1-Introduction

1.1 Overview
First of all, sincerely thanks for selecting the R620 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, it will be helpful to work with it better.
RWD has been always dedicated to improving the product function and the service quality, and will reserve the rights to revise the products itself and contents described in the instruction manual at any time without notice in advance.
If you find the practical situations about the supplied goods do not agree with the contents described in the manual, or have any questions or ideas about our products and service, welcome to contact us. For latest information, please visit our web site or contact us immediately.
This manual is applicable to R620 Portable Animal Anesthesia Machine.

1.2 Safety
Operation of an anesthesia system involves oxygen gas pressure and the use of potentially hazardous materials. In order to prevent injury to animals or operators and 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.

1.3 General description
R620 anesthesia machine is a compact and stable equipment designed by RWD Life Science. The principle is that the anesthetic agent transforms from liquid to gas and mixes with oxygen according to a certain proportion for inspiration of animals in order to make them anesthetized.
Figure 1-1 shows a diagram of how the system operates. Before anesthesia can be administered, an oxygen (and/or other medical gas) supply is connected to the anesthesia machine, the vaporizer is filled with anesthetic agent, and absorbent canister is filled with CO₂ absorbent. The breathing bag, animal breathing circuit, and all accessory tubing and bags are then connected. The operator increases the oxygen flow rate by turning the flow meter control valve counterclockwise until the desired rate is indicated on the meter. The breathing bag gradually inflates.
Next, operator can set the anesthetic agent concentration (%) by turning the knob on the vaporizer to the desired setting. The gas mixture flows through the inspiration valve into the animal’s lungs. The animal exhales through the expiration valve into the breathing bag where the exhaled gas mixes with the constantly flowing fresh gas.
In a rebreathing type circuit, the fresh and exhaled gas mixture is forced through the CO₂ absorber where the exhaled carbon dioxide is removed and the ventilation cycle is repeated. The operator determines 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 APL valve.

Figure 1-1 Anesthesia system flow diagram

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Anesthetic vaporizer</td>
<td>7</td>
<td>Animal’s lung</td>
</tr>
<tr>
<td>2</td>
<td>O₂ flowmeter</td>
<td>8</td>
<td>Expiration valve</td>
</tr>
<tr>
<td>3</td>
<td>O₂ flowmeter control valve</td>
<td>9</td>
<td>Breathing bag</td>
</tr>
<tr>
<td>4</td>
<td>O₂ flush button</td>
<td>10</td>
<td>APL valve</td>
</tr>
<tr>
<td>5</td>
<td>Inspiration valve</td>
<td>11</td>
<td>CO₂ absorbent canister</td>
</tr>
<tr>
<td>6</td>
<td>Endotracheal tube connector</td>
<td>12</td>
<td>Pressure gauge (cmH₂O)</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working area</td>
<td>Large enough to accommodate the anesthesia system.</td>
</tr>
<tr>
<td>Gas supply</td>
<td>Medical oxygen</td>
</tr>
<tr>
<td></td>
<td>Pressure: 40-50 psi</td>
</tr>
<tr>
<td>Environment</td>
<td>Storage temperature: -40 - 55 ℃</td>
</tr>
<tr>
<td></td>
<td>Operating temperature: 15-35 ℃</td>
</tr>
<tr>
<td></td>
<td>Relative humidity: 5-90 %</td>
</tr>
</tbody>
</table>

1.5 System standard features

Figure 1-2 Device body of R620
<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>Main support</td>
<td>⑦</td>
<td>Vaporizer</td>
</tr>
<tr>
<td>②</td>
<td>O₂ flowmeter</td>
<td>⑧</td>
<td>Pressure gauge (cmH₂O)</td>
</tr>
<tr>
<td>③</td>
<td>O₂ flush button</td>
<td>⑨</td>
<td>APL valve</td>
</tr>
<tr>
<td>④</td>
<td>Inspiration &amp; expiration valve component</td>
<td>⑩</td>
<td>Non-rebreathing circuit connector</td>
</tr>
<tr>
<td>⑤</td>
<td>Endotracheal tube/ mask connector plug</td>
<td>⑪</td>
<td>Breathing bag mount</td>
</tr>
<tr>
<td>⑥</td>
<td>CO₂ absorbent canister</td>
<td>⑫</td>
<td>Rebreathing circuit connector</td>
</tr>
</tbody>
</table>

① Main support
Solid metal support for assembling of following component.

