

Veterinary Anesthesia Machines



Service and Parts Manual

Model Numbers:

- VMS[®]**
- VMS[®] Plus**
- VMC[™]**
- VME[™]**
- VME2[®]**
- VML[®]**
- VMR[™]**



Matrix VMS



Matrix VMS Plus



Matrix VMS Wall Mount



Matrix VMC



Matrix VME2



Matrix VME Tabletop

FOR USE BY MIDMARK TRAINED TECHNICIANS ONLY

Matrix VML & VMR (not shown)

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(*) Indicates multiple pages due to model / serial number break(s).

Symbols



DANGER

Indicates an imminently hazardous situation which will result in serious or fatal injury if not avoided.

This symbol is used only the most extreme conditions.



WARNING

Indicates a potentially hazardous situation which could result in serious injury if not avoided.



Caution

Indicates a potentially hazardous situation which may result in minor or moderate injury if not avoided. It may also be used to alert against unsafe practices



Equipment Alert

Indicates a potentially hazardous situation which could result in equipment damage if not avoided.



In Section A, test the components as indicated. (ex. 1st ✓ then go to, 2nd ✓)

Refer to Section B for testing procedures.

The symbols below may be used in this manual to represent the operational status of table functions and components.



Indicates the function / component is working properly. No action required.



Indicates the function / component is working, but a problem exists.



Indicates the function is not working at all, or that the component is faulty.



Caution

Federal law restricts this device to sale by or on the order of a licensed veterinarian.

Ordering Parts

The following information is required when ordering parts:

- Serial number & model number
- Part number for desired part
(Refer to Section E: Exploded Views & Parts Lists)

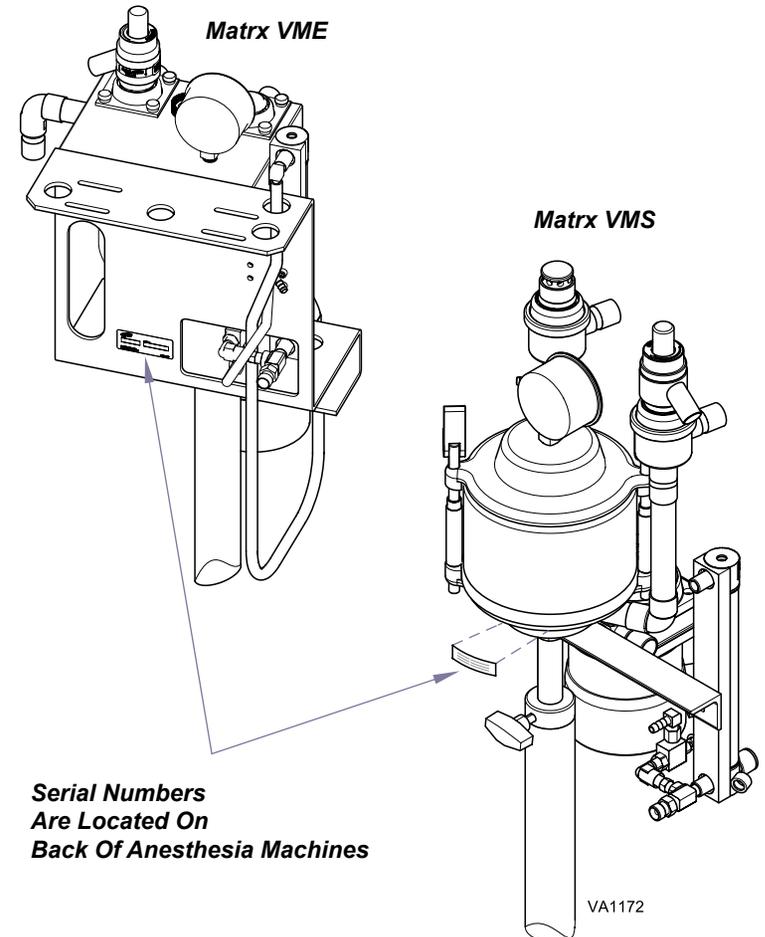
Non-warranty parts orders may be faxed to Midmark using the Fax Order Form in the back of this manual.

For warranty parts orders, call Midmark's Technical Service Department with the required information.

Hours: 8:00 am to 5:00 p.m. EST (Monday thru Friday)

Phone: 1-800-Midmark

Serial Number Location



General Information

Scheduled Maintenance Chart

Scheduled Maintenance		
Interval	Inspection / Service	Description
Before Every Surgery	Inspect	Check machine connections and rubber parts for looseness, damage or wear. Replace as nesscessary.
	Perform Leak Test	Refer to Leak Test Procedure in Section B of this manual.
Daily	Clean	Refer to Cleaning Anesthesia Machine in Section B of this manual.
Weekly	Change Absorbent Material	Follow manufacturer's recommendations for proper use of CO2 absorbents.
Annually	Service Vaporizer	Service and calibrate vaporizer.
Every 2 Years	Replacement	<i>Replace components found in maintenance kits. (O-rings, gaskets, valve disks, breathing circuit, breathing bag, tubing)</i>
Date of Service:		Model Number:
Location:		Serial Number:
Service Technician:		Notes:

General Information

Midmark Product Warranty / Return

Definition of a Warranty Return

A product or part covered by the Midmark warranty that fails while the terms of the warranty are in effect.

THIS WARRANTY IS GIVEN IN PLACE OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OTHERWISE.

No statement or claim about the product by any employee, agent, representative or dealer of Midmark shall constitute a warranty by Midmark or give rise to any liability or obligation of Midmark. Subject to the next sentence, Midmark warrants that each product or part shall be free from defects in workmanship and materials, under normal use and with appropriate maintenance, for one (1) year from the date of delivery to customer except for anesthesia machines and VIP 3000 vaporizers which have a five (5) year warranty, ClassicSeries Wet-ring Vacuums which have a three (3) year/6,000 hour warranty and ClassicSeries Lubricated Compressors which have a two (2) year/1,500 hour warranty. For plastic, rubber and disposable parts or items, Midmark warrants only that each such part and item shall be free from defects in

workmanship and materials at the time of delivery to the customer. Midmark's obligation for breach of this warranty, or for negligence or otherwise, shall be strictly and exclusively limited to Midmark's choice of repair or replacement of the product or part. This warranty shall be void for any product on which the serial number has been altered, defaced or removed. Midmark shall not be liable for any damage, injury or loss arising out of the use of the product, whether as a result of a defect in the product or otherwise, if, prior to such damage, injury or loss, the product was (1) damaged, misused, or misapplied; (2) repaired, altered or modified by persons other than Midmark; (3) not installed in strict compliance with applicable codes and ordinances; or (4) not installed by Midmark or an authorized Midmark dealer.

UNDER NO CIRCUMSTANCES SHALL MIDMARK BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES AS THOSE TERMS ARE DEFINED IN THE UNIFORM COMMERCIAL CODE.

Warranty Returns

1. Merchandise returned for warranty credit or replacement must have been purchased from Midmark within the specified warranty period or proof of installation within that time will be required.
2. Defective items will, at Midmark's discretion, either be repaired or replaced with equivalent merchandise.
3. If merchandise is found to not be defective, the 25% restocking fee will be charged.
4. Freight charges to return defective merchandise to Midmark are not reimbursable.
5. Freight charges to ship replacement or repaired merchandise to customer will be paid by Midmark.

Non-Warranty Returns

1. The following will NOT be accepted for credit: • Rubber goods over 30 days old • Rubber goods not in original, sealed package • All hoses • Special order items • Goods without a Return Goods Authorization (RA) • Merchandise more than 90 days old (from Midmark invoice date)
2. A 25% restocking charge will be deducted from the original purchase amount for all credits issued, except for return due to: • Midmark order entry error •

Warranty returns

3. Return Authorization (RA) numbers are valid for 180 days after the date issued.
4. Freight charges will not be credited.
5. Freight collect shipments are not accepted.
6. If merchandise is found to have been misused or in any way damaged after shipment from Midmark, credit will be made less charges for repair and less the 25% restocking charge. If merchandise is not salvageable, no credit will be issued.
7. All claims for damage or shortage occurring in transit must be made by the customer directly to the carrier.

Midmark Product Warranty / Return Continued On Next Page

General Information

Midmark Product Warranty / Return (Continued)

Service and Repair Policy

Repair Service Procedures – Midmark offers repair service on all Midmark anesthesia equipment. This includes anesthesia equipment from Ohmeda, Fraser Harlake, Fraser Sweatman and Cyprane TEC 3. We provide excellent turnaround on all products with customer approval for service-repair work. All returns must be made through an authorized dealer. Units for repair should be sent to Midmark and packaged in the original shipping container if possible. Please contact our Customer Service Department prior to shipping the unit prepaid to receive an authorization RMA number. Specify the RMA number on the outside of the box and label it to the attention of Repair Service Center. Our highly qualified repair department is staffed with personnel trained in the manufacture and repair of Matrix veterinary anesthesia equipment. Vaporizer Service Warranty – In addition to the service records mentioned above, Midmark will warranty the service performed for a period of six months except for damage due to improper usage, handling or care.

Rental Returns, Anesthesia Equipment

1. Charges will accrue from the time the equipment was received by the customer through its receipt by Midmark and will be charged at the time of return of the rental to Midmark. A minimum of one month charge will be made. Partial months will be rounded up to the next full month.
2. Loaners used during the repair of equipment that is under warranty will be at no charge. Loaner units must be returned to Midmark within 7 days after receipt of repaired unit or monthly charge will be initiated. Freight charges for loaner to be sent to customer will be paid by Midmark.

Vaporizer Servicing

1. Vaporizers returned for servicing must be made through an authorized dealer. Units for repair should be sent to Midmark and packaged in the original shipping container if possible. Please contact our Customer Service Department prior to shipping the unit prepaid to receive authorization RMA number. Specify the RMA number on the outside of the box and label it to the attention of Repair Service Center.
2. Midmark Vaporizer -Service Records – Subsequent to servicing, each vaporizer has a separate service and performance record established which is placed on file at the Midmark Service Center in Versailles, OH. Should the need arise to verify that your equipment has been maintained to manufacturer's specifications, Midmark will be happy to supply this information.

