there are any indications of improper function.
- Never pour water or any other fluids into the anesthetic vaporizer. Fill vaporizer with only the designated anesthetic agent.
- Avoid use of oil or grease on any anesthesia or respiratory equipment where oxygen is used; an explosion may occur.

2.4.2 Preventing system and facility damage

- Immediately contain and clean up spilled anesthetic.
- Isoflurane is very caustic and may dull the paint finish of the system if spillage occurs. If spillage should occur, allow it to evaporate. Do not attempt to wipe it with a cloth.
- Do not place heavy items on top of the anesthesia equipment.
- Follow all recommended system maintenance procedures specified in ***Section 7 – Maintenance.***
- Keep an appropriate distance from walls to ensure stable gas supply.

2.4.3 Facility environmental health

- Immediately contain and clean up any spilled anesthetic agent.
- If the system is used in a confined space, ensure that there is adequate ventilation.
- Dispose of any hazardous materials and contaminated items in accordance with local regulations.

2.5 System malfunction

If your system does not operate properly, refer to ***Section 6 – Troubleshooting*** which includes descriptions, possible causes, and suggested solutions.

3-Unpacking and assembling

3.1 Overview

This section provides the unpacking and assembly procedure for your R620-S1 anesthesia system.

3.2 Unpacking the system

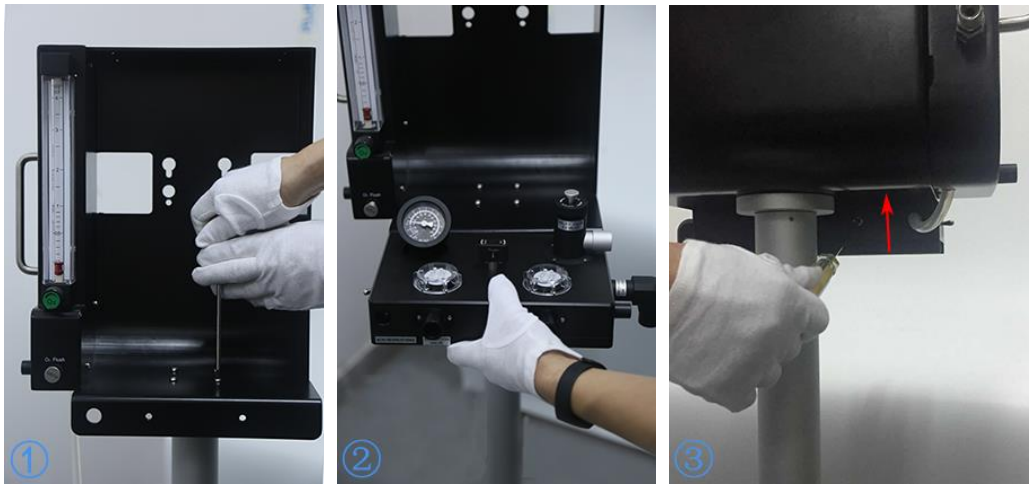
Your system is shipped in boxes that have been carefully packed at the factory for safe delivery. When you receive your system, please do the following:

- Check the shipping documents to ensure that all boxes have been received.
- Examine the shipping boxes for damage. Immediately make a damage claim to the carrier if there is serious damage and contact RWD. We suggest taking photographs of any damage found.
- Carefully open each box and remove each individual component. Save all boxes and packing materials for future shipments.
- Check the packing list or invoice to ensure all ordered components are included. If you have any doubt or need help, contact RWD or local dealer immediately.

3.3 Assembling the system

3.3.1 Assembling base

3.3.2 Assembling main support and vaporizer

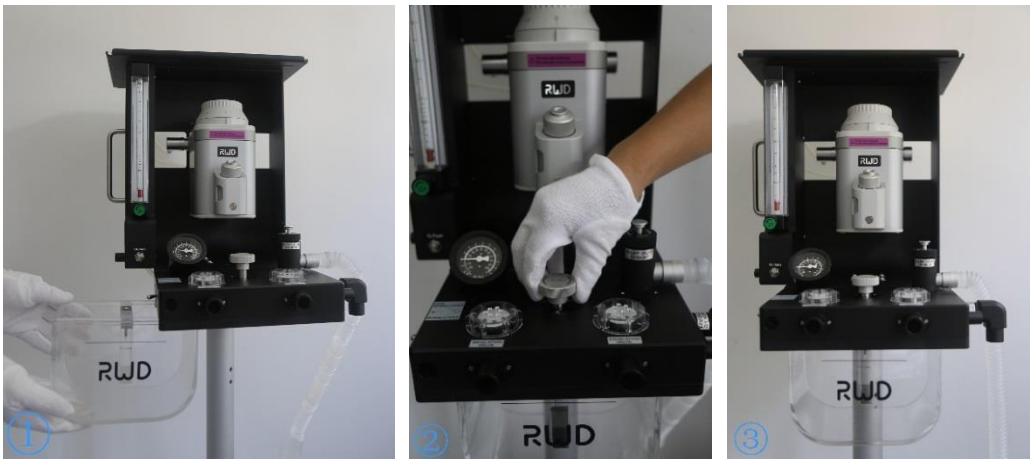


The installation method for the cage mount type vaporizer is shown below:

