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# OPERATION GUIDE

## Veterinary Anesthesia Machine

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**\*\* Assembly instructions next page \*\***



**Please Note:**

**Shown with optional anesthesia monitor**

**Your machine stand may vary from pictures in manual.**

## About this Manual

This operation guide contains important information for safe use of the product. Read and understand the entire contents of instructions before use.

The purpose of this document is to provide the user with adequately detailed documentation to install, operate and maintain the equipment efficiently.

Please keep this manual on hand for easy reference.

## Assemble your Machine

BMS - Mobile base only

BMT (table top) & BMW (wall mount) are shipped fully assembled

1. Unbox and remove all the packing material and protective stretch wrap on each item.
2. Your vaporizer will likely be shipped in a separate box (do not use any screws included in the vaporizer box)
3. Find the included screwdriver, wrench and small bag of screws for vaporizer (attached to this manual)
4. Place the 5 wheel base upside down on a level floor. Find the box with 5 wheels and push the stem into the holes in bottom of the base.
5. If you ordered the optional oxygen yoke for E tank use mount that part now by sliding the post through the U bolts and tightening the bolt securely. The yokes should align parallel to the holes in the top plate on the post. You can determine final mounting height after complete assembly of the machine and with an oxygen tank.
6. Insert the tapered end of post into the hole in the base. Please note there should be a black plastic piece on the bottom of the post, if you do not see that part please check through the packing material/box.
7. Follow the instructions on the white stickers (removable) on the post top and black shelf top. First mount the shelf onto the post top plate. Next install the vaporizer as far to the left as possible, then the flowmeter and then the absorber assembly.
8. Each sticker describes which screws/washers/nuts to use and where to place them.
9. The flowmeter, absorber assembly and connectors to the vaporizer are all pre-connected. You can remove the white tubing to the top of the flowmeter to feed through the hole in the shelf and the same with the white tubing from the outlet side of the flowmeter to the inlet nipple on the absorber (feed it through the hold in the front face for the shelf).
10. Find the inhalation/exhalation valves and bag mount parts inside the sodasorb canister. The valves screws on, doesn't matter which one goes on which side and the bag mount just pushes into the hole the right side.
11. Attach the metal "cage" (looks like a water bottle holder) for your waste gas charcoal canister (F/Air), using the included screw clamp, onto the post (near the base).
12. Push the white corrugated tubing onto the outlet port of the pop-off (APL) valve. The other end fits onto standard waste gas charcoal canisters.

*Note: the waste gas hose (blue) on the non-rebreathing circuit has an adapter (white plastic) pre-installed by us to fit onto charcoal canisters, be sure you retain this adapter when replacing your non-rebreathing circuit, it's not supplied by the manufacturers of the non-rebreathing circuit).*

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## CHAPTER 1: INTRODUCTION

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### Intended Use

This machine is intended for Veterinary Use Only.

Not for Human Use.

### Safety Instructions

This manual uses two safety flags to indicate different levels of risk.

#### **WARNING**

If critical situations that could lead to operator or patient's injury is assumed by mishandling of the product.





#### **CAUTION**

If critical situations that could lead to product damage assumed by mishandling of the product.

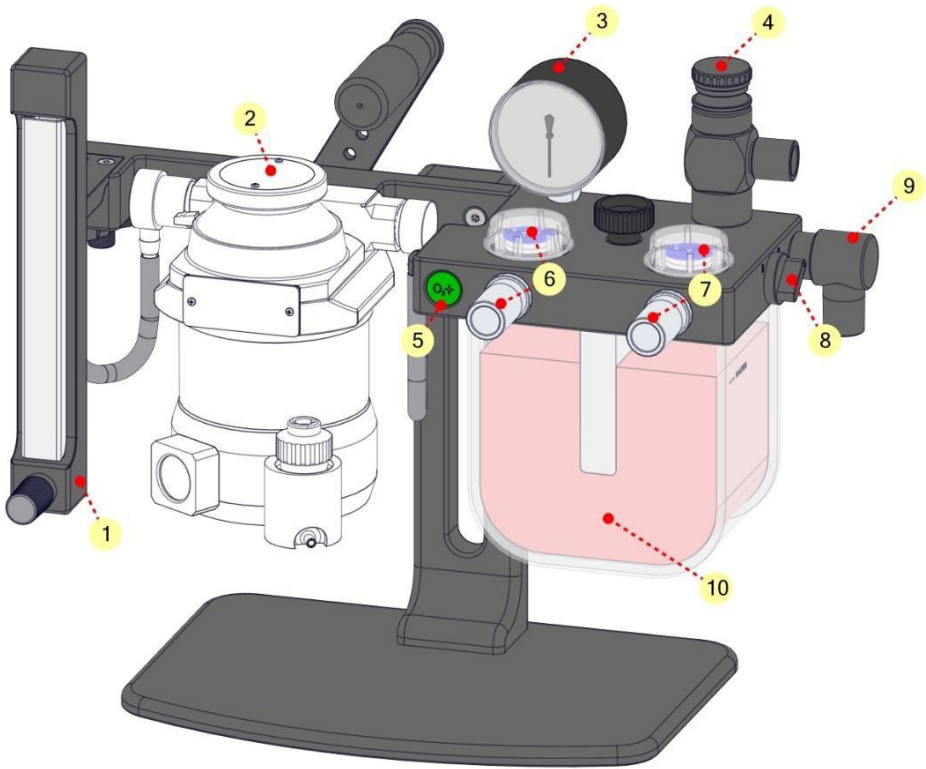
Read these warnings, cautions and instructions before using this anesthesia machine. Failure to properly follow these instructions could result in death or serious injury to the operator or patient.

