SOMNI 3

VETERINARY ANESTHETIC VAPORIZER OPERATIONS MANUAL

SOMNI PRODUCT MANUAL

SOMNI SCIENTIFIC

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SOMNI SCIENTIFIC

USER RESPONSIBILITY

The SOMNI 3 is a precision medical vaporizer designed for **Veterinary Use Only.** This vaporizer was designed to mix the vapors of specified liquid anesthetic gas agents with anesthetic delivery gases. The vaporizer will continue to provide reliable performance only if the manufacturer's operating and maintenance instructions are followed. The vaporizer, as with any mechanical medical device, requires periodic preventative maintenance and calibration. Any components, which become worn, distorted, or contaminated should be replaced by a factory authorized service center. A vaporizer that requires service should not be used until it has been accurately tested and verified by a factory authorized service center. Field-testing of vaporizer output using portable test equipment, while valuable, is not a substitute for factory authorized preventative maintenance. Factory service and calibration is recommended every two years, field testing is recommended annually at minimum. The user assumes full responsibility and liability of any use of the vaporizer.

WARNINGS AND CAUTIONS

- This vaporizer is intended for **Veterinary Use Only**
- **Do not** fill the vaporizer with any agent other than the one specified on the front label. Vaporizers are specifically designed dependent on agent type. Therefore, any other agent used can prove to be dangerous to a patient.
- **Do not** use this vaporizer until it is mounted upright, vertical and out of operation for a minimum of **(1) hour** after initial filling to allow for proper initial wick absorption. Failure to allow wicking time may result with inaccurate output at the selected dial setting.
- **Do not** carry vaporizer by control dial. Handle and transport vaporizer with care by grasping the vaporizer firmly with two hands.
- **Do not** modify, tamper, or disassemble the vaporizer. There is a probable danger of damaging the vaporizer and altering the calibration accuracy.
- **Do not** put vaporizer into any liquid, including water.
- **Do not** attempt to sterilize vaporizer.
- **Do not** drain anesthetic agent into any container other than a properly marked container.
- **Do not** tilt or tip vaporizer beyond a 45-degree angle while filled with liquid agent. If unit is accidentally tipped on its side, please call the manufacturer for specific instructions.
- **Do not** have vaporizer serviced by anyone other than a SOMNI Scientific authorized service center.
- **Do not** operate vaporizer prior to leak testing the anesthetic equipment, ensuring secure connections to prevent unnecessary anesthetic exposure
- Turn the vaporizer **OFF** when not in use
- It is recommended that the vaporizer is kept upright at all times, after installation.

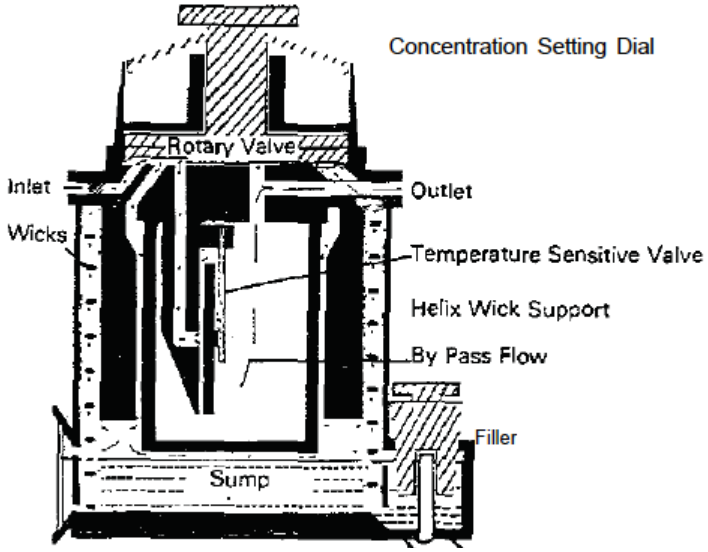
PRINCIPLES OF OPERATION

VAPORIZER SUMP AND VALVE ASSEMBLY

This anesthetic vaporizer is comprised of a vaporizing chamber and duct system (located within the sump cover), rotary valve and concentration dial. The concentration dial is connected to the rotary valve underneath. The rotary valve contains ducts and a vapor control channel. With the concentration dial in the off position, the rotary valve links the inlet and outlet of the vaporizer, allowing carrier gas to pass through. When the concentration dial is turned on, the carrier gas is split in, a stream and a stream flowing into the vaporizing chamber.