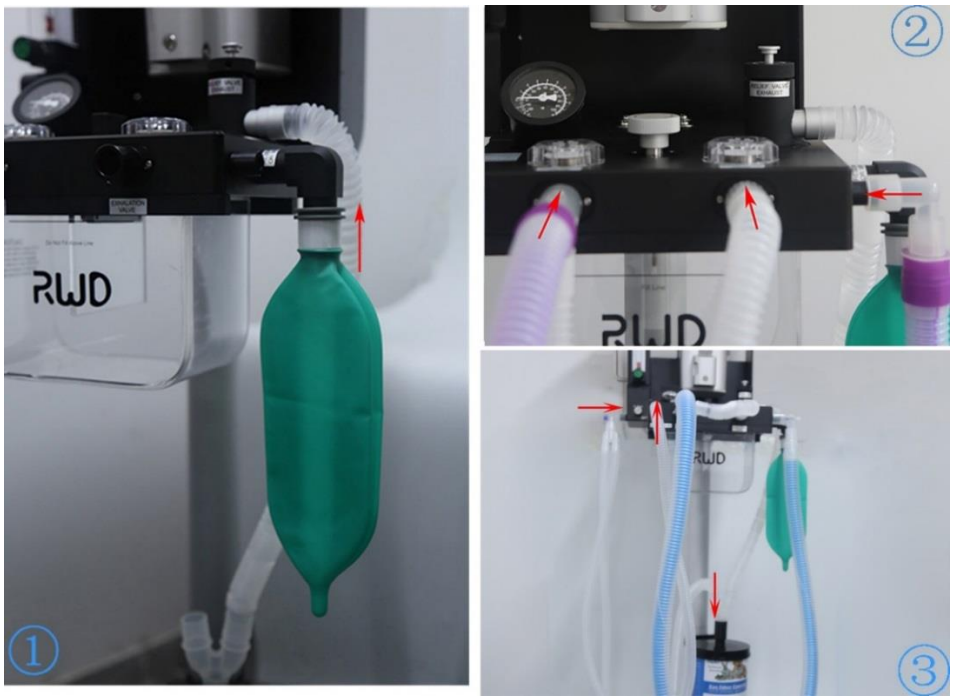
The installation method for the Selectatec type vaporizer is shown below:

3.3.3 Assembling monitor tray and gas filter canister

3.3.4 Assembling CO2 absorbing canister (Push the canister to the end of the track)



3.3.5 Assembling breathing bag, rebreathing circuit and non-rebreathing circuit



Note: Please choose the appropriate breathing bag according to the size of the animal, too large or too small bag may cause adverse results. If the bag stops working, check whether the animal is breathing normally and whether the circuit is smooth.

Breathing bag selection suggestions:

Weight of animals	Size of breathing bag
4.5kg	1/2L
4.6~9kg	1L
9.1~27.2kg	3L
37.3~54.4kg	3L
＞54.4kg	5L

4-System setup

4.1 Overview

This section provides the setup procedures required to prepare your R620-S1 anesthesia system for veterinary surgical procedures.

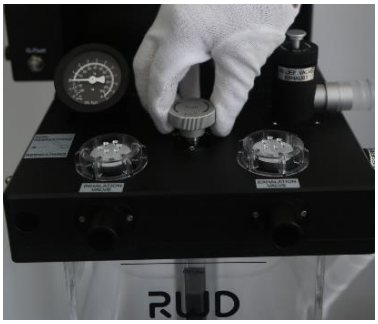
4.2 Materials and supplies

- Oxygen supply source
- Connection tube for oxygen source and flowmeter
- Animal breathing circuit
- Breathing bag
- CO_2 absorbent
- Anesthetic agent
- Wrench for tightening oxygen supply fitting

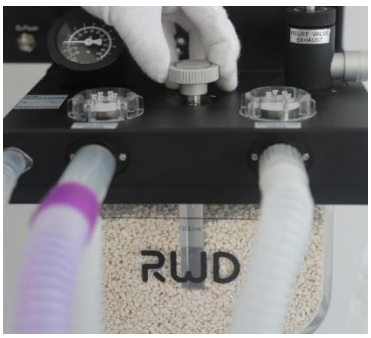
4.3 Initial system preparation

4.3.1 Setting up the system

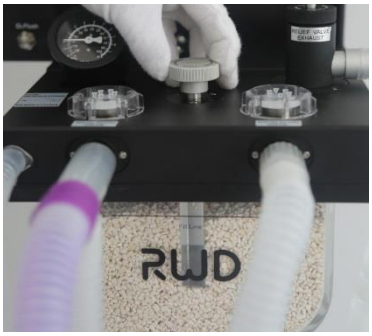
1) Position the system in the area where it will be used.
2) Fill the CO_2 absorber canister with absorbent as follows:
   - Loosen the fixing knob and remove the absorber.