Customer Return Instructions

Please follow the procedures outlined below so there is no delay of credit to your account. You must have a Return Authorization (RA) number before returning any merchandise to Midmark except for out-of-warranty repairs, equipment rentals, or vaporizers for servicing. Credit may be issued only after the merchandise is returned to and inspected by Midmark and determination is made that credit is due.

To Receive a Return Authorization

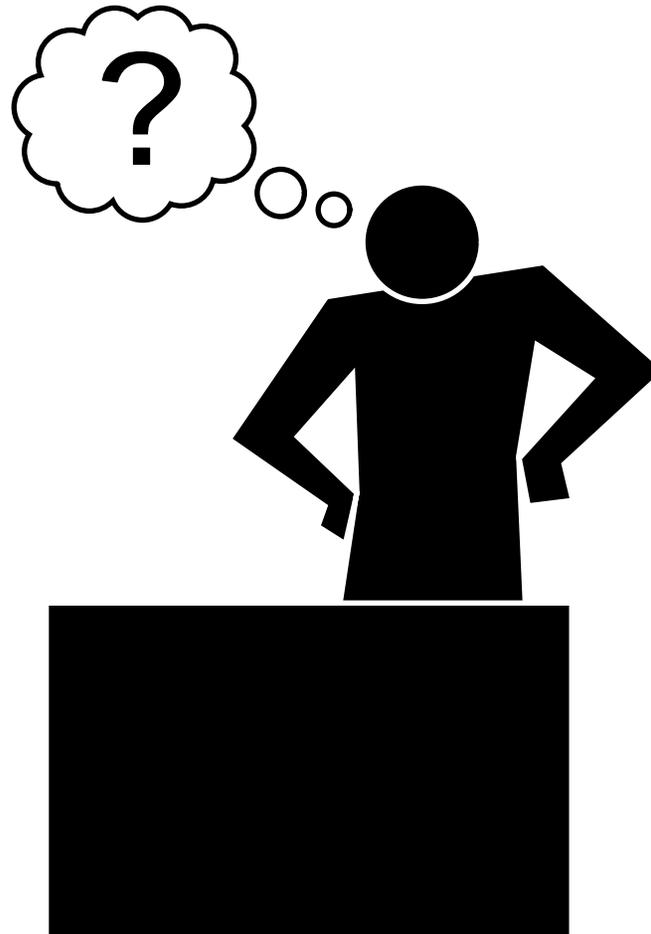
1. Call your Midmark Customer Service Representative at 1-800-MIDMARK (800-643-6275) to obtain an RA number.
2. Send the merchandise freight prepaid.

Non U.S. or Canada Service - Call your local Midmark Representative for the location of your nearest service center for further instructions.

Section A

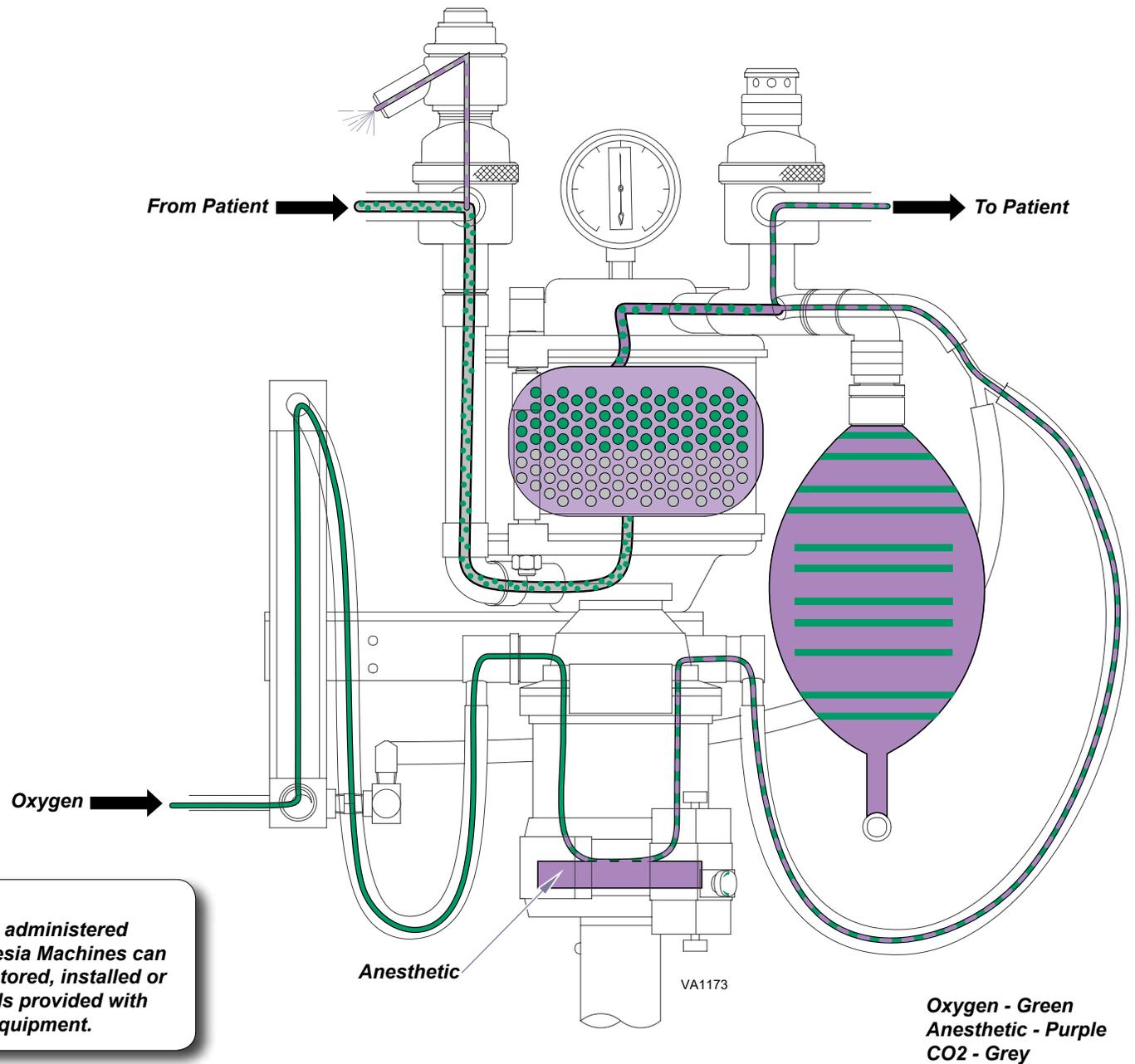
Operation & Troubleshooting

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Theory of Operation

1. Oxygen enters the machine at the lower back of flowmeter.
2. Oxygen exits flowmeter near top.
3. The oxygen enters the vaporizer and collects anesthetic gas.
4. The oxygen and anesthetic exits the vaporizer.
5. Oxygen and anesthetic enters the reservoir bag and inhalation tube then is inhaled by the patient.
6. The patient exhales. Waste gas enters the machine.
7. Waste gas enters the CO2 absorber canister which removes the CO2.
8. Gas without CO2 enters the reservoir bag, inhalation tube and patient, recycling the gas.
9. A small amount of waste gas exits the APL valve, maintaining pressure in machine and patient's lungs at 1-3cm H2O.



WARNING

Analgesic compounds and oxygen administered through Matrix by Midmark Anesthesia Machines can be dangerous to patient and practitioner if stored, installed or administered improperly. Follow all protocols provided with these substances and associated delivery equipment.

Models:	All
Serial Numbers:	

VMS, VMS Plus & VMC Operation



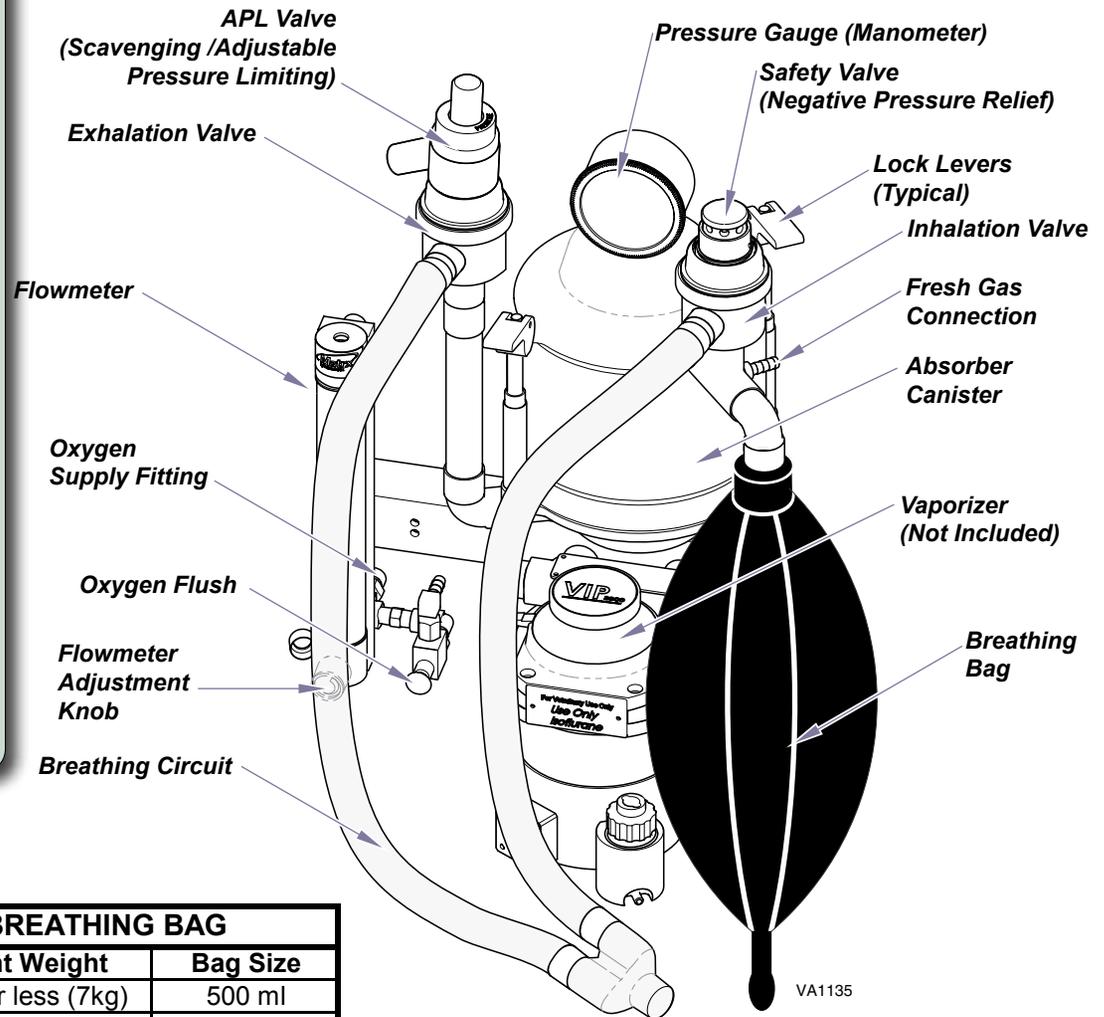
CAUTION

Insure gas supplies are adequate and turned on. Verify vaporizer is filled to eliminate the possibility of anesthetic depletion during surgery.