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 O₂ flush button
Press to deliver the oxygen directly to breathing circuit. It is generally used to flush the anesthetic gas in system or in emergency.

④ Inspiration & expiration valve module
The one-way valve is made up with floatable discs and nickel-plated brass valve to control gas flow direction to form gas circulation in system. It makes sure the animal will not inhale the gas just exhaled. The floatable discs go up and down as animal breaths, and operator can confirm the respiratory status with the floatable discs.

⑤ Endotracheal tube/ mask connector plug
Used for placing the endotracheal tube/ mask connector. Meanwhile the plug blocks the breathing circuit, it’s useful for system leak detection, adjusting system pressure and flushing circuit.

⑥ CO₂ absorbent canister
The absorbent canister is filled with a granular carbon dioxide absorbent material eg. soda lime. It uses a coaxial gas flow path to provide for more efficient use of absorbent, while reducing flow resistance. The chemical reaction that takes place in the canister creates heat and humidity, which is added to the delivery of anesthesia to the animal.
7 Vaporizer

The vaporizer is the most complicated and expensive part of the anesthesia system. More attention should be paid to its maintenance and operation. 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. The coiled pipe design inside the vaporizer ensures the output is not affected by the fluctuation of pressure, temperature and gas flow. The inner design of the vaporizer is different according to the anesthetic agent. Please use the correct anesthetic agent following the tag on the vaporizer. The misuse may cause the damage to the equipment and animal.

5 Pressure gauge

Measures and displays the pressure of gas mixture in breathing circuit.

9 APL valve

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 APL valve to keep the pressure stable. Usually, the outlet of the valve is connected to a gas filter canister.

10 Non-rebreathing connector

Used for connecting to a non-rebreathing circuit, which is generally applicable to animals below 7 kg.

11 Breathing bag mount

Used for connecting to a breathing bag when using the anesthesia system in a rebreathing circuit configuration.

12 Rebreathing circuit connector

Used for connecting to a rebreathing circuit, which is generally applicable to animals over 7 kg.
2-Safety

2.1 Overview
This section provides basic safety information necessary for operating your R620 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 the operation and maintenance should follow the instructions of this manual. Misuse of your system may result in injury to animals and operators or damage to property. Misuse includes:
- Using inappropriate gas and anesthetic agents
- Making unauthorized modifications to the equipment
- Operating the system using gas pressure exceeding maximum ratings

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 anesthesia system.

2.4.1 Animal and operator safety
- Always keep a backup anesthesia delivery plan in case of an emergency occur.
- 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 guarantee period, annual service inspections to ensure proper operation is 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 things on the anesthesia system.

Make sure that the oxygen hose does not cross walkways and aisles. This may present a tripping hazard.

Wearing personal protective equipments is suggested.

Make sure the oxygen hose is securely connected to the system before starting a procedure.

Make sure that any exhaled gas containing anesthetic is recovered or 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 (O₂) saturation, carbon dioxide (CO₂) level, and anesthetic agent level at all times when operating the system.

Remove the system from service if any indications of improper function exist.

Never pour water or any other fluids into the anesthetic vaporizer. Fill vaporizer only with the anesthetic agent for which it is designed.

Avoid use of oil or grease on any anesthesia or respiratory equipment where oxygen is used. An explosion may occur.

Make sure the pressure of the oxygen is between 40-50 psi.

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 on top of the anesthesia equipment.

Follow all recommended system maintenance procedures specified in Section 7 – Maintenance.

Keep appropriate distance from the wall to ensure a stable gas supply.

2.4.3 Facility environment 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 items contaminated with hazardous materials should be 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 assembling procedure for your R620 anesthesia system.