- Fill the canister with CO2 absorbent. Do not exceed maximum capacity



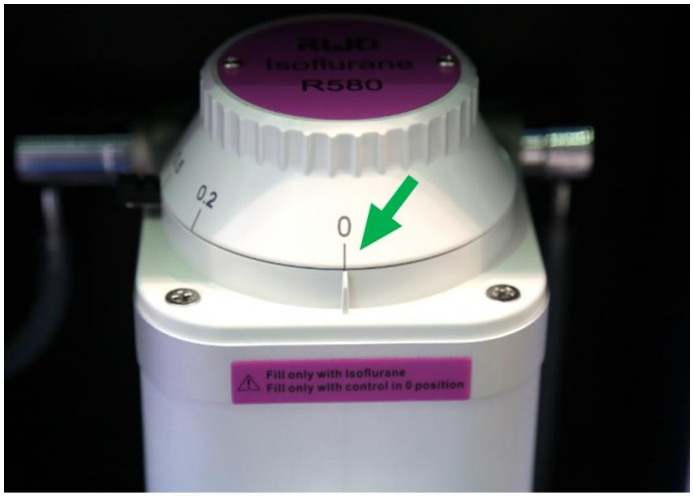
- Reinstall the absorbent canister and tighten the knob.



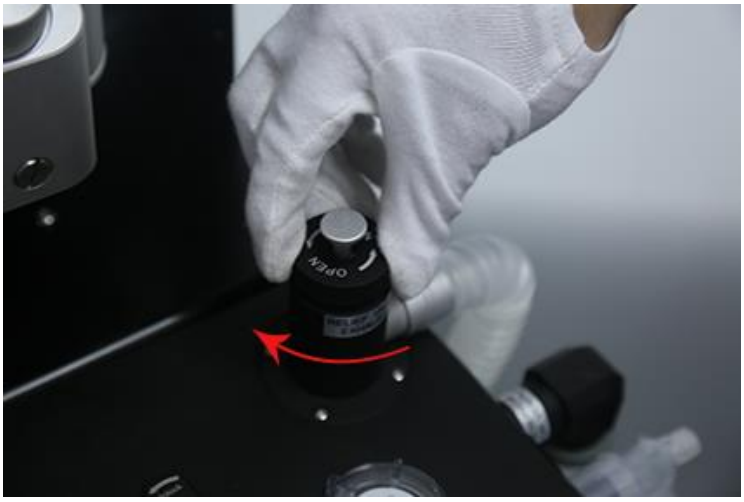
3) System leak checking

The anesthesia system must be operated with no leaks, please check system according to the following steps.

- Close all the open ends of the anesthesia system.
- Make sure the volume percent dial on the anesthetic vaporizer is set to the zero (0) position.



- Close the APL valve completely by rotating clockwise.



- Open the oxygen source, adjust the needle oxygen regulator between 40 - 50 psi by rotating the knob counter-clockwise.
- Turn on the oxygen flowmeter control valve, increase the flow rate to 1 L/min. The system pressure will increase with oxygen flowing into the system. The operator can also increase the pressure by pressing the oxygen flush button. Turn off the flowmeter control valve when pressure gauge goes up to about 30 cmH_2O.

- There is no leak in the system, if the pressure gauge needle drops 2 cmH_2O or less, within 10 seconds. However, there is a system leak if the pressure gauge needle drops more than 2 cmH_2O in 10 seconds. The operator needs to check all connections in the system. If there is any doubt or you need help, contact RWD or local dealer immediately.

4.3.2 Filling the anesthetic vaporizer

The filling method of the vaporizer will depend on the type of anesthetic vaporizer selected by the user. RWD supplies three kinds of vaporizers with different filling methods-Pour Fill, Easy Fill and Key Fill.

Make sure to pour the correct anesthetic agent into the filler port. Filling with the incorrect anesthetic agent could cause serious injury or death to the animal.

If anesthetic agent spills on system surfaces, allow it to evaporate. Rubbing spilled anesthetic agent with a cloth may damage the system finish.

4.3.2.1 Pour Fill

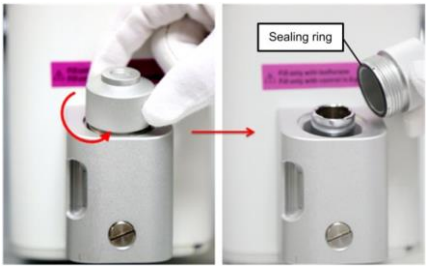
1) Turn and remove the sealing cap of the vaporizer. Do not leave any debris.

2) Carefully pour appropriate agent into the filler port. Observe the agent level sight glass on vaporize, and keep the agent level between the two marks.

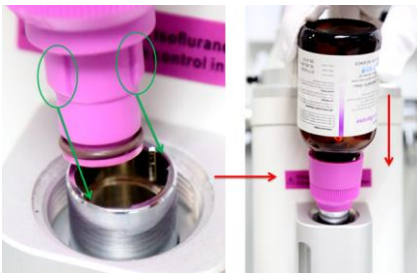
3) Tighten the sealing cap.

4.3.2.2 Easy Fill

1) Turn and remove the sealing cap of the vaporizer. Check the black sealing ring.

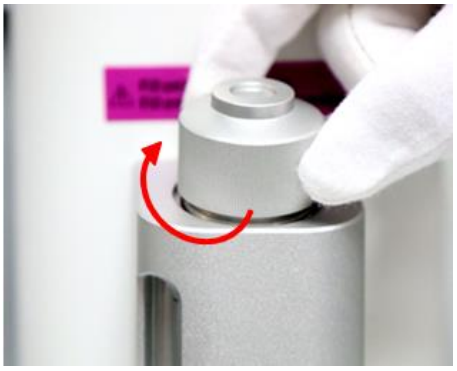


2) Mount an adaptor onto the agent bottle, insert into filler port along the groove, and press down on the bottle.