This section provides basic safety information necessary for operating your VAM-510

### **WARNINGS**

-  This device is intended for use by persons trained in professional veterinary care. The operator must be thoroughly familiar with the information in this manual before using the equipment.
-  Improper Setup, Use, or Maintenance of anesthetic agents and compressed gas in conjunction with this machine may result in serious injury or death.
-  It is the Operator's responsibility to Pressure Test the anesthesia machine on a daily basis, before using the machine on a patient. Failure to do so may result in operator exposure to anesthetic agents and decreased level of anesthetic and oxygen delivered to the patient.
-  It is the Operator's responsibility to supply and maintain an adequate waste gas removal system. Failure to do so may result in operator exposure to anesthetic agents.

## Get Familiar with the Machine



### **1. Flowmeter**

The flowmeter controls the delivery of oxygen into the breathing circuit. The standard Flowmeter reads from 0.2 to 4.0 LPM (other ranges are available).

### **2. Vaporizer (Optional)**

The vaporizer changes a liquid anesthetic agent into its vapor and delivers given concentration of anesthetic agent in a safe and reliable manner.

### **3. Manometer**

The pressure manometer used during a pressure test of the anesthesia machine for leak detection. And provides a visual measurement of the patient airway pressure.

### **4. Pop-off Valve**

The pop-off valve directs the waste anesthetic gas from the machine to a scavenging system. In the completely open position, the pop-off valve will release pressure at 2 cm H<sub>2</sub>O, while maintaining a constant passive volume in the breathing bag. The valve will relief as a protection when pressure reaches 60 cmH<sub>2</sub>O in closed position.

### **5. Oxygen Flush Valve**

This valve is used to quickly deliver oxygen to the patient (bypasses the vaporizer). It is also used to pressure test the anesthesia machine.

### **6. Inhalation Valve/ Port**

This valve opens to allow fresh anesthetic gas and oxygen delivery to the patient during inhalation. It closes during exhalation.

### **7. Exhalation Valve/ Port**

This valve opens to allow exhaled gas to circulate through the CO<sub>2</sub> absorber canister and closes during inhalation to prevent rebreathing of carbon dioxide.

### **8. Circuit Switch Valve**

This valve is used to turn on or off the exhaled gas airway for entering the absorber canister. The exhaled gas circulate through the absorber canister when this valve is turned ON, flows to the breathing bag and pop-off valve without entering the absorber canister when this valve is in OFF position.

### **9. Breathing Bag Port**

The breathing bag port is used to connect a breathing bag or ventilator hose.

### **10. CO<sub>2</sub> Absorbent Canister**

The canister holds absorbent to remove carbon dioxide from the re-circulating anesthetic and oxygen.

## CHAPTER 2: HOW TO USE

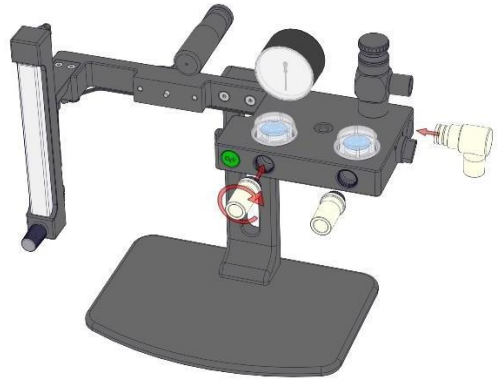
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### Set Up the Machine

#### 1. Install breathing circuit and bag fittings

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- Locate inhalation/exhalation ports and bag mount port inside the soda sorb canister.
- Screw and tighten the inhalation/exhalation ports.
- Attach the breathing bag fitting using a push and twist action.



