

LAS 4000 USER MANUAL



LARGE ANIMAL ANESTHESIA DELIVERY SYSTEM



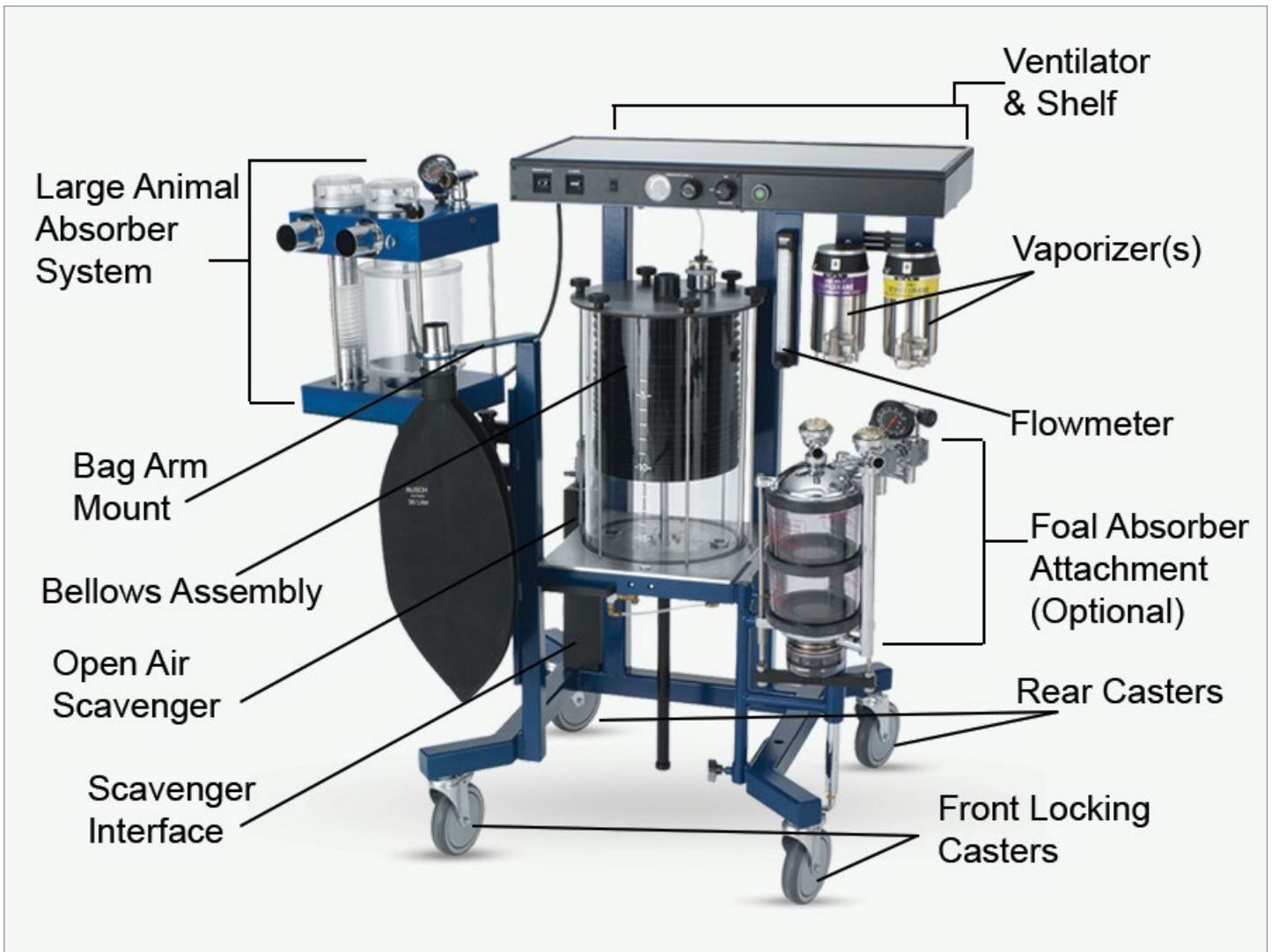
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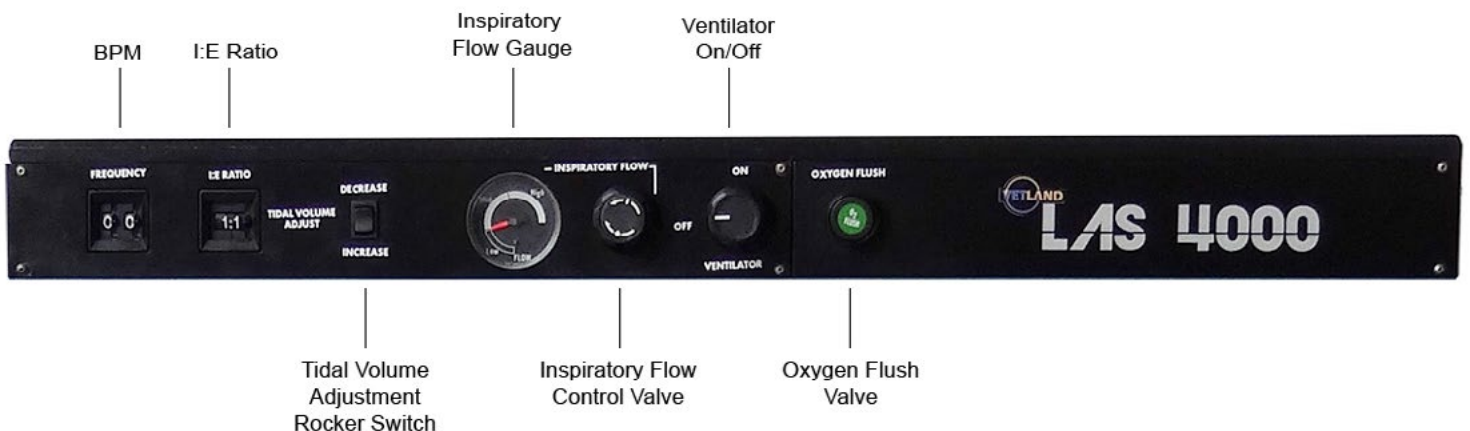
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Components of Machine

