

Filling the vaporizer

⚠ WARNING Do not fill the vaporizer with any substance other than Suprane™ (desflurane). If any substance other than Suprane™ (desflurane) is used, patient injury could occur.

When the vaporizer is in use, do not fill the vaporizer if the following conditions apply:

- The dial setting is more than 8% at flows of 8 liters/minute or above.
- The vaporizer is subjected to any high back pressure.
- The Suprane™ (desflurane) has been refrigerated or chilled below 18 °C.

Failure to comply with this warning may result in a temporary decrease in delivered concentration and activate the NO OUTPUT alarm.

Only fill the vaporizer when it is in an upright position. Failure to do so may result in the vaporizer being over filled.

Only fill the vaporizer when it is connected to the electrical supply. This enables you to observe the agent level display. Do not attempt to fill the vaporizer when the level display indicates that it is full.

To avoid explosive hazards, flammable anesthetic agents such as Ether and Cyclopropane must not be used in this vaporizer. Only anesthetic agents which comply with the requirements for non-flammable anesthetic agents in the IEC 601-2-13 Standard, *Particular Requirements for the Safety of Anesthesia Machines*, are suitable for use in the presence of this vaporizer.

As this vaporizer is not suitable for use with flammable anesthetic agents such as Ether or Cyclopropane, the use of antistatic breathing tubes and face masks is not necessary. The use of antistatic or electrically conductive breathing tubes when utilizing high frequency electric surgery equipment may cause burns and is therefore not recommended in any application of this vaporizer.

Filling procedure

When filling the Tec 6 Plus Vaporizer, observe the following:

- The vaporizer must only be filled when it is in an upright position.
- The vaporizer sump can be filled when the vaporizer is in its WARM-UP cycle or at any time the vaporizer is in use except as noted in the warning. If the vaporizer is in its OPERATIONAL condition, the time taken for the agent to flow into the vaporizer may be increased.
- Only agent bottles with a Saf-T-Fill™ bottle probe specific to Suprane™ (desflurane) should be inserted into the filler port.

Step 1

Remove the bottle cap from the Suprane™ (desflurane) bottle and ensure that the O-ring is correctly fitted to the bottle probe.

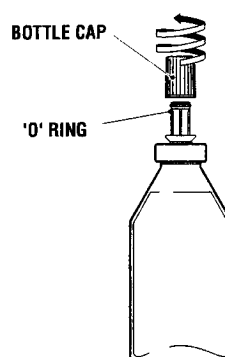


Figure 1-14 • Removing the bottle cap

Step 2

Insert the bottle probe into the filler port and then push the bottle firmly against the spring pressure until it is fully engaged in the filler port.

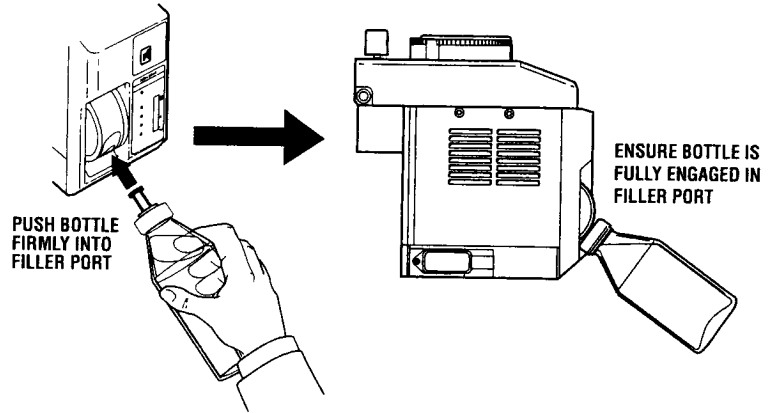


Figure 1-15 • Loading the bottle

⚠ WARNING

Ensure that the bottle probe is fully engaged into the filler port before attempting to lift the bottle. If the bottle cannot easily be lifted, do not force it, otherwise the valve can be broken.

Step 3

Lift the bottle upwards.

If the bottle cannot easily be lifted, it may be because the bottle has not been completely inserted.

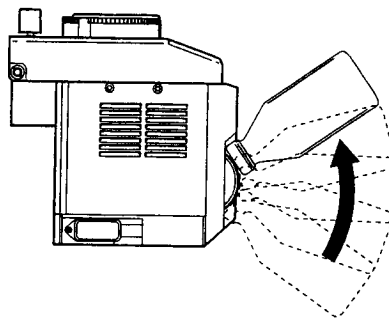


Figure 1-16 • Lifting the bottle

Step 4

Fill the vaporizer.