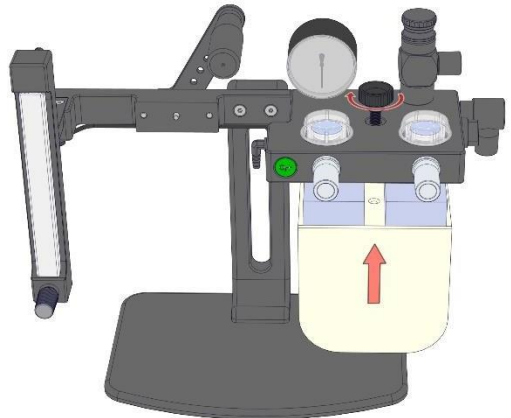
#### 2. Attach the CO<sub>2</sub> Absorbent Canister

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- Align the screw hole on the canister with the fixing knob, match the top surface of the canister with the rectangular notch underneath the circuit block.
- Secure the canister by tightening the fixing knob.

**⚠ CAUTION**

Do not overtighten the fixing knob.

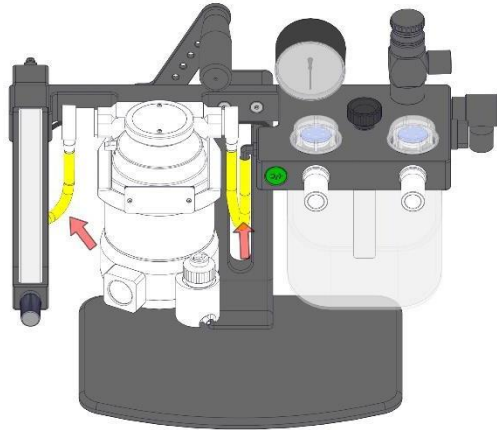
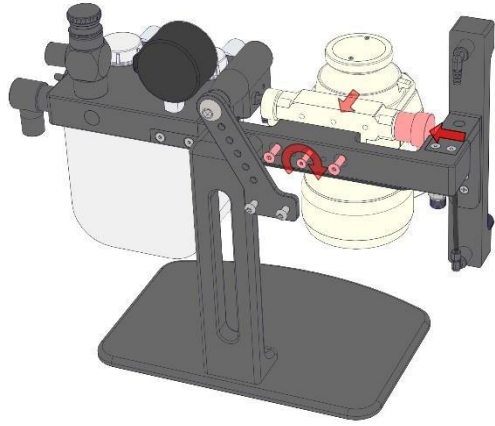




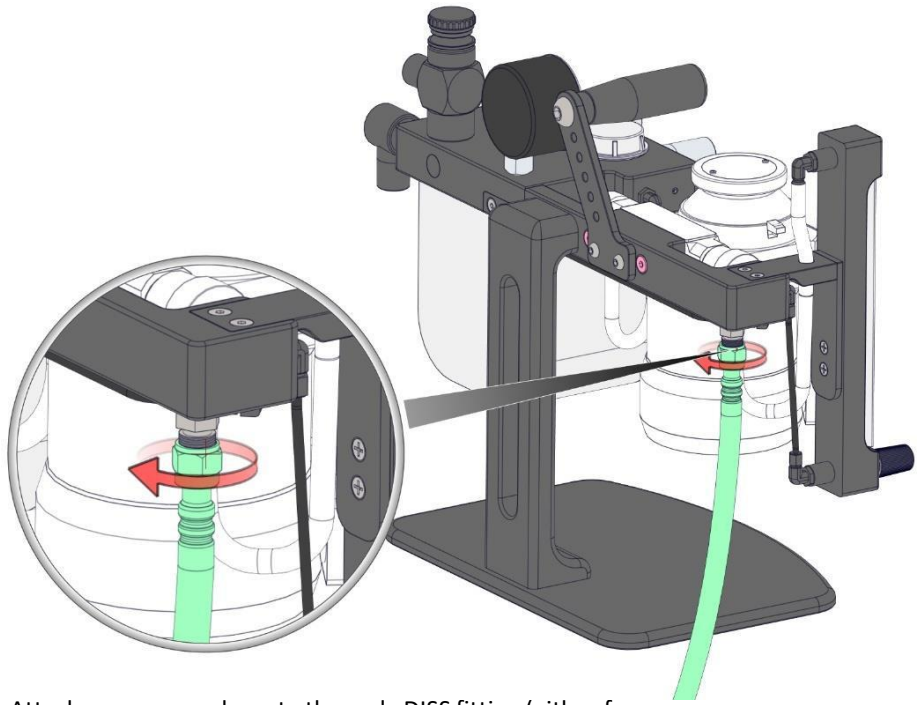
### 3. Mount the Vaporizer

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- a) Using the parts from the small bag labeled "vaporizer mounting screws", follow the instructions on the white sticker.
- b) Push on the metal inlet/outlet "ear" pieces to the vaporizer inlet/outlet ports (they are different sizes so you can not install incorrectly).