3.2 Unpacking the system
Your system is shipped in boxes that have been carefully packed at the factory for safe delivery of the system to you. 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. Taking photos is suggested for keeping the evidence.
- 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 ordered are included. In case there is any doubt or need any help, contact RWD or local dealer immediately.

3.3 Assembling the system

3.3.1 Assembling portable base

![Assembling portable base images](image_url)
3.3.2 Assembling main support and vaporizer
3.3.3 Assembling CO₂ absorbent canister

3.3.4 Assembling monitor tray and gas filter canister
3.3.5 Assembling breathing bag and rebreathing circuit
4-System setup

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

4.2 Materials and supplies
- Oxygen supply source (40-50 psi, user-provided)
- Connection tube for oxygen source and flowmeter (optional)
- Animal breathing circuit (contained)
- Breathing bag (contained)
- CO₂ absorbent (optional)
- Anesthetic agent (optional)
- Wrench for tightening oxygen supply fitting (user-provided)

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 CO₂ absorbent canister with absorbent as follows:
   - Hold the absorbent canister (VERY IMPORTANT!) while turning the canister fastener knob for removing the absorbent canister.
   - Fill the absorbent canister with CO₂ absorbent to within 2-3 cm of the top of the canister.
- Reinstall the absorbent canister and tighten the knob.

3) System leak checking

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

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

- Close the APL valve completely by clockwise rotating regulator.
Open oxygen source, adjust the needle oxygen regulator between 40 to 50 psi by clockwise rotating regulator.

Turn on the oxygen flowmeter control valve, increase the flow rate up to 1 L/min. The system pressure will increase with oxygen flowed into system. Operator can also increase the pressure by pressing oxygen flush button. Turn off the flowmeter control valve when the needle of pressure gauge goes up to about 20 cmH₂O.

Observe the needle of pressure gauge, there is no leak in the system if the needle keeps its level. On the other hand, system leaks if the needle drops down, operator needs to check all the connection in the system. In case there is any doubt or need any help, contact RWD or local dealer immediately.

4) 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 up to 1 L/min. The system pressure will increase with oxygen flowed into system.

• Turn the APL valve clockwise to increase system pressure, and pay attention to the needle of pressure gauge. Stop rotating until it reaches a appropriate pressure, which is recommended not to be over 20 cmH₂O;
• Turn off the flowmeter, and reconnect the breathing bag and rebreathing circuit.

4.3.2.1 Filling the anesthetic vaporizer - Pour Fil

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

2) Carefully pour appropriate agent into the filler port. Observe the agent level sight glass on vaporizer. Keep agent level inside tube between the two marks.
3) Tighten the sealing cap.

4.3.2.2 Filling the anesthetic vaporizer - Easy Fil

1) Turn and remove the sealing cap of the vaporizer. Check the black sealing ring.
2) Mount an adaptor onto the isoflurane bottle, insert into filler port along the groove, and press it in the end.

3) Observe the agent level sight glass on the vaporizer. Keep the agent level inside the tube between the two marks.

4) Tighten the sealing cap.
5- Operation

5.1 Overview
This section provides the procedures and information needed to successfully operate your R620 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 is filled into the vaporizer.
- Make sure the vaporizer volume-percent dial is set to zero (0).
- Confirm that the CO$_2$ absorbent canister is filled within 2-3 cm of the top and that absorbent has not expired. Refill the canister with fresh absorbent if necessary.
- Ensure the oxygen source is connected with anesthesia system closely.
- Ensure the pressure of oxygen supply is between 40-50 psi and it is enough during the complete experiment.
- Make sure the O$_2$ control valve works properly.
- Confirm that the breathing circuit is clear and clean and check the ventilation and cleanliness of the experimental environment.

5.3 Anesthesia procedure
1) Wear anesthesia mask or do endotracheal intubation for animal after anesthesia 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 value. Pressing of dial lock key is necessary only when the concentration is set from position “0”.