To Operate Anesthesia Machine...

- A) Lift CO2 absorber canister lock levers. Slide clear canister free of absorber assembly. Fill canister with absorbent material, following directions on canister label. Be sure canister and gasket mating surfaces are completely free of absorbent. Replace canister in absorber assembly. Simultaneously, close both lock levers to secure canister.
- B) Connect breathing bag and breathing circuit.
- C) Connect a 50-55 PSI (3.4-3.8 Bar) oxygen supply line to the oxygen supply fitting on the back of the flowmeter.
- D) Adjust flowmeter and vaporizer settings to meet physiologic needs of the patient.
- E) During anesthesia, monitor the pressure gauge, inhalation and exhalation valves, and the breathing bag. Make necessary corrections in flow rate, vaporizer setting, and Scavenging/Adjustable Pressure Limiting (APL) valve, to insure adequate depth of anesthesia and adequate ventilation of the patient.

Note: For guidelines on induction and anesthesia techniques, or particular species physiologic requirements, etc., please refer to a veterinary anesthesia textbook.



Equipment Alert

Never invert or tilt the vaporizer when it contains anesthetic liquid. Never overtighten the flowmeter needle valves, damage to the needle and seat will eventually result. Using the flowmeter, pressure gauge or pressure relief valve as handles when transporting can result in damage to components.

BREATHING BAG	
Patient Weight	Bag Size
15 lbs or less (7kg)	500 ml
15-30 lbs (7-14 kg)	1 liter
30-60 lbs (14-27 kg)	2 liter
60-100 lbs (27-45 kg)	3 liter
100 + lbs (45 + kg)	5 liter

VA1135

Models:	All VMS, VMS + and VMC
Serial Numbers:	

VME & VME2 Operation



CAUTION

Insure gas supplies are adequate and turned on. Verify vaporizer is filled to eliminate the possibility of anesthetic depletion during surgery.

To Operate Anesthesia Machine...

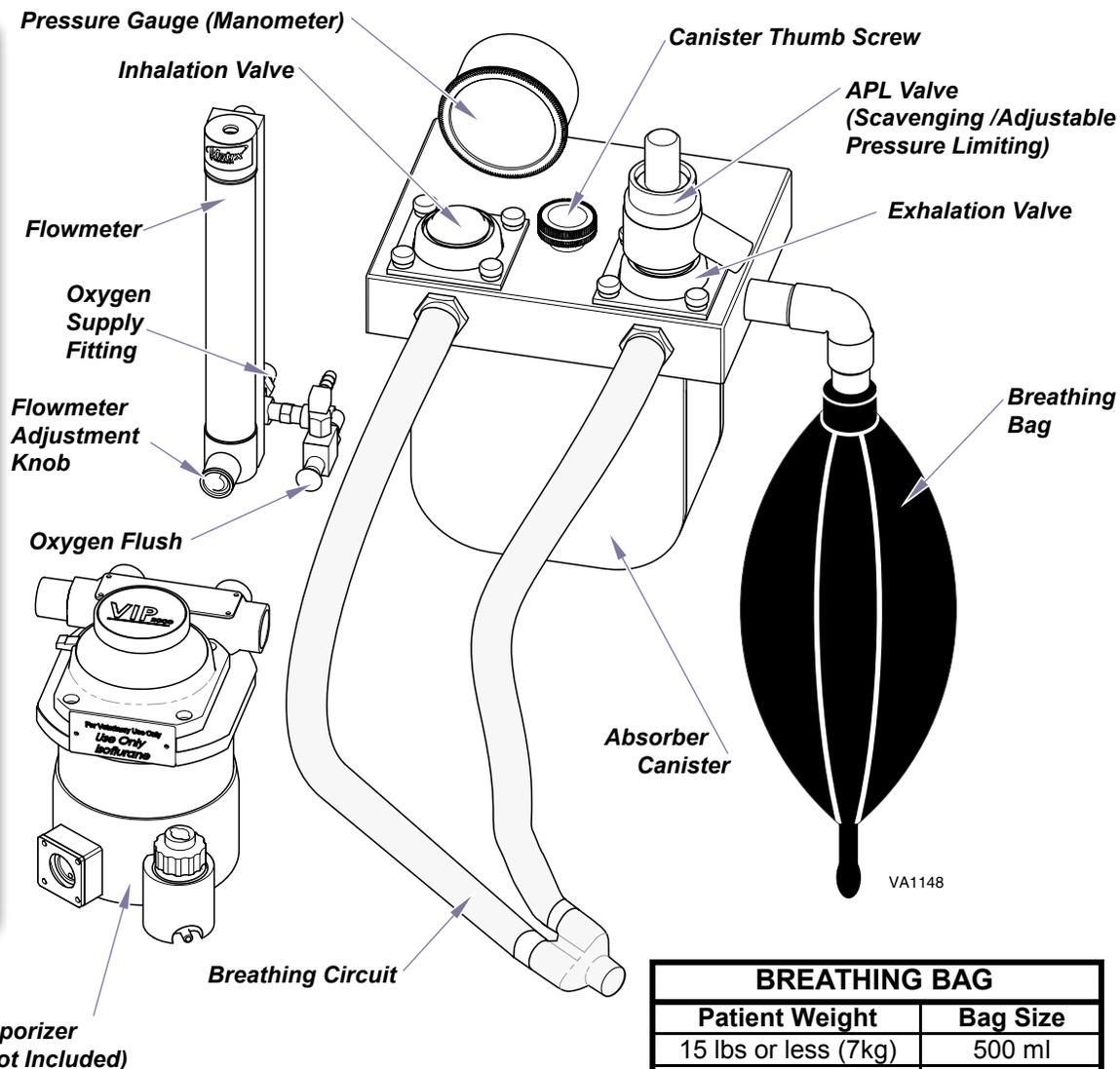
- A) Loosen thumb screw to remove CO2 absorber canister. Fill canister with absorbent material, following directions on canister label. Be sure canister and gasket mating surface are completely free of absorbent. Replace canister in absorber assembly. Tighten thumb screw.
- B) Connect breathing bag and breathing circuit.
- C) Connect a 50-55 PSI (3.4-3.8 Bar) oxygen supply line to the oxygen supply fitting on the back of the flowmeter.
- D) Adjust flowmeter and vaporizer settings to meet physiologic needs of the patient.
- E) During anesthesia, monitor the pressure gauge, inhalation and exhalation valves, and the breathing bag. Make necessary corrections in flow rate, vaporizer setting, and Scavenging/Adjustable Pressure Limiting (APL) valve, to insure adequate depth of anesthesia and adequate ventilation of the patient.

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Equipment Alert

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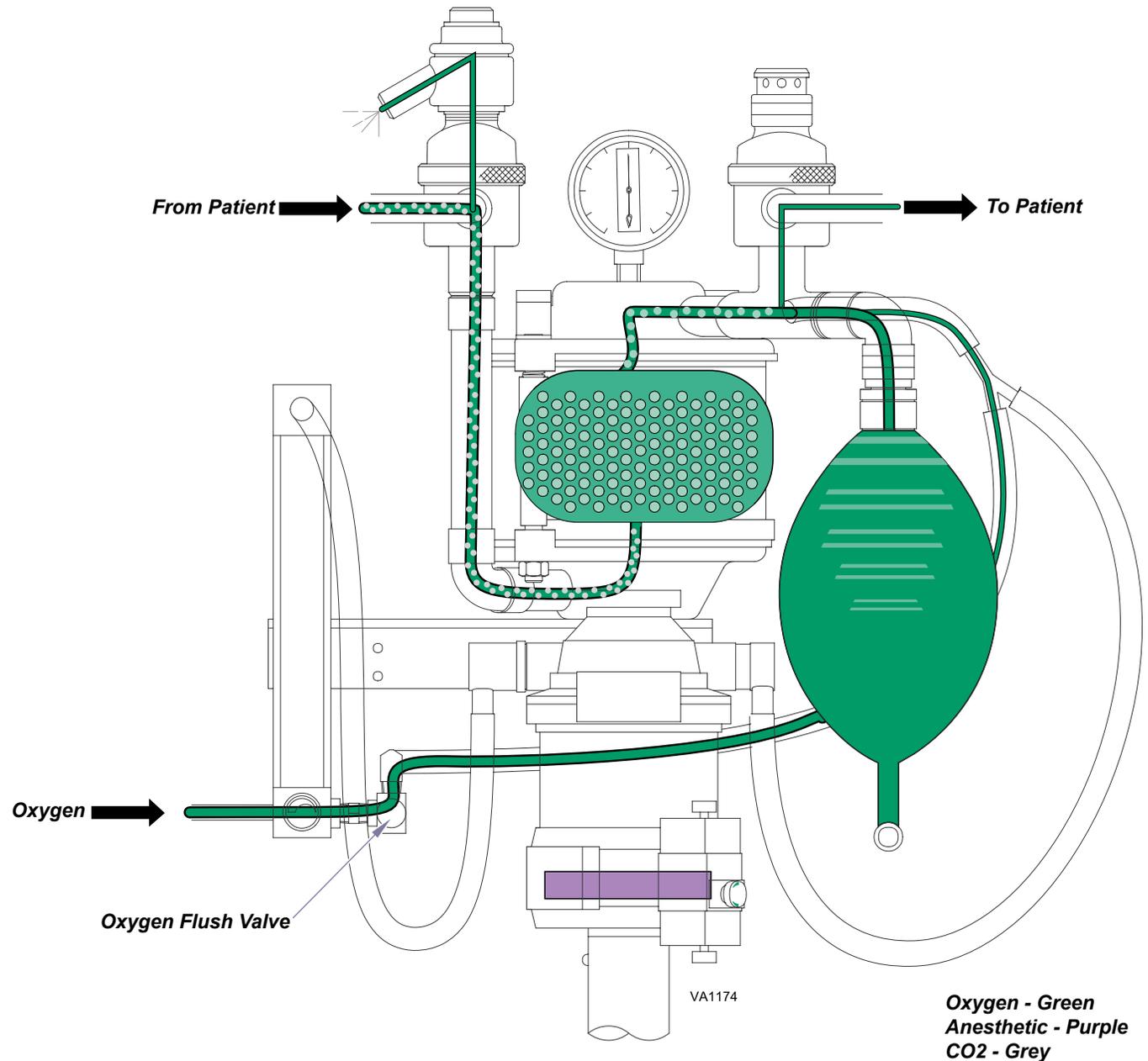
BREATHING BAG

