Veta 3

Anesthesia Machine

Operator's Manual

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- all installation operations, expansions, changes, modifications and repairs of this product are conducted by Mindray authorized personnel;
- the electrical installation of the relevant room complies with the applicable national and local requirements; and
- the product is used in accordance with the instructions for use.

WARNING: **It is important for the hospital or organization that employs this equipment to carry out a reasonable service/maintenance plan. Neglect of this may result in machine breakdown or personal injury.**

NOTE: **This equipment must be operated by skilled/trained clinical professionals.**

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- Malfunction or damage caused by unstable or out-of-range power input.
- Malfunction or damage caused by force majeure such as fire and earthquake.
- Malfunction or damage caused by improper operation or repair by unqualified or unauthorized service people.
- Malfunction of the instrument or part whose serial number is not legible enough.
- Other malfunctions not caused by instrument or part itself.

Phone Numbers and How To Get Assistance

A network of service representatives and factory-trained distributors is available. Prior to requesting service, perform a complete operational check of the instrument to verify proper control settings. If operational problems continue to exist, contact the Service Department at 877.913.9663 (toll free) for Technical Support or 650.316.3199 (outside North America) for assistance in determining the nearest field service location.

Please include the instrument model number, the serial number (located on the back of the Anesthesia System), and a description of the problem with all requests for service.

Warranty questions should be directed to a local representative. A list of offices, along with their phone numbers, is provided at the end of this manual.

NOTE: **Upon request, calibration instructions or other information will be provided to assist the user's appropriately qualified technical personnel in repairing those parts of the Anesthesia System which are designated as repairable.**

Manufacturer and Address

Manufacturer:	Shenzhen Mindray Bio-Medical Electronics Co., Ltd.
Address:	Mindray Building, Keji 12th Road South, High-tech industrial park, Nanshan, Shenzhen 518057, P.R. China

Foreword

The Operator's Manual for the Veta 3 Anesthesia Machine (herein referred to as Anesthesia Machine, Equipment, Veta 3) contains the instructions necessary to operate the product safely and in accordance with its function and intended use. Observance of this manual is a prerequisite for proper product performance and correct operation and ensures patient and operator safety.

This manual is based on the maximum configuration and therefore some contents may not apply to your product. If you have any question, please contact us.

This manual is an integral part of the product. It should always be kept close to the equipment so that it can be obtained conveniently when needed.

Intended Audience

This manual is for clinical professionals who are expected to have a working knowledge of medical procedures, practices and terminology as required for monitoring of critically ill patients.

Illustrations

All illustrations in this manual serve as examples only. They may not necessarily reflect the setup or data displayed on your anesthesia system.

Responsibilities of Operators

The proper function of the Anesthesia System can only be guaranteed if it is operated and serviced in accordance with the information provided in this manual and by an authorized Mindray service representative. Non-compliance with this information voids all guarantee claims.

The Anesthesia System must be operated by qualified and trained personnel only. All operators must fully observe this operator's manual and relevant additional documentation. They must also comply with the WARNINGS, CAUTIONS, and NOTES detailed in this manual.

Table of Contents

1.0 *Safety*

1.1 Safety Information

WARNING — Indicates a potential hazard or unsafe practice that, if not prevented, could result in death, serious injury or property damage.

CAUTION — Indicates a potential hazard or unsafe practice that, if not prevented, could result in minor personal injury, product fault, damage or property loss.

NOTE — Highlights important precautions and provides descriptions or explanations for better use of this product.

1.1.1 WARNING

WARNING: Do not operate the anesthesia machine before reading this manual.

WARNING: Before operation, ensure that the machine, connecting cables, and accessories are in correct working order and operating condition.

WARNING: Do not use the machine in the presence of flammable or explosive materials to prevent fire or explosion.

WARNING: Do not open the case of the machine, as you may suffer an electric shock. All servicing and upgrading operations of the machine must be carried out only by the trained and authorized Mindray personnel.

WARNING: Fresh gas flow must never be switched off before the vaporizer is switched off. The vaporizer must never be left switched on without a fresh-gas flow. Otherwise, anesthetic agent vapor at a high concentration can get into the machine lines and ambient air, causing harm to people and materials.

WARNING: Before moving the anesthesia machine, remove the objects from the top shelf and bracket to prevent the system from tilting.

WARNING: Do not use the anesthesia machine when there is leakage in the breathing system.

WARNING: Check the specifications of the Anesthetic Gas Scavenging System (AGSS) processing system and the specifications of the anesthesia machine to ensure compatibility and to prevent a mismatched processing system.

WARNING: A hazard may exist due to the use of improper connectors. Ensure all assemblies use the proper connectors.

WARNING: Single use breathing tubes, soda lime and other single use items may be considered potential biologically hazardous items and should not be reused. Dispose of these items in accordance with hospital policy and local regulations for contaminated and biologically hazardous items.

WARNING: The top shelf should not be used to push or lift the machine.

WARNING: Do not use antistatic masks or breathing tubes.

WARNING: **Cross infection may be caused if the anesthesia machine is used without timely disinfection.**

WARNING: **Do not clean or repair the machine during operation.**

1.1.2 CAUTION

CAUTION: **Use only the accessories specified in this manual to ensure animal safety.**

CAUTION: **Dispose of the machine and its accessories that approach the end of service life in compliance with applicable local laws and regulations or hospital regulations.**

CAUTION: **Electromagnetic field may affect the equipment performance. Therefore, other devices used in the vicinity of the machine must meet corresponding EMC requirements. Mobile phones and X-ray or MRI Machine are possible sources of interference as they emit higher levels of electromagnetic radiation.**

CAUTION: **Always install or transfer the machine carefully to prevent the machine from fall, collision, violent vibration or other damage from external mechanical force.**

CAUTION: **In standard configuration, the anesthesia machine can maintain stable when it is tilted at 10 degrees. Do not hang objects on two sides of the machine in case of tipping.**