- When the bottle moves easily, lock the bottle in the upper position.
- When the bottle reaches the upper stop, the agent bubbles for up to 45 seconds before it flows from the bottle through the filler port into the vaporizer sump.
- Hold the bottle in position at the upper stop and fill until the bottle is empty or the indicator on the display panel indicates that the sump is full.

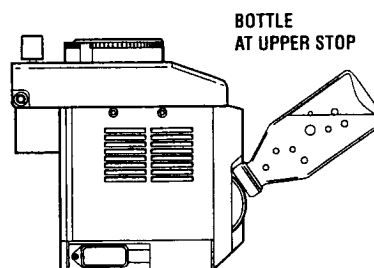


Figure 1-17 • Filling the vaporizer

⚠ WARNING

Grip the bottle firmly while rotating it downwards from the upper stop position to the lower stop position and hold the bottle firmly in the filler port until the small amount of agent in the system has drained back into the bottle. Failure to do so may result in spilling agent.

Step 5

Drain the bottle and remove.

- Grip the bottle firmly and lower it from the upper stop position to the lower stop position.
- When the bottle reaches the lower stop position, hold the bottle firmly in the filler port for at least five seconds to allow the small amount of agent in the filler system to drain back into the bottle.
- To avoid dropping the bottle, support the bottle as it is automatically unlocked from the filler port and released from the filler. Note: Do not twist the bottle as you pull the bottle out
- The valve on the bottle automatically closes to help avoid loss of agent.

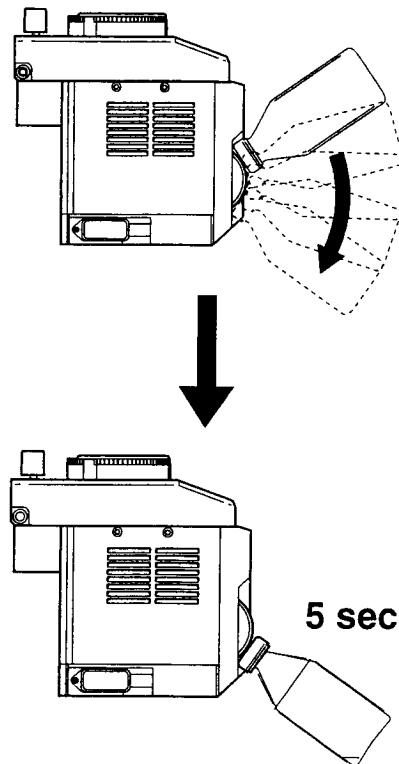


Figure 1-18 • Removing the bottle

User Maintenance

Maintenance Intervals

Prior to performing any maintenance procedures or returning to a service center for repairs, clean and disinfect the vaporizer.

Annually:	Battery replacement.
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Two years from purchase date and every six months thereafter:	Planned safety inspections together with the anesthesia system by qualified personnel. Inspect and perform Output concentration check.
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Cleaning

⚠ WARNING

Do not put any substance other than Suprane™ (desflurane) into the vaporizer sump.

Do not immerse the vaporizer in water or any other liquid.

Do not autoclave the vaporizer.

Do not allow cleaning agents to accumulate in the filler, the gas inlet and outlet ports or around the control dial.

External cleaning

To clean external surfaces, use a moist cloth and a detergent (pH 7 to 10.5).

For disinfection purposes, cleaning agents of a surface germicide type should be used. In terms of material compatibility, cleaning agents which contain the following active ingredients are suitable for use:

- Aldehydes,
- Alcohol,
- Quaternary ammonium compounds.

⚠ WARNING

To avoid possible damage to the vaporizer, do not use the following compounds as cleaning agents:

- Halogen hydrolyzing compounds,
- Strong organic acids,
- Oxygen hydrolyzing compounds.

Internal contamination

If the vaporizer is filled or partly filled with an incorrect volatile agent or other contaminant, proceed as follows:

1. Remove the vaporizer from service immediately and label the vaporizer stating that it is contaminated.
2. Return the vaporizer to the Datex-Ohmeda Authorized Service Center stating that the vaporizer is contaminated and, if possible, the type of contaminant in the vaporizer.

Output concentration check

Connect the Tec 6 Plus to Anesthesia Machine.

1. Set the oxygen output of the anesthesia machine to a flow of 5 ± 0.5 L/min.
2. Ensure that the fresh gas output is connected to a gas scavenging system.
3. Measure the concentration at the fresh gas outlet, using an agent monitor which is calibrated to measure desflurane.
4. Allow the readings to stabilize and check that the readings are within specified tolerances.
5. Document and maintain the test results, including the date, person performing the test, and serial number of the unit tested.


The accuracy of the measuring equipment must be considered when obtaining the readings!

