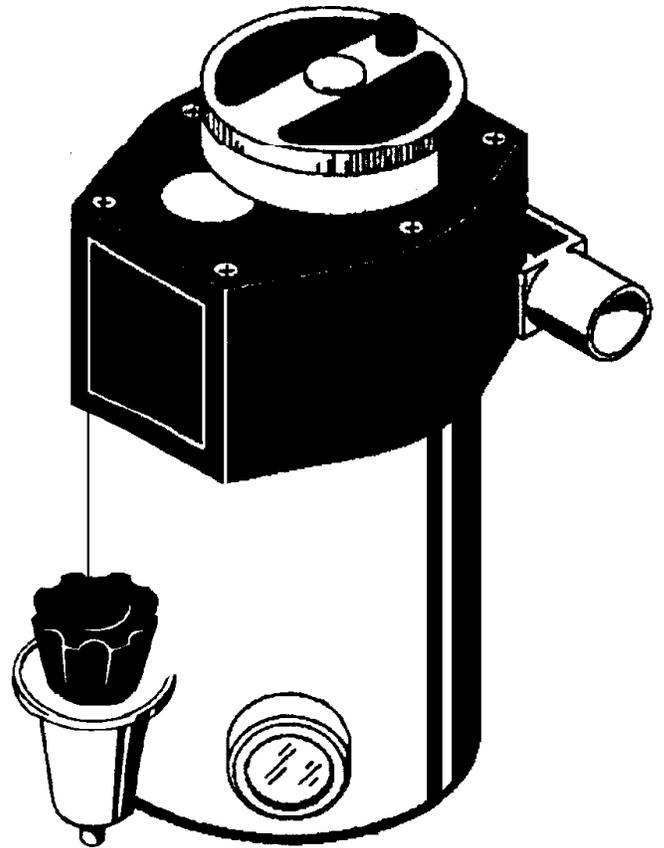
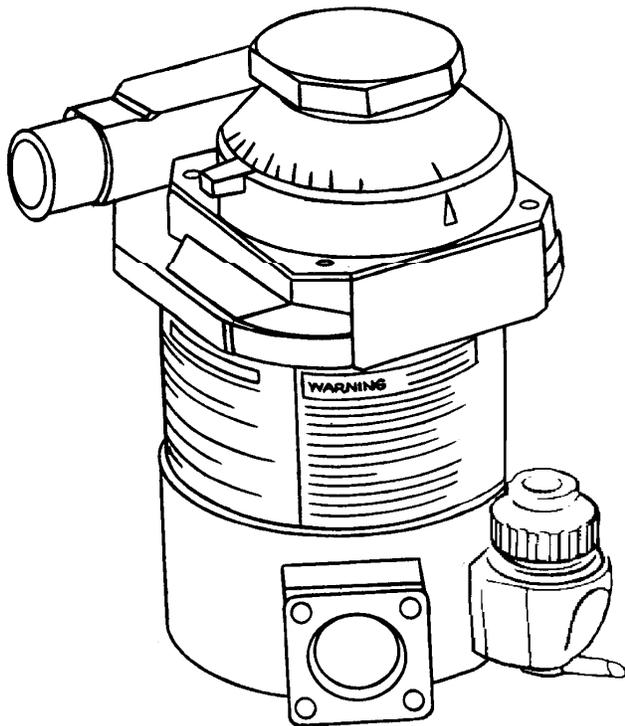


Operating Instructions  
& Maintenance  
Guidelines  
for Precision  
Vaporizers



VETEQUIP

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## Examination and Preparation for Use

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We want you to be completely satisfied with your vaporizer. Please look now to see if it is as you expected. Should anything not be exactly right, please call your sales representative right away for help.

1. Examine shipping carton for signs of external damage.
2. Inspect vaporizer for visible damage or missing parts.
3. Check that control dial operates freely.

This vaporizer is designed to give you many years of trouble-free use. It is both flow rate and temperature compensated to give precise delivery of anesthetic gas. This is done by simply setting the control dial to the percentage you want to deliver. (See Performance section of manual for clinical ranges.)

This vaporizer is to be operated under the normal surveillance and control of a veterinarian trained in its use. However, you need to know more about this vaporizer than just how to operate it. Please read this manual in its entirety. Abbreviated operating instructions can be found on page 14.