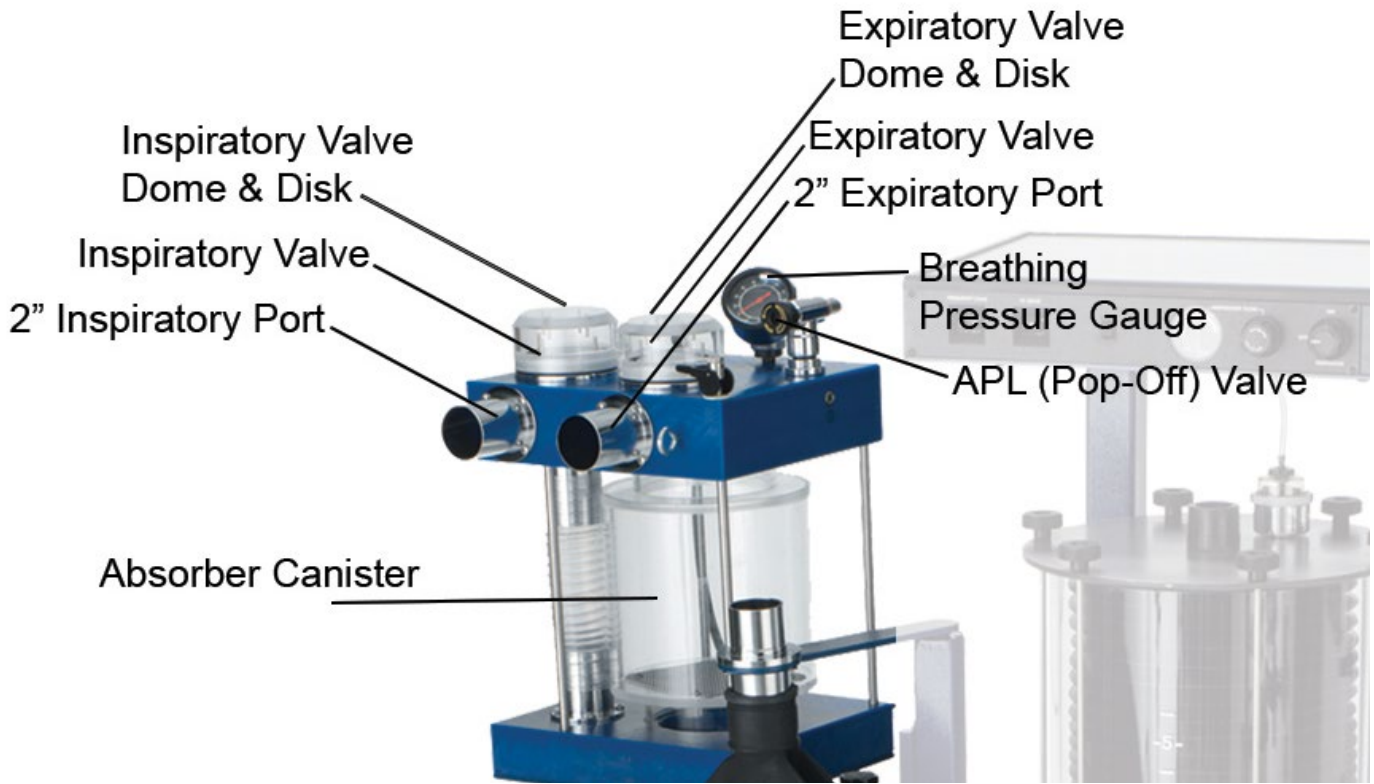
Each unit is shipped with a set of 2" breathing hoses; 2" patient wye, 15L breathing bag, and an operator's manual.