Dial Setting	Min Vol %	Max Vol %
1	.5	1.50
6	5.10	6.90
12	10.20	13.80
18	15.30	20.70

Changing the battery

Change the battery every 12 months, irrespective of condition.

Step 1

Turn the dial to 

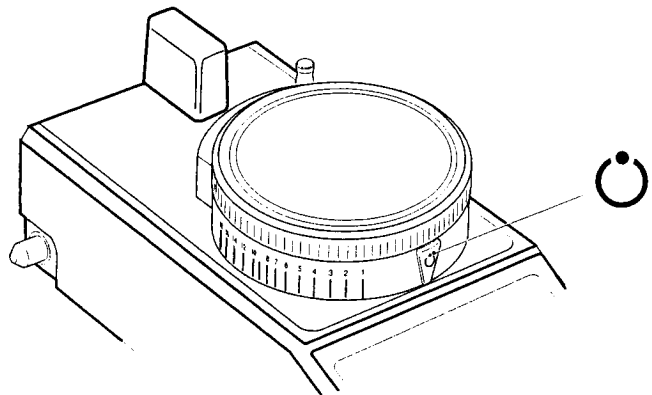


Figure 6-1 • Setting the dial to standby

Step 2

Disconnect the power cord from the electrical supply.

Step 3

Remove the battery cover.

- Remove the vaporizer from the manifold of the anesthesia system as described in *Removing the vaporizer from a manifold* in Chapter 4 and invert the vaporizer.
- Unscrew the battery cover securing screw.
- Remove the battery cover.

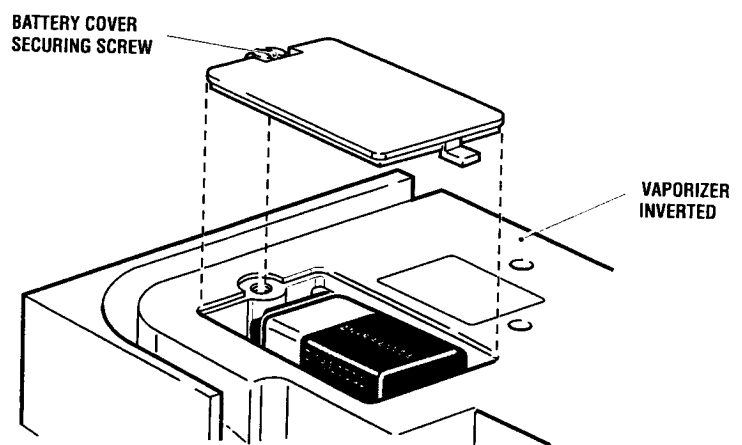


Figure 6-2 • Removing battery cover

Step 4

Remove the battery and disconnect the terminals.

Dispose of the battery according to local regulations.

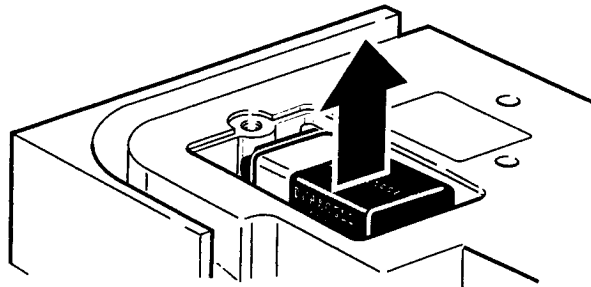


Figure 6-3 • Removing the battery

⚠ CAUTION Install only a Duracell MN1604 or VARTA Energy 2000 nine volt battery in the vaporizer. If any other battery is installed, it can damage the vaporizer.

⚠ WARNING The battery terminals must be firmly clipped onto the battery to help prevent a possible disconnection when the vaporizer is moved.

Step 5

Install a new battery.

- Clip the battery terminals firmly onto the new battery, observing the correct polarity.
- Insert the battery into the vaporizer.

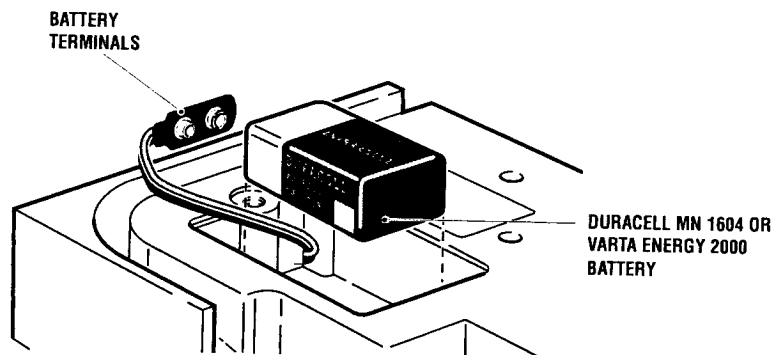


Figure 6-4 • Installing new battery

Step 6

Fit the battery cover to the base of the vaporizer and tighten the securing screw.