If you have any questions or comments, we would welcome the opportunity to address them. Please call your local sales representative.

Thank you!



Model #: \_\_\_\_\_

Serial #: \_\_\_\_\_

Purchased: \_\_\_\_ / \_\_\_\_ / \_\_\_\_

**For Sales or Service support, call:**

**800-466-6463**

or

925-463-1828

# Contents

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## Warnings

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DO NOT FILL THE VAPORIZER WITH ANY ANESTHETIC AGENT OTHER THAN THE ONE SPECIFIED ON THE FRONT LABEL. THE VAPORIZER IS DESIGNED FOR THAT AGENT ONLY. ANY OTHER AGENT THAN THAT SPECIFIED CAN PROVE TO BE DANGEROUS TO A PATIENT.

IF A VAPORIZER IS FILLED WITH THE WRONG AGENT, DRAINING WILL NOT ELIMINATE THE AGENT SINCE SOME OF THE AGENT WILL HAVE BEEN ABSORBED INTO THE WICK. THE WICK MUST BE THOROUGHLY CLEANED AND DRIED. THIS PROCEDURE MUST BE PERFORMED AT AN AUTHORIZED SERVICE CENTER.

DO NOT CARRY THE VAPORIZER BY THE CONTROL DIAL.

DO NOT MODIFY, TAMPER WITH, OR DISASSEMBLE THE VAPORIZER. THERE IS A POTENTIAL DANGER OF DAMAGING THE VAPORIZER AND ALTERING THE CALIBRATION ACCURACY.

DO NOT IMMERSE THE VAPORIZER IN ANY LIQUID, INCLUDING WATER.

DO NOT STERILIZE THE VAPORIZER.

DO NOT DRAIN THE ANESTHETIC AGENT INTO ANY CONTAINER OTHER THAN A PROPERLY MARKED CONTAINER.

INCOMPLETE SEALING OF THE FILL CAP WILL RESULT IN LOSS OF GASES.

DO NOT FILL THE VAPORIZER UNLESS THE CONTROL DIAL IS IN THE 'OFF' POSITION.

DO NOT TURN THE DIAL 'ON' DURING FILLING OR ATTEMPT TO FILL BEYOND THE 'FULL' MARK.

KEEP THE VAPORIZER UPRIGHT AT ALL TIMES.

NEVER TILT A CALIBRATED VAPORIZER BEYOND 45 DEGREES WHEN CHARGED. DANGEROUS OVERDOSE MAY RESULT DURING SUBSEQUENT USE. THIS CONDITION CAN BE DETECTED BY CALIBRATION VERIFICATION ONLY.

DO NOT CONNECT THE VAPORIZER DIRECTLY INTO THE PATIENT BREATHING CIRCUIT.

DO NOT TURN ON TWO VAPORIZERS AT THE SAME TIME.

DO NOT PUT WATER OR ANY OTHER SOLVENT IN A VAPORIZER

DUE TO THE WICK'S CAPACITY TO ABSORB AGENT, THE VAPORIZER WILL CONTINUE TO DELIVER THE SET CONCENTRATION FOR A CONSIDERABLE PERIOD OF TIME EVEN IF NO LIQUID LEVEL CAN BE VIEWED THROUGH THE SIGHT WINDOW. HOWEVER, DO NOT USE A VAPORIZER IN THIS CONDITION ON A PATIENT.

FLUSH FLOWS THROUGH AN OPEN VAPORIZER MAY RESULT IN UNWANTED CONCENTRATIONS OF ANESTHETIC AGENT.

DO NOT IGNORE MAINTENANCE OF YOUR VAPORIZER. AN ANNUAL CALIBRATION RECERTIFICATION IS HIGHLY RECOMMENDED BY THE MANUFACTURER.

## Cautions

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Vaporizer should be serviced by an authorized service center.

Turn the vaporizer 'OFF' when not in use.

A vaporizer MUST be in a vertical upright position to indicate liquid agent levels accurately.

If a screw-cap filler vaporizer is pressurized, turn the screw cap slowly before filling.

If a keyed-filler vaporizer is pressurized, turn the screw slowly before filling.

The delivered concentration may be different from the set concentration if the vaporizer is operated in a tilted position.