CAUTION: **Fix the equipment on the top shelf securely to prevent unexpected sliding.**

CAUTION: **Prevent or avoid using and storing the gas supply hose assembly in an environment exposed to ultraviolet light or oxidizing agents, or in a high-temperature or moist environment to avoid damage to people and materials because of the release of pressure from aged hoses in the assembly.**

CAUTION: **The machine is not suitable for use in a magnetic resonance imaging (MRI) environment.**

CAUTION: **Unintended movement may occur if the casters are not locked. Casters should be locked during operating the machine.**

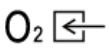
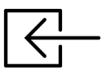
1.1.3 NOTE

NOTE: **Put the machine in a location that facilitates observation, operation and maintenance. During operation, stay right in front of the machine within four meters away from the display to facilitate observation of the displayed information on the machine.**

NOTE: **Keep this manual somewhere near the machine for convenient and prompt access.**

NOTE: **This manual describes the product for the purpose of fully covering its functions and configuration options, and the product you have purchased may not support part of these functions or configuration options.**

1.2 Device Symbols

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	Refer to the operator's manual		Warning
	Not autoclavable	IPX1	Degree of protection against harmful ingress of water
	Unlock		Lock
	Oxygen supply connector		Air supply connector
MIN	Minimum value	MAX	Maximum value
	Gas outlet		Flow or pressure control knob
	Temperature limitation		Humidity limitation
	Atmospheric pressure limitation		Keep dry
	This way up		Fragile, handle with care
	Recyclable		Stacking limit by number
	Manufacturer		Date of manufacture
SN	Serial number		Defibrillation-proof type BF applied part
	No push	O_2+	O_2 flush button
	MR Unsafe - do not subject to magnetic resonance imaging (MRI)		Gas Inlet

Manual bag connector

ACGO switch

Rx Only

U.S. Federal Law restricts this device to sale by or on the order of a physician or other practitioner licensed by state law to use or order the use of this device.

NRTL certification mark

2.0 *Overview*

2.1 Introduction

2.1.1 Intended Use

The anesthesia machine supplies anesthetic agents to the animals and provides respiratory support.

WARNING: The anesthesia machine cannot be used in an MRI environment.

WARNING: The anesthesia machine should be operated by professional and trained anesthetists.

2.1.2 Contraindications

Not identified yet.

2.1.3 Product Description

The anesthesia machine consists of a main unit, anesthetic gas delivery system, anesthetic vaporizer, anesthetic breathing system (including the airway pressure gauge, CO2 absorbent canister, inspiratory and expiratory check valves and APL valve), Anesthetic Gas Scavenging System (AGSS) and accessories. The anesthetic machine is applicable to the patient environment. The applied parts of the anesthesia machine are masks and breathing tubes.

The anesthesia system provides the following ventilation modes:

- Manual Ventilation
- Non-rebreathing ventilation

2.2 Equipment Views

Refer to the accompanied Installation Guide to install this anesthesia machine.

2.2.1 Main Unit (Front View)

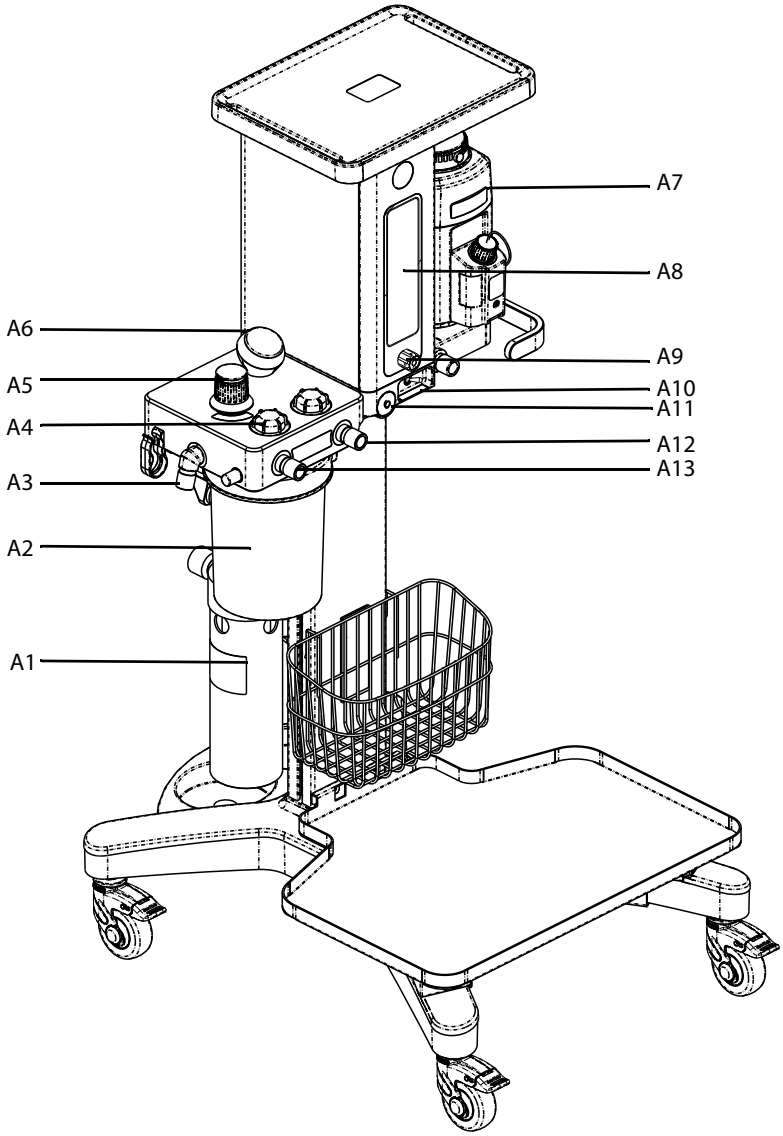


Figure 2-1 Main Unit (Front View)