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

5.4 Using the oxygen flush button
If the animal needs high concentrations of oxygen instantaneously, 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 again be administered.

Use caution on the pressure gauge while using to avoid overpressure.
5.5 Using the non-rebreathing circuit

A non-rebreathing circuit is recommended for animals below 7kg. The exhaled gas will not go through CO₂ absorbent canister, but be directly exhausted into the gas filter canister or outdoor when anesthesia system is used with a non-rebreathing circuit.

5.6 Post-anesthesia procedure

Once the anesthesia procedure is completed, 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 put the connector onto the plug on the main support of anesthesia system.
3) Close the flowmeter valve by turning the knob clockwise until the oxygen flow reads zero (0).
4) Press the oxygen flush button for 2-3 seconds and squeeze the breathing bag to purge the system of anesthetic gas and carbon dioxide.
5) Cut off the oxygen supply source.
6) Open the APL valve by turning it counterclockwise.
7) Record the used time of absorbent in the CO₂ absorbent canister. If the total time is over 10 h, change the absorbent as described in Section 4 – System Setup.
8) If the system will be vacant for a long time, drain the anesthetic agent inside the vaporizer as described in Section 7 – Maintenance.
9) 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 anesthesia system and recommended corrective actions. If you experience problems are 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 is necessary, such as wearing gloves, 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 resolution should be kept. Such records should include the date, the nature of the problem encountered, and the actions that resolved the problem.

6.5 Problem – Solution matrix
Table 6-1 contains problems that may occur during operation of your R620 anesthesia system and their corrective actions. If you continue experiencing a problem after trying the suggested corrective actions, please contact RWD or local dealer for support.
<table>
<thead>
<tr>
<th>No.</th>
<th>Problem</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No or low anesthetic vapor output</td>
<td>a. Vaporizer is functioning properly, but machine output is not getting to animal</td>
<td>Check breathing system components for leaks, tears, holes, etc. Ensure the mask/endotracheal tube makes a good seal with the animal.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. Anesthetic agent reservoir is empty</td>
<td>Fill the reservoir with appropriate anesthetic agent.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c. Vaporizer is turned off</td>
<td>Press the dial lock key on the vaporizer and adjust the dial to the desired volume-percent of anesthetic.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>d. Leak around the vaporizer filler port</td>
<td>Make sure the sealing cap on the vaporizer is fully closed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>e. Vaporizer malfunction – internal fault</td>
<td>Contact RWD or local dealer for servicing.</td>
</tr>
<tr>
<td>2</td>
<td>APL valve knob is hard to turn</td>
<td>APL valve threads require cleaning</td>
<td>Contact RWD or local dealer for servicing.</td>
</tr>
<tr>
<td>3</td>
<td>Needle on system pressure gauge is stuck and does not move</td>
<td>Mechanical damage</td>
<td>Replace pressure gauge. Contact RWD or local dealer for servicing.</td>
</tr>
<tr>
<td>4</td>
<td>Needle on system pressure gauge does not read zero (0) or is fluctuating when all gases are turned off</td>
<td>Gauge requires adjustment</td>
<td>Carefully remove lens cover from pressure gauge with knife blade or screw driver and adjust set screw with jeweler’s screw driver to “0” position.</td>
</tr>
<tr>
<td>5</td>
<td>Needle on system pressure gauge indicates several centimeters of positive pressure after exhalation has ended</td>
<td>Constriction or obstruction downstream from the APL valve</td>
<td>Disconnect the APL valve exhaust hose and monitor the pressure gauge. If the pressure does not return to zero, contact RWD or local dealer for servicing. If pressure returns to zero: a. Check the exhaust hose for possible obstruction due to moisture buildup or debris. b. Remove the obstruction. c. Reconnect the hose to the APL valve.</td>
</tr>
<tr>
<td>No.</td>
<td>Problem</td>
<td>Cause</td>
<td>Solution</td>
</tr>
<tr>
<td>-----</td>
<td>------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>6</td>
<td>Needle on system pressure gauge indicates a negative pressure</td>
<td>Inadequate fresh gas flow</td>
<td>Increase fresh gas flow rates.</td>
</tr>
<tr>
<td>7</td>
<td>Animal sleep level seems too light</td>
<td>a. Vaporizer is empty</td>
<td>Fill vaporizer with the appropriate anesthetic agent.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. Anesthetic concentration is set too low</td>
<td>Adjust the dial to increase the volume-percent of anesthetic.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c. Leak in animal breathing circuit</td>
<td>Check breathing system components for leaks, tears, holes, etc. Ensure the mask/endotracheal tube makes a good seal with the animal.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>d. Excessive CO₂ build-up</td>
<td>1. Check CO₂ absorbent and replace if necessary.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Check proper function of inspiration and expiration valves.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>e. Leak around the vaporizer filler port</td>
<td>Make sure the sealing cap on the vaporizer is fully closed.</td>
</tr>
<tr>
<td>8</td>
<td>Animal sleep level seems too deep</td>
<td>a. Anesthetic concentration is set too high</td>
<td>Adjust the dial to reduce the volume-percent of anesthetic.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. Vaporizer malfunction</td>
<td>Contact RWD or local dealer for servicing.</td>
</tr>
<tr>
<td>9</td>
<td>Breathing bag is overly distended</td>
<td>a. Pop-off valve is closed</td>
<td>Open the pop-off valve.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. Flow rate is set too high</td>
<td>Turn the flowmeter valve knob clockwise to decrease the oxygen flow rate.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c. The outlet port of pop-off valve is clogged up</td>
<td>Check and clean the outlet port of pop-off valve.</td>
</tr>
<tr>
<td>10</td>
<td>Gas is flowing, but breathing bag does not inflate</td>
<td>a. Breathing bag is punctured</td>
<td>Renew the breathing bag.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. Pop-off valve is completely open</td>
<td>Turn the knob on the pop-off valve counterclockwise until the bag starts to inflate.</td>
</tr>
<tr>
<td>11</td>
<td>Gas flow is leaving through expiration port when squeezing breathing bag</td>
<td>One way valve inside is broken</td>
<td>Contact RWD or local dealer for servicing.</td>
</tr>
</tbody>
</table>
Table 6-1 R620 anesthesia system: Problem – Solution Matrix (continued)