3) Observe the agent level sight glass on the vaporizer, and keep the agent level between the two marks.

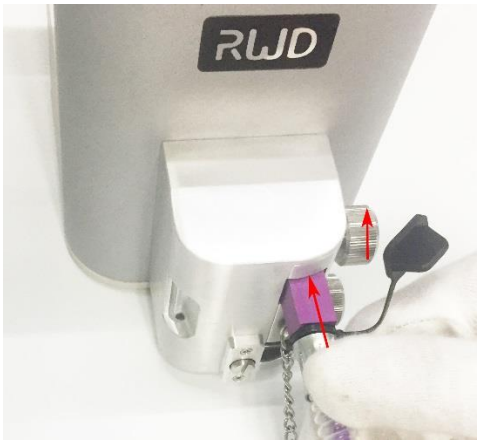
4) Tighten the sealing cap.



4.3.2.3 Key Fill

1) Rotate the upper jacking bar counterclockwise to loosen it and take out the current limiting block;

2) First, ensure that the feedback control lever is tightened, and then insert the adapter into the filer port, rotate the upper jacking bar clockwise to tighten it, and lift the anesthetic bottle up and keep upright to add the agent;



3) Upon completion of filling, loosen the upper jacking bar and take out the adapter, insert the current limiting block into the filer port and tighten the upper jacking bar.

5- Operation

5.1 Overview

This section provides the procedures and information needed to successfully operate your R620-S1 anesthesia system.

Only trained veterinary professionals should operate the anesthesia system.

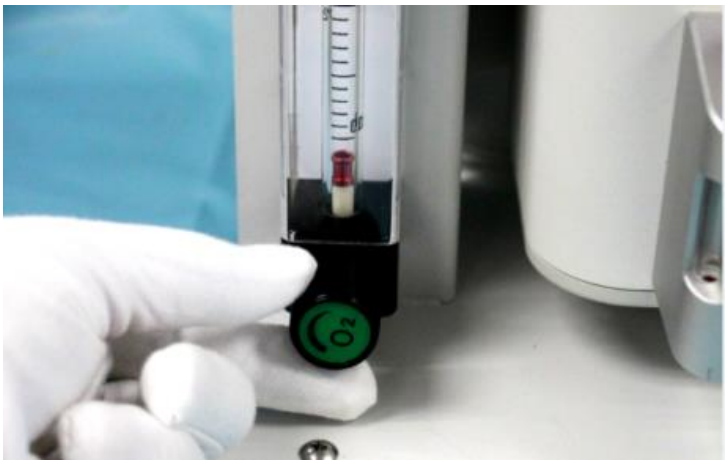
5.2 Pre-use checkout

Perform the pre-use checkout procedure before each use of your anesthesia system as follows:

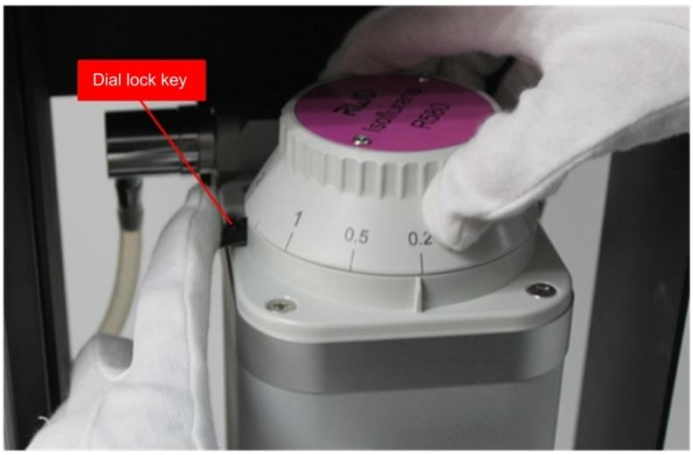
- Ensure anesthetic agent in the vaporizer.
- Make sure the vaporizer volume-percent dial is set to zero (0).
- Confirm that the absorbent has not expired.
- Ensure the oxygen source is connected to the anesthesia system.
- Ensure oxygen supply pressure is between 40-50 psi and remains so during the entirety of the procedure.
- Make sure the O_2 control valve works properly.
- Confirm that the breathing circuit is clean and clear, and ensure adequate ventilation and cleanliness of the experimental environment.

5.3 Anesthesia procedure

1) Use an anesthetic mask or endotracheal tube on the animal after anesthetic induction.
2) Turn the O_2 control valve counterclockwise and observe the position of float to set a suitable flow rate.



3) Press the dial lock key and turn the dial to set the concentration. Pressing the dial lock key is only necessary when the concentration is set to the zero “0” position.



4) Connect the breathing circuit to the endotracheal tube or mask, and provide anesthetic gas to the animal. The operator can change the anesthetic depth by adjusting the concentration of anesthetic gas during surgery.

5.4 Using the oxygen flush button

If the animal needs high concentrations of oxygen instantaneously, the operator can activate the oxygen flush button. Once activated, the flow meter and anesthetic vaporizer are bypassed and oxygen is administered to the patient without anesthetics. As soon as the oxygen flush button is released, the preset anesthesia mixture will be administered again.

Use caution to avoid over-pressurizing the system.