Patient Weight	Bag Size
15 lbs or less (7kg)	500 ml
15-30 lbs (7-14 kg)	1 liter
30-60 lbs (14-27 kg)	2 liter
60-100 lbs (27-45 kg)	3 liter
100 + lbs (45 + kg)	5 liter

Models:	All VME & VME2
Serial Numbers:	

Oxygen Flush

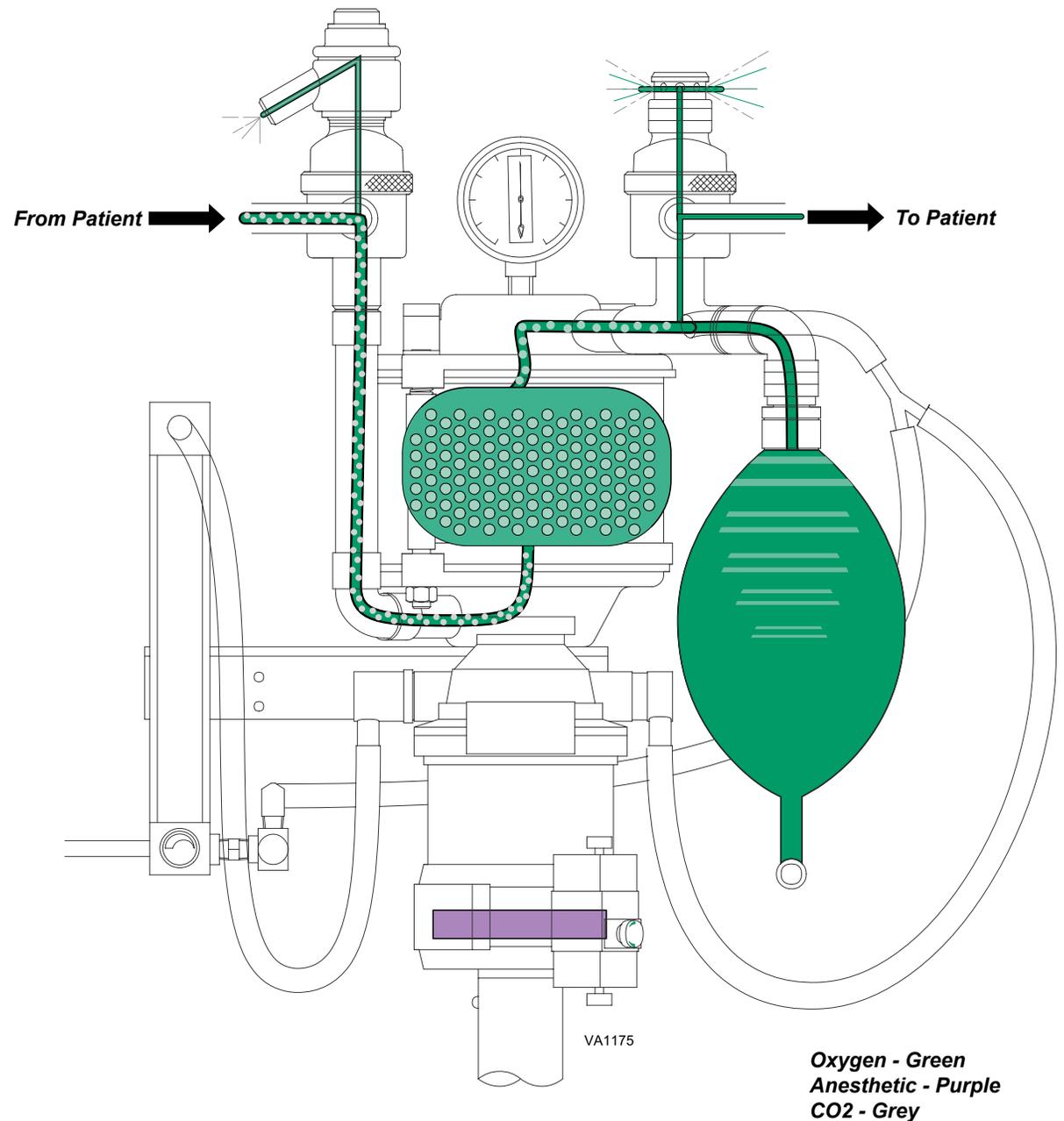
1. Oxygen enters the machine at the lower back of flowmeter.
2. Pressing the button on the oxygen flush valve bypasses the vaporizer.
3. Oxygen enters the reservoir bag and inhalation tube then is inhaled by the patient.
4. The patient exhales. Waste gas enters the machine.
5. Waste gas enters the CO2 absorber canister which removes the CO2.
6. Oxygen without CO2 enters the reservoir bag, inhalation tube and patient, recycling the oxygen.
7. A small amount of waste gas exits the APL valve, maintaining pressure in machine and patient's lungs at 1-3cm H2O.



Models:	All	
Serial Numbers:		

Safety Valve (Negative Pressure Relief Valve)

1. If there is no oxygen in the tank or the flow is shut off at the flow meter, room air enters the machine through the safety valve. The patient does not receive anesthetic gas.
2. During inhalation, the reservoir bag deflates first, then air from the safety valve is drawn into the system.
3. The patient exhales. Waste gas enters the machine.
4. Waste gas enters the CO₂ absorber canister which removes the CO₂.
5. Air without CO₂ enters the reservoir bag, inhalation tube and patient, recycling the air.
6. A small amount of waste gas exits the APL valve.



Models:	All	
Serial Numbers:		

Troubleshooting Chart

Problem	Probable Cause	Correction
Anesthesia Machine Leaks	Absorber canister.	Make sure gasket surfaces are clean and have no and free of absorbent granules. <i>VME Models Only</i> - Check tightness of absorber canister knob, verify no absorbent granules are in threaded hole. <i>VMS and VMC Models Only</i> - Verify absorber levers are in closed position. Refer to: Section B Absorber Canister
	Breathing bag, breathing circuit or hoses not sealing or has a hole.	Check breathing bag, breathing circuit and hoses for leak and replace if needed. Refer to: Section B Breathing Bag and Breathing Circuit
	Valve domes are loose.	Check inhalation and exhalation valve domes and o-rings are seated and clean. Verify thumb screws (<i>VME Models</i>) and or retainer rings (<i>VMS and VMC Models</i>) are tight. Refer to: Section B Inhalation and Exhalation Valves
	APL valve.	Make sure APL valve is closed during test and fully seated to clear exhalation dome. Remove APL valve, plug opening in clear dome to determine if leak originates from APL valve. Check O-ring under APL valve. Refer to: Section B APL Valve
	Vaporizer.	Verify fittings connected to vaporizer are tight. Check filler cap on vaporizer is tight and O-ring is undamaged. (<i>Test with Vaporizer turned off.</i>)
	Loose connection.	Check all connections to machine and fittings.
	Safety valve.	If machine is fitted with optional safety valve (negative pressure relief) valve, remove valve and plug opening in clear dome to determine if leak originates from safety valve. Check O-ring under safety valve. Refer to: Section B Safety Valve
Difficult to Induce Patient <i>"Will not go under"</i>	Machine leaking.	Perform leak test. Refer to: Section B Leak Test
	Anesthetic low.	Check anesthetic level.
	Flow rate setting.	Check for proper flow rate. Refer to: Section B Flowmeter
Desired Depth Of Anesthesia Not Maintainable <i>"Patient wakes up during procedure."</i>	Machine leaking.	Perform leak test. Refer to: Section B Leak Test
	CO ₂ absorbent is old.	Change CO ₂ absorbent. Refer to: Section B Absorber Canister
	Anesthetic low.	Check anesthetic level.
	Flow rate setting.	Check for proper flow rate. Refer to: Section B Flowmeter