COMPONENT		DESCRIPTION
A1	**AGSS System**	Used to discharge waste gas.
A2	**CO2 absorbent canister**	The container for holding the CO2 absorbent.
A3	**Manual bag connector**	Used to connect the manual bag for manual ventilation.
A4	**Observation window of expiratory/inspiratory check valve**	Used to observe the status of expiratory and inspiratory check valves from outside the equipment.
A5	**APL valve**	A rotary regulator for setting the pressure limit of the breathing system during manual ventilation. The scales on the APL valve indicate approximate pressure. Rotating the APL valve clockwise will increase the pressure limit and rotating it counterclockwise will decrease the pressure limit. The pressure limit will increase by 30 cmH2O after pressing the APL valve and return to the original pressure after releasing.
A6	**Airway pressure gauge**	Used to indicate the airway pressure.
A7	**Vaporizer**	The vaporizer can accurately feed the anesthetic agent into anesthesia breathing system at certain concentration. Each vaporizer is calibrated for a specified anesthetic agent and is only suitable for that anesthetic agent. The specific agent that the vaporizer must be used is marked in text and by specific color on the vaporizer.
A8	**Flowmeter**	Shows the flow of O2 or air.
A9	**Flowmeter control knob**	Rotate the knob to adjust the flow.
A10	**ACGO (Auxiliary Common Gas Outlet) switch**	Used to enable/disable the ACGO function and output fresh gas.
A11	**O2 flush button**	Used to provide fixed O2 flow for the inspiratory branch of the breathing system. Please note that the animal should be disconnected with the machine when pressing the O2 flush button.
A12	**Inspiratory branch**	Inspiration connector.
A13	**Expiratory branch**	Expiration connector.

Table 2-1 Main Unit (Front View) Components List

2.2.2 Main Unit (Back View)

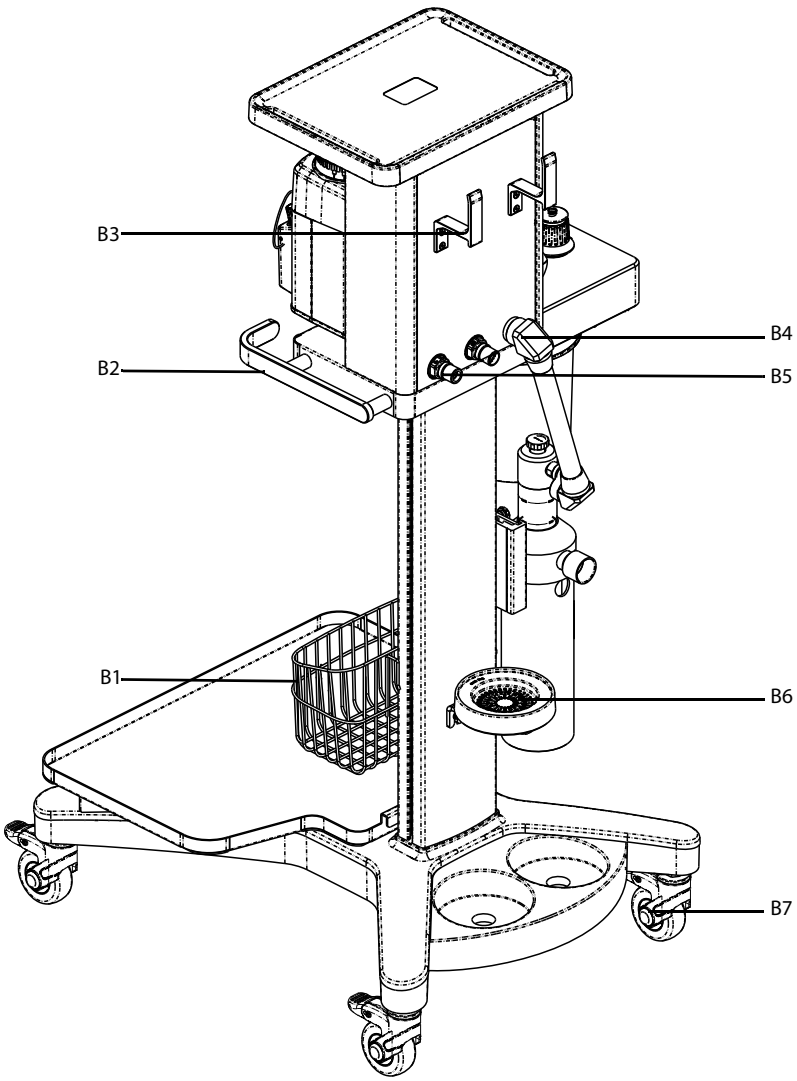


Figure 2-2 Main Unit (Back View)

COMPONENT		DESCRIPTION
B1	**Basket**	Used to store various medical equipments.
B2	**Handrail**	Used to move the machine. Its maximum bearable force is 100 N. **WARNING: The top shelf should not be used to lift the machine.**
B3	**Hanger**	Used to hang gas supply hoses and power cords. **NOTE: Hang the cables on the hanger when moving the machine so as to prevent unexpected tilting.**
B4	**Waste gas scavenging outlet**	Used to connect AGSS or the anesthesia gas filter canister.
B5	**Gas supply connector**	Oxygen supply connector.
B6	**Tray**	Used to place the anesthesia gas filter canister.
B7	**Caster**	The casters are used to move the machine, and the brakes to fix it.

Table 2-2 Main Unit (Back View) Components List

3.0 *Preoperative Tests*

3.1 Requirements of Preoperative Tests

Preoperative tests on the anesthesia machine should be performed according to the test intervals listed below. Refer to special procedures or precautions in this manual.