5.5 Using the rebreathing circuit and non-rebreathing circuit

Pull the circuit switch to RB, the available circuit is the rebreathing circuit (turn off the switch in the non-rebreathing circuit to avoid waste gas running into the circuit).

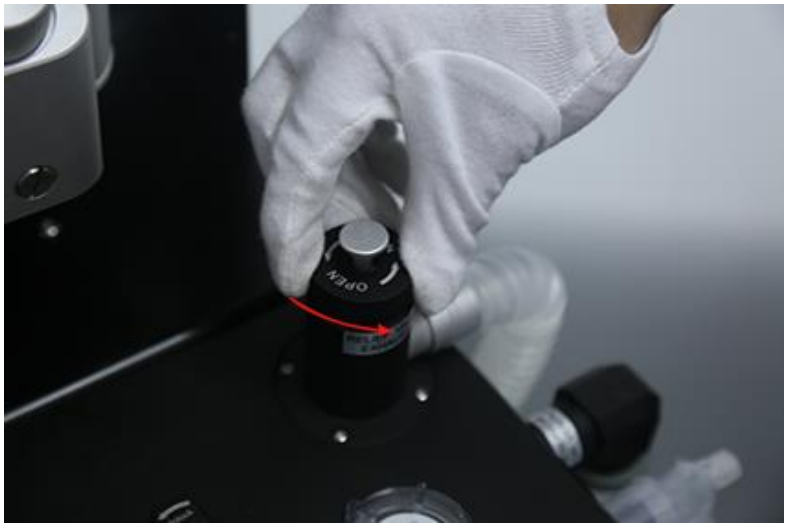
Pull the circuit switch to NRB, the available circuit of system is the non-rebreathing circuit (turn off the APL valve to avoid waste gas running into the rebreathing circuit).

Note: It is forbidden to close the Thumb switch during anaesthesia, otherwise lung injury or death of animals may occur.

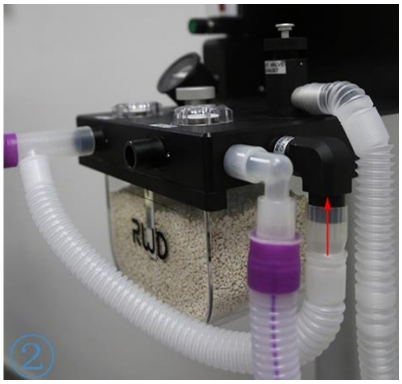
Closure may cause lung damage or death in animals under anesthesia

5.6 Adjusting the highest pressure in system

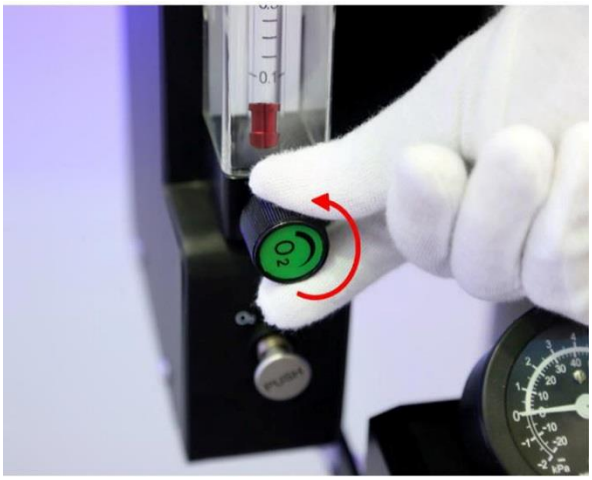
- Turn the APL valve counterclockwise to completely open, make sure the needle of pressure gauge has dropped down to zero;



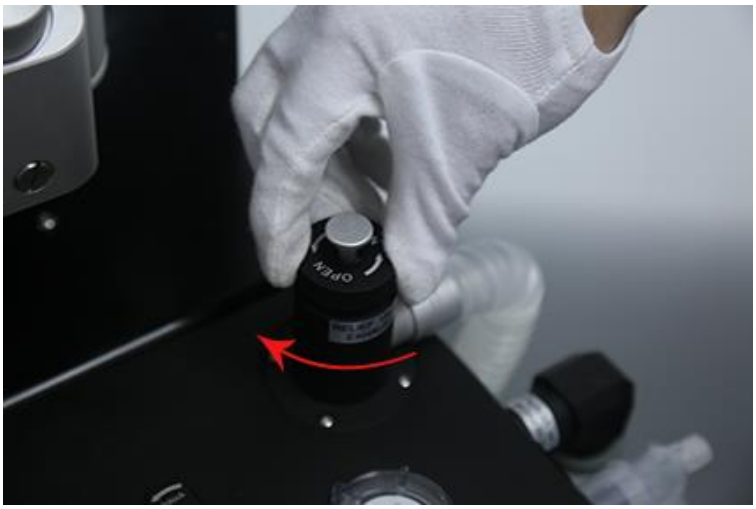
- Remove the breathing bag, and connect the exhaled port of rebreathing circuit to breathing bag mount;



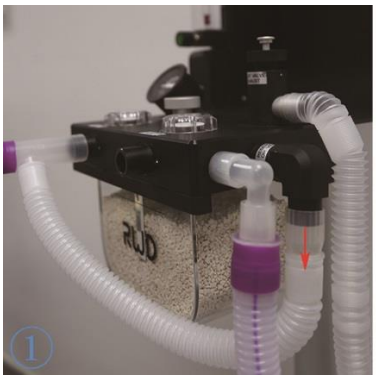
- Turn on the oxygen flowmeter control valve, increase the flow rate to 1 L/min. The system pressure will increase with oxygen flowing into system.