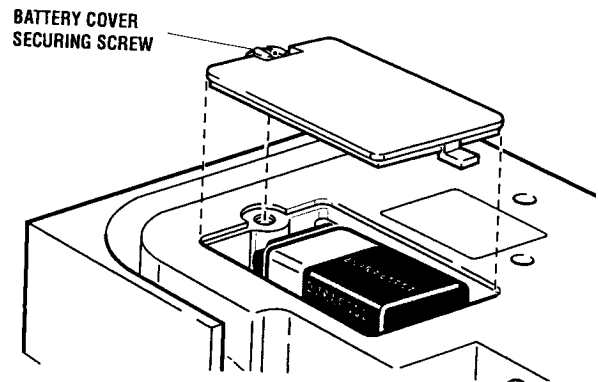


Figure 6-5 • Replacing battery cover

⚠ WARNING

Do not throw batteries onto a fire, do not open with force and do not recharge. To do so may result in operator injury. When disposing of batteries, treat them as special waste and dispose of according to local regulations.

Spare parts

Description	Part No.
O-ring Kit	1104-3025-000
Battery	1370219
NAD Mounting Kit	1107-7097-000
<i>Power Cords:</i>	
Aestiva (universal) .5 m	1006-3796-000
IEC 320 1.5 m	1107-3191-000
North America 3.5 m	1107-3189-000
North America 1.5 m	1107-3190-000
Continental Europe 1.5 m	1007-3186-000
Continental Europe 3.5 m	1107-3185-000
United Kingdom 3.5 m	1107-3187-000
Australia / New Zealand 1.5 m	1107-4020-000
Australia / New Zealand 3.5 m	1107-4025-000

To order contact your Datex-Ohmeda customer service representative.

Alarm and indicator display

See Figure 7-1.

1. When the electrical supply is connected, each light and each LCD agent level display bar on the front display panel (17) flashes and the auditory alarm activates to indicate that the alarms are operational. After approximately four seconds, each light is extinguished, the LCD bars stop flashing and the auditory alarm is silenced.
2. The amber WARM-UP light is illuminated to indicate that the vaporizer is in its warm-up cycle and the LCD agent level display bars indicate the amount of agent in the sump.
3. During the warm-up cycle, the shut-off valve (8) is closed to prevent the supply of vapor to the pressure regulating valve (7), and the electronics (16) perform the zero check.
4. When the vaporizer attains the required operating temperature, the amber WARM-UP light is extinguished and the green OPERATIONAL light illuminates to indicate that the vaporizer is ready for use.

Delivery of gas/agent vapor

1. When the vaporizer is ready for use, a signal from the electronics (16) operates the solenoid (19) in the interlock mechanism which allows the dial and rotary valve (1) to be turned.
2. When the dial and rotary valve (1) are turned, a signal from the electronics (16) opens the shut-off valve (8).
3. The pressure control transducer (3) sends a signal of the difference between the gas inlet pressure and the regulated agent pressure to the electronics (16). The electronics alters the regulated agent pressure by opening or closing the pressure regulating valve (7) to balance the pressures.
4. When the regulated agent pressure of the circuit is equal to the gas inlet pressure, the vaporizer functions correctly.
5. The dial and rotary valve (1) regulates the volume of vapor being delivered to the fresh gas mixture.
6. The fresh gas mixes with the vapor just prior to the gas/agent outlet in the proportions consistent with the selected dial setting.