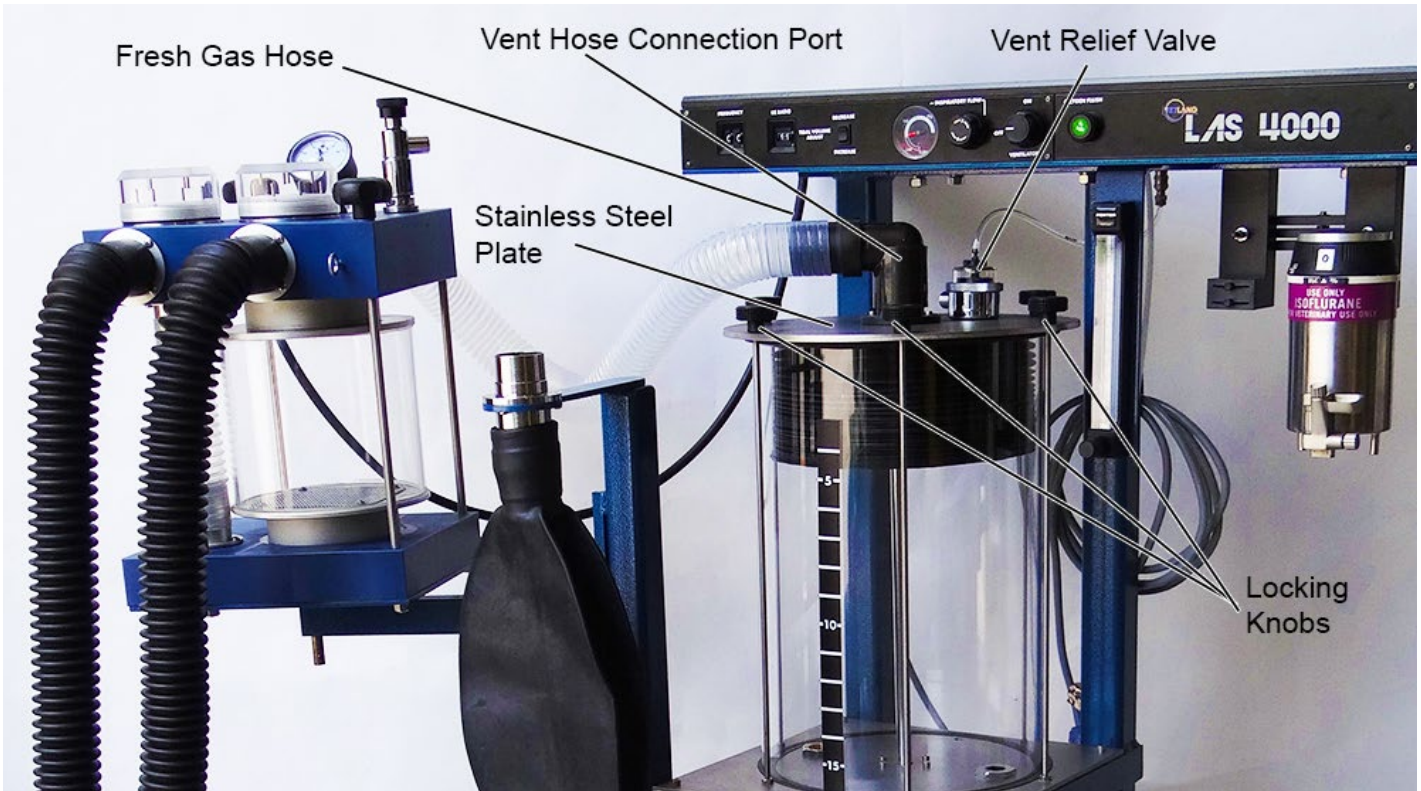
Ventilator Controls



Large Animal Absorber



Bellows Assembly



User Warnings and Safety Precautions

The LAS-4000 is a restricted use device and is sold only on the order of a licensed veterinary professional. The device is intended for use only by a qualified technician under the direction of a qualified veterinarian. Users of this device are responsible for reading and understanding the information contained within this manual.

- Constant attention by a qualified person is required during clinical applications.
- Do not place more than 25 lbs. on top of the system ventilator box.
- A waste gas evacuation system must be utilized with the LAS-4000.
- Remove the system from service if any indications of improper function exist.
- VETLAND's systems are intended for veterinary use only and will function as described when operated and maintained in accordance with the procedures of this manual.
- VETLAND strongly recommends the use of ECG, CO₂ and anesthetic agent monitoring at all times when operating any anesthesia system.
- Any person responsible for the installation or operation of the LAS-4000 systems should be thoroughly familiar with the instruction manual.
- VETLAND recommends scheduled service inspections every six months by a qualified technician to ensure proper operation. Testing of high and low pressure systems for leaks and proper machine verify proper output percentages utilizing a certified Riken analyzer during the inspections. However, the Drager vaporizer does not require mandatory scheduled recalibrations or rebuilds.
- This system must be used by or on the order of a trained veterinarian.
- To ensure proper function of the LAS-4000 anesthesia system, the pre-use performance verification procedure should be performed before each use of the equipment.
- Read the entire Operator's Manual before using the LAS-4000.
- Use only medical compressed oxygen which meets USP purity standards.
- Do not use oily or greasy substances on any anesthesia (or anesthesia-related) respiratory equipment. A pressurized mixture of oxygen with grease or oil can produce an explosion.
- Never use pressure-reducing regulators with any gases other than those identified on the regulator.
- When using large G or H type cylinders or a central medical gas system, make sure the supply pressure to the anesthesia system is at least 50 psi, but not exceeding 60 psi.

User Warnings and Safety Precautions

- Keep open flames and combustibles (e.g. ether, acetone) away from the anesthesia system.
- Never pour water or any other fluids into the anesthetic vaporizer. Fill vaporizer only with the anesthetic agent for which it is designed.
- Electrical safety inspections on the unit should be performed prior to putting into service and annually thereafter to verify proper grounding and polarity of the system.
- **ELECTRIC SHOCK HAZARD—DO NOT** remove any of the ventilator covers or panels. Refer all service and/or maintenance to VETLAND trained and authorized technicians.
- Opening of the control unit by unauthorized personnel voids all warranties. VETLAND assumes no liability for any malfunction or failure of the ventilator if the control unit seal is broken.
- Follow sterilization procedures for the various components as not to damage the components. As with any sterilization process, verify the sterility of each component and follow manufacturer specifications for each sterilant.
- Before moving the Veterinary Anesthesia System, turn off and disconnect the medical gas supply and any AC power cords.
- When transporting the Veterinary Anesthesia System, secure all hoses, grip the main body firmly with both hands and move with caution. Use extra caution when moving machine over thresholds.
- Only use replacement parts provided or approved by VETLAND.
- VETLAND has thoroughly tested many types of paints and coatings including epoxy, polyester, and hybrids. The powder coating currently being used on VETLAND equipment has proven most durable. However, isoflurane is very caustic and may dull the finish of the paint. VETLAND recommends that a filler attachment be used when adding agent to the vaporizer. If spillage should occur, allow to evaporate. Do not attempt to wipe with a cloth.

Setup

Upon Receipt

- Examine shipping cartons for damage. Report any damage with carrier immediately for a claim.
- Remove the LAS-4000 components from their shipping boxes. Retain the cartons for future shipments.
- Verify proper quantities shipped.

Initial Setup

- The unit is shipped assembled; carefully uncover and inspect for damage per the receiving instructions above. Attach the accessory items as described and in the sub assembly images and check operation. Make sure canister, valve domes, and disc are installed tightly. Connect oxygen supply (50 psi) and verify vaporizers have been filled a minimum of 3 hours before use and vaporizer internal temperatures are between 60 and 95 degrees. Install canister and verify the absorbent is fresh, (not desiccated) and capable of absorbing carbon dioxide. Follow manufacturer specifications for application, testing and service requirements.

Performance Verification

Performance Verification Procedure Test should be completed daily as pre-use checks. Any unit not passing this test should be removed from service immediately and a request for service dispatch be made.

Special Notice: The Performance Verification Procedure must be performed prior to daily clinical applications to insure proper function and system integrity. The user must verify proper levels of supply gases; anesthetic agents and electrical voltage are present prior to connection to patients. The patient breathing circuits, ET tubes and other patient interface accessories must be verified to be in proper working order prior to the start of any clinical procedure. For your protection the results of these verification procedures should be documented and kept on file for no less than 5 years for future reference.

1. Anesthesia Breathing System and Fresh Gas Delivery System Test

The below test specifications apply to an anesthesia breathing system without accessories. Test limits described below will be exceeded when accessory items are included in the test. The supplier of the accessory should be contacted for leak specifications.