- Turn the APL valve clockwise to increase system pressure, pay attention to the pressure gauge needle. Stop rotating when it reaches an appropriate pressure, which is recommended to not be over 20 cmH_2O;



- Turn off the flowmeter, and reconnect the breathing bag and rebreathing circuit.



5.7 Post-anesthesia procedure

Once the anesthetic procedure is complete, perform the following steps in order:

1) Turn OFF the vaporizer by turning the volume-percent dial clockwise to zero "**0**".
2) Remove breathing circuit from endotracheal tube or mask, and place the connector onto the plug on the main support of the anesthesia system.
3) Press the oxygen flush button for 2-3 seconds and squeeze the breathing bag to purge the system of anesthetic gas and carbon dioxide.
4) Disconnect the oxygen supply source.
5) Open the APL valve by turning it counterclockwise.
6) Record the used time of absorbent in the CO_2 absorbing canister. If the total time is over 10 hours, change the absorbent; as described in ***Section 4 – System Setup***.
7) If the system will be unused for a long period of time, drain the anesthetic agent inside the vaporizer; as described in ***Section 7 – Maintenance***.
8) Thoroughly clean the anesthesia system; as described in ***Section 7 – Maintenance***.

6- Troubleshooting

6.1 Overview

This section will help you determine the origin of common problems/alarms you may experience with your R620-S1 anesthesia system and the recommended corrective actions. If you experience problems not listed in this section, or continue experiencing the problem after trying the suggested corrective actions, please contact RWD or your local dealer for support.

6.2 Safety

Some troubleshooting procedures may involve the use of hazardous materials and contact with biological hazards. Always follow all applicable local regulations and the material manufacturer's Material Safety Data Sheet (MSDS) recommendations. During the procedure, basic personal protective equipment is necessary, such as wearing gloves, a mask and eye protection.

6.3 Machine status

Unless otherwise specified, the anesthesia system may be connected to gas supplies during the performance of the troubleshooting procedures described in this manual. Make sure the gas supplies and vaporizer are turned off before the procedure.

6.4 Record keeping

A record of problems and their resolutions should be kept. Such records should include the date, nature of the problem encountered, and the actions taken to resolve the problems.

6.5 Problem – Solution matrix

Table 6-1 contains problems that may occur during operation of your R620-S1 anesthesia system and their corrective actions. If you continue experiencing a problem after trying the suggested corrective actions, please contact RWD or your local dealer for support.

Table 6-1 R620-S1 anesthesia system: Problem – Solution Matrix

No.	Problem	Cause	Solution
1	No or low anesthetic vapor output	a. Vaporizer is functioning properly, but machine output is not getting to animal	Check breathing system components for leaks, tears, holes. Ensure the mask/endotracheal tube makes a good seal with the animal.
		b. Anesthetic agent reservoir is empty	Fill the reservoir with appropriate anesthetic agent.
		c. Vaporizer is turned off	Press the dial lock key on the vaporizer and adjust the dial to the desired volume-percent of anesthetic.
		d. Leak around the vaporizer filler	Make sure the sealing cap on the vaporizer is fully closed.
		e. Vaporizer malfunction – internal fault	Contact RWD or local dealer for servicing.
2	APL valve knob is hard to turn	APL valve threads require cleaning	Contact RWD or local dealer for servicing.
3	Needle on system pressure gauge is stuck and does not move	Mechanical damage	Replace pressure gauge. Contact RWD or local dealer for servicing.
4	Needle on system pressure gauge indicates a negative pressure	Inadequate fresh gas flow	Increase fresh gas flow rates.

Table 6-1 R620-S1 anesthesia system: Problem – Solution

No.	Problem	Cause	Solution
5	Animal anesthetic level is too light	a. Vaporizer is empty	Fill vaporizer with the appropriate anesthetic agent. ⚠ Do not fill anesthetic agent when the device is in use.
		b. Anesthetic concentration is set too low	Adjust the dial to increase the volume-percent of anesthetic.
		c. Leak in animal breathing circuit	Check breathing system components for leaks, tears, holes, etc. Ensure the mask/endotracheal tube makes a good seal with the animal.
		d. Excessive CO2 build-up	1. Check CO2 absorbent and replace if necessary. 2. Check proper function of inspiratory and expiratory valves.
		e. Leak around the vaporizer filler	Make sure the sealing cap on the vaporizer is fully closed.
6	Animal anesthetic level is too deep	a. Anesthetic concentration is set too high	Adjust the dial to reduce the volume-percent of anesthetic.
		b. Vaporizer malfunction	Contact RWD or local dealer for servicing.
7	Breathing bag is overly distended	a. APL valve is closed	Open the APL valve.
		c. The outlet port of APL valve is clogged	Check and clean the outlet port of APL valve.
8	Gas is flowing , but breathing bag does not inflate	a. Breathing bag is punctured	Renew the breathing bag.
9	Gas flow is leaving through expiratory port when squeezing breathing bag.	One way valve inside is broken	Contact RWD or local dealer for servicing.