Perform the preoperative tests listed below at these events:

- **Before using the equipment on each animal:**
  - Leak Tests
  - Pipeline Tests
  - Vaporizer Tests
  - Breathing System Tests
  - Inspect the AGSS
  - Inspect the Anesthesia Gas Filter Canister
  - Pre-operation Preparations
- **After the service or maintenance of the anesthesia machine:**
  - System Check
  - Pipeline Tests
  - Breathing System Tests
  - Inspect the AGSS
  - Pre-operation Preparations

NOTE: **Do not use the machine if a failure occurs. Please contact Mindray Technical Support.**

3.2 Preoperative Checklist

WARNING: **To ensure the normal operation of the machine and the safety of both the user and the animal, please follow all check procedures established by the hospital before administering anesthesia to the animal.**

- **Each day before administering anesthesia machine, the following should be done:**

1. Check for any damage to or dangerous conditions in the equipment. Ensure all necessary equipment and supplies are present, e.g., drugs and CO_2 absorbent (not exhausted).
2. Check that the vaporizers are properly installed and sufficiently filled and that filler ports are tightly closed.
3. For the anesthesia gas filter canister, check if its gaining weight surpasses the claimed range. For an anesthesia machine equipped with an AGSS, check if the AGSS float position is between the Min and Max scale lines.

- **Prior to administering anesthesia machine to each animal, the following should be done:**

1. Check for any damage to or dangerous conditions in the equipment; ensure all necessary equipment and supplies are present, e.g., anesthetic drugs, CO_2 absorbent (not exhausted) and anesthesia gas filter canister (not overweighted).
2. Check that the central supply O_2 and Air pressure is within the specified range for pipelined gas supply (i.e., 280-600 kPa/40-87psi). Or, check the oxygen generator works well when using the oxygen generator and ensure that its maximum output pressure does not surpass 600 kPa.
3. With a breathing circuit and manual bag attached, check the operation of unidirectional valves by visual inspection.
4. Check the ventilation capability in Manual mode.

- **Prior to administering anesthesia machine to each animal, the following should be done:**
  - Leak Test.

3.3 System Inspect

Check the system to meet the following requirements:

1. The equipment is correctly connected and in good condition.
2. Inspect the system for:

   a. Damage to flowmeters, vaporizers, gauges, supply hoses.

   b. Complete breathing system with adequate CO_2 absorbent.
3. Inspect other items:

   a. Flow control valve is closed.

   b. Vaporizer is closed.

   c. Vaporizer is dosed.
4. All components are correctly attached.
5. The breathing system is correctly connected and the breathing tubes are undamaged.
6. The gas supply system has been connected and the pressures are correct.
7. The necessary emergency equipment is available and in good condition.
8. Inspect the color of the soda lime in the canister. Replace the soda lime immediately if obvious color change is detected.
9. Applicable anesthetic and emergency drugs are available.
10. The casters are not damaged or loose, the brake(s) is set and prevents movement.
11. Ensure the breathing system is in proper position.
12. Check if the O_2 flush button is normal.

3.4 Manual Circuit Leak Test

1. Connect the manual bag connector.
2. Ensure that the Y-piece and the flowmeter are closed.
3. Adjust the APL valve to 30 cmH_2O.
4. Push the O_2 flush button until the airway pressure gauge value is about 25 cmH_2O.

5. Release the O_2 Flush button. Ensure that the reading of the airway pressure gauge will not decrease more than 10 cmH_2O from 20 cmH_2O in 15 seconds..

3.5 Pipeline Tests

1. Connect the Air/O_2 pipeline or oxygen generator with the gas supply connector of the anesthesia machine. Then, turn on the system.
2. Adjust the flow to a medium level of the measurement range.
3. Ensure that the readings of each pipeline pressure gauge are within the range of 280 to 600 kPa. Please note that the readings of the pressure gauge should be in line with the output pressure of the oxygen generator.
4. Cut off the gas supply of the pipeline.
5. Ensure that the gauge of related gas supply pressure decreases to zero.

3.6 Breathing System Tests

WARNING: Objects in system can stop gas flow to the animal. This can cause injury or death. Ensure that there are no test plugs or other objects in the breathing system.

WARNING: Do not use a test plug that is small enough to fall into the breathing system.

1. Ensure that the breathing system is correctly connected and not damaged.
2. Ensure that the check valves in the breathing system are operating normally.
   a. If the inspiratory check valve opens during inspiration and closes at the start of expiration, then the inspiratory check valve is operating normally.
   b. If the expiratory check valve opens during expiration and closes at the start of inspiration, then the expiratory check valve is operating normally.

3.6.1 APL Valve Tests

1. Connect the manual bag connector.
2. Connect the Y-piece on the breathing circuit to the leak test port.
3. Turn the APL valve control knob to adjust the pressure to 30 cmH_2O.
4. Set the O_2 flow to 3 L/min.
5. Ensure that value displayed on the airway pressure gauge ranges from 20 to 40 cmH_2O.
6. Pull the APL valve and observe the reading on the airway pressure gauge to verify that the pressure can reach to 50 -70 cmH_2O.
7. Adjust the APL valve to the MIN position.
8. Ensure that the value displayed on the airway pressure gauge does not exceed 10 cmH_2O.
9. Set the O_2 flow to a minimum value. Ensure that the value displayed on the airway pressure gauge does not decrease below 0.

3.7 Inspect the AGSS

Open the waste gas disposal system and check if the float can surpass the MIN line. Please read the figures according to the float center. If the float is tacky or damaged, please reinstall or replace it based on the following possible conditions.

NOTE: **Do not block the AGSS pressure compensation openings during the inspection.**

If the float fails to move up to above the MIN scale line, possible reasons include as follows:

1. The float surface is tacky. Turn over the AGSS and check if the float moves up and down freely.
2. The float is rising slowly. The filter may be blocked. Disconnect the EVAC port with the AGSS. Dismount the AGSS and its hose, together with its upper cover. Check the AGSS filter, and shake it above the waste container. Clean it if necessary. If it is a must to replace the filter, please follow local regulations to dispose of discarded filters.
3. The waste gas disposal system is not working, or the pump rate is less than the flow required for proper operating of the AGSS.