## Connect to the Oxygen Source



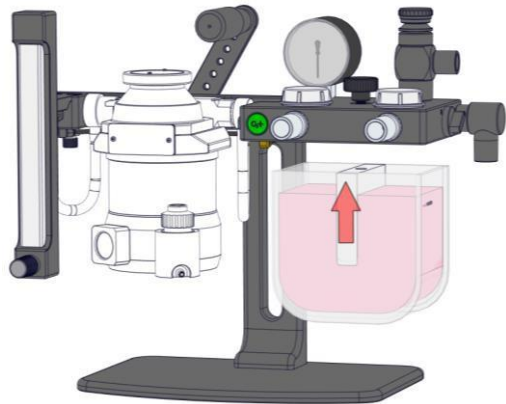
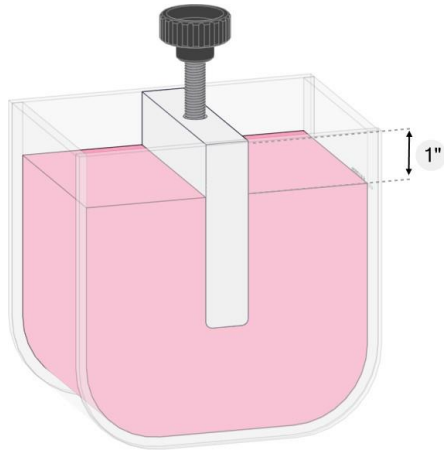
- Attach your oxygen hose to the male DISS fitting (either from your oxygen tank/central oxygen drop and/or the optional oxygen E tank yoke).
- The machine has two oxygen inlets behind the flowmeter, you can use either one or both if you have 2 oxygen sources. They have on-way check valves so no cap is needed.
- Attach the opposite end of the oxygen hose to an oxygen source that is regulated to 50 PSI.

### **⚠ CAUTIONS**

- ⚠** Do not over tighten the oxygen hose on the back of the anesthesia machine as this may inadvertently loosen the male DISS fitting and may result in leakage.
- ⚠** Do not apply compressed gas to the machine that is unregulated. Using compressed gas delivered in excess of 65 psi may damage the flowmeter, gas tubing, and flush valve.

## Filling the CO<sub>2</sub> Absorbent Canister

- a) Unload the absorbent canister from the circuit block.
- b) Screw the fixing knob to the threaded opening at the top of the canister before filling the absorber.
- c) Fill the absorber canister to about 1" from the top, the approximate volume of absorbent is 1200cc at this line.
- d) Unscrew the fixing knob and clean the sealing surface of the canister to ensure good contact with the gasket.
- e) Once the absorber canister is filled, match the top surface of the canister with the notch underneath the circuit block. Secure the canister in place by turning the fixing knob clockwise until hand-tight.



### CAUTIONS

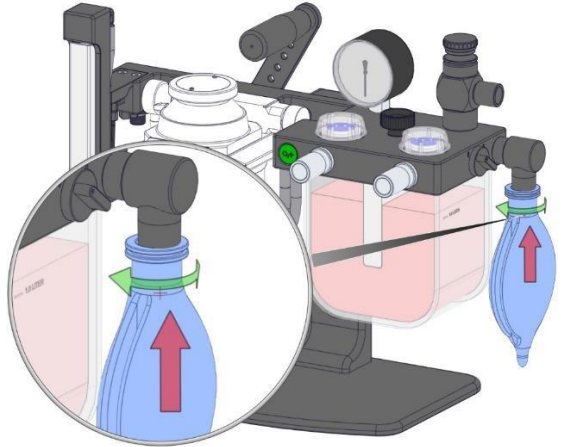
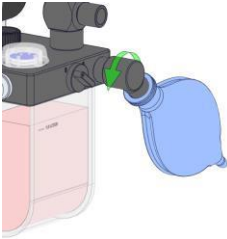
- ⚠ A leak in the anesthesia machine may result if the sealing surface of the absorber canister is not cleaned after filling with absorbent.
- ⚠ Over-tightening the canister fixing knob may cause damage to the canister and result in leakage.

## Filling / Recycling the Anesthetic Agents

Please refer to the OPERATOR MANUAL of the vaporizer.