The vaporizing chamber contains two concentric wicks that are in contact with the liquid anesthetic agent. The wicks ensure the vapor is maintained at saturation of concentration in the gas that leaves the vaporizing chamber. The flow through the vaporizing chamber is controlled by the concentration dial.

Temperature compensation occurs automatically utilizing a bi-metallic strip to keep the output of the vaporizer constant during conditions of changing temperature.



EXAMINATION AND PREPARATION FOR USE

1. Examine shipping carton for signs of external damage.
2. Remove contents from carton and inspect for visible damage such as dents or missing parts.
3. If damage or missing parts are discovered or suspected, notify customer service immediately at 1-877-637-3625.
4. Check that control dial operates freely.
5. Confirm the drain valve is completely closed .
6. Remove the mounting hardware (vaporizer spacer and 3-6mm bolts with washers) and drain tube (*not shown) from package.

INSTALLATION

The standard mounting system requires bolting of the vaporizer directly to a rigid back bar of an anesthetic gas machine. The vaporizer should always be mounted between the gas flow-metering unit and the breathing circuit-always upstream of any absorber or humidifier. Ensure that emergency oxygen supplies or oxygen flush enter the gas circuits downstream of the vaporizer.

A. The SOMNI 3 is supplied with mounting hardware consisting of a spacer and 3-6mm bolts. While supporting the weight of the vaporizer, install the spacer between the vaporizer and the mounting surface and secure the vaporizer using the mounting bolts provided. Ensure the bolts are tightly secured, but be sure not to over-tighten.

B. Connect the 23mm inlet and outlet adapters to the corresponding outlets on the cagemount. Twist and firmly push on for a secure, leak-free connection. It may be necessary to connect the 23mm adapters prior to mounting the vaporizer.

C. Complete a 10 second pressure test to confirm a leak free installation. **Instructions on Page 10.**

INSTALLATION

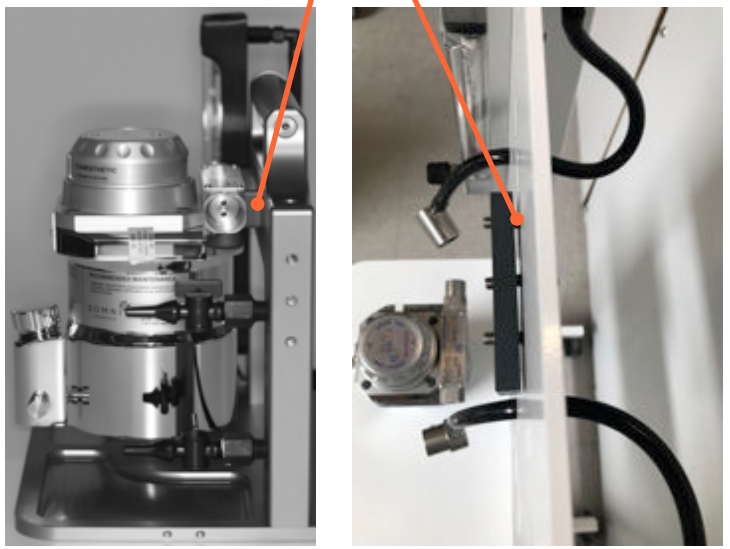
IMPORTANT!

- The direction of gas flow must be from “inlet to outlet” (i.e. from left to right) when viewing the vaporizer from the front.
- Ensure the liquid (which may accumulate in the breathing circuit or the CO2 absorber) can not enter the vaporizer while:

  -in use
  -during disassembly of the circuit
  -when the machine is not in use

The vaporizer is fitted with standard 23 mm inlet and outlet taper connections.

Vaporizer Spacer Placement



OPERATING INSTRUCTIONS

1. Observe all instructions and warnings on the vaporizer
2. Fill only with agent indicated with vaporizer in OFF position
3. Perform a leak test prior to first use (See instructions below- “10 Second Test”)
4. Depress locking button to turn dial from OFF position
5. Turn dial counterclockwise to desired concentration
6. Then turn control dial counter clockwise to desired concentration
7. Turn vaporizer to “OFF” position when not in use

10 SECOND PRESSURE TEST

Before each use, "leak test" the anesthesia system and ensure the waste gases have a patent way through the evacuation system.