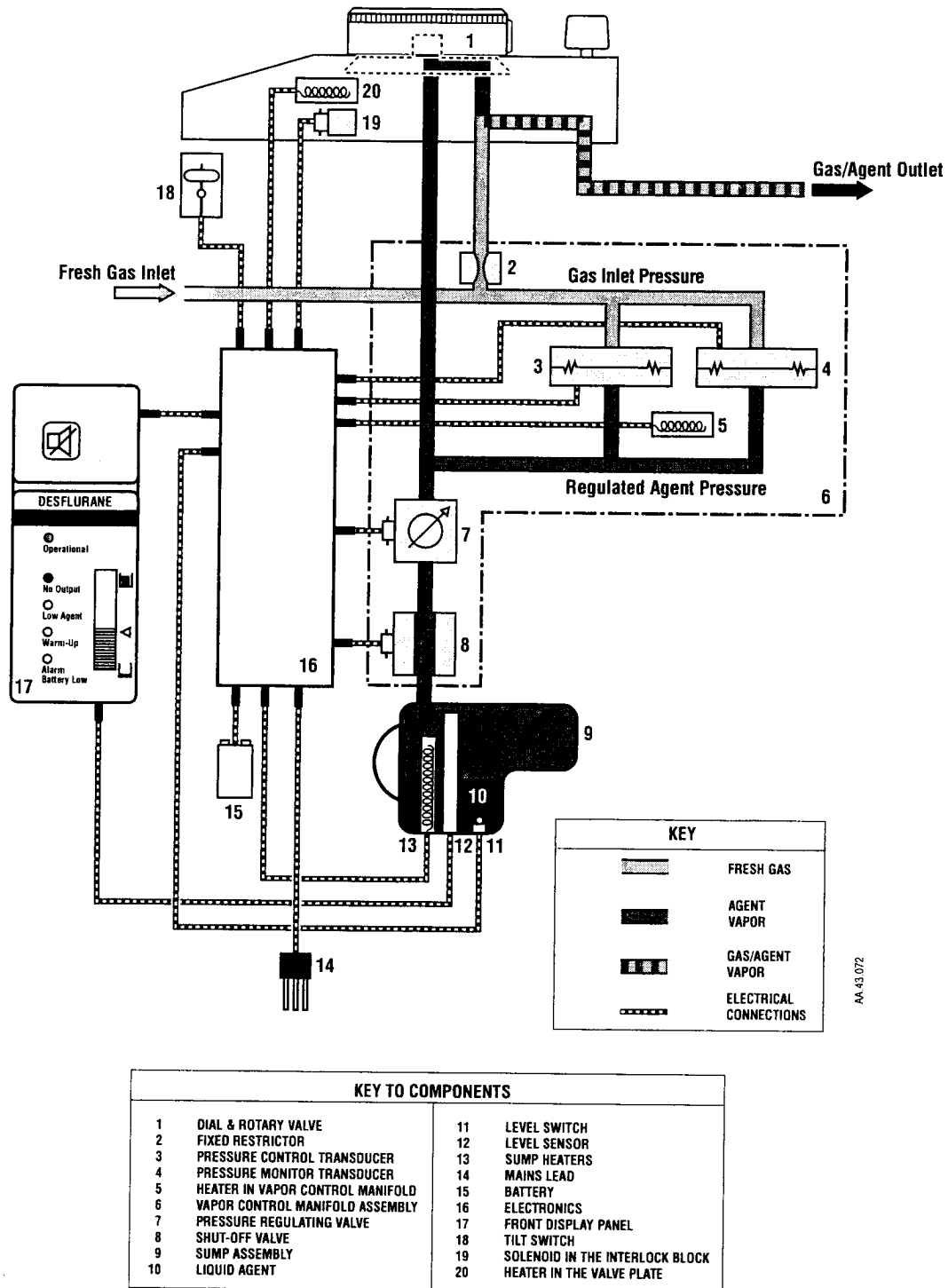


Figure 1-1 • Vaporizer schematic

Troubleshooting guide

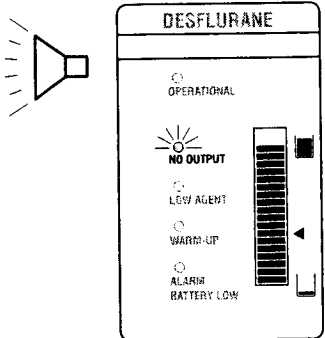
The following table details the alarm condition and the actions which must be performed to correct the alarm condition and the possible cause.

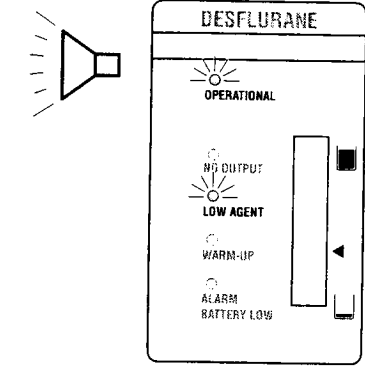
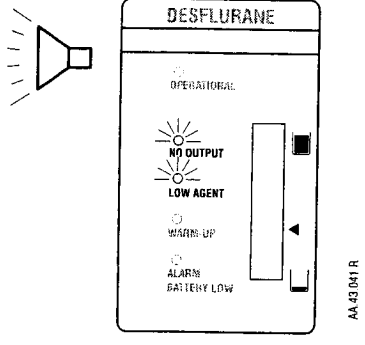
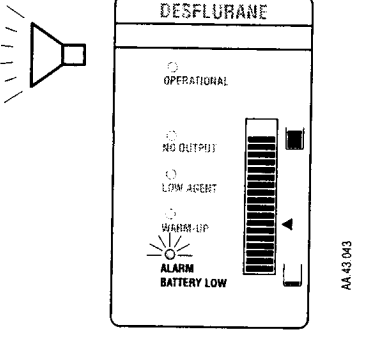
If vaporizer fails to function correctly after the appropriate action has been taken, send the vaporizer to the Datex-Ohmeda Authorized Service Center for repair.