<table>
<thead>
<tr>
<th>No.</th>
<th>Problem</th>
<th>Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>No gas flow</td>
<td>a. Facility or cylinder gas supply valve is closed</td>
<td>Open gas supply valve.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. Gas cylinder is empty</td>
<td>Replace empty gas cylinder.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c. Gas supply hose is disconnected</td>
<td>1. Ensure gas supply hose is connected to the cylinder or facility gas system.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Ensure the gas supply hose is securely connected to the anesthesia system.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>d. Oxygen flow control turned off</td>
<td>Turn the flowmeter valve knob counterclockwise to increase the oxygen flow rate.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>e. Gas supply regulator malfunction</td>
<td>Connect the system to an alternate oxygen supply.</td>
</tr>
<tr>
<td>13</td>
<td>Gas flow is not sufficient</td>
<td>a. Oxygen flow is set too low</td>
<td>Turn the flowmeter valve knob counterclockwise to increase the oxygen flow rate.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. Leak around vaporizer inlet port</td>
<td>1. Make sure the sealing cap at the inlet port is fully closed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Verify that inlet port is not obstructed by animal hair, etc.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>c. Leak in animal breathing circuit</td>
<td>Check all hose connections, particularly around mask or endotracheal tube.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>d. CO₂ absorbent canister is leaking</td>
<td>1. Shut down the anesthesia system.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Remove the absorbent canister.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. Remove any absorbent granules that are lodged between the canister and sealing gasket.</td>
</tr>
<tr>
<td>14</td>
<td>Oxygen flush button sticks</td>
<td>Valve inside malfunctions</td>
<td>The valve requires cleaning or replacement.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Contact RWD or local dealer for servicing.</td>
</tr>
<tr>
<td>15</td>
<td>Float in oxygen flowmeter sticks</td>
<td>Dirty flow tube</td>
<td>Flow tube needs cleaning.</td>
</tr>
<tr>
<td>16</td>
<td>Oxygen flow control valve knob is hard to turn</td>
<td>Dirty or damaged needle valve</td>
<td>Flow valve needs cleaning or replacement.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Contact RWD or local dealer for servicing.</td>
</tr>
<tr>
<td>17</td>
<td>Oxygen flow failure</td>
<td>Internal fault</td>
<td>Contact RWD or local dealer for servicing.</td>
</tr>
<tr>
<td>18</td>
<td>Audible leakage around oxygen hose connector</td>
<td>a. Loose oxygen hose connection</td>
<td>Tighten the connection with a crescent wrench.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>b. Tube does not fit.</td>
<td>Replace the tube.</td>
</tr>
</tbody>
</table>
7- Maintenance