1		Wear safety goggles or safety glasses.
2		Turn O2 supply primary switch to "OFF"
3		With vaporizer in "ON" position (2% concentration), drain oxygen from line by turning "ON" fresh gas switch to induction chamber (be sure to have evac for the induction chamber "ON".
4		When oxygen stops flowing (flow meter will drop to zero and O2 pressure gauge will drop to zero), turn induction chamber fresh gas supply to the "OFF" position.
5		Fill vaporizer with liquid anesthetic.
6		Turn vaporizer dial to "OFF" position.
7		Turn O2 supply primary switch to the "ON" position

FILLING INSTRUCTIONS-FUNNEL FILL

CAUTION:

1. Verify that vaporizer dial and delivery gas flowmeter(s) are in the “OFF” position.

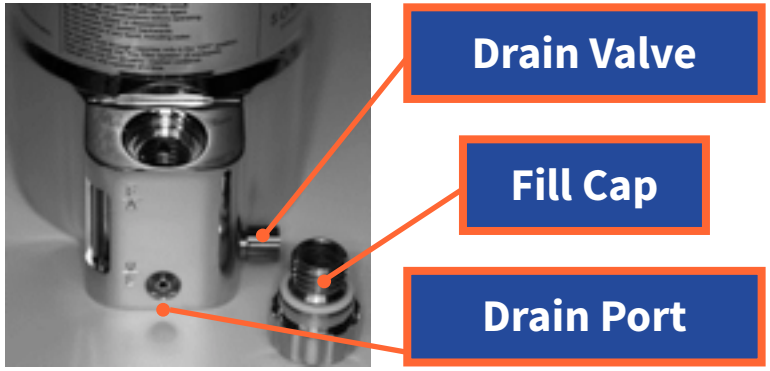
2. Verify that anesthetic agent is the same as labeled on front of vaporizer.

   DO NOT fill vaporizer with any agent other than the one specified on the front label. The vaporizer is designed for that agent only. Any agent other than specified could prove to be dangerous to a patient.

3. Verify that the drain valve on the right side of the fill assembly is closed by turning clockwise until finger tight.

4. Remove the funnel cap and pour agent slowly into opening. Simultaneously, observe the agent level through the sight glass. Note: If the vaporizer is dry, the level will fall slightly as the wick absorbs the agent.

5. Replace cap by turning cap clockwise. Cap should be tight to prevent leaks.



DRAINING INSTRUCTIONS-FUNNEL FILL

CAUTION:

Liquid **MUST** be drained from the vaporizer into a properly labeled container.

1. Attach small drain tube to the hole in the front of the vaporizer fill assembly.

2. Hold an empty, properly labeled container under the tube.

3. Open the drain valve located on the right side of the fill assembly. After all liquid is drained, close the valve finger tight to seal.

4. Discard used anesthetic agent per proper protocol.

FILLING INSTRUCTIONS - KEY FILLED

CAUTION:

The vaporizer may be pressurized. Open the dial to relieve internal pressure and then close. Unscrew the top key retaining screw slowly when removing the replica key plug on vaporizers fitted with key fill design.

A. Remove the cap and seal from the anesthetic bottle. Check that the bottle is not damaged and attach the fitted keyways of the bottle adapter to the keys of the bottle collar. Screw them together until fully secured and tightened. The bottle is now ready to fill the vaporizer. Only the correct agent-keyfill adapter can be fitted to the respected anesthetic agent bottle.

B. Ensure that the vaporizer dial control is set to the “OFF” position. Loosen the top key retaining screw on the filler assembly counter-clockwise and withdraw the replica key plug.

C. Insert the keyfill bottle adapter into the fill socket.

FILLING INSTRUCTIONS - KEY FILLED

D. After insertion, tighten the key retaining screw clockwise to tighten and seal the keyfill adapter in the filler socket.

E. Raise the bottle above the level of the fill socket, avoiding kinking the adapter tube. The agent should begin flowing into the vaporizer from the anesthetic bottle within a few seconds. If this does not occur, remove the bottle and adapter from the vaporizer and remove the adapter from the bottle. Carefully shake the adapter two or three times to clear the tube, then repeat steps A through E.

F. When the vaporizer is filled to the maximum level mark in the sight glass, lower the bottle below the level of the filler socket and wait for five seconds to allow any agent in the adapter to drain back into the bottle, then unscrew the top key retaining screw and remove the adapter from the fill socket.