3.8 Pre-operation Preparations

1. Ensure that the equipment for airway pressure maintenance, manual ventilation and tracheal intubation, and applicable anesthetic and emergency drugs are available.
2. Connect the manual bag to its connector.
3. Turn off the vaporizer.
4. Turn the APL valve control to the MIN position to fully open the APL valve.
5. Ensure that the breathing system is correctly connected and not damaged.

4.0 *Operation*

4.1 Set O_2 and Air Inputs

1. Connect the gas supply and ensure there is enough pressure for gas supply.
2. Adjust the flows of O_2 and Air by rotating the knob and their values are displayed on the flowmeter.

4.2 Set the Vaporizer

Press the control dial of the vaporizer to set the concentration of anesthetic agent to a proper value.

NOTE: **The barometric pressure may differ from the calibration pressure of the anesthetic vaporizer. This may cause an inaccurate output of the anesthetic agent. The operator should continuously monitor the concentration of anesthetic agent during system use to determine if the output concentration is accurate.**

NOTE: **Jerky movements or tilting at an angle of more than 30° can cause incorrect output concentration.**

NOTE: **If the vaporizer is not going to be used for up to six months, then the anesthetic agent inside the vaporizer should be drained.**

NOTE: **Check the liquid level of the vaporizer. If the liquid level is below the min warning line, it needs to add anesthetic agent.**

4.2.1 Fill the Anesthetic Agent

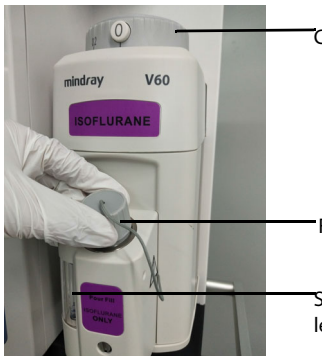
Check the following items before filling the anesthetic agent:

1. Check the vaporizer for damage.
2. Set the control dial to "0" (off) position.
3. Observe expiry date of the anesthetic agent.
4. After filling for the first time, wait 15 minutes for the dry wicks inside to become saturated.

WARNING: **Only fill the vaporizer with the anesthetic agent specified on it. Before use, check the name of anesthetic agent and color mark on the vaporizer and the anesthetic agent bottle. Sevoflurane is yellow while Isoflurane is purple.**

WARNING: **Stop using the vaporizer immediately which has been filled or partly filled with the wrong anesthetic agent or other substance to prevent danger to health. If this occurs, mark the vaporizer for incorrect filling and call the distributor for servicing.**

4.2.1.1 Pour Fill System



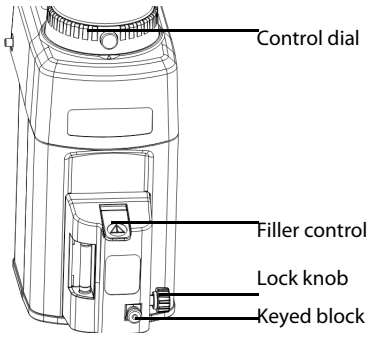
1. Set the control dial to "0" (off) position.
2. Rotate the filler cap slowly anticlockwise to discharge the pressure in the vaporizer.
3. Remove the cap of the anesthetic bottle, and pour the anesthesia agent into the vaporizer slowly.
4. Check the filling level on the sight glass during filling. The filling level must not exceed the maximum mark, or there is a risk of incorrect output concentration. If the maximum mark has been exceeded, the agent will flow out. Please drain the excess liquid (see "Drain the Anesthetic Agent" on Page 4-4)until the level drops below the maximum mark.
5. Tighten the filler cap clockwise. If this is not done properly, fresh gas and anesthetic agent may escape when the vaporizer is switched on next time.

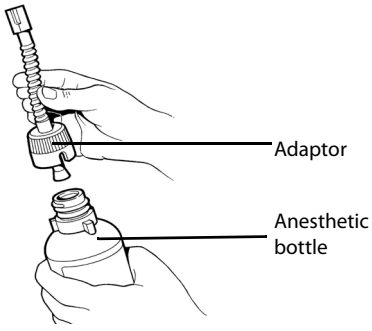
WARNING: **Significant quantities of anesthetic agent vapor may escape if the control dial does not return to "0" position.**

CAUTION: **It is necessary to wait at least 5 seconds after setting the control dial to "0" position before opening the vaporizer. This allows the pressure to balance and prevents fresh gas and anesthetic agent vapor escaping from the vaporizer.**

4.2.1.2 Key Filler System

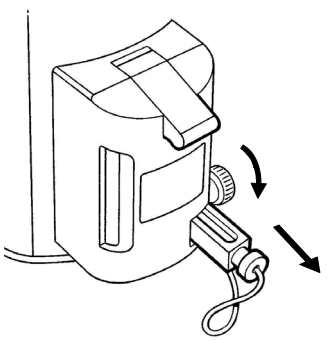
1. Set the control dial to "0" (off) position.
2. Attach the Keyed Filler adaptor to the bottle.
3. Tighten the adaptor to ensure an airtight joint, which must be maintained throughout the filling operation.

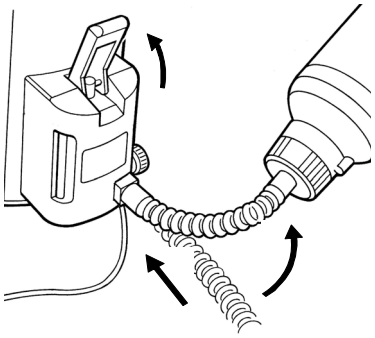




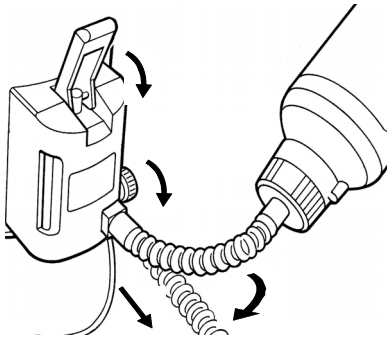
4. Loosen the knob and pull the keyed block out.