- 1.1 Close all flow control valves.
- 1.2 Turn Switch to "off."
- 1.3 Turn vaporizer(s) to zero (0) concentration
- 1.4 Short circuit inspiratory and expiratory valves with 2" hose.
- 1.5 Close APL valve (pop-off valve); knob must be turned fully clockwise to stop position
- 1.6 Attach breathing bag to bottom of bag mount
- 1.7 Connect sphygmomanometer squeeze bulb to hose barb on test terminal.
- 1.8 Hand pump squeeze bulb until pressure at breathing system pressure gauge indicates 50cm-H₂O.
- 1.9 Observe pressure drop at gauge.

Thirty (30) seconds, or longer, shall be required for a pressure decrease from 50 to 40cm H₂O.

If the pressure drop exceeds these parameters, please turn to the troubleshooting guide. To determine the size of the leak, gradually adjust the oxygen flowmeter to introduce oxygen to the closed circuit until the breathing pressure gauge holds steady. Note the level of oxygen in flow....this is the machine leak rate at 50cmH₂O. Remember to remove the 2" test hose and readjust the APL/pop off valve for normal operation.

Performance Verification [continued]

2. VAPOR Exclusion System Test

2.1 Set control knob on each Vaporizer to “0” position.

2.2 Adjust control knob on one Vaporizer to any setting above “0” concentration.

2.3 With one Vaporizer set as above it shall not be possible to set another Vaporizer to any position other than “0.” Repeat for each Vaporizer position.

Under these conditions it shall not be possible to adjust any Vaporizer if another is already set higher than “0” percent.

Note: On Vaporizer 19.1, it is necessary to depress the white “0” button when setting control knob.

2.4 Re-adjust all Vaporizers to “0” position.

Verify proper vaporizer output with a gas analyzer. Vaporizer efficacy test can be performed in the field by a qualified service technician utilizing a certified anesthetic gas testing device or may be sent to VETLAND, call 877-329-7775 for more information. Follow all manufacturers’ recommendations for operation and service requirements.

3. APL Valve (Pop-off Valve) Flow Test

3.1 Short circuit inspiratory and expiratory valves with 2” hose.

3.2 Open APL Valve; knob must be turned fully counter-clockwise to stop position.

3.3 Open O2 flow control valve and set flow to 8 lpm.

3.4 Occlude bag mount opening.

3.5 Observe breathing system pressure gauge.

Breathing system pressure gauge shall not exceed 2 cm H₂O.

4. Flowmeter Test

Adjust flow over the full range of the flow meter. With an anesthesia machine supply pressure within the nominal range, it shall be possible to adjust the flow over the full range of the flow meter. The ball in the flow meter shall move smoothly and freely as the flow control valve is adjusted. Ensure that the ball sits on the bottom stop when flow control is turned fully clockwise to its stop. Note: There is a positive mechanical stop to prevent damage to the flow control valve.

Performance Verification [continued]

5. Ventilator Test / Pressure Test

- 5.1 Attach 2" hose from bellows outlet to absorber ventilator inlet
- 5.2 Close APL Valve
- 5.3 Adjust Inspiratory Valve to maximum of "LOW" zone.
- 5.4 Turn ventilator switch to "on"
- 5.5 Adjust O2 flow to 8 lpm.
- 5.6 Adjust tidal volume to approximately 5 lpm.
- 5.7 Attach a breathing circuit with patient wye.
- 5.8 Occlude outlet with plug

System pressure gauge shall indicate a pressure in excess of 30 cmH₂O when bellows stops its upward motion (Note: the bellows will not fully deflate). During the expiratory phase, downward movement of the bellows, the pressure in the system indicated at the pressure gauge shall decrease to approximately 2 cmH₂O pressure when the bottom of the bellows reaches its resting position. The pressure in the system may drop below zero (0) momentarily before reaching its final condition.

Inspiratory-Expiratory Ratio Test

With ventilator operating as describe above, adjust frequency to 10 breaths per minute.

5.9 Using a stopwatch time the inspiratory phase of the respiratory cycle (start of bellows upward movement to start of bellows downward movement). Record Inspiratory phase time. Using a stopwatch, time the expiratory phase of the respiratory cycle (start of the bellows downward movement). Record the expiratory phase time.

5.10 Inspiratory to Expiratory phase time shall be 1:2 +/- 15%; eg. At 10 BPM the inspiratory time shall be 1.8 to 2.2 seconds, the expiratory time shall be 3.6 to 4.4 seconds.

Frequency (BPM) Test

5.11 With ventilator operating as described above, measure time required for one respiratory cycle (start of upward bellows movement to start of next upward bellows movement). Elapsed time shall be within +/- 10% of calculated time; e.g. at 10 BPM, calculated time equals 6 seconds, tolerance range is 5.4 seconds to 6.6 seconds.

Performance Verification [continued]

6. Flow Direction Test

6.1 Connect bag to bag terminal.

6.2 Connect ventilator hose to patient wye

6.3 Open APL valve.

6.4 Open O2 flow control valve to 3LPM

6.5 Turn on ventilator

6.6 Set breath rate to 5 BPM

6.7 Set tidal volume to 7 LPM

6.8 Adjust ventilator inspiratory flow so that the tidal volume is fully delivered within the inspiratory phase time. *The pressure gauge shall neither exceed +2cmH₂O during expiratory phase. Do not go below -2cmH₂O during inspiratory phase.

7. Oxygen Flush

Actuate the oxygen flush by pressing the “O₂ Flush” button on the control panel.

The oxygen flush delivers a flow of approximately 50 lpm of oxygen directly to the fresh gas outlet. Releasing the O₂ Flush button must immediately shut off this flow.

8. Scavenger System Test

Verify anesthetic waste gas is being removed properly and not polluting the OR environment.