Because the SOMNI 3 vaporizer sump can hold 250 ml capacity, there may be no excess agent.

If there is any excess liquid agent, allow this to escape from the filler socket completely, then insert and fully tighten the replica key plug to prevent gas from escaping through the filler.

Note: If the vaporizer was dry before filling, the level will decrease as the wicks absorb the agent.

DRAINING INSTRUCTIONS - KEY FILLED

CAUTION:

Ensure the dial is in the “OFF” position, that the recovery bottle is below the drain nozzle. The vaporizer may be pressurized, open and close the vaporizer to help relieve internal pressure.

DRAINING PROCEDURE:

A. Remove cap from recovery bottle and position under the drain nozzle.

B. If needed, to allow air to vent, unscrew the top retaining screw and remove the replica key plug from the filler socket.

C. Open the drain screw valve by turning knob counterclockwise to initiate the agent draining process. Allow agent to pour into recovery bottle.

D. When draining has been successfully completed, close the drain screw valve by turning the knob clockwise and insert replica key plug back into filler socket and secure.

ASSURING PERFORMANCE OF YOUR VAPORIZER

To assure the continued performance of your vaporizer, the manufacturer recommends **full factory preventative maintenance** be performed every 2 years. Accurate and efficient anesthetic gas delivery is a primary consideration in patient care. Anesthetic agent vapors are extremely potent, and a very small error in concentration could be hazardous.

Preventative Maintenance Includes:

- Disassembly of the vaporizer
- Cleaning and inspection of all components
- Replacement of internal wick and seals
- Testing of thermostat and adjusting or replacing if needed
- Reassembly and leak test
- Calibration using industry standard laser refractometer

Preventative Maintenance Ensures:

- Worn components are replaced when necessary and calibration is verified.
- Wicks are replaced to prevent the accumulation of contaminants which can hinder anesthetic vaporization and interfere with efficient anesthetic gas delivery.
- Inspection and service can reveal accidental damage that could alter performance and allows correction
- Correction of vaporizer leaks and prevents the vaporizer from contributing to unnecessary personnel exposure to waste anesthetic gas pollution.

SPECIFICATIONS

Calibration

Vaporizers are calibrated at 21° C. The variation in output with temperature, flow rate and duration of use is small, and the variation in output when used with Intermittent Positive Pressure Respiration is negligible.

Resistance to Gas Flow

5cm.wg at the "OFF" setting at 5 liter/min 02 at 22° C

Duration of Use

The rate of consumption of anesthetic agent depends primarily on flow rate and vapor output concentration. As an approximate working figure, 1.0 ml of liquid anesthetic is required to provide 200 ml of vapor.

The rate of evaporation of anesthetic agent may be used (with caution) as an approximate method of checking that the delivered output is not grossly in error. It may also be used as a means of estimating how often the vaporizer is likely to need refilling.

The approximate hourly consumption of anesthetic agents can be expressed as follows:

3 x % x F

Where % represents the setting of the vaporizer output percentage, F represents the input flow rate in liter/min.

Example: If a vaporizer is set to deliver 2% at 6 liter /min total input gas flow rate.

Approximate rate of agent consumption = 3 x 2 x 6 = 36 ml/hour.

The above figures are approximate and intended for clinical guidance only. Figures will vary depending on flow meter type (and other varying factors). Results will be grossly in error if the vaporizer drain port is not fully closed.

Liquid Capacity

Amount of anesthetic agent to fully charge the vaporizer =250 ml.

Amount retained by Wick System =75 ml.

Weight and Dimensions

Weight 15.5 lb. / 7kg
Height 7.58 in / 195 mm
Depth 5.5 in / 140 mm
Width 5.25 in / 135 mm
Capacity 250 ml
Wicking Capacity 75 ml

Some ventilators may impose higher, steady back pressures (around 100 mm HG), producing more significant depression of the v/v percentage. Increased patient uptake of agent, along with improved ventilation can often mitigate these effects, eliminating the need to compensate for increased back pressure at the vaporizer.

High Back Pressures;

Pressures in excess of 400mm Hg could conceivably occur during procedures similar to bronchoscopy or because of occlusion of downstream tubing and piping or for other reasons. These effects on v/v percentage cannot be precisely predicted but the most likely effects will be reductions in concentration (or small increases).