Chart Continued on Next Page

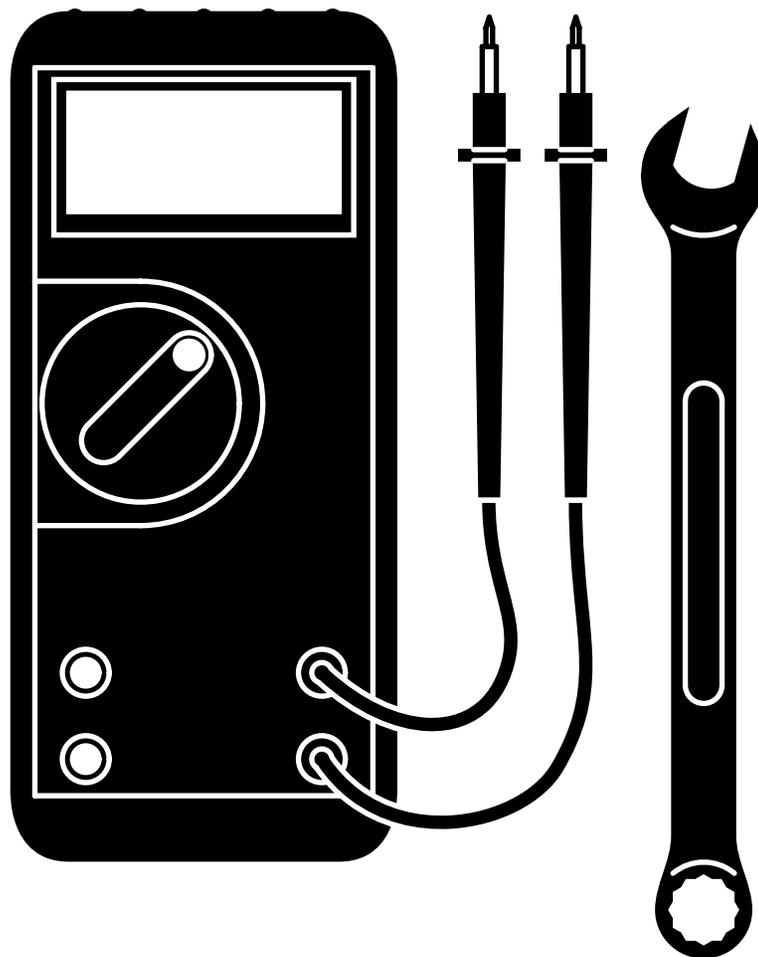
Models:	All	
Serial Numbers:		

Troubleshooting Chart (continued)

Problem	Probable Cause	Correction
Breathing Bag “Over-Inflated”	APL valve closed.	Open APL valve. Refer to: Section B APL Valve
	Pressure setting.	Check pressure reading on pressure gauge • If pressure is between 1 - 3 cm H ₂ O when bag appears “over inflated” machine is functioning properly. • If pressure is over 4 cm H ₂ O, check for obstructions in scavenging device. Replace APL valve. Refer to: Section B Pressure Gauge
Breathing Bag Does Not Inflate	Machine leaking.	Perform leak test. Refer to: Section B Leak Test
	Excessive draw (if using a active scavenger).	Check active scavenger for excessive draw.
	Oxygen flow rate.	Check oxygen flow. Refer to: Section A Oxygen Flush
Insufficient Or No Oxygen Flow	Machine leaking.	Perform leak test. Refer to: Section B Leak Test
	Oxygen supply and or pressure.	Check oxygen supply and pressure. Refer to: Section B Flowmeter and Pressure Gauge
	Flowmeter needle valve broken.	Check flowmeter needle valve for operation. Refer to: Section B Flowmeter
Inhalation and Exhalation Valves Not Working Properly	Valves dirty or damaged.	Check valve seats for damage. Refer to: Section B Inhalation and Exhalation Valves
		Replace dirty or warped valve disks.

Models:	All	
Serial Numbers:		

Section B



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Testing & Repair

Flowmeter

Function

The needle valve is used to adjust the flow of oxygen into the machine. Turning the green knob clockwise closes the valve. Turning it counterclockwise opens it.

The ball in the graduated glass tube indicates the current rate of flow. Readings should be taken based on the position of the center of the ball.

The oxygen connection on the back of the flow meter uses a DISS (Diameter Indexed Safety System) fitting. This means that no standard gas fitting other than oxygen should be able to physically connect to the back of the flowmeter.

The color of the knob and the hose from the oxygen tank match the standard color code for oxygen. This is green for units sold in the USA.

Flowmeter

Ball

DISS Oxygen Fitting

Needle Valve



VMS Plus Model Shown

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Exploded View / Part Numbers	E-1

www.midmark.com	File Name
Needle Valve Replacement	
Round Face	10536700
Flat Face	10188300

Models:	All	
Serial Numbers:		

Testing & Repair

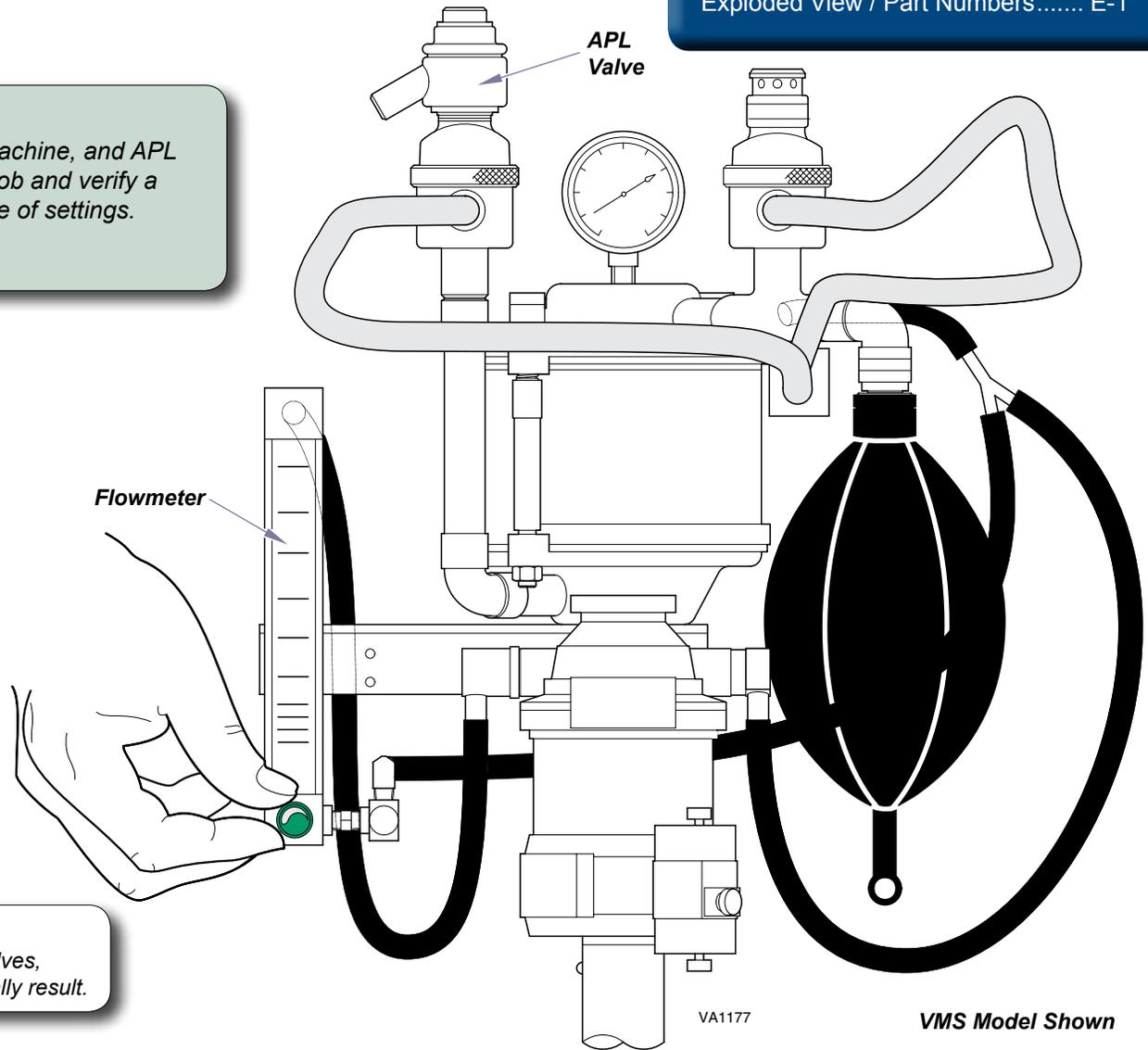
Flowmeter

Functional Test

To Test flowmeter functionality..

With (50-55 PSI (3.4-3.8 Bar)) oxygen supplied to machine, and APL valve fully opened, rotate flowmeter needle valve knob and verify a smooth movement of flowmeter ball though full range of settings.

Note: Do not over tighten needle valve when closed.



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Tubing Diagrams	D-1
Exploded View / Part Numbers	E-1

Equipment Alert
Never overtighten the flowmeter needle valves, damage to the needle and seat will eventually result.

Models:	All
Serial Numbers:	

Testing & Repair

Oxygen Flush Valve

Function

The oxygen flush valve is a single purpose, self closing device that receives oxygen from the supply line and directs a flow of oxygen (35 to 75 LPM) directly into the system while bypassing the vaporizer.

Oxygen Flush Valve	Page
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Tubing Diagrams	D-1



VMS Plus Model Shown

Models:	All	
Serial Numbers:		

Testing & Repair

Reservoir

Function

The reservoir bag (breathing bag) is composed of rubber or plastic. The neck of the bag includes an opening to enable attachment to the 22mm tapered bag port on the anesthesia machine.

In general, small bags are used for small patients and large bags are used for large patients.

Bag functions:

- Acts as a reservoir – Allows gas to collect during exhalation so a reservoir is available for the next inhalation if greater than supplied by the flowmeter.
- Visually monitor patients respiration.
- Bags are very compliant. They serve as a buffer for excessive pressure in the system
- Provides a method for manually assisted ventilation (bagging a patient).



VMS Plus Model Shown

Reservoir (Breathing Bag)	Page
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Tubing Diagrams	D-1
Exploded View / Part Numbers.....	E-1

www.midmark.com	File Name
Maintenance Kit	
VMS, VMS +, VMC	10577100
VME, VME2	10577200

Breathing Bag

Models:	All	
Serial Numbers:		

Testing & Repair

Breathing Circuit

Function

The breathing circuit is a flexible corrugated tube used to convey gases to and from the patient. Corrugated tubing reduces kinking. They are available in 15mm and 22mm sizes.