### Attach the Breathing Bag and Gas Scavenger

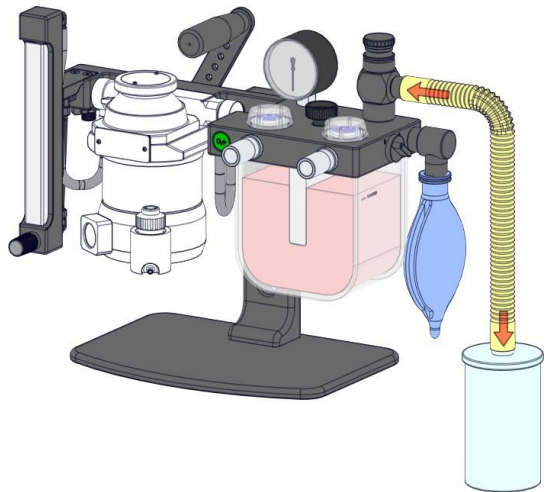
- Attach the breathing bag to the bag port by a push and twist action.
- Turn the bag port fitting counterclockwise if the space is not enough for the inflated bag.



- Attach a charcoal canister or Active Waste Gas Scavenging System to the pop-off valve port.
- Open the pop-off valve completely before use.

#### **i** NOTE

The Pop-Off Valve will be kept in the Closed Position when using a ventilator.

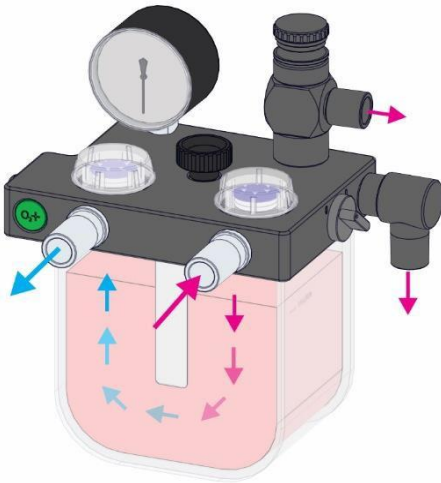
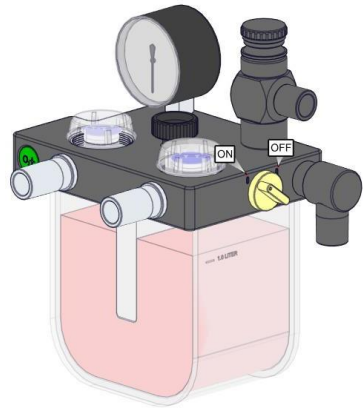


## Select Circulation Mode

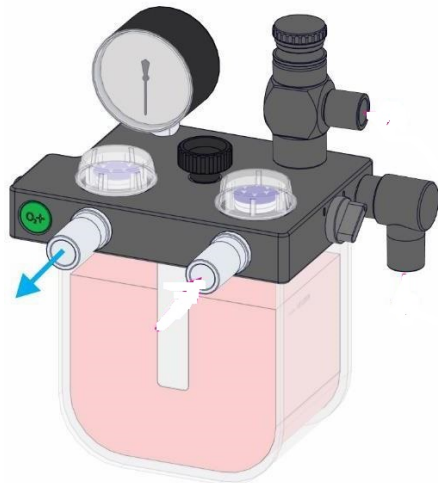
The rebreathing circuit can be opened or closed by a switch located to the right of the circuit block.

Keep the switch ON when using rebreathing circuit. Turn off the switch when using the inhalation port as anesthetic gas outlet for non-breathing circuit.

The following diagrams show the route of gas circulation with each switch position.