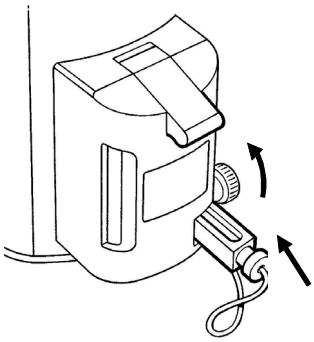
5. Insert the keyed end of the bottle adaptor fully into the vaporizer receiver. Tighten the lock knob to secure the adaptor.
6. Raise the bottle above the filler.
7. Open the filler control and allow the liquid to flow into the vaporizer until the upper mark is reached on the filler block window.





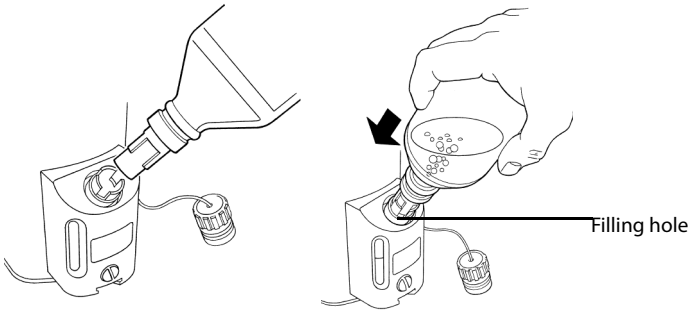
8. Close the filler control.
9. Lower the bottle below the level of the filler and allow the liquid in the bottle adaptor to flow back into the bottle. Loosen the lock knob, remove the bottle adaptor from the receiver.
10. Reinstall the keyed block and tighten the knob.





CAUTION: If the connection between the filling adaptor and the anesthetic agent bottle is not tight, the anesthetic agent may escape.

4.2.1.3 Quik-Fil System



1. Set the control dial to "0" (off) position.
2. Remove the protective cap from the anesthetic agent bottle filler, checking that the bottle and filler mechanism are not damaged.
3. Remove the vaporizer filler block cap and insert the bottle nozzle into the filler block. Rotate the bottle to align the bottle filler keys with the slots in the filler block.
4. Note the liquid level in the vaporizer window and press the agent bottle firmly into the vaporizer filler against the spring valve assembly. Allow the liquid to flow into the vaporizer until the maximum level mark is reached, paying continuous attention to the level in the window and the air return bubbles flowing into the bottle.
5. Release the bottle when the vaporizer is full and the continuous stream of bubbles ceases.
6. Pull out the bottle from the vaporizer filler and replace the vaporizer filler block cap, and the protective cap on the agent bottle.

NOTE: **The highest liquid level of the anesthesia agent is 250ml and the lowest of it is 35 ml.**

4.2.2 Drain the Anesthetic Agent

WARNING: **Handle, Storage, or dispose of the drained anesthetic as drug. Otherwise, anesthetic agent may be misused.**

WARNING: **When the drainage is completed, please tighten the filler cap and drainage knob; otherwise, the anesthetic agent may escape when the vaporizer is turned on next time.**

NOTE: **Do not reuse anesthetic agent drained from the vaporizer.**

NOTE: **During drainage, do not make an anesthetic bottle full; otherwise, anesthetic overflow may occur.**

4.2.2.1 Pour Fill System

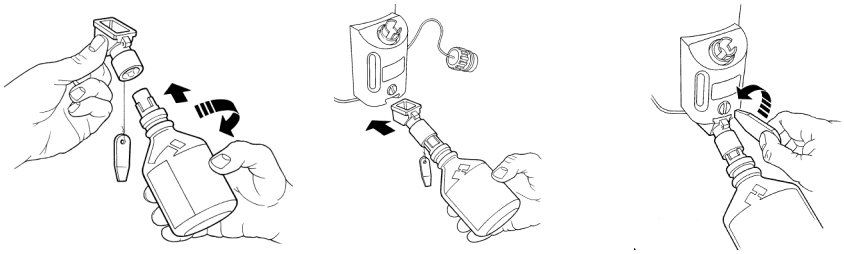
1. Set the control dial to "0" (off) position.
2. Select the correct bottle and place it under the drainage outlet.
3. Slowly rotate the filler cap counterclockwise.
4. Drain the anesthetic agent until no anesthetic agent is visible in the window and no anesthetic agent flows into the bottle. If necessary, turn off the drainage knob and drain the anesthetic agent into another anesthetic bottle.

5. When the vaporizer has been completely drained, close the drainage knob clockwise. Tighten the cap of the anesthetic agent bottle even if it is completely empty. Additionally, tighten the filler cap.

4.2.2.2 Key Filler System

1. Set the control dial to"0"(off) position.
2. Repeat Step 2-5 of Filling the anesthetic agent: Key Filler System (see "Key Filler System" on Page 4-2). Put the bottle under the vaporizer.
3. Open the filler control and allow the liquid of the adapter flow back to the bottle.
4. Close the filler control. Loosen the knob and pull the keyed block out. Reinstall the keyed block and tighten the knob.

4.2.2.3 Quik-Fil System



1. Remove the protective cap from an empty bottle. Insert the bottle nozzle into the drain funnel. Rotate the bottle to align the bottle filler keys with the index slots in the drain funnel, and screw the drain funnel onto the empty bottle.
2. Remove the vaporizer filler block cap.
3. Fully insert the drain funnel into the keyed drain slot, and unscrew the drain plug. Continue to drain the vaporizer until empty. Tighten the drain plug, and pull out the drain funnel.
4. Unscrew the drain funnel from the bottle and refit the bottle cap and the vaporizer filler block cap.