Overview of Features

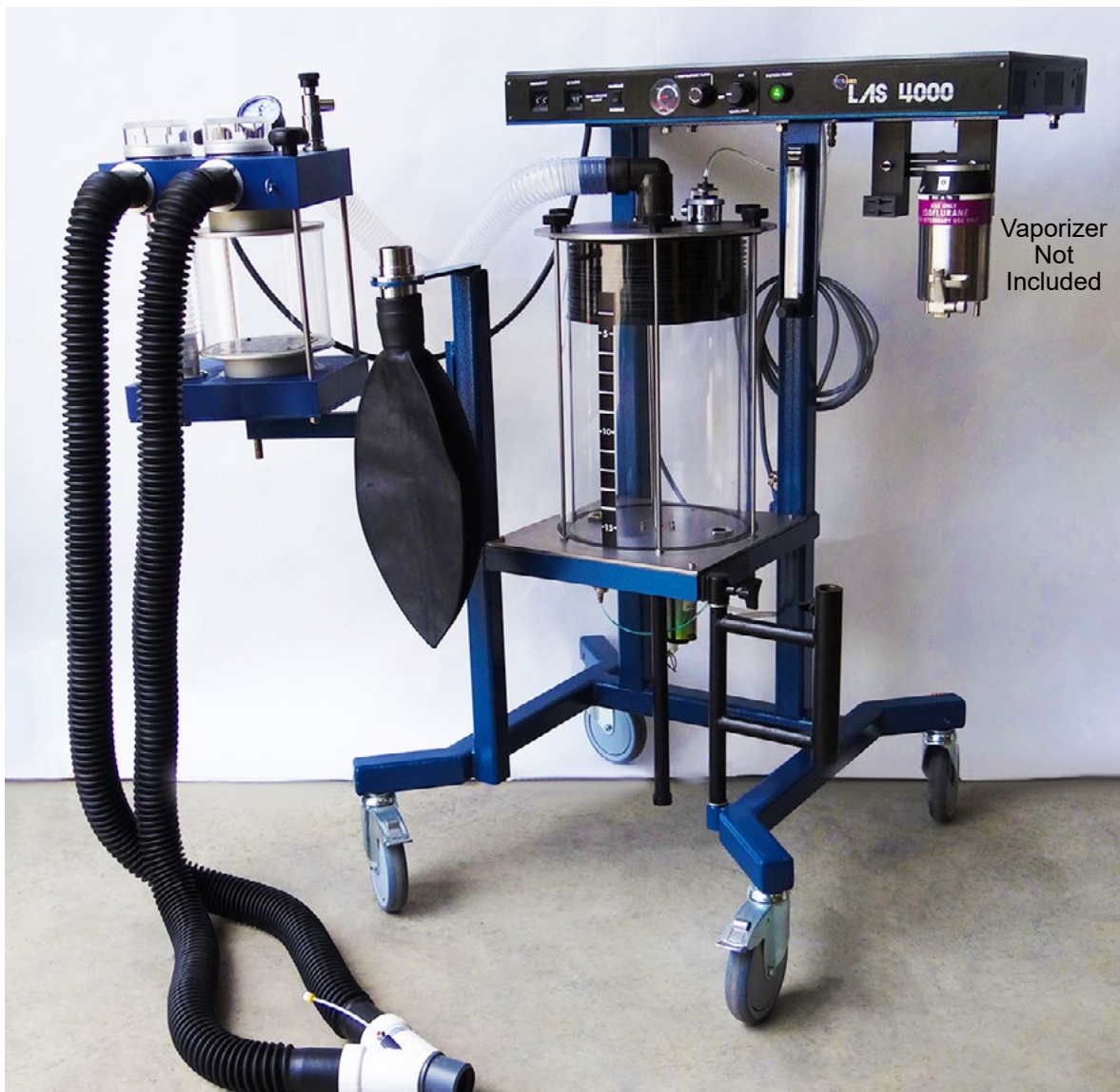
The LAS-4000 by VETLAND is a total anesthesia support system for large animals. It is equipped with the reconfigured Drager AVE ventilator for maximum performance. The unit can be operated as a simple anesthesia machine for spontaneous breathing or as a controller of the animal's ventilation. The LAS-4000 provides leading edge design and technology in large animal anesthesia for practitioners and veterinary schools around the world. Manufactured to VETLAND's demanding standards, the LAS-4000 provides the superior engineering, versatility and unmatched accuracy required in the sophisticated science of large animal anesthesia.

- The market's largest possible air passageways were designed into the LAS-4000 to allow for maximum flow with the least resistance to the patient.
- The "Tandem" directional valves were designed in keeping with the objective of providing the free flow of gases and maintaining very low resistance to the patient. Each valve disc is free floating within its cage and assures unidirectional flow with minimal resistance.
- The flush valve provides 50 lpm of oxygen flow for rapid oxygenation directly to the inspiratory limb of the patient system. The LAS-4000 utilizes Drager vaporizers which are pressure protected and therefore utilize a single port to eliminate unnecessary gas connections.
- The LAS-4000 frame was designed to be balanced and topple proof. The flared caster mounts provide stability yet maintain a minimal footprint. The LAS-4000 Absorber and optional Foal Absorber mount on articulating arm brackets can be lowered, retracted, or extended for optimal performance no matter the situation.
- The Drager vaporizers utilized on the LAS-4000 are the best in the world. VETLAND provides a ten year warranty and the vaporizers do NOT have a required calibration schedule. The LAS-4000 also boasts a 2 vaporizer mounting system with exclusion safety to allow the clinician the flexibility of multiple drug choices without dismantling and reassembling vaporizers.
- The foal absorber option is a totally separate system which reduces trapped volume considerably for those smaller patients. The foal absorber canisters, valves, valve disc, pop off, and gauge assembly can be utilized for patients from 25 lbs. to 600 lbs.
- The reconfigured Drager AVE ventilator utilizes room air via the venturi as a large portion of the bellows utilizes room air via the venture as a large portion of the bellows drive gas; saving nearly 65% of oxygen consumption over competitive models utilizing ONLY oxygen to drive the bellows.
- The ventilator also offers preset I:E ratios for convenience, fully adjustable inspiratory flow control for 1 to 15 liters of tidal volume.

Accessory Kit

Standard with each machine order:

- Inspiratory and Expiratory circuit limb of 2 inch x 56 inches polypropylene hose
- Patient wye piece with luer lock CO₂ sampling port
- 15 Liter bag
- Setup and installation instructions
- Operators manual
- 24/7 tech support hotline



Large Animal Anesthesia Ventilator Instructions

Classification

The LAS-4000 Anesthesia Ventilator is a volume preset, time-cycled ventilator that features solid state timing, pneumatic circuitry, independent controls, and ease of operation and cleaning. The unit acts as a controller of respiratory rate. The Inspiratory/Expiratory phase time ratio is variable, in steps from 1:1 to 1:4.5 (standard) and 1:2 to 1:8 (optional).