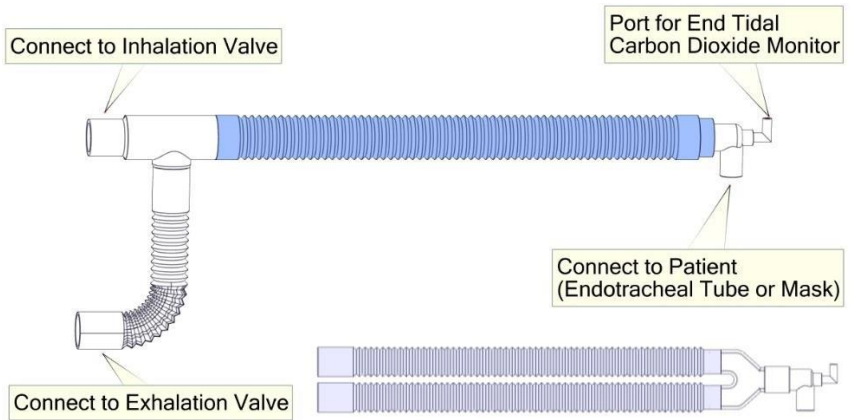


Rebreathing Circuit Switch ON

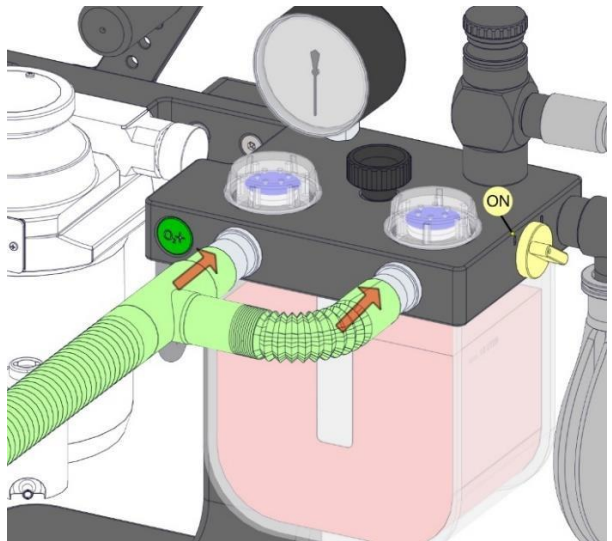


Rebreathing Circuit Switch OFF

## Attach the Rebreathing circuit



- a) Connect the breathing circuit to inhalation and exhalation valve as shown on the figure.
- b) Turn the rebreathing circuit switch to ON position.

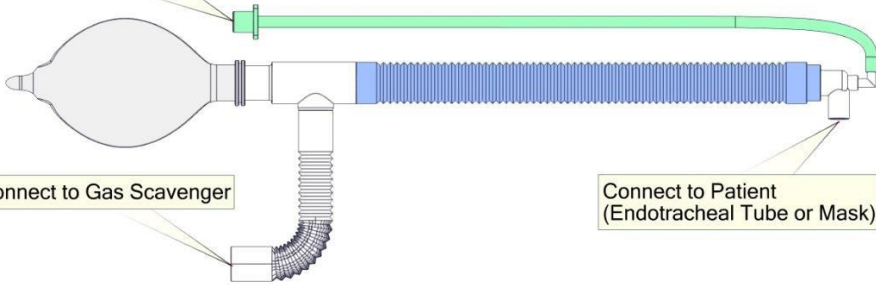


## Attach the Non-rebreathing circuit

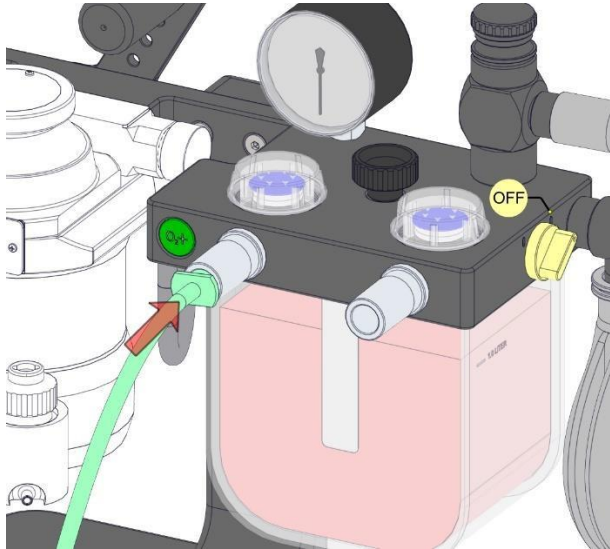
Connect to Fresh Gas Outlet  
(15mm Adaptor)

Connect to Gas Scavenger

Connect to Patient  
(Endotracheal Tube or Mask)



- a) Connect the 15mm adaptor to inhalation valve as shown on the figure.
- b) Turn the rebreathing circuit switch to OFF position.



## Perform a Pressure Test

The pressure test must be performed before using the machine. Please follow the steps listed below.

- a) Check that every parts have been installed properly and all gas fitting are securely connected.
- b) Check that the machine is attached to an oxygen supply that is regulated to 50 PSI, keep flowmeter and pop-off valve closed.
- c) Attach breathing bag and rebreathing circuit on the machine then occlude the patient end of the circuit with finger.
- d) Pressurize the system to 30 cmH<sub>2</sub>O by pressing the oxygen flush valve.
- e) System pressure should not drop more than 5 cmH<sub>2</sub>O in 10 seconds.

If there is a leak, dial in oxygen from the flowmeter to compensate for the leak. Use soapy water solution to locate the leak in the following sequence.

- a) Inhalation / exhalation valves
- b) CO<sub>2</sub> absorbent canister
- c) Pop-off valve
- d) Bag and circuit hoses
- e) Endcaps on the vaporizer
- f) Gas inlet on the circuit block
- g) Gas tubing

### **WARNING**

It is the Operator's responsibility to Pressure Test the anesthesia machine before using the machine on a patient. Failure to do so may result in operator exposure to anesthetic agents and decreased level of anesthetic and oxygen delivered to the patient.