4.3 Manual Ventilation

1. Rotate the APL valve and adjust the pressure of the breathing system to an appropriate range.

2. Set the Auto/Manual switch to the Manual position.

In this mode, APL valve is used to adjust the peak pressure of breathing system and gas volume of the manual bag. When the pressure in the breathing system reaches the preset limit of the APL valve, the valve will be opened to release the excessive gas.

5.0 *Maintenance*

5.1 Maintenance Schedule

The schedules listed below are the minimum frequency based on 2,000 hours of usage per year. The equipment should be serviced more frequently if used more than this yearly usage.

NOTE: **During cleaning and installation, inspect the parts and seals for damage. Replace and repair them if necessary.**

MINIMUM MAINTENANCE FREQUENCY	MAINTENANCE
Every day	Check the weight of the anesthesia gas filter canister; check the O_2 flush function; use soft cloths, mild soap and water to clean the surface of the anesthesia machine and CO_2 absorber canister.
Every week	Check whether the inspiratory/expiratory gasket is damaged; check whether the inspiratory/expiratory valve is damaged or coiled; calibrate the pressure sensor.
Every two weeks	Drain the vaporizer.
On-demand	• Replace the soda lime in the canister if the soda lime color changes. • Replace the delivery system hose if it is damaged. • Replace the gas supply hose if it is damaged. • Replace the APL valve if its release pressure deviation is too large.

Table 5-1 Maintenance schedule

5.2 Methods for Cleaning and Disinfection

WARNING: **During cleaning and disinfection, ensure the applicability and correctness of the cleaning and disinfection methods.**

WARNING: **Keep all liquids away from electronic components. Prevent liquid from penetrating into the equipment casing.**

NOTE: **Clean and disinfect the machine as needed before the first use of the equipment. Refer to this chapter for the cleaning and disinfection methods.**

NOTE: **Do not use abrasive cleaning agents (such as steel wool, silver polish and cleaning agents). The pH value of cleaning solutions must be within the 7.0–10.5 range.**

CLEANING AND DISINFECTION METHODS	CATEGORY
Clear water	Cleaning agent
Soap solution (PH 7.0–10.5)	Cleaning agent
Alcohol (75%)	Moderately efficient disinfectant
Ultraviolet radiation	/

Table 5-2 Cleaning agents and Disinfectants

5.2.1 Wiping

- When cleaning the exteriors of the anesthesia machine, use wet cloths soaked in alkalescent cleaning agents (such water or soap-suds of pH 7.0 to 10.5) to wipe the surface of the equipment. When disinfecting the exteriors of the anesthesia machine, use wet cloth soaked in moderately efficient disinfectant (ethanol (75%)) to wipe the surface of the equipment.
- When the cleaning or disinfection is completed, use dry and lint-free cloths to remove the residual cleaning or disinfectant agent solution.

5.2.2 Ultraviolet radiation

- During the disinfection of the anesthesia machine, place it at a 30 W light in one meter for at least 60 minutes.

CAUTION: Ultraviolet radiation is harmful to the human body. Do not stay in the room during ultraviolet radiation.

6.0 *Accessories*

WARNING: Please use the accessories specified in this chapter only. Using other accessories may lead to inaccurate measured values or equipment faults.

WARNING: Disposable accessories shall be used only once. Repeated use may lead to performance degradation or cross-infection.

WARNING: Please do not use an accessory that shows signs of damage in its package or itself.

WARNING: The equipment and its accessories, at the end of their service lives, shall be disposed of in compliance with the guidelines regulating the disposal of such products and in accordance with local regulations for contaminated and biologically hazardous items.

6.1 Accessories List

PART NUMBER	DESCRIPTION OF COMPONENT
040-000067-00	Quik-fil Drain Funnel adaptor for draining the vaporizer, Sevoflurane
040-002707-00	Key filler adaptor for filling the vaporizer, Isoflurane
040-002708-00	Key filler adaptor for filling the vaporizer, Sevoflurane
115-026747-00	Quik-fil adaptor for filling the vaporizer, Sevoflurane
040-001187-00	Airway adaptor
040-001827-00	Latex-free breathing bag, disposable, 0.5L
040-001828-00	Latex-free breathing bag, disposable, 1L
040-001829-00	Latex-free breathing bag, disposable, 2L
040-001830-00	Latex-free breathing bag, disposable, 3L
040-001850-00	Breathing Tube, silicon, reusable, adult, 1.5m
040-001851-00	Breathing Tube, silicon, reusable, child/infant, 1.5m
040-001854-00	Breathing Tube, silicon, reusable, adult, 0.45m
040-001856-00	Silicon breathing bag, reusable, 0.5L
040-001857-00	Silicon breathing bag, reusable, 1L
040-001858-00	Silicon breathing bag, reusable, 2L
040-001859-00	Silicon breathing bag, reusable, 3L
040-001866-00	Connector, L type (Elbow), reusable, 22M/15F, 22F
040-001867-00	Connector, Y-piece, reusable, with sample port, 22M/15F， 15M
040-001868-00	Connector, Y-piece, reusable, with sample port, 22M/15F， 22F
040-001869-00	Connector, direct-connector, reusable, 22M/22M
040-001870-00	Connector, direct-connector, reusable, 22M/15M
040-006307-00	VM-2 masks for animals
040-006382-00	Tube for waste anesthetic gas absorb, EVA
040-006389-00	Tube for waste anesthetic gas absorb, silicon
040-006410-00	Adaptor for AGSS, S type, 30F, 22M
040-006411-00	Adaptor for AGSS, L type, 22F, 22M