The LAS-4000 is recommended to be used with the Large Animal Absorber System. With the bag attached, the standard relief valves of the absorber, as well as the breathing bag, are activated and the system is ready for spontaneous breathing, or manually assisted ventilation. With the vent hose attached ventilator bellows, as well as the ventilator relief valve are activated for automatic ventilation.

The above described arrangements offer a maximum of ease of operation and places the rebreathing bag in a most convenient location for the operator. Standard anesthesia APL valve (pop off) as well as ventilator relief valve are connected to the same exhaust gas scavenger system. The ventilator relief valve is mounted on the bellows top plate.

The ventilator itself is conveniently designed as a monitoring shelf and placed above the anesthesia machine. This arrangement does not take any valuable space from the operating room.

The only component of the ventilator in contact with the patient's breath is the interior of the bellows. This item can easily be removed for cleaning, sterilization, and drying purposes by disengagement of six locking knobs.

Large Animal Anesthesia Ventilator Instructions [continued]

Specification

1. Electrical Power Supply

1.1 Primary – 100-240VAC, 1 AMP max.

1.2 Secondary – 8.2 V.D.C. (output is short circuit protected, current limited to 8A).

2. Gas Connection: Oxygen 45-65 PSI (Medical Air Optional)

3. Controls

3.1 On-off switch: coupled to control electrical power and gas input to unit

3.2 Tidal Volume: Adjustable between 1L to 15 L. (see tidal volume warnings when utilizing the foal absorber in the foal absorber manual).

3.3 Frequency Control: Variable from zero (0) to ninety-nine (99) breaths per minute (BPM) in one BPM increments.

3.4 Inspiratory-Expiratory Phase Time Ratio Control: Variable in indicated steps of 1:1, 1:1.5, 1:2, 1:2.5, 1:3, 1:4, 1:6, 1:8.

3.5 Flow Control: Infinitely variable within the minimum and maximum values indicated on the flow gauge.

3.6 Working Pressure: The pressure within the bellows chamber, variable 25 +/- 5 ccH₂O to 100 +/- 10 cmH₂O maximum dependent upon flow setting.

Controls

1. ON/OFF

This switch controls the power supply to the ventilator. When the switch is in the “OFF” position, the unit is not operable regardless of adjustment.

2. Tidal Volume Rocker Switch

The tidal volume maybe preset. As in any volume preset anesthesia ventilator, the actual ventilation of the lung is different from preset volume, due to the ventilation of the equipment compliance as well as the influence of fresh gas flow into the system. Control of tidal volume is by means of a rocker switch located left of center of the control panel.

Large Animal Anesthesia Ventilator Instructions [continued]

3. Frequency Control (BPM)

The respiratory frequency may be preset between 01 and 99 breaths per minute in one breath per minute steps by means of thumbwheel controller indicator switch. The thumbwheel located left of the center of the control panel is labeled "FREQUENCY."

4. Flow Control

Control of inspiratory flow rate is by means of a rotary control knob located at left of center of the control panel. The flow setting should be adjusted so that the bellows always reaches the upper stop. The rate of flow is indicated on a gauge, labeled "FLOW", adjacent to the flow control knob.

5. Inspiraoty-Expiraoty Phase Time Ratio Control (I:E)

Inspiratory-Expiratory phase time ratio is variable in calibrated steps from 1:1 through 1:8. Calibration at each increment is marked on the I:E controller indicator thumbwheel. The thumbwheel is located to the right of the frequency thumbwheel and is labeled "I:E RATIO."

Large Animal Anesthesia Ventilator Instructions [continued]

Principle of Operation

The LAS-4000 Anesthesia Ventilator operates on 8.2 volts D.C. supplied from an isolated source. Pneumatic power from the ventilator is supplied by oxygen or air via inlet connection. The pressure of this gas should be 50 psi. The ventilator will cease to function if this pressure drops below 42 psi.

Control of frequency (BPM) and inspiratory-expiratory (I:E) phase is by means of a solenoid, which controls flow of gas to control valve, therefore, to the pneumatic portion of the ventilator.

With on-off switch in the "ON" position, gas is supplied to the pneumatic portion of the ventilator and electric power is supplied to the electronic control module of the ventilator. The electronically controlled solenoid valve delivers a pressure signal to the pneumatic control valve which opens and closes the valve with a frequency determined by the solid state timing circuit. The ratio of opened to closed time is variable in steps 1:1, 1:1.5, 1:2, 1:2.5, 1:3, 1:4, 1:6, and 1:8. This is controlled by thumbwheel indicator control switch. The ratio in use is indicated on the thumbwheel. The BPM setting is indicated on thumb

The flow gauge is divided into three zones, these are:

1. "Low" inspiratory flow
2. "Medium" inspiratory flow
3. "High" inspiratory flow

The indicator needle must be set in the low portion of the "low" zone if extremely low flows are required.

When the pneumatic control valve is activated by the timing circuit, gas is allowed to flow via a venture into the bellows chamber. During the process of gas flow being delivered to the chamber, the dump valve is actuated and closes. The increasing pressure in the bellows chamber produces a pressure on the bellows and moves the bellows in an upward direction thus delivering the breathing gas contained in the bellows into the anesthesia breathing system.

Unlike competitive systems, the LAS-4000 utilizes a venture system to drive the bellows using 33% oxygen drive gas and 67% room air; which means significant savings on oxygen consumption.

The present tidal volume of the bellows may be altered by adjusting the position of the volume adjustment plate. Movement of the volume adjustment plate is accomplished by depressing the rocker switch.

Large Animal Anesthesia Ventilator Instructions [continued]

In the event that the bellows fails to meet the upper stop within the preset inspiratory phase time, it may be necessary to increase the setting at the flow control valve (low to high)

It is known that ventilator dials cannot be calibrated in values of inspiratory flow due to the influence of such parameters as airway resistance, total lung compliance, and equipment compliance upon the flow generated by the ventilator. Therefore, we have taken the approach of indications of low flow, medium flow, and high flow.