Avoid kinks in the rubber tubing that will restrict flow. Eliminate leaks that will effect total flow to the patient.

To fill the vaporizer when in use, it will be necessary to turn the vaporizer OFF.

No repair should ever be undertaken or attempted by anyone not having the training and qualifications to perform these tasks.

# Description

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## General

This vaporizer is designed for 'out of circuit' use in continuous flow techniques of inhalation anesthesia.

This vaporizer is temperature and flow compensated so that the output remains relatively constant despite cooling due to vaporization and variations in inlet flow (see - Performance section).

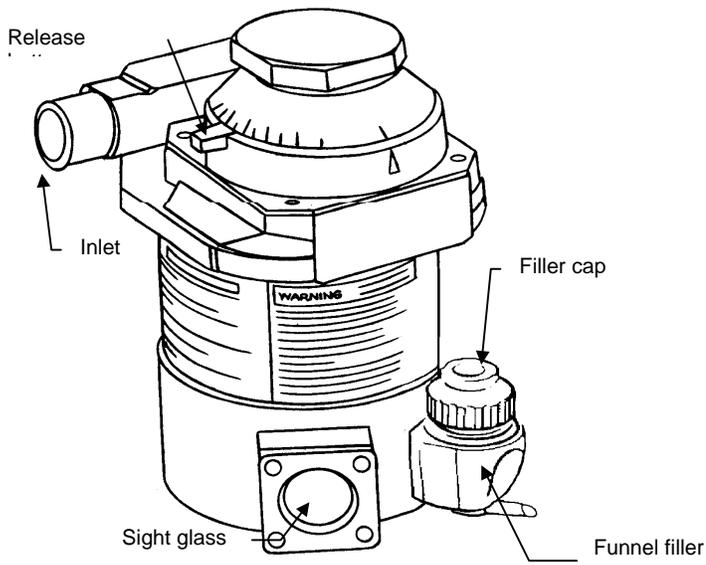
This vaporizer is clearly labeled with the name of the anesthetic agent for which it is designed.

A single control dial with a concentration scale calibrated in % of anesthetic agent vapor per total volume (v/v) is employed to set the desired concentration of the anesthetic agent.

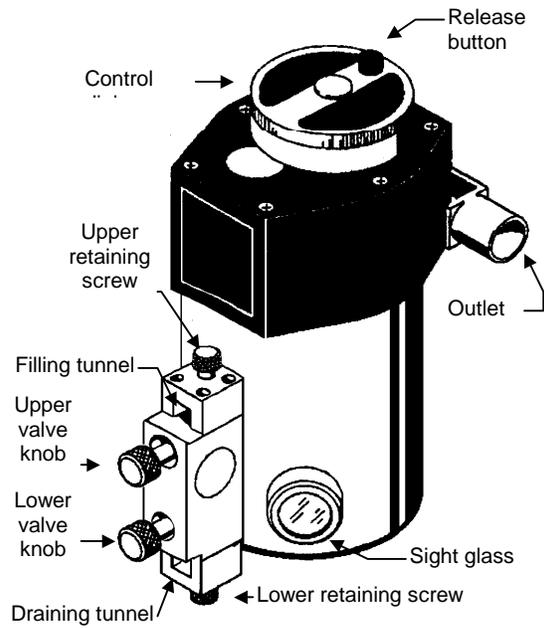
To prevent accidental displacement of the control dial from the 'OFF' position to 'ON', a release button is incorporated in the dial assembly. Simultaneous depression of the release button and counter-clockwise rotation of the dial is necessary to achieve an 'ON' setting.

An inlet filter protects the vaporizer against particulate contamination.

Calibrated vaporizers are adaptable for use on many types of anesthesia machines and are available with either a funnel or key-fill system.



**Cyprane style vaporizer**  
Funnel filler system



**Ohio style vaporizer**  
Keyed filler system

# Specification

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## Calibration

Vaporizers are calibrated at 21°C (70°F) and at elevated temperatures. 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.

## Agent Usage

The rate of consumption of anesthetic agent depends primarily on flow rate and vapor output concentration.

The rate of evaporation of anesthetic agent may, with caution, be used as an approximate method of checking that the delivered output is not grossly in error, and 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:

$$3 \times \% \times F$$

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 =  $3 \times 2 \times 6 = 36$  ml/hour.