Breathing circuits have 22mm female fittings at either end, to enable connection to the inhalation and exhalation ports on the anesthesia machine, and a 15mm female patient end for connection to masks or Endotracheal tubes.

Unilimb Rebreathing Circuits are a unique tube-within-a-tube design, which reduces clutter of multiple tubes.



VMS Plus Model Shown

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www.midmark.com		File Name
Maintenance Kit		
VMS, VMS +, VMC		10577100
VME, VME2		10577200

Breathing Circuit

Unilimb Breathing Circuit



Models:	All	
Serial Numbers:		

Testing & Repair

Inhalation Valve

Function

The inhalation valve is a simple unidirectional flutter valve with a 22mm male connector. A light thin disc seats horizontally on a circular knife-edge. A removable clear dome covers the top of the valve so that the disc can be observed. A guide, incorporated in the dome, prevents the disc from becoming dislodged.

Gas enters the valve at the bottom and flows through the center of the valve, raising the disc from its knife-edge seat. The gas then passes under the dome and through to the breathing circuit.

The inhalation valve opens on inhalation and closes on exhalation.

Inhalation Valve



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www.midmark.com	File Name
Maintenance Kit	
VMS, VMS +, VMC	10577100
VME, VME2	10577200

Models:	All	
Serial Numbers:		

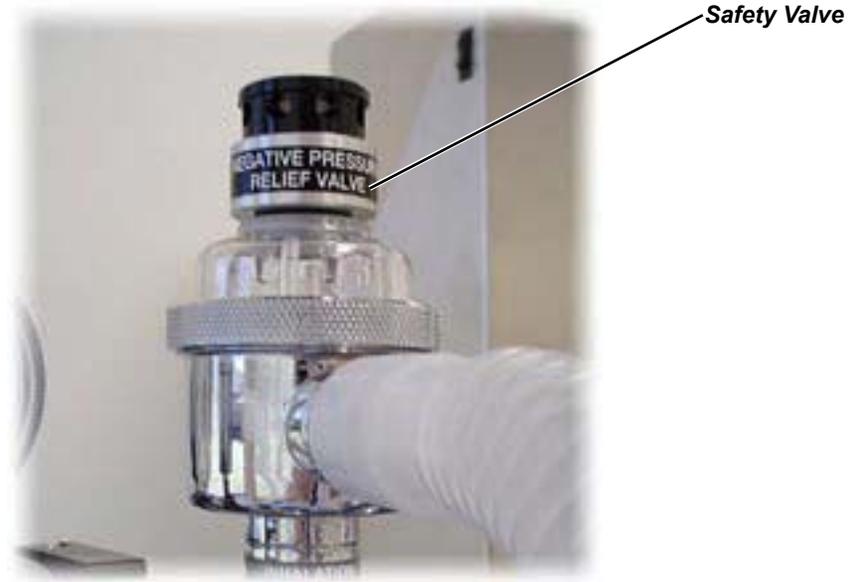
Testing & Repair

Safety Valve

Function

The safety (negative pressure relief) valve allows the patient to breathe if the oxygen supply runs out or is shut off.

This flexible diaphragm valve lets air in if the pressure inside the machine during inhalation becomes lower than the pressure outside.



Models:	All	
Serial Numbers:		

Testing & Repair

Pressure Gauge (Manometer)

Function

The pressure gauge (manometer) allows you to monitor pressure inside the system.

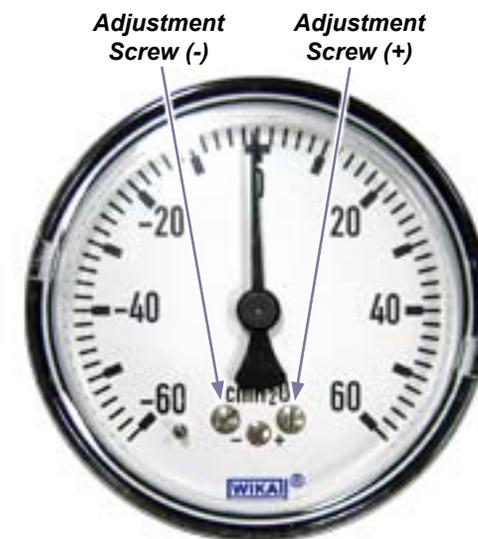
It is especially useful for leak testing the anesthesia machine and for monitoring the system pressure during assisted ventilation.



*Old Style Marshall
Pressure Gauge*



*Old Style Weksler
Pressure Gauge*



*New Style Wika
Pressure Gauge*

Models:	All	
Serial Numbers:		

Testing & Repair

APL Valve

Function

The APL (scavenging / adjustable pressure limiting) valve controls the pressure in the system.

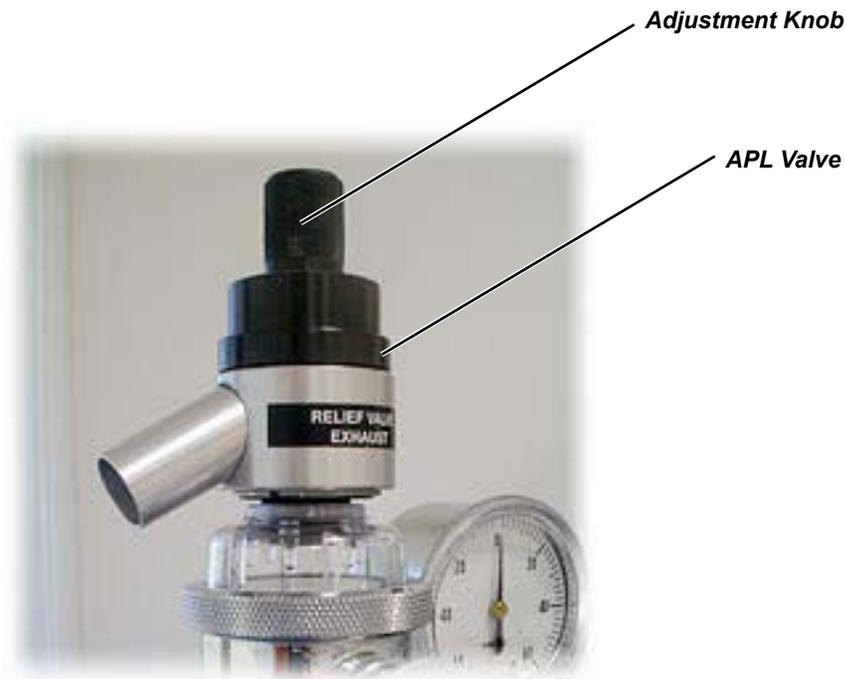
If the pressure in the system exceeds the pressure exerted by the weight of the poppet or the pressure exerted by the compression spring, the valve opens and gas escapes. This normally occurs when the patient is exhaling.

The pressure in the anesthesia machine and the patient's lungs can be controlled by turning the adjustment knob on top of the valve.

Fully open, the APL valve maintains a pressure in the anesthesia machine and the patient's lungs, of 1-3cm H₂O.

APL Valve	Page
Function	B-10
Functional Testing	B-11
Tubing Diagrams	D-1
Exploded View / Part Numbers	E-1

www.midmark.com	File Name
Maintenance Kit	
VMS, VMS +, VMC	10577100
VME, VME2	10577200



Models:	All	
Serial Numbers:		

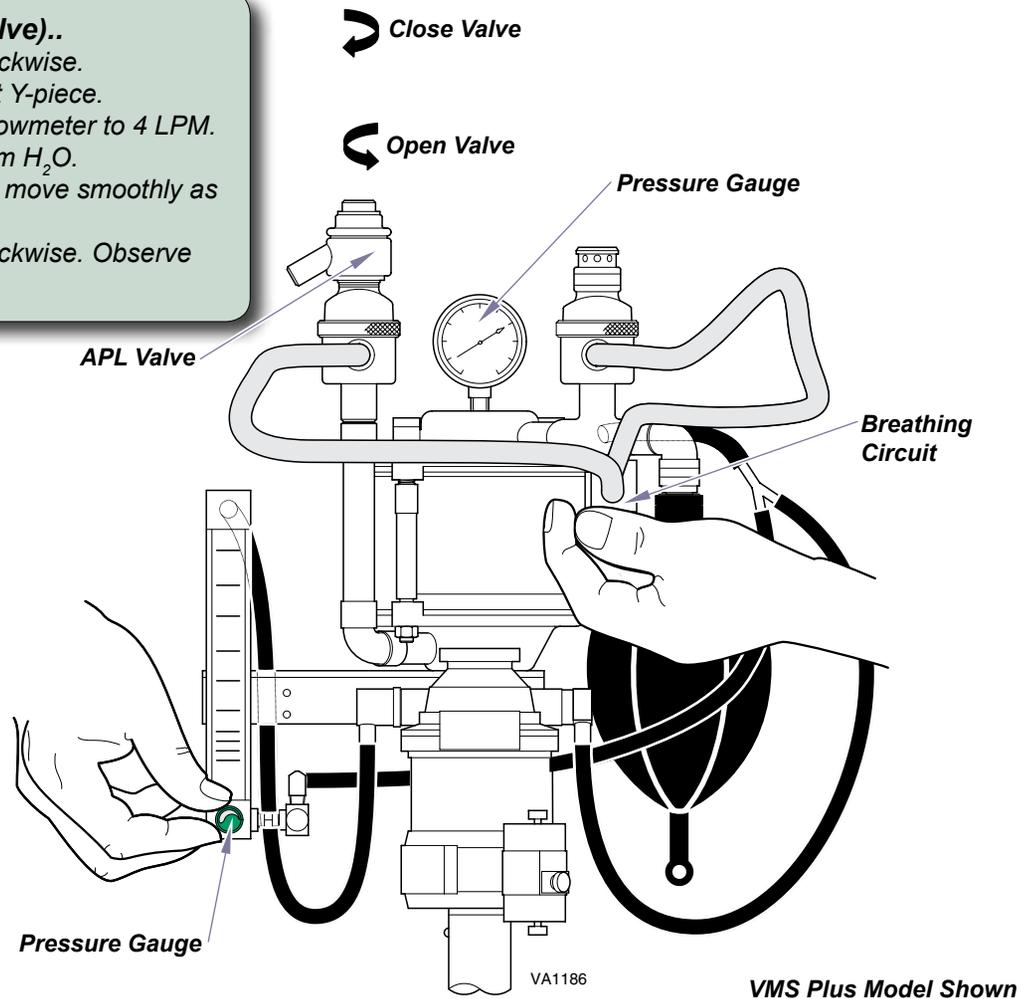
Testing & Repair

APL Valve	Page
Function	B-10
Functional Testing	B-11
Tubing Diagrams	D-1
Exploded View / Part Numbers	E-1

APL Valve

Functional Test

- Scavenging/Adjustable Pressure Limiting (APL Valve)..**
- A) Open APL valve all the way by turning knob counter clockwise.
 - B) Place thumb over patient connection of breathing circuit Y-piece.
 - C) Turn on oxygen supply (50-55 PSI - 3.4-3.8 Bar), turn flowmeter to 4 LPM.
 - D) Observe pressure gauge. Verify reading is less than 4cm H₂O.
 - E) Slowly begin closing APL valve. Pressure gauge should move smoothly as pressure increases. **DO NOT EXCEED 40cm H₂O!**
 - F) Open APL valve all the way by turning knob counter clockwise. Observe pressure gauge and return to less than 4cm H₂O.