The expiratory phase starts when the timing circuit closes the pneumatic control valve and the dump valve opens simultaneously. The pressure in the chamber is then released through the dump valve and the bellows expands until the bottom of the bellows is stopped by the volume adjustment plate. During the expansion of the bellows the pressure in chamber keeps breathing system relief valve closed. This valve opens when the bellows bottom reaches the volume adjustment plate and the excess gas is released from the breathing system.

Control of respiratory frequency (BPM) is maintained by use of thumbwheel switch. The control is calibrated in frequency from 01 to 99 BPM, in one BPM increments.

Control of inspiratory-expiratory phase time ratio is by means of thumbwheel switch. The control knob dial is calibrated in steps of 1:1, 1:1.5, 1:2, 1:2.5, 1:3, 1:4, 1:6, and 1:8 (optional).

Recommended Sequence of Adjustments

1. Adjust tidal volume to desired settings.
2. Adjust breaths per minute to desired frequency.
3. Set I:E to desired ratio.
4. Set inspiratory flow to “low” range to start.
5. Turn power switch to “on”.
6. Connect ventilator hose to the absorber vent inlet port. Adjust inspiratory flow setting if necessary so that bellows reaches the upper stop.

Large Animal Anesthesia Ventilator Instructions [continued]

Improper Functions and Their Cause

1. Ventilator fails to cycle with on-off switch in “ON” position.

Probable causes and ways of elimination:

- 1.1 Electrical supply shut off or not connected. Connect to power.
- 1.2 Drive gas (Oxygen or AIR) supply shut off or not connected. Connect gas supply.
- 1.3 Set to 01 or higher.

2. Ventilator cycles but bellows maintains a lower position with little or no upward movement.

Probable causes and ways of elimination:

- 2.1 Drive gas not at 50-60 psi. Check and adjust gas supply pressure.
- 2.2 Inspiratory flow set too low. Adjust higher.
- 2.3 Liquid in bellows or in corrugated ventilator hose. Drain and clean.

3. Ventilator cycles but bellows does not reach lower stop.

Probable causes and ways of elimination:

- 3.1 Fresh gas flow set too low, increase flow as required.
- 3.2 Tidal volume set too high.
- 3.3 Small leak in anesthesia breathing system; check for and correct leaks.
- 3.4 Hose barb on ventilator relief valve not tightened securely to valve dome.

The manufacturer or manufacturer’s representative should be contacted immediately in all cases when the ventilator does not function properly and the cause of the improper functioning cannot be easily detected and corrected. For better understanding between our representative and the user, we have prepared a “Trouble Report” and included it on the last page of this manual. Please refer to the various points when reporting a problem or when a visit by a service representative is requested.

Large Animal Anesthesia Ventilator Instructions [continued]

Check-Out Procedure

1. Have ventilator connected to anesthesia system.
2. Occlude patient wye with plug.
3. Adjust tidal volume to approximately 7 liters.
4. Turn power switch to the “on” position.
5. Adjust frequency to 10 Breaths per Minute
6. Adjust flow to maximum of low zone.
7. Set I:E phase time ratio to 1:2.

With the settings above, the system pressure gauge shall indicate a pressure in excess of 30 cm-H₂O. If this pressure is not reached, check for leaks; refer to “Trouble Report”.

Large Animal Anesthesia Ventilator Instructions [continued]

Warnings

1. The electronic control module of the LAS-4000 is enclosed in a metal shield. The purpose of this shield is to protect the control module from transient electromagnetic radiation. The control module SHALL NOT be removed from the metal shield.
2. Proper ventilation of the patient shall be observed by the action of the breathing system pressure gauge, by patient chest movement and use of a CO2 monitor.
3. Never operate ventilator without bellows being properly installed.
4. Movement of the bellows shall not be used as an indicator of a tight system or a securely connected patient.
5. Fire Hazard: Never use oil or grease on any anesthesia equipment; oils and greases oxidize readily and will burn violently in the presence of oxygen.
6. Federal Law restricts this device to sale by or on the order of a physician.
7. LAS-4000 is not to be used in the presence of flammable anesthetic gases or agents.

Cleaning and Sterilization

NOTE: Heat sterilization of the bellows is not recommended. Liquid disinfection can be used when the flushing procedures guarantees complete removal of liquid disinfectant.

Care and Cleaning

All components should be kept clean and inspected for wear on a regular basis.

Vent Components

- Metrex cleaning products (Cavicide) is recommended and available from VETLAND.

Clean the absorber canister/drain fluids

- Clean the IE Valves.
- Ethylene Oxide will accelerate the aging of components and cause crazing of acrylics which will not be warranted.
- Metrex cleaning products (CAVICIDE) is recommended and available from VETLAND.

External Components

- Metrex/cavicide solutions are recommended for external wipe down.

Troubleshooting Guide

If the unit leaks and will not pass pressure test:

- Verify absorber canister is installed properly and makes a tight seal.
- Verify all hoses, bags and tubing are secure and without damage.
- Verify vaporizer filler plugs are closed tightly and vaporizer(s) is in the off position.
- May pinch or occlude fresh gas hose between absorber and machine will narrow the search for the leak source.

If you can't get oxygen flow:

- Verify oxygen cylinders are not depleted.
- Verify oxygen supply hoses are connected.
- Verify proper oxygen flow control valve movement (the needle valve could be broken).

If the patient is light (anesthetic):

- Verify agent level in vaporizer.
- Verify that all patient hose connections are correct.
- Verify that all patient hoses are free from damage to eliminate room air diluting the patient mixtures.
- Verify the bellows are free from damage—any hole or tear in the rubber goods will allow bellows drive gas to crossover to the patient breathing gases and dilute the mixture.

If the bag and or bellows won't reinflate:

- Possible leak—verify bag does not have a hole.
- Perform a leak test—note findings and call for service support.

If you can't ventilate your patient:

- Perform pressure test.
- Verify that the vent switch in the ON position.
- Verify that the inspiratory flow control turned above the minimum setting.
- Verify that the BPM is set to something more than 00.
- Verify that the tidal volume is set to appropriate levels.