The figures are intended only for clinical guidance and are approximate. They will vary depending upon the type of anesthetic agent employed, accuracy of graduation of flowmeters, etc., and will be grossly in error if the vaporizer drain port is not fully closed.

# Performance

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## Effects of Variables

### Temperature

The effects of variation of temperature are normally negligible at commonly used combinations of dial setting and ambient temperature.

The vaporizer responds very slowly to changes in ambient temperature and (to prevent the valve from closing completely) as a safety feature the temperature sensitive valve does not respond to temperatures below the range of approximately 12 - 15°C (54 - 59°F). Should the vaporizer temperature be lower than this, the output can be expected to be lower than that indicated on the dial.

At temperatures above 32°C (90°F), the vaporizer output may be unpredictably high - particularly if the temperature approaches the boiling point of the specific anesthetic agent.

To avoid inaccuracies due to extreme temperatures the vaporizer should be allowed to attain a temperature of 20-32°C (68 - 90°F).

### Flow

The vaporizer compensates for variations in inlet flow from 300 ml to 10 liters per minute with minimal change in output concentration. Resistance to flow within the vaporizer is minimal: 40 cm/H<sub>2</sub>O (30 mm/Hg) at 10 liters per minute.

### Carrier Gas Composition

Small effects can occur when the carrier gas composition is changed from oxygen to air or nitrous oxide/oxygen mixture. As a general rule variation of output with carrier gas composition can be considered of negligible clinical significance since the effects, if any, are normally less than 10% of setting. Where changes occur, the usual effect is that the output is slightly depressed when nitrous oxide is employed compared to the output when oxygen is the carrier gas. The presence of nitrous oxide reduces the required inspired concentration of volatile agent and this mitigates this small depression in output from the vaporizer.

### Time Out of Service

If the anesthetic machine on which the vaporizer is fitted is left for a period of time with no gases flowing, a concentration of agent may be observable at the machine outlet when the gas flow is turned 'on' and the vaporizer is turned 'off'. This concentration can be expected to fall rapidly to zero (e.g. within about 15 seconds at 5 liter/min.). This phenomenon is a normal characteristic of anesthetic vaporizers and machines. Clinically this is normally considered to be insignificant because of the small volume of vapor involved.

### Other Variables

Ambient temperature, input flow rate and duration often can affect delivered concentrations, particularly when the vaporizer is used at extremes of the usual clinical range. The valve design and temperature compensation system of this vaporizer reduces these effects, under most clinical conditions, to levels that are clinically not significant.

# Principle of Operation

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## Vaporizer Valve Assembly

In the 'OFF' position, there is a direct link between the 'inlet' and 'outlet' within the vaporizer. When the dial is turned 'ON' the carrier gas is split into two streams; bypass and vaporizing chamber flow.

Carrier gas entering the vaporizing chamber flows through agent saturated wicks. As the carrier gas passes through the wicks it becomes saturated with vapor.

The amount of agent picked up in the vaporizing stream will vary due either to variation in room temperature or to the cooling which takes place when the agent is vaporized. Each causes changes in the effective vapor pressures of the anesthetic agents. Unless some form of compensating device was used, the output of the vaporizer for a given flow and dial setting would change with temperature.

**NOTE: This principle is one of many reasons explaining why it is recklessly dangerous to use a jar and wick style vaporizer with extremely volatile anesthetic agents such as Halothane and Isoflurane.**

This vaporizer has a temperature-compensating device (thermostat) to control the proportion of carrier gas entering the vaporizing chamber. If the temperature of the vaporizer falls, the thermostat closes and more carrier gas is allowed into the vaporizing chamber. If the temperature of the vaporizer increases, the thermostat opens and less carrier gas is allowed into the vaporizing chamber. In this way the output of the vaporizer remains constant under conditions of changing temperature.