Models:	All	
Serial Numbers:		

Testing & Repair

Exhalation Valve

Function

The exhalation valve is a simple unidirectional flutter valve with a 22mm male connector. A light thin disc seats horizontally on a circular knife-edge. A removable clear dome covers the top of the valve so that the disc can be observed. A guide, incorporated in the dome, prevents the disc from becoming dislodged.

Exhaled gas enters the valve through the breathing circuit port, raising the disc from the knife-edge seat. The gas then passes under the dome and through the absorber canister or is vented out the APL valve.

The exhalation valve opens on exhalation and closes on inhalation.



Exhalation Valve

Exhalation Valve	Page
Function	B-12
Functional Testing	B-13
Tubing Diagrams	D-1
Exploded View / Part Numbers	E-1

www.midmark.com	File Name
Maintenance Kit	
VMS, VMS +, VMC	10577100
VME, VME2	10577200

Models:	All	
Serial Numbers:		

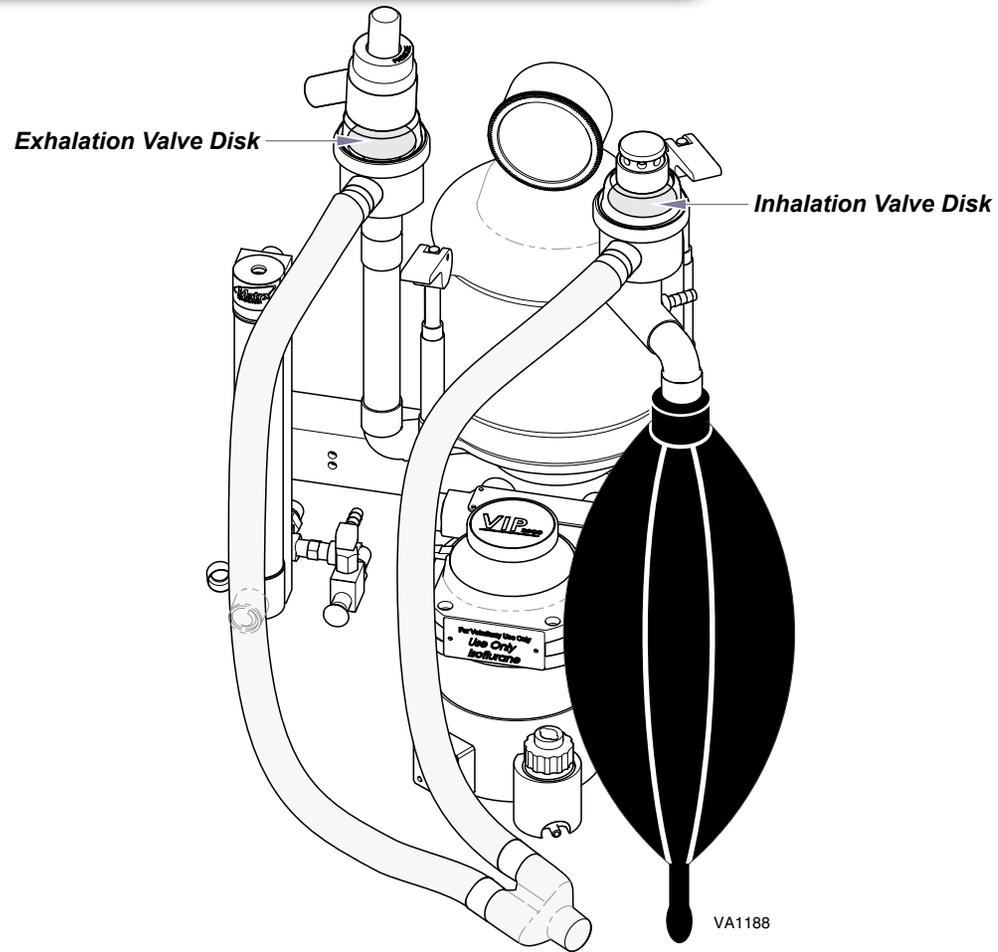
Testing & Repair

Inhalation & Exhalation Valve

Functional Test

Valves	Page
Exhalation Function	B-12
Inhalation Function	B-7
Functional Testing	B-13
Tubing Diagrams	D-1
Exploded View / Part Numbers	E-1

To test Inhalation and Exhalation Valves..
Check that valve disks are operating properly by observing movement during breathing cycles.



Models:	All	
Serial Numbers:		

Testing & Repair

Absorber Canister

Function

The absorber canister holds carbon dioxide absorption material. The absorbent removes CO₂ from expired gases before gases recycle back to the patient.

The 1500cc (1350g) absorber canister (found on the VMS and VMC anesthesia machines) has a transparent plastic canister located between upper and lower metal housings. Gaskets at the top and bottom fit between the canister and metal housings. A screen in the bottom gasket holds granular material in place, and a screen in the top gasket prevents granular material from entering the breathing circuit, if loose absorbent is used.

The absorber canister for the VME and VME2 anesthesia machines has a gasket located under the manifold. The canister attaches to the manifold with a knob accessed on top of the manifold.

Absorber Canister	Page
Function	B-14
Cleaning	B-15
Tubing Diagrams	D-1
Exploded View / Part Numbers.....	E-1

www.midmark.com	File Name
Maintenance Kit	
VMS, VMS +, VMC	10577100
VME, VME2	10577200



Absorber Canister

VMS Model Shown

Equipment Alert
Over-tightening the canister knob can strip the canister mounting hole.

Models:	All	
Serial Numbers:		

Testing & Repair

Absorber Canister

Filling & Cleaning

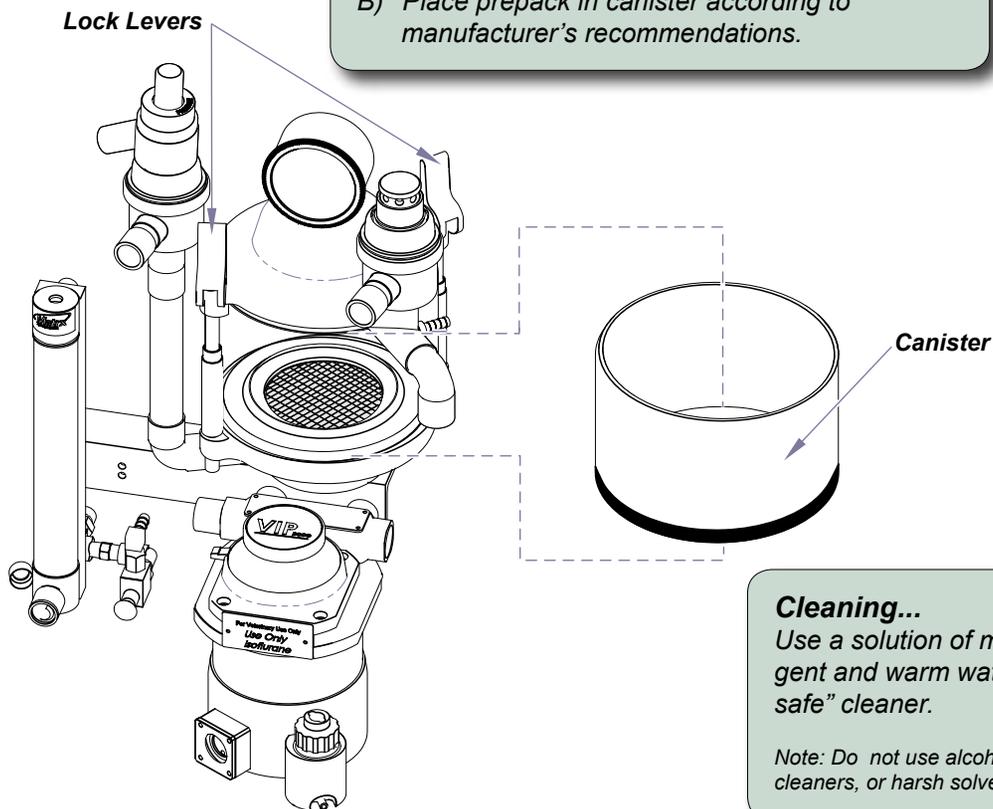
VMS, VMS+, VMC...

Loose absorbent

- A) Fill canister one third full.
- B) Gently tap sides of canister to settle absorbent.
- C) Fill canister two-thirds full and repeat step B.
- D) Fill canister to fill line and repeat step B.

Prepacks

- A) Peel off all sealing labels and wraps.
- B) Place prepack in canister according to manufacturer's recommendations.



Cleaning...

Use a solution of mild soap or detergent and warm water, or any "acrylic safe" cleaner.