Table 6-1 R620-S1 anesthesia system: Problem – Solution Matrix (continued)

No.	Problem	Cause	Solution
10	No gas flow	a. Facility or cylinder gas supply valve is closed	Open gas supply valve.
		b. Gas cylinder is empty	Replace empty gas cylinder.
		c. Gas supply hose is disconnected	1. Ensure gas supply hose is connected to the cylinder or facility gas system. 2. Ensure the gas supply hose is securely connected to the anesthesia system.
		d. Oxygen flow control turned off	Turn the flowmeter valve knob counterclockwise to increase the oxygen flow rate.
		e. Gas supply regulator malfunction	Connect the system to an alternate oxygen supply.
11	Gas flow is not sufficient	a. Oxygen flow is set too low	Turn the flowmeter valve knob counterclockwise to increase the oxygen flow rate.
		b. Leak around vaporizer inlet port	1. Make sure the sealing cap at the inlet port is fully closed. 2. Verify that inlet port is not obstructed by animal hair, etc.
		c. Leak in animal breathing circuit	Check all hose connections, particularly around mask or endotracheal tube.
		d. CO2 absorbent canister is leaking	1. Shut down the anesthesia system. 2. Remove the absorbent canister. 3. Remove any absorbent granules that are lodged between the canister and sealing gasket. 4. Reassemble the vaporizer.
12	Oxygen flush button	Valve inside malfunctions	The valve requires cleaning or replacement. Contact RWD or local dealer
13	Float in oxygen flowmeter sticks	Dirty flow tube	Flow tube needs cleaning.
14	Oxygen flow control valve knob is hard	Dirty or damaged needle valve	Flow valve needs cleaning or replacement. Contact RWD or local dealer for servicing.
15	Oxygen flow failure	Internal fault	Contact RWD or local dealer for servicing.
16	Audible leakage around oxygen hose connector	a. Loose oxygen hose connection	Tighten the connection with a crescent wrench.
		b. Tube does not fit.	Replace the tube.

7- Maintenance

7.1 Overview

This section provides the maintenance procedures to keep your R620-S1 anesthesia system in good operating condition.

7.2 Safety

Some maintenance procedures may involve the use of hazardous materials and contact with biological hazards. Always follow all applicable local regulations and the material manufacturer's Material Safety Data Sheet (MSDS) recommendations. During the procedure, basic personal protective equipment is necessary, such as wearing gloves, a mask and eye protection.

7.3 Annual inspection

RWD recommends that your R620-S1 anesthesia system be inspected annually for proper function. Contact RWD or your local dealer for service.

7.4 Machine status

Unless otherwise specified, the anesthesia system may be connected to gas supplies during the performance of the maintenance procedures described in this manual. However, make sure the oxygen supply is OFF and the vaporizer is set to zero volume-percent.

7.5 Record keeping

A record of system service and maintenance should be kept. Such records should include service and maintenance dates, part numbers of any replaced parts, dates when consumables are replenished, and other pertinent data.

7.6 Parts and materials

Contact RWD or your local dealer if parts or materials are needed during the maintenance.

7.7 Cleaning the equipment

Maintenance of the anesthesia system involves possible contact with biological and chemical hazards. Wear gloves, a mask, and eye protection during all cleaning

7.7.1 Required materials and supplies

- Germicidal cleaner
- CO_2 absorbent material
- Water and clean cloth

- Personal Protective Equipment (masks, eye protection, gloves, etc.)

7.7.2 Weekly maintenance

1. Wipe all surfaces of the system with a cloth dampened with germicidal cleaning solution.
2. Remove hair, dust, and debris from all vaporizer surfaces; especially around the volume-percent dial and the anesthetic fill port.
3. Check the CO_2 absorber canister for exhausted absorbent. If its total use time is over 10 hours, replace it as follows:

a. Remove the canister from the bottom of the machine and shake out the spent absorbent.

Do not bang the edge of the canister on any surface. This may damage the sealing surfaces.

b. Wash the canister in warm water, and dry thoroughly.
c. Wipe the canister gasket, located on the underside of the machine, with a clean cloth dampened with germicidal cleaner. Make sure there is no absorbent residue remaining on the gasket surface.
d. Fill the canister with fresh CO_2 absorbent material to within 2-3 cm of the top edge.
e. Reinstall the canister firmly.

4. Perform a pre-use checkout; as specified in ***Section 5 – Operation***.
5. Check the cleanliness of the oxygen supply.
6. Check anesthesia system leaks; as specified in ***Section 4 – System setup***.

7.7.3 Draining the vaporizer

If the system will be unused for a long period of time, drain the anesthetic agent inside the vaporizer.

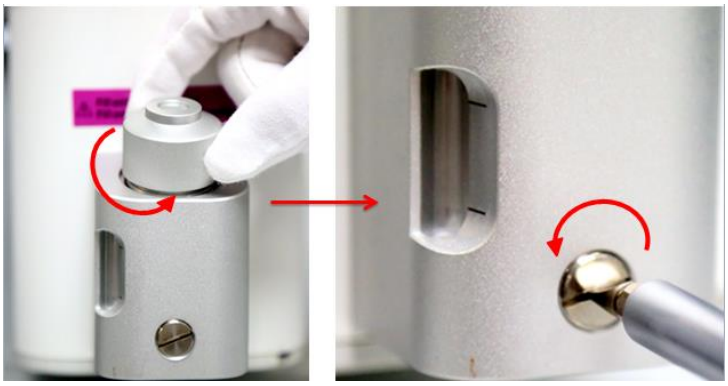
- Perform this procedure in a well-ventilated location.
- Refer to the anesthetic agent manufacturer's MSDS for required personal protective equipment, handling, and disposal of waste anesthetic agent.
- Do not mix the anesthetic agent with other liquid.