## Installation

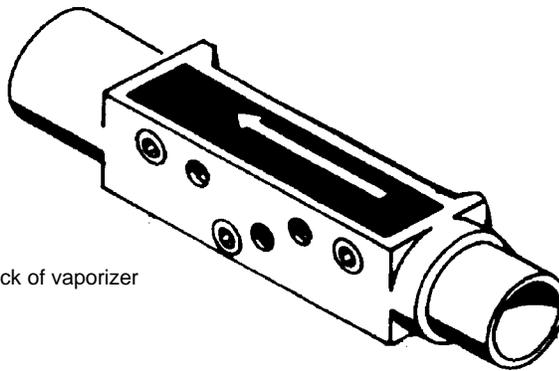
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The vaporizer may be mounted onto a back bar assembly, interlock, a tabletop stand or a clamp fitted to the frame of the anesthesia apparatus.

The vaporizer should always be mounted between the flow-metering unit and the patient breathing circuit--but upstream of any flush valve, absorber or humidifier.

Ensure that liquid which may accumulate in the breathing circuit or the CO<sub>2</sub> absorber cannot enter the vaporizer while in use or during disassembly of the circuit or when the machine is not in use.

Unless otherwise specified, all vaporizers are supplied standard with 23mm inlet and outlet tapers. The standard mounting system requires bolting of the vaporizer directly to a rigid back bar of an anesthesia gas machine.



Viewed from back of vaporizer

**IMPORTANT**

The direction of gas flow must be from "inlet" to "outlet" in the direction of the arrow, i.e. from left to right when viewing the vaporizer from the front.

# Operating Instructions

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**OBSERVE ALL WARNINGS AND INSTRUCTIONS IN THIS MANUAL.**

## Turning On

1. To turn the vaporizer 'ON', depress the control dial release button, and simultaneously turn control dial counter-clockwise to desired concentration.

NOTE: To avoid the inadvertent delivery of small concentrations the control dial should be turned to 'OFF' when the vaporizer is not in use.

## Filling and Draining

**WARNING - 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 OTHER AGENT THAN THAT SPECIFIED CAN PROVE TO BE DANGEROUS TO A PATIENT.**

**WARNING - DO NOT FILL VAPORIZER UNLESS THE CONTROL DIAL IS IN THE 'OFF' POSITION.**

**WARNING - DO NOT TURN THE DIAL 'ON' DURING FILLING OR ATTEMPT TO FILL BEYOND THE 'FULL' MARK.**

**WARNING - DO NOT DRAIN THE AGENT INTO ANY CONTAINER OTHER THAN A PROPERLY MARKED CONTAINER.**

Periodically check the agent level. The vaporizer should be refilled at appropriate intervals. The vaporizer will function satisfactorily as long as there is agent visible in the sight glass.

The vaporizer should be filled and used in an upright position. Small deviations from the upright position will not affect the output or the safety of the vaporizer. Because the agent depth is shallow in relation to the diameter of the vaporizing chamber, more frequent checks of the agent levels should be carried out when small deviations from the upright position occur. This will avoid obtaining a misleading impression of the amount of agent in the vaporizer.

At intervals - ideally not exceeding two weeks - the vaporizer should be drained into an appropriately marked container when the agent level is low and the agent discarded. Less frequent intervals may be used when the anesthetic agent (e.g. Isoflurane) does not contain additives or stabilizing agents.

## Funnel Filler

To fill:

Dial should be in 'OFF' position.

If the vaporizer wicks are dry, the level will fall as the wicks absorb the liquid agent. The agent is not lost.

- 1) Remove filler cap by turning cap counter-clockwise. Turn cap slowly if vaporizer is pressurized. Be sure drain plug is closed.
- 2) Verify that the agent is the same as that specified on the vaporizer.
- 3) Pour agent slowly into opening. Observe proper agent level through sight glass. If the vaporizer wick is dry, the level will fall slightly as the wick absorbs the agent.
- 4) Replace cap by turning cap clockwise. Cap should be tight to prevent leaks.



To Drain:

- 1) Remove the filler cap to reveal the drain plug.
- 2) Unscrew the plug, but do not remove. (Some vaporizers have a slot in the filler cap to unscrew plug.)
- 3) Drain only into a properly marked container.



## Keyed Filler System

The filling system consists of three elements - the bottle collar, the adapter and the filling / draining unit fitted to the vaporizer. Key fill and drain systems are designed to prevent the wrong agent from being used in the vaporizer. For example, an Isoflurane vaporizer cannot be filled using a Halothane bottle adapter. And, the Halothane bottle adapter will not fit on either the Isoflurane bottle or into the Isoflurane vaporizer.