## Before Use Checklist

| # | ITEM TO CHECK   |
|---|---|
| 1 | Check that the flowmeter needle valve operates smoothly and that the ball moves freely within the flow tube.  |
| 2 | Check that the vaporizer is adequately filled with proper agent.  |
| 3 | Check the breathing circuit for proper configuration, secure connections.   |
| 4 | Check the oxygen flush valve operates normally.   |
| 5 | Check the rebreathing circuit switch for proper position.   |
| 6 | Check that pop-off valve is completely opened, the scavenging system is properly connected/turned on and does not have too much draw.                           |
| 7 | Check that the CO2 absorbent canister is filled within 1" of the top and that absorbent has not expired. Refill the canister with fresh absorbent if necessary. |
| 8 | Pressure test the system.   |

### WARNING

Failure to completely open the pop-off Valve during Normal Operation may result in serious injury or death. The pop-off valve should be kept in the open position at all times unless you are giving the patient a manual breath. Note: The pop-off Valve will be kept in the Closed Position when using a ventilator.

## Emergency Shutdown

In the event of a major malfunction, shut down the system as follows:

- a) Turn off the oxygen supply.
- b) Set the vaporizer(s) to zero percent.
- c) Disconnect the facility O2 supply line (if used).
- d) Switch the patient to a backup anesthesia delivery system and continue the medical procedure.
- e) Contact Branton Vet Anesthesia Service for service.

## CHAPTER 3: MAINTENANCE

### Post-anesthesia Procedure

| # | ITEM                      | ACTION  |
|---|---------------------------|---|
| 1 | Flowmeter                 | Close the flowmeter valve by turning the knob clockwise until the oxygen flow reads zero.   |
| 2 | Vaporizer                 | Turn OFF the vaporizer by turning the concentration dial to zero.   |
| 3 | Oxygen Flush Valve        | Press the oxygen flush button for two to three seconds and squeeze the breathing bag to purge the anesthetic gas and exhaled gas in the system. |
| 4 | Oxygen Supply             | Close the oxygen cylinder valve or disconnect the oxygen supply hose from the facility supply system.   |
| 5 | CO <sub>2</sub> Absorbent | If the color has changed or after approximately 8 to 10 hours of surgery, change the absorbent.   |
| 6 | Breathing Circuit         | Detach the patient breathing circuit from the port, clean or dispose  |
| 7 | Breathing Bag             | Detach the breathing bag from the bag port.   |

#### CAUTION

Do not overtighten the flowmeter knob. Overtightening the knob can damage the needle valve and result in leakage.

### Cleaning the Machine

| ITEM                                      | ACTION   |
|---|--|
| Machine surfaces                          | Clean surfaces of the system with a cloth dampened with germicidal cleaning solution.  |
| Reusable hoses, masks, endotracheal tubes | Follow the manufacturer's recommended disinfection or sterilization process.   |
| Absorber canister                         | Empty and clean the CO <sub>2</sub> absorbent canister. Discard the absorbent material in accordance with the local regulations. |

|                                |   |
|--------------------------------|---|
|                                | Wipe the canister gasket with a clean cloth dampened with germicidal cleaner. Make sure there is no absorbent residue remaining on the gasket surface.  |
| Inhalation / exhalation valves | Unscrew the plastic dome caps that rest on top of the inhalation/exhalation valves. Visually inspect the dome caps for cracks or worn areas that may leak. Visually inspect the plastic flutter disks for tears, signs of wear, or curling. Ensure the disk completely covers the valve opening. Visually inspect the gaskets for signs of wear or curling. Clean all components with mild soap and water, dry completely. Replacement dome caps, flutter disks, and gaskets are available. |

## Weekly Maintenance

- a) Wipe all surfaces of the system with a cloth dampened with germicidal cleaning solution.
- b) Remove hair, dust, and debris from all vaporizer surfaces; especially around the concentration dial and the anesthetic fill port.
- c) Check the CO<sub>2</sub> absorbent canister for exhausted absorbent. If more than ¾ of the absorbent has changed color, replace it as specified before.
- d) Check the cleanliness of the oxygen supply and scavenging hoses. Clean or replace as necessary.
- e) With a cloth dampened with a germicidal cleaner, all surfaces of the anesthesia system.

## Preparing the System for Storage

- a) Turn off the oxygen supply valve and disconnect the facility oxygen supply line if used.
- b) Remove and discard disposable breathing tubes and bags in accordance with local regulations.
- c) Empty and clean the CO<sub>2</sub> absorbent canister. Discard the absorbent material in accordance with the manufacturer's MSDS and local regulations.
- d) Drain the vaporizer as specified in vaporizer's Operation Manual.
- e) Clean and disinfect all surfaces and connections as specified earlier in this section.
- f) Protect the system from dust and contamination with a plastic cover or other suitable means.