Note:

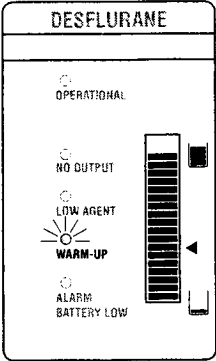
If the dial is at the ○ setting when an alarm occurs, the auditory alarm does not repeat.

Vaporizer Status	Action	Possible cause
The vaporizer dial release can be depressed, but the dial will not turn. When more pressure on the dial release is applied, a click on the mechanism is detected. The dial still cannot be turned.	Let go of the dial release, then: a) Allow the vaporizer to warm up until the green OPERATIONAL light illuminates. b) If another vaporizer is in use, turn the other vaporizer to dial to OFF/ ○.	a) During WARM UP, the interlock mechanism prevents vaporizer use. b) The interlock mechanism of another vaporizer is operative.

Alarm indication	Action	Possible cause
	<p>Turn the dial to ○. Restore external power. The vaporizer may go to operational or perform a thorough system check before going operational, depending on time of external power restoration, or permanently red alarm if an internal power failure is detected.</p> <p>Note that a power failure causes the higher pitched audio alarm tone.</p> <hr/> <p>Turn the dial to ○ and level the vaporizer.</p> <hr/> <p>⚠ WARNING Use an alternative means of anesthesia.</p>	<p>Power failure.</p> <hr/> <p>Tilt</p> <hr/> <p>Any internal malfunction.</p>

Alarm indication	Action	Possible cause
	<p>Fill the sump with Suprane™.</p>	<p>Agent level <60 ml.</p> <p>⚠ WARNING If this condition persists until there is less than 20 ml of agent in the sump, the NO OUTPUT alarm is activated and the output ceases.</p>
	<p>Turn the dial to ○ and fill the sump with Suprane™.</p> <p>⚠ WARNING If the NO OUTPUT alarm persists, use an alternative means of anesthesia.</p>	<p>Agent level <20 ml.</p>
	<p>Change the battery as soon as practical (ideally within eight hours of alarm indication).</p>	<p>Alarm battery low.</p>

Tec 6 Plus Vaporizer

Alarm indication	Action	Possible cause
	<p>⚠ WARNING Do not attempt to use the vaporizer.</p>	<p>If the amber WARM-UP light does not extinguish within ten minutes after the vaporizer is connected to an electrical supply, there may be an internal malfunction.</p>

Specifications

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Note:

All specifications are nominal and subject to change without notice.

Calibration

Check the calibration certificate that is included with your Tec 6 Plus Vaporizer.

⚠ WARNING The Tec 6 Plus Vaporizer can only be calibrated at a Datex-Ohmeda Authorized Service Center.

The Tec 6 Plus Vaporizer is calibrated at 760 torr and at a nominal 21 °C for the following concentrations (v/v percent): 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 16 and 18, using O₂ as the carrier gas flowing at five liters/minute.

Electrical supplies

Voltage requirement	100 to 120V AC 50/60 Hz or 220 to 240V AC 50/60 Hz
Power consumption	250 VA nominal
Current input	Maximum current requirement is 2.0 A

The ~ symbol on the vaporizer rating label denotes that the external AC power supply must be single phase sinusoidal alternating current.


Performance

Concentration range	1 to 18%
Scale	1% from 1 to 10% 2% from 10 to 18%
Calibrated flow range at 21 ± 2 °C	0.2 to 10 liters/minute
Accuracy at 5 liters/min O ₂	± 0.5% v/v of delivered agent or ± 15% dial setting (whichever is greater)
Liquid capacity	390 ml nominal volume (indicated on level display) 240 ml refill capacity indicator nominal 60 ml reserve (not indicated on level display)
Flow resistance	Less than 50 cm H ₂ O at 5 liters/minute of O ₂ at 21 °C Less than 250 cm H ₂ O at 15 liters/minute of O ₂ at 21 °C
Battery	Duracell MN 1604 or VARTA Energy 2000
Operating temperature range	18 °C to 30 °C (64 °F to 86°F)
Operating humidity range	30% to 75% relative humidity (non-condensing)
Storage temperature range	-40 °C to 60 °C (-40 °F to 140°F)
Storage relative humidity range	0% to 95% relative humidity at 40 °C (non-condensing)
Storage atmospheric pressure	70.0 to 106.0 kPa

Classification

The vaporizer can be powered indefinitely unless a fault condition occurs, also known as continuous rating.