7.1 Overview
This section provides the maintenance procedures to keep your R620 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 is necessary, such as wearing gloves, mask and eye protection.

7.3 Annual inspection
RWD recommends that your R620 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, mask, and eye protection during all cleaning procedures.**

7.7.1 Required materials and supplies
- Germicidal cleaner
- CO₂ 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 CO₂ absorbent canister for exhausted absorbent. If its total use time is over 10 h, replace it as follows:
   a. Remove the canister from the bottom of the machine and shake out the spent absorbent.

   ![Warning: 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 CO₂ absorbent material to within 2-3 cm of the top edge.
   f. 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 vacant for a long 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 and handling and disposal of waste anesthetic agent.
   - Do not mix the anesthetic agent with other liquid.

   ![Warning: 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) The method of draining vaporizer is different for Pour Fil and Easy Fil type:
   i. Pour Fil type vaporizer:
      a) Loosen the sealing cap and overturn it onto the internal core.
b) Remove the internal core to make the anesthetic agent flows naturally.

c) When the anesthetic agent stops draining from the vaporizer, tighten the internal core and sealing cap.

ii. Easy Fil type vaporizer:
    a) Loosen the sealing cap, then loosen the bottom screw with a screwdriver to make the anesthetic agent flows naturally.
b) When the anesthetic agent stops draining from the vaporizer, tighten the bottom screw and sealing cap.

5) Remove the drain tube and deal with the waste anesthetic agent according to the regulations.

6) If the anesthesia system is vacant more than 6 months, use oxygen to flush the vaporizer thoroughly.

8-Product information

8.1 Overview
This section provides the warranty information, features and specifications of R620 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 features
- Standard closed circuit breathing loop design;
- Applicable to cats, dogs, monkeys, pigs and other animals of 100kg weight or less;
- Two options available: open and semi-open anesthesia mode;
- The oxygen flow meter adjustable ranges from 0.1 to 4 L/min;
- With oxygen flush function to replace the system with pure oxygen very quickly;
- With APL automatic pressure relief feature to protect animal from damage caused by excessive pressure. Adjustable pressure range is -20 to +120 cm H₂O;
- CO₂ absorbent canister (1100 ml) is installed in the front part of the machine that is easy to observe and disassemble for changing;
- Newly designed vaporizer provides enough flow of anesthetic gas for animal;
- The concentration of anesthetic gas from the vaporizer can be adjusted from 0 to 5%, without effect by fluctuation of flux, temperature, flow rate and pressure. The safety locking device well prevents accidental volatilization of anesthetic agent;
- Dual-channel flowmeter is optional;
- Compact and easy to clean;