### Ohio Style Vaporizer Only

To Fill:

If the vaporizer wicks are dry, the level will fall as the wicks absorb the liquid agent. The agent is not lost.

- 1) Attach the bottle adapter to the appropriate bottle.
- 2) Ensure the vaporizer control is set in the 'OFF' position. Insert the keyed block of the adapter fully into the filling (upper) tunnel, with the two adapter holes DOWN. Tighten the retaining screw located above the filling tunnel.
- 3) Open the upper valve knob to allow the liquid to flow gradually into the vaporizer. The bottle can be elevated to increase the fill rate.
- 4) Fill the vaporizer with the liquid agent until the FULL mark is reached as viewed through the sight window.
- 5) When the vaporizer is full, lower the bottle, close the valve knob, and remove the block from the tunnel.

**WARNING:** - INCOMPLETE SEALING OF THE VAPORIZER VALVES ON THE KEYED FILL AND DRAIN MODELS WILL RESULT IN LOSS OF GASES. TO HELP PREVENT SUCH LOSS, MAKE SURE THAT THE FILL AND DRAIN VALVES ARE COMPLETELY CLOSED WHEN THE VAPORIZER IS IN USE.

**WARNING:** - FAILURE TO OBTAIN A GAS-TIGHT SEAL AT BOTH ENDS OF THE BOTTLE ADAPTER MAY PERMIT LEAKAGE OF AIR INTO THE BOTTLE AND CONSEQUENT OVERFILLING OF THE VAPORIZER.

To Drain:

- 1) Insert the keyed block of the adapter (use a properly marked empty bottle) fully into the draining (lower) tunnel, with the two adapter holes UP. Tighten the retaining screw located below the draining tunnel.
- 2) Open the lower valve knob to allow the liquid to flow into the bottle. The bottle must be held lower than the draining tunnel.
- 3) Close the valve knob when the vaporizer is emptied and remove the block from the tunnel.

**WARNING:** - TO AVOID DEFEAT OF THE KEYED FILLING SYSTEM, DRAIN THE AGENT INTO THE PROPERLY MARKED AND KEYED BOTTLE ONLY.

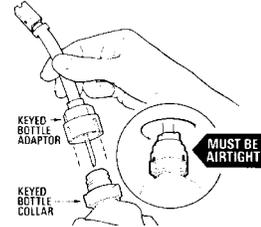
To avoid wasting liquid agent and to minimize the concentration of agent in room air, always cap the bottle after filling or draining the vaporizer. The bottle adapter attached to a bottle does not prevent spilling or evaporation.

## Cyprane Style Vaporizer Only

To Fill:

If the vaporizer wicks are dry, the level will fall as the wicks absorb the liquid agent. The agent is not lost.

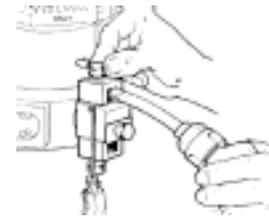
- 1) Attach the bottle adapter to the appropriate bottle.



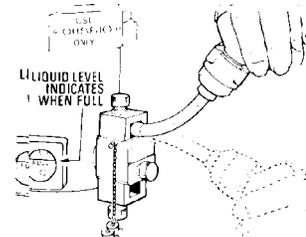
- 2) Ensure the vaporizer control is set in the 'OFF' position. Turn top retaining screw on vaporizer filler unit counter-clockwise and withdraw filler plug. Turn cap slowly if vaporizer is pressurized.



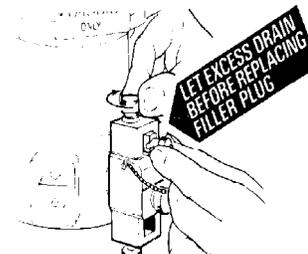
- 3) Insert the keyed block of the adapter fully into the filling tunnel, with the two holes DOWN. Take care to bend tube slightly so bottle is below inlet level to prevent spillage. Turn the retaining screw above filling tunnel clockwise and tighten to seal fill adapter in the filling tunnel.



- 4) Raise bottle above level of filling tunnel, without kinking tube. A steady stream of air bubbles should emerge from the inner tube within 2 seconds.