Type of protection against electric shock is Class 1. Accessible conductive parts of Class 1 equipment are connected to a protective earth in such a way that they do not become live in the event of a failure of the basic insulation.

The  symbol on the vaporizer rating label denotes the degree of protection against electric shock, which is Type B.

The vaporizer is not protected against liquid flowing into the interior of the unit.

Weight and dimensions

Datex-Ohmeda

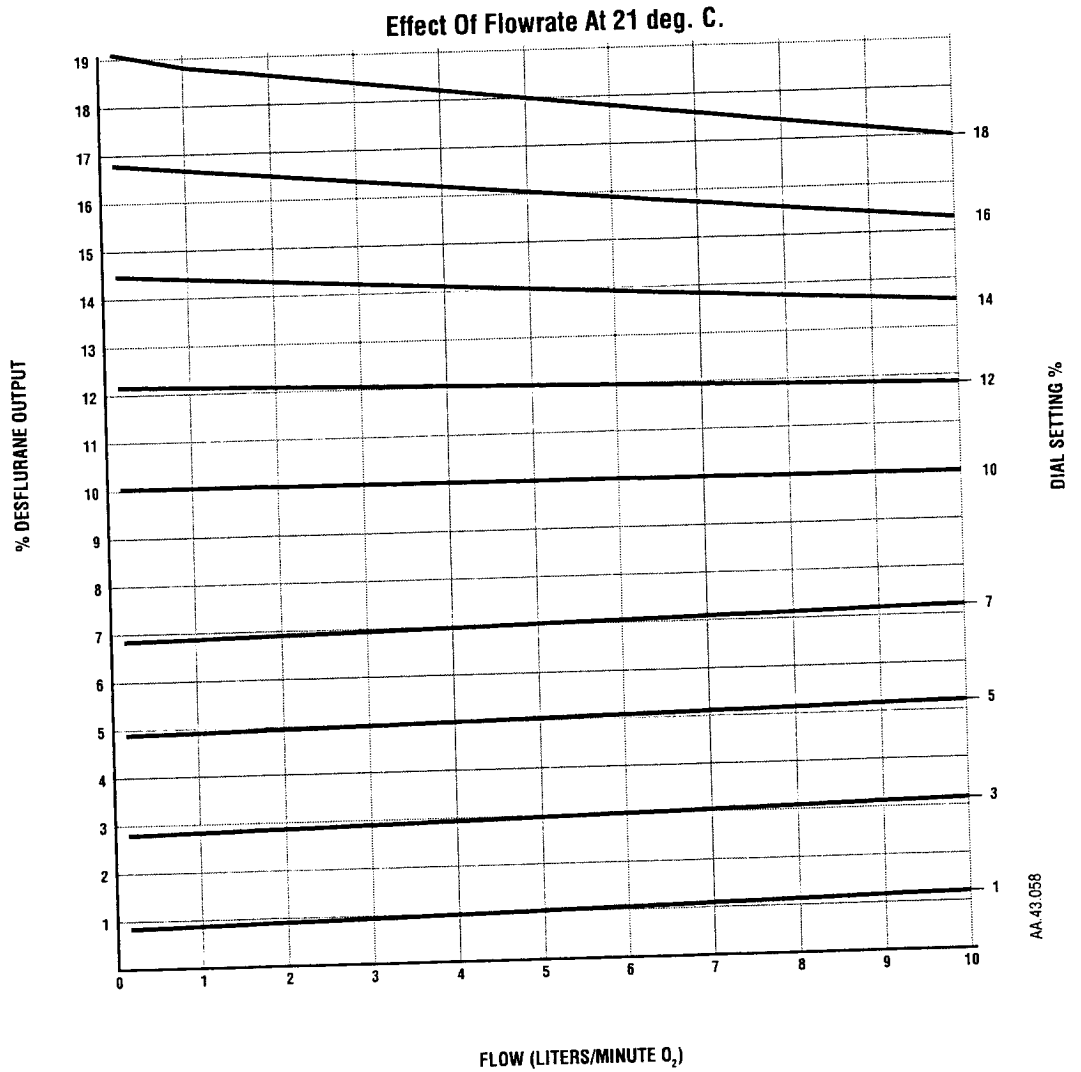
Weight	9.5 kg	20 lb 15 oz (empty)
Depth	235 mm	9 1/4 inches
Width	110 mm	4 3/8 inches
Height	250 mm	9 7/8 inches (in the unlocked position)

North American Dräger

Weight	10 kg	22 lb (empty)
Depth	235 mm	9 1/4 inches
Width	110 mm	4 3/8 inches
Height	235 mm	9 1/4 inches

Flow characteristics

The graph shows the nominal output of the Tec 6 Plus Vaporizer at 760 torr.