Do not wipe spilled anesthetic agent from any painted surfaces or the finish may be damaged. Allow the anesthetic to evaporate.

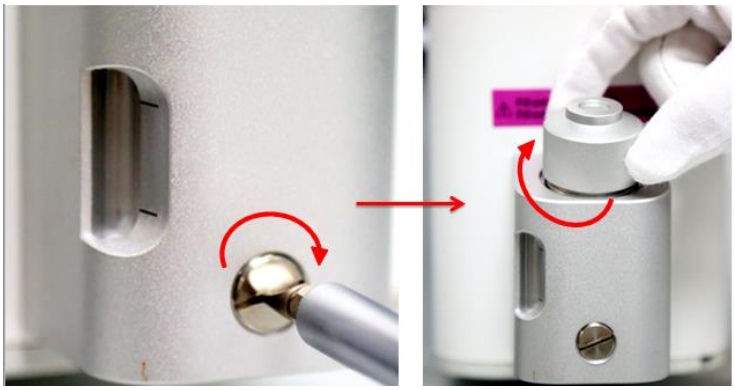
1) Make sure the oxygen supply is OFF and vaporizer is set to zero.

2) Make sure the anesthesia system is in a well-ventilated area.
3) Attach a drain tube to the drain port. Place the other end of the tube in a receptacle to catch the drained anesthetic agent.

4) Loosen the sealing cap, then loosen the bottom screw with a screwdriver to make the anesthetic agent flow out of the drain port.



5) When the anesthetic agent stops draining from the vaporizer, tighten the bottom screw and sealing cap.



6) Remove the drain tube and deal with the waste anesthetic agent according to your local regulations.

8-Product information

8.1 Overview

This section provides the warranty information, features and specifications of R620-S1 anesthesia system.

8.2 Product warranty

This warranty is only applicable to those new products purchased from RWD or dealers authorized by RWD, as well as the first person to whom it extends.

8.3 Product specifications

Material	**Mainly aluminum alloy**	
Working condition	Temperature：10 ~ 35℃	Humidity：5 ~90 %HR
Storage condition	Temperature：-10 ~ 55℃	Humidity：5 ~ 90 %HR
Oxygen flow rate	0.2~10 L/min, 0.2~8 L/min when concentration >4 %	
Oxygen grade	Medical grade	
Concentration range	Isoflurane：0.5～5 %(v/v), Sevofluran: 0.5～8 %(v/v)	
Settable concentration point	Isoflurane: 0 ~ 0.5 ~ 1.0 ~ 1.5 ~ 2.0 ~ 2.5 ~ 3.0 ~ 3.5 ~ 4.0 ~ 4.5 ~ 5.0 %(v/v) Sevofluran: 0 ~ 0.5 ~ 1.0 ~ 2.0 ~ 3.0 ~ 4.0 ~ 5.0 ~ 6.0 ~ 7.0 ~ 8.0%(v/v)	
Perfusion volume of anesthetic agent	The recommend volume is 100 mL, as the volume between max and min visible liquid level is about 120 mL.	
Consumption of anesthetic agent	About 3 ×oxygen flow rate (L/min) ×set concentration value(% (v/v)) e.g. When the isoflurane concentration is set at 2 % and the oxygen flow rate is set at 600 mL/min, a bottle of isoflurane of 100 mL could be consumed for about 28 hours.	
Loss of anesthetic agent	22℃， dial at 0 %，< 0.5 mL/24h.	
Max pressure load	50 kPa	
Max inclined angle	30 °	

9-Useful information

9.1 Overview

This section provides information that may be helpful to the users of R620-S1 anesthesia systems.

9.2 Pressure equivalents

1 atm = 1033 cmH_2O = 760 mmHg = 760 Torr = 1013 mb = 14.7 psi

1 psi = 70.3 cmH_2O = 51.7 mmHg = 68.9 mb = 6.9 kPa

1 mmHg = 1.36 cmH_2O = 1.33 mb

1 cmH2O = 0.736 mmHg = 0.981 mb

9.3 Pressure unit conversions

Table 9-1 Pressure unit conversions

Unit	psi	inchH_2O	kPa	millibar	cmH_2O	mmHg
psi		27.680	6.8947	68.947	70.308	51.715
inch H_2O	$3.6127x10^{-2}$		0.2491	2.491	2.5400	1.8683
kPa	0.14504	4.0147		10.000	10.1973	7.5006
millibar	0.01450	0.40147	0.100		1.01973	0.75006
cmH_2O	$1.4223x10^{-2}$	0.3937	0.09806	0.9806		0.7355
mmHg	$1.9337x10^{-2}$	0.53525	0.13332	1.3332	1.3595	

9.4 Minimum alveolar concentration (MAC) anesthetic levels

Table 9-2 MAC levels

Animal	Halothane	Isoflurane	Sevoflurane
Cat	1.19	1.63	2.58
Dog	0.87	1.3	2.34

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