SPECIFICATIONS

Back Pressure Fluctuating
Fluctuating backpressures may be imposed on the vaporizer by downstream components and assisted or controlled ventilation to the patient. This can affect the vaporizer and increase the concentration by intermittently altering the pressures, therefore altering flow distribution within the vaporizer. The greatest effects are observed in combinations of very low flow rates and low dial settings, with large and rapid pressure fluctuations. These effects become progressively less notable as the dial setting and flow rates increase, causing the magnitude and rate of cycling pressure fluctuations to decrease.

In clinical use, vaporizers are considered unaffected by fluctuating back pressures which occur frequently in most typical, clinically encountered conditions appertaining to human anesthesia.

Carrier Gas Composition
Small effects can occur when the carrier gas composition is changed (i.e., from Oxygen to air, or in a Nitrous Oxide and Oxygen mixture). As a general rule, variation of output with carrier gas compilation should be considered of low clinical signfigance, since the side effects (if any) are typically less than 10% of the setting.

In an instance where significant changes do occur, the usual effect is a slightly depressed output once nitrous oxide is employed (compared to the output when oxygen is the carrier gas).

Other Variables
Ambient temperature, input flow rate and duration can often affect delivered concentrations, particularly when vaporizers are used at the clinical extremes of such variables.

The valve design and temperature compensation system of the Somni 3 vaporizers work to reduce the effects to levels considered not significant by clinical standards.

SPECIFICATIONS

Effects of Variables

Temperature

Temperature variation effects are typically negligible at common dial setting and ambient temperature combinations.

The vaporizer responds very slowly to change in ambient temperate to prevent the valve from closing completely. As an additional safety feature, the temperature sensitive valve does not respond to temperatures below the approximate range of 12-15° C.

Should the vaporizer temperature be lower than this, then the output can be expected to be lower than that indicated on the dial.

At temperatures above the range shown on the performance curves, the vaporizer output may be unpredictably high-particularly if the temperature approaches the boiling point of the anesthetic agent.

To avoid any inaccuracies due to extreme temperatures, the vaporizer should be allowed to reach a temperature within the suggested range (of the performance curves) prior to use.

Pressure

Vaporizers are graduated in v/v percentage at 760 mm Hg. If the ambient pressure changes the v/v % will change so that at an ambient pressure P mm Hg the delivered percentage (D % v/v)-

Equation 1 $$D = \frac{\% \times 760}{P}$$

Where % is the nominal setting of the vaporizer.

It is generally accepted that the depth of anesthesia depends on the inspired partial pressure of agent and not the concentration by volume of agent.

To obtain a consistent depth of anesthesia when gross changes of barometric pressure occur, it is necessary to change the v/v percentage in inverse proportion to the barometric pressure. The vaporizer automatically performs this action. For practical and clinical purposes, the effects of barometric pressure can be ignored.

The vaporizer automatically does this and for practical clinical purposes the effects of the barometric pressure can be ignored.

WARRANTY AND SERVICE

Limited Warranty

SOMNI Scientific (SOMNI) warrants to the original purchaser that the products, not including accessories, shall be free from defects in materials and workmanship under normal use, if maintained in accordance with SOMNI's guidelines and used according to its labeling, for the period specified in the manual.

Warranty period is Lifetime contingent upon a 2 year service cycle from the invoiced date of purchase.

THIS LIMITED WARRANTY, IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES WHETHER EXPRESSED OR IMPLIED, BY OPERATION OF LAW OR OTHERWISE, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

This warranty is void if the product has been altered, misused, damaged by neglect or accident, tampered with, not properly maintained, not installed in strict compliance with applicable codes and ordinances, or repaired by persons not authorized by SOMNI. This warranty does not cover normal wear and tear and maintenance items and specifically excludes accessory items and any other equipment used with the product.

Limitation of Remedies

SOMNI Scientific's only obligation under this limited warranty is the repair or replacement of the product. THIS IS THE EXCLUSIVE REMEDY. SOMNI shall not be liable for and hereby disclaims any direct, incidental, consequential or special damages or delays, including but not limited to loss of use, downtime, lost business, revenues and profits.

Warranty Procedure

To obtain warranty service, contact SOMNI Scientific **877-637-3625** or **info@somniscientific.com**.

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