Troubleshooting Guide [continued]

- Verify that the ventilator hose has been connected between the bellows assembly and the absorber.

If the bellows won't compress fully:

- Verify that the BPM, IE, tidal volume and inspiratory control are set to levels that would allow full compression of the bellows.
- Check each setting note above—suggest setting to 10 BPM
- Verify that the bellows canister is attached correctly with a tight seal.
- Verify all breathing hoses are damage free and connected correctly without leaks.

Warranty

VETLAND recommends that any service work be performed by an authorized VETLAND representative. Authorized representatives have attended service training and possess a photo ID badge signed by the president of VETLAND declaring their expertise. For a list of authorized service centers or representatives, please contact VETLAND at 877-329-7775. Routine care, maintenance, and cleaning may be performed by competent individuals who have read and understand this manual in its entirety.

PRODUCT WARRANTY

All VETLAND products are guaranteed to be free of defects for a period of three (3) years from the date of delivery and shall include workmanship and material. The following are exceptions to this warranty:

- Defects caused by misuse, mishandling or by modifications not authorized by VETLAND.
- Rubber, plastic and consumable components and materials are warranted to be free of defects at time of delivery.
- Warranty for the various anesthetic vaporizer as follows:
 - Drager 19.1 Calibrated Vaporizers— ten (10) years from date of shipping
 - Tec 3, Tec 4, and Ohio Calibrated Vaporizers – Three (3) years from date of shipping
- Warranty for EX3000 electronics and all other patient monitors is one year.
- Accessory cables, probes, and sensors are warranted for 90 days.

Any product which proves to be defective in workmanship or material will be replaced, credited or repaired at the discretion of VETLAND. VETLAND is not responsible for normal deterioration, wear and tear or abuse. In any case, VETLAND will not be liable beyond the original selling price. Application of this warranty is subject to the following conditions:

- Merchandise returned for warranty credit or replacement must have been purchased from VETLAND within the specified warranty period or proof of installation within that time will be required.
- VETLAND must promptly be notified upon detection of the defective product of material. If the defective product of material cannot be repaired at the customer's site, it must be returned to VETLAND, shipping prepaid. In no case will VETLAND be responsible for customs fees.

Warranty [continued]

- Examination of the product or material by VETLAND must confirm that the defect is covered by the terms of this warranty.
- Notification of the defective product or material must be received by VETLAND no later than two (2) weeks following the expiration of this warranty.
- Items returned by customer with warranty claim that are subsequently found to be functioning correctly after thorough testing will carry a nominal fee up to a restocking fee to recover any shipping, handling or personnel expense involved with the claim.

In order to assure complete protection under this warranty, the Warranty Registration Card (if applicable) must be returned to VETLAND within (10) business days of receipt of the product.

- The above is the sole warranty provided by VETLAND. No other warranty expressed or implied is intended. Representatives of VETLAND or its agents are not authorized to modify the terms of this warranty without VETLAND's current president's signature of approval.
- Upon receipt of authorized returned goods and inspection of the merchandise will be conducted and appropriate action will be taken. VETLAND's decision regarding disposition of these goods is final.

VETLAND products in need for factory repair require a return authorization

All items to be returned should be shipped prepaid to:

Vetland Medical Sales and Services
ATTN: RMA (#____)
2601 Holloway Road
Louisville, KY 40299 USA



Additional Information

Limitation of Liability

All VETLAND products are ONLY to be used for VETERINARY purposes. VETLAND products are not designed to be used for human patients.

VETLAND liability, whether arising out of or related to manufacture and sale of the goods, their installation, demonstration, sales representation, use, performance, or otherwise, including any liability based upon VETLAND's Product Warranty, is subject to and limited to the exclusive terms and conditions as forth above, whether based upon breach of warranty or any other cause of action whatsoever, regardless of any fault attributable to VETLAND and regardless of the form of action (including, without limitation, breach of warranty, negligence, strict liability or otherwise).

The stated Express Warranties are in lieu of all warranties, expressed or implied, including without limitation warranties of merchantability, fitness, or any particular purpose of non-infringement. VETLAND shall not be liable for, nor shall buyer be entitled to recover any special incidental or consequential damages, or for any liability incurred by buyer to any third party in any way arising out of or relating to the goods.

In the unlikely event of a disagreement, the place of venue is Louisville, KY, USA.

Technical Specifications

ELECTRICAL	120 VAC 50/60 HZ	
DIMENSIONS		
	Height	53"
	Base Width:	31"
	Base Depth:	31"
VENTILATOR		
	ON/OFF switch:	Provides AC power to AVE vent
	TIDAL VOLUME:	Motor driven adjustable tidal volume through use of a momentary rocker switch (5-15 liters of tidal volume available)
	VENTILATOR:	Time-cycled, electrically controlled, pneumatic powered
	FREQUENCY CONTROL:	Variable from zero to ninety-nine breaths per minute in one BPM increments
	INSPIRATORY/EXPIRATORY:	I:E ratio available 1:1, 1:1.5, 1:2, 1:2.5, 1:3, 1:3.5, 1:4, 1:4.5
	INSPIRATORY FLOW:	Controlled through operator adjustable regulator
ABSORBER		
	CIRCUIT PRESSURE GAUGE:	-20cm/H ₂ O to 80cm/H ₂ O range
	APL VALVE:	Adjustable pressure limit valve allows control from completely closed to fully open
	INSP./EXP. PORTS:	Inspiratory and expiratory flow controlled through visible check valves
REMARKETED OPTIONS:		
	I:E RATIO UPGRADE:	Allows for delivery of 1:2, 1:2.5, 1:3, 1:3.5, 1:4, 1:4.5, 1:6, 1:8 ratios
	FOAL ABSORBER:	Separate absorber reduces down-time while switching to a separate machine for foal or small animal anesthesia
	OPEN AIR SCAVENGING SYSTEM:	For use with suction (vacuum) waste gas disposal systems
	E-CYLINDER MOUNTING:	Provides a safe back-up supply of oxygen in the event of a main O ₂ supply failure
	ISOFLURANE VAPORIZER:	Temperature compensated wick-style vaporizer with range of 0% - 5%
	SEVOFLURANE VAPORIZER:	Temperature compensated wick-style vaporizer with range of 0% - 7%