045-004360-00	Trolley assembly
0611-20-58778	Nozzle connector
0611-20-58779	Oxygen nozzle nut
082-001227-00	O_2 supply hose, US standard, BS, DISS, 5m, 34U-OXY-BS/DS-5
082-001228-00	Air supply hose, US standard, BS, DISS, 5m, 34U-AIR-BS/DS-5
082-001355-00	Air supply hose, US standard, Chemetron, DISS, 5m, 34U-AIR-CH/DS-5
082-001356-00	O_2 supply hose, US standard, Chemetron, DISS, 5m, 34U-OXY-CH/DS-5
082-001374-00	Air supply hose, US standard, Ohmeda, DISS, 5m, 34U-AIR-OH/DS-5
082-001375-00	O_2 supply hose, US standard, P-B, DISS, 5m, 34U-OXY-PB/DS-5
082-001376-00	O_2 supply hose, US standard, Ohmeda, DISS, 5m, 34U-OXY-OH/DS-5
082-001378-00	Air supply hose, US standard, P-B, DISS, 5m, 34U-AIR-PB/DS-5
115-002342-00	Passive AGSS accessory kit
115-009073-00	AGSS low flow receiving hose, from AGSS assembly to hospital's waste gas disposal system
115-009097-00	AGSS high flow receiving hose, from AGSS assembly to hospital's waste gas disposal system
115-017375-00	AGSS Assembly, high-flow, low vacuum
115-017376-00	AGSS Assembly, low-flow, high vacuum
115-029947-00	Reusable breathing circuit accessory kit, small animal
115-029948-00	Disposable breathing circuit accessory kit with mask, small animal
115-029949-00	Reusable breathing circuit accessory kit, large animal
115-029950-00	Disposable breathing circuit accessory kit with mask, large animal
115-075146-00	AGSS waste gas transfer hose, from main unit to AGSS assembly
115-075999-00	Tray material package (0676)
115-076013-00	AGSS kit, high flow, low vacuum
115-076014-00	AGSS kit, low flow, high vacuum
115-076054-00	Oxygen concentrator tray kit (DISS)
115-076172-00	Sundries Basket kit
M90-000149---	Hose clamps: size 9.5-12mm, galvanized

A.0 *Product Specifications*

A.1 Safety Specifications

Degree of protection against electric shock	Type BF, defibrillation-proof
Degree of protection against harmful ingress of	IPX1
Disinfection and sterilization methods.	Recommended by manufactures
Degree of protection against hazards of explosion	Ordinary equipment, without protection against explosion; not for use with flammable anesthetics.
Degree of mobility	Mobile (including the base and casters)

Table A-1 Safety Specifications

A.2 Environment Specifications

MAIN UNIT			
Item	Temperature (ºC)	Relative humidity (non-condensing)	Barometric pressure (kPa)
Operation	10 to 40	15% to 95% R.H.	70 to 106.7
Storage	-20 to 60	10% to 95% R.H.	50 to 106.7

Table A-2 Environment Specifications

A.3 Physical Specifications

DIMENSIONS	
Dimensions	Overall size (excluding the trolley, anesthesia gas filter canister, oxygen generator; including accessories): (620 mm±25mm)×(515 mm±25mm)×(330 mm±25mm)(height*width*thickness) Overall size (excluding the anesthesia gas filter canister, oxygen generator; including the trolley and accessories): (1215 mm±25mm)×(620 mm±25mm)×(690 mm±25mm) (height*width*thickness)
Standard weight	≤ 20 kg (excluding the trolley, anesthesia gas filter canister, oxygen generator; including accessories) ≤ 34 kg (excluding the anesthesia gas filter canister, oxygen generator; including the trolley and accessories)
Maximum weight	≤ 75 kg (excluding the trolley, anesthesia gas filter canister, oxygen generator, monitor, infusion pumps and accessories) ≤ 90 kg (including the trolley, anesthesia gas filter canister, oxygen generator, monitor, infusion pumps and accessories)
CASTER	
Caster	Four casters with brakes.

Table A-3 Physical Specifications

A.4 Pneumatic System Specifications

GAS SUPPLY	
Gas type	Air, oxygen
Gas supply pressure range	280kPa to 600kPa (40Psi~87Psi)
Input connector	NIST or DISS
FLOWMETER	
Flow range	0 L/min~100 L/min

Table A-4 Pneumatic System Specifications

A.5 Breathing System Specifications

CONNECTOR	
Manual bag connector	Coaxial 22mm male/15mm female conical connector
Inspiration connector	Coaxial 22mm male/15mm female conical connector
Expiration connector	Coaxial 22mm male/15mm female conical connector
Exhaust connector	30mm male conical connector
AIRWAY PRESSURE GAUGE	
Range	-20 cmH_2O~100 cmH_2O
APL VALVE	
Range	0 cmH_2O~70 cmH_2O

Table A-5 Breathing System Specifications

A.6 Anesthetic Vaporizer

VAPORIZER	
Filling methods	Isoflurane: Pour Fill, Key Filler Sevoflurane: Pour Fill, Key Filler, Quik-Fil
Weight	6.0kg±0.5kg (empty) 6.5kg±0.5kg (full)
Filling volume	360 ml (dry wick) 300 ml (moist wick) 260 ml (between the minimum and maximum marks)
Concentration range	Isoflurane: 0 vol.%~6 vol.% Sevoflurane: 0 vol.%~8 vol.%
Concentration accuracy range	±0.25vol.% or ±20% of set value, whichever is greater.

Table A-6 Anesthetic Vaporizer

A.7 Anesthetic Gas Scavenging System (AGSS)

ACTIVE AGSS		
Type of the applicable disposable system	High flow	Low flow
Extract flow	75L/min~105L/min	25L/min~50L/min
PASSIVE AGSS		
Type of connector	30 mm male conical connector	
WEIGHER		
Support configuration	⩽ 130 mm gas filter canister	
Maximum load	2 kg	

Table A-7 Anesthetic Gas Scavenging System

P/N: 046-021688-00 (1.0)