## CHAPTER 4: TROUBLESHOOTING

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This section will help you determine the origin of common problems you may experience with your VAM-510 Anesthesia System and recommended corrective actions.

| <b>PROBLEM</b>                          | <b>POSSIBLE CAUSE</b>  | <b>CORRECTIVE ACTION</b>   |
|---|--|--|
| No oxygen flow through oxygen flowmeter | Empty oxygen tank.   | Use full oxygen tank.  |
|   | Oxygen supply is turned off                                    | Turn on oxygen supply.   |
|   | Defective pressure regulator                                   | Change a new regulator.  |
|   | Oxygen hose is disconnected or loose                           | Connect or tighten oxygen hose at machine and oxygen source.           |
|   | Damaged flowmeter needle valve                                 | Replace needle valve.  |
| No or low anesthetic vapor output       | Leak in anesthesia machine                                     | Perform a System Pressure Test for leakage detection.                  |
|   | Not enough oxygen flow   | Increase oxygen flow to at least 1 LPM.                                |
|   | Anesthetic agent reservoir is empty                            | Fill the reservoir with appropriate anesthetic drug.                   |
|   | Vaporizer is turned off  | Adjust the dial to the desired concentration.                          |
|   | Leak around the vaporizer filling port                         | Make sure the fill and drain valves on the vaporizer are fully closed. |
|   | Vaporizer malfunction  | Contact manufacturer for servicing.                                    |
|   | Too much draw or vacuum coming from Active Waste Gas Scavenger | Decrease draw or vacuum for Active Waste Gas Scavenger.                |
| Pop-off valve knob is hard to turn      | Pop-off valve threads require cleaning                         | Contact manufacturer for servicing.                                    |

|   |   |  |
|---|---|--|
| Needle on system pressure gauge is stuck and does not move                | Mechanical damage   | Replace the pressure gauge.  |
| Needle on pressure gauge does not read zero when all gases are turned off | Gauge requires adjustment   | Carefully remove lens cover from pressure gauge by counterclockwise turn. Adjust the needle using the set screw near to the zero mark. |
| Needle on pressure gauge indicates a negative pressure                    | Inadequate fresh gas flow   | Increase fresh gas flowrate.   |
|   | Too much draw or vacuum coming from Active Waste Gas Scavenger        | Decrease draw or vacuum for Active Waste Gas Scavenger.  |
| Breathing bag does not inflate  | Leak in anesthesia machine  | Perform a System Pressure Test for leakage detection.  |
|   | Too much draw or vacuum coming from Active Waste Gas Scavenger        | Decrease draw or vacuum for Active Waste Gas Scavenger.  |
| Breathing bag over inflates (Pressure is over 5 cm H <sub>2</sub> O)      | Size of bag is inappropriate for the size patient it is being used on | Check the size of the bag and change if needed.  |
|   | Pop-off valve is partially or completely closed or not functioning    | Open pop-off valve completely or clean or replace pop-off valve.   |
|   | Scavenging system vacuum is set too low                               | Increase draw or vacuum for Active Waste Gas Scavenger.  |
|   | Flow is obstructed passing through the charcoal canister              | Position charcoal canister so gas can pass through properly / Replace the charcoal canister.   |
|   | Flush Valve is defective.   | Contact manufacturer for servicing.  |
| Oxygen flush button sticks  | Malfunctioning flush valve  | The flush valve requires cleaning or replacement. Contact manufacturer for servicing.  |
| Float in oxygen flowmeter sticks  | Dirty flow tube   | Contact manufacturer for servicing.  |

## CHAPTER 5: SPECIFICATION & SPARE PARTS

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### Performance Characteristics

|                                     |   |
|-------------------------------------|---|
| Oxygen Inlet:                       | DISS Male   |
| Flowmeter:                          | 0.2 to 4 LPM  |
| Inhalation/Exhalation Valves:       | 22 mm, tapered ; 15mm I.D.  |
| Pressure Manometer:                 | -40 to 80 cmH <sub>2</sub> O  |
| Pop-off Valve:                      | 22 mm, relieves at 2 cmH <sub>2</sub> O (fully opened),<br>60 cmH <sub>2</sub> O (fully closed) |
| Flush Valve:                        | 10-15 LPM   |
| CO <sub>2</sub> Absorbent Canister: | 1300 cc   |

### Dimensions

|         |                                     |
|---------|-------------------------------------|
| Height: | 35 cm (13.7 in)                     |
| Depth:  | 22 cm (8.7 in)                      |
| Width:  | 45 cm (17.7 in)                     |
| Weight: | 7.0 kg (15.4 lbs) without vaporizer |



**Whittemore Enterprises, Inc.**  
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