Effects of output at varied altitudes

The Tec 6 Plus Vaporizer is calibrated in percent v/v and the calibration is not affected by ambient pressure changes. The partial pressure of the delivered agent at any selected dial setting varies directly with the changes in ambient air pressure. The required dial setting can be calculated using the following formula:

$$\text{Required Dial Setting} = \text{Normal Dial Setting \% v/v} \times \frac{760 \text{ torr}}{\text{ambient pressure (torr)}}$$

The table below shows the dial setting on a Tec 6 Plus Vaporizer at altitudes of 1000m and 2000m respectively above sea level:

Normal dial setting % v/v	Required dial setting percent	
	At an altitude of 1000m (3282 feet)	At an altitude of 2000m (6564 feet)
5	5.5	6
10	11	12.5
14	17	18

Effects of ambient temperature

The performance of the Tec 6 Plus Vaporizer is not significantly affected by the temperature variations within the operating range specified in *Performance*.

Effects of back pressure

Fluctuating back pressure does not significantly affect the output of the Tec 6 Plus Vaporizer.

Steady back pressure does not significantly affect the concentration of the agent delivered (v/v), but does increase partial pressure of the agent. The increase is in the ratio of total back pressure to the vaporizer calibration pressure of 760 torr.

Effects of carrier gas composition

Small output decreases can occur when the carrier gas composition is changed from 100% oxygen.

When either air or nitrous oxide is employed as the carrier gas, the output is lowered compared to the output when oxygen is the carrier gas. This effect is the greatest (up to 20% of setting) at low flows when nitrous oxide is employed, but using nitrous oxide reduces the required inspired concentrations of volatile agent which can, depending upon the proportion, mitigate the decreases in output from the vaporizer.

Warranty

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Warranty

This product is sold by Datex-Ohmeda under the warranties set forth in the following paragraphs.

Such warranties are extended only with respect to the purchase of this Product directly from Datex-Ohmeda or Datex-Ohmeda's Authorized Dealers as new merchandise and are extended to the first Buyer thereof, other than for purpose of resale.

For a period of twenty-four (24) months from the date of original delivery to the first Buyer or to Buyer's order, but in no event for a period of more than two years from the date of original delivery by Datex-Ohmeda to a Datex-Ohmeda Authorized Dealer, this Product, other than its expendable parts, is warranted against functional defects in materials and workmanship and to conform to the description of the Product contained in the Operation and Maintenance manual and accompanying labels and/or inserts, provided that the same is properly operated under conditions of normal use, that regular periodic maintenance and service is performed and that replacements and repairs are made in accordance with the instructions provided. This same warranty is made for a period of thirty (30) days with respect to expendable parts. The foregoing warranties shall not apply if the Product has been repaired other than by Datex-Ohmeda or other than in accordance with written instructions provided by Datex-Ohmeda, or altered by anyone other than Datex-Ohmeda, or if the Product has been subject to abuse, misuse, negligence, or accident.

Datex-Ohmeda's sole and exclusive obligation and the Buyer's sole and exclusive remedy under the above warranty is limited to repairing or replacing, free of charge, at Datex-Ohmeda's option, a Product which is confirmed as being defective by Datex-Ohmeda following the Buyer's notification to Datex-Ohmeda and, where requested, return of the Product to Datex-Ohmeda in accordance with the instructions contained in the Servicing Policy section of the O & M Manual, not later than seven (7) days after the expiration date of the applicable warranty. Datex-Ohmeda shall not be otherwise liable for any damages including but not limited to incidental damages, consequential damages, or special damages.

There are no express or implied warranties which extend beyond the warranties herein above set forth. Datex-Ohmeda makes no warranty of merchantability or fitness for a particular purpose with respect to the Product or parts thereof.

Servicing policy

Repairs and service procedures must be performed at a Datex-Ohmeda Authorized Service Center. Contact your Datex-Ohmeda Service Representative or Datex-Ohmeda Authorized Distributor.

If you are shipping the unit to the nearest Datex-Ohmeda Field Operations Unit, package the vaporizer and power cord securely for protection in its original packaging, and ship it prepaid. Provide the following items:

1. Details of any difficulties experienced with the equipment.
2. Warranty information such as a copy of the invoice or other documentation.
3. Purchase order number to cover repair or service of equipment not under warranty.
4. Ship to and bill to information.
5. The name and telephone number of the person to contact.