8.4 Product specifications

<table>
<thead>
<tr>
<th>Material</th>
<th>Mainly aluminum alloy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working condition</td>
<td>Temperature: 15 ~ 35 °C  Humidity: 5 ~ 90 %</td>
</tr>
<tr>
<td>Storage condition</td>
<td>Temperature: -40 ~ 55 °C  Humidity: 5 ~ 90 %</td>
</tr>
<tr>
<td>Oxygen flow rate</td>
<td>0.2<del>15 L/min, 0.2</del>8 L/min when concentration &gt;4 %</td>
</tr>
<tr>
<td>Oxygen grade</td>
<td>Medical grade</td>
</tr>
<tr>
<td>Concentration range</td>
<td>Isoflurane: 0.2<del>5 %(v/v), Sevofluran: 0.2</del>8 %(v/v)</td>
</tr>
<tr>
<td>Settable concentration point</td>
<td>Isoflurane: 0 ~ 0.2 ~ 0.5 ~ 1.0 ~ 1.5 ~ 2.0 ~ 2.5 ~ 3.0 ~ 3.5 ~ 4.0 ~ 4.5 ~ 5.0 %(v/v)   Sevofluran: 0 ~ 0.2 ~ 0.5 ~ 1.0 ~ 1.5 ~ 2.0 ~ 2.5 ~ 3.0 ~ 3.5 ~ 4.0 ~ 4.5 ~ 5.0 ~ 6.0 ~ 7.0 ~ 8.0%(v/v)</td>
</tr>
<tr>
<td>Perfusion volume of anesthetic agent</td>
<td>The recommend volume is 100 mL, as the volume between max and min visible liquid level is about 120 mL.</td>
</tr>
</tbody>
</table>
| 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 28~30 hours. |
| Loss of anesthetic agent       | 22 °C, dial at 0 %, < 0.5 mL/24h. |
| Max pressure load              | 100 kPa               |
| Max inclined angle             | 30°                   |
9-Useful information

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

9.2 Pressure equivalents

1 atm = 1033 cmH₂O = 760 mmHg = 760 Torr = 1013 mb = 14.7 psi
1 psi = 70.3 cmH₂O = 51.7 mmHg = 68.9 mb = 6.9 kPa
1 mmHg = 1.36 cmH₂O = 1.33 mb
1 cmH₂O = 0.736 mmHg = 0.981 mb

9.3 Pressure unit conversions

Table 9-1 Pressure unit conversions

<table>
<thead>
<tr>
<th>Unit</th>
<th>psi</th>
<th>inchH₂O</th>
<th>kPa</th>
<th>millibar</th>
<th>cmH₂O</th>
<th>mmHg</th>
</tr>
</thead>
<tbody>
<tr>
<td>psi</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>inch H₂O</td>
<td>3.6127x10⁻²</td>
<td></td>
<td>0.2491</td>
<td>2.491</td>
<td>2.5400</td>
<td>1.8683</td>
</tr>
<tr>
<td>kPa</td>
<td>0.14504</td>
<td>4.0147</td>
<td></td>
<td>10.000</td>
<td>10.1973</td>
<td>7.5006</td>
</tr>
<tr>
<td>millibar</td>
<td>0.01450</td>
<td>0.40147</td>
<td>0.100</td>
<td></td>
<td>1.01973</td>
<td>0.75006</td>
</tr>
<tr>
<td>cmH₂O</td>
<td>1.4223x10⁻²</td>
<td></td>
<td>0.09806</td>
<td>0.9806</td>
<td></td>
<td>0.7355</td>
</tr>
<tr>
<td>mmHg</td>
<td>1.9337x10⁻²</td>
<td>0.53525</td>
<td>0.13332</td>
<td>1.3332</td>
<td>1.3595</td>
<td></td>
</tr>
</tbody>
</table>

9.4 Minimum alveolar concentration (MAC) anesthetic levels

Table 9-2 MAC levels

<table>
<thead>
<tr>
<th>Animal</th>
<th>Halothane</th>
<th>Isoflurane</th>
<th>Sevoflurane</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cat</td>
<td>1.19</td>
<td>1.63</td>
<td>2.58</td>
</tr>
<tr>
<td>Dog</td>
<td>0.87</td>
<td>1.3</td>
<td>2.34</td>
</tr>
<tr>
<td>Horse</td>
<td>0.88</td>
<td>1.31</td>
<td>2.34</td>
</tr>
</tbody>
</table>
RWD Life Science

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