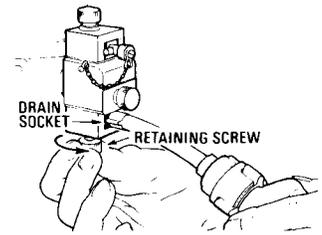


- 5) When vaporizer is filled to the 'FULL' level, lower the bottle. Remove fill adapter. If any excess liquid drains from the filler tunnel, allow this to escape completely before inserting and tightening filler plug. **Failure to replace and tighten retaining screw will cause gas to escape through filler.** The vaporizer is now ready for use.

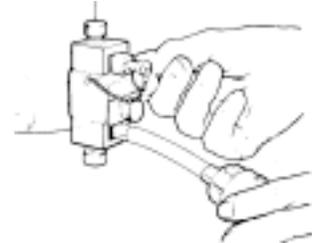


To Drain:

- 1) Insert the fill adapter in drain (lower) tunnel, with the two holes UP, and tighten retaining screw.

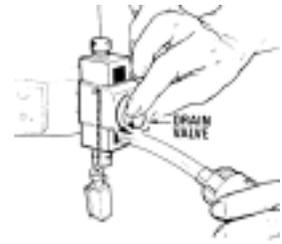


- 2) Remove filler plug to let air vent from bottle and for draining to occur. Hold bottle slightly downward without kinking tube.

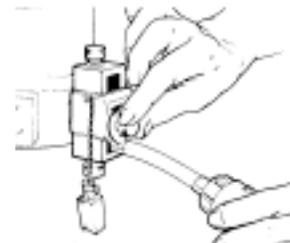


**CAUTION:** Turn cap slowly if vaporizer is pressurized.

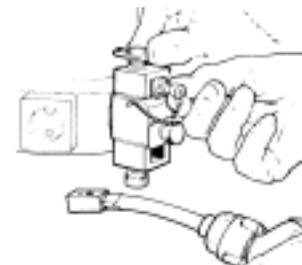
- 3) Open drain valve on front by turning counter-clockwise and vaporizer will drain.



- 4) At completion of draining, close drain valve (clockwise).



- 5) Remove the bottle adapter and replace the filler plug in the filler tunnel. Tighten retaining screw (clockwise).  
**Failure to replace and tighten retaining screw will cause gas to escape through filler.**



# Maintenance

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**WARNING - DO NOT MODIFY, TAMPER WITH OR DISASSEMBLE THE VAPORIZER BECAUSE OF THE DANGERS OF DAMAGING THE UNIT AND ALTERING THE ACCURACY OF GRADUATION.**

Observation of the instructions given earlier, regular servicing and normal professional vigilance is normally all that is required to maintain the vaporizer in a safe working condition.

## Schedule

Every Two Weeks:

The vaporizer should be drained into an appropriately marked container when the agent level is low and the agent discarded. Less frequent intervals may be used when the anesthetic agent does not contain additives or stabilizing agents.

Annually:

The vaporizer should be serviced at an authorized service center. This service should include:

- 1) Complete disassembly of components.
- 2) Inspection of all parts for damage and wear.
- 3) Thorough cleaning of all metal parts.
- 4) Replacement of wicks, seals and damaged, worn or outdated items.
- 5) Lubrication where necessary.
- 6) Re-assembly of vaporizer and testing for and correction of any leaks.
- 7) Verification of the delivered vapor concentrations under closely defined conditions at different temperatures in order to test the temperature compensating mechanism. Any re-graduation or adjustment where necessary.
- 8) Maintaining continuous service record.

**WARNING - DO NOT PUT WATER OR ANY OTHER SOLVENT IN A VAPORIZER. A VAPORIZER SHOULD BE FILLED WITH THE SPECIFIED ANESTHETIC AGENT ONLY.**

Clean the exterior of the vaporizer with a damp cloth.

Never allow cleaning agents to accumulate in the filler, gas inlet and outlet ports, or around the control dial.

## Contamination

If a contaminant is put into the vaporizer (e.g. inappropriate anesthetic agent, alcohol, water, etc.), contact an authorized service center immediately.

## Repairs

Repairs should only be carried out by an authorized service center.

Note: It is not possible to change the graduation range or anesthetic agent.