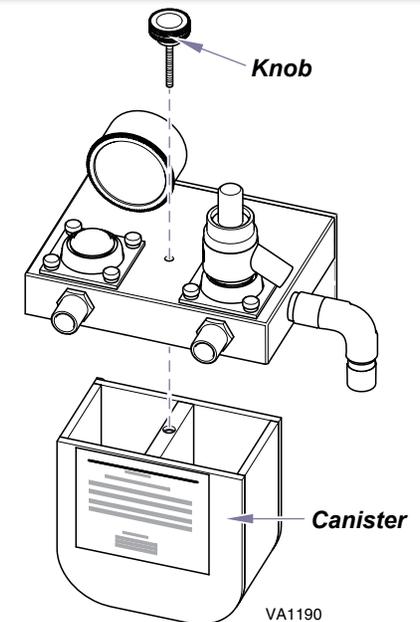
Note: Do not use alcohol, bleach, window cleaners, or harsh solvents.

Absorber Canister	Page
Function	B-14
Filling & Cleaning	B-15
Tubing Diagrams	D-1
Exploded View / Part Numbers	E-1

VME, VME2...

- A) Cover threaded hole when filling.
- B) Fill both sides of canister 1/2 full.
- C) Gently tap sides of canister to settle absorbent.
- D) Fill canister to fill line.

Note: The usable volume of absorbent should be not less than 1.5 times the tidal volume, do not wait for complete color change.



Equipment Alert - VME & VME2

Over-tighting the canister knob can strip the canister mounting hole.

Models:	All
Serial Numbers:	

Testing & Repair

Leak Test - VMS, VMS Plus & VMC

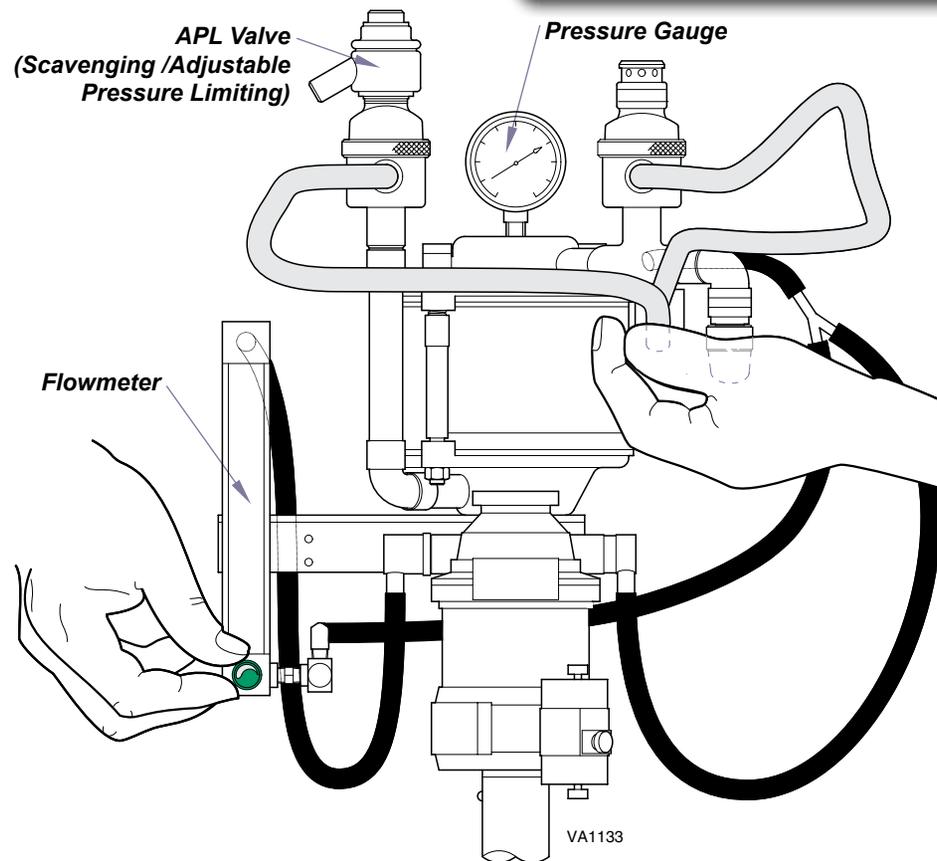


Equipment Alert

Do not activate the oxygen flush during any part of this leak test.

To perform leak test...

- A) Close APL (Scavenging /Adjustable Pressure Limiting) valve by turning knob clockwise.
- B) Place thumb over patient connection of breathing circuit Y.
- C) Remove breathing bag and cover bag port opening. (Use palm of hand that is covering Y.)
- D) With oxygen (50-55 PSI [3.4-3.8 Bar]) supplied to anesthesia machine, slowly open flowmeter to register 30cm H₂O on anesthesia machine pressure gauge.
- E) Turn off flowmeter when pressure reaches 30cm H₂O. (If pressure holds steady the system is leak free but if pressure drops, proceed to step (F).)
- F) Slowly open flowmeter until pressure stabilizes at 30cm. H₂O setting. (This determines the magnitude of the leak. If leak rate is greater than 300ml/min; proceed to step (G).)
- G) Refer to: "What if machine leaks?"
- H) Replace reservoir bag. Repeat step (B) and steps (D) through (F). This will determine the integrity of breathing bag.



What if Machine Leaks?

- 1) **Breathing Bag** - If leak occurs, replace.
- 2) **Breathing Circuit** - Install new breathing circuit or obstruct inhalation / exhalation openings to determine if leak originates from breathing circuit.
- 3) **Vaporizer Fittings** - Verify fittings and tubing are securely attached.
- 4) **Canister Gaskets** - Check for loose absorbent grains between canister housing gaskets.
- 5) **Verify Canister** is seated properly.
- 6) **Safety Valves** - Remove valve and obstruct opening to determine if leak originates from negative pressure relief valve. Check the o-ring under valve for damage.
- 7) **APL Valve** - Remove valve and obstruct opening to determine if leak originates from APL valve. Check the o-ring under valve for damage.
- 8) **O-Rings** under chrome retaining rings. Check the o-rings for damage.

Models:

All VMS, VMS + and VMC

Serial Numbers:

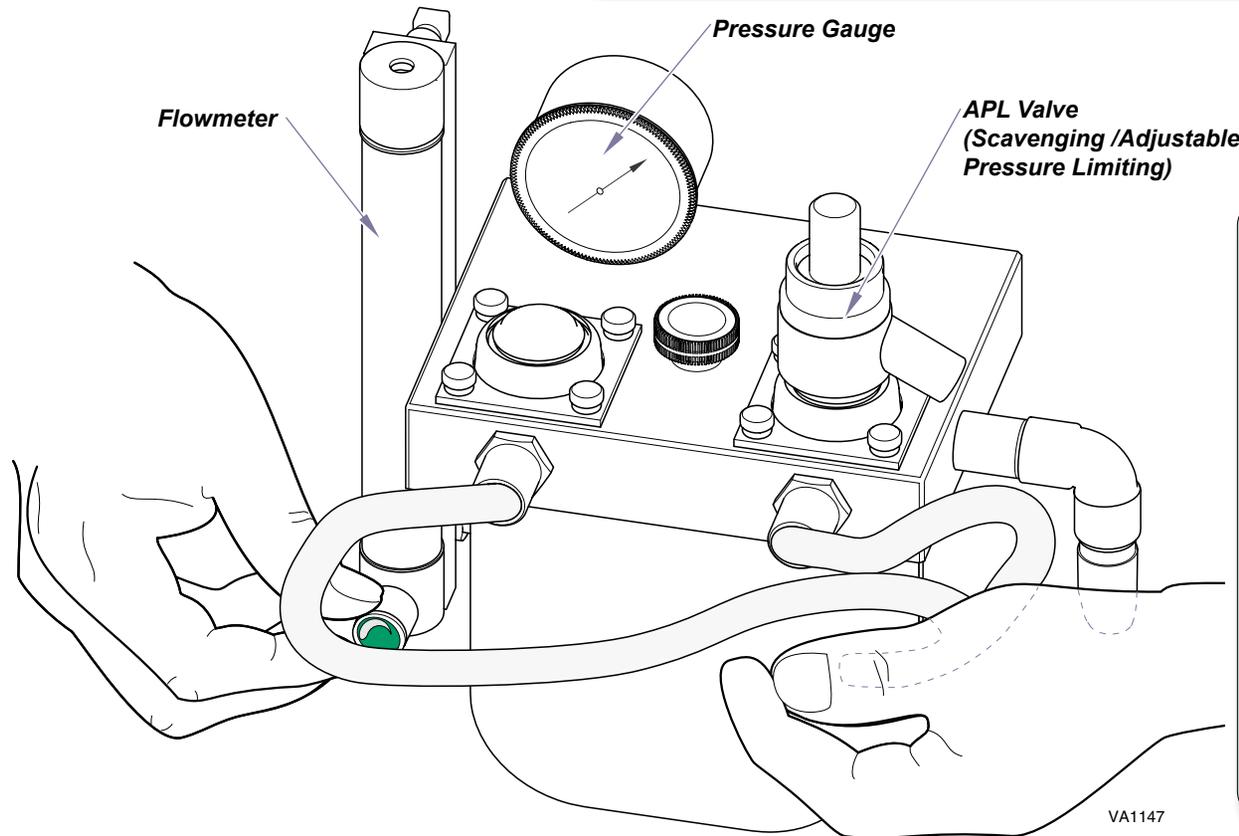
Testing & Repair

Leak Test - VME & VME2

BREATHING BAG	
Patient Weight	Bag Size
15 lbs or less (7kg)	500 ml
15-30 lbs (7-14 kg)	1 liter
30-60 lbs (14-27 kg)	2 liter
60-100 lbs (27-45 kg)	3 liter
100 + lbs (45 + kg)	5 liter

To perform leak test...

- Close APL (Scavenging /Adjustable Pressure Limiting) valve by turning knob clockwise.
- Place thumb over patient connection of breathing circuit Y.
- Remove breathing bag and cover bag port opening. (Use palm of hand that is covering Y.)
- With oxygen (50-55 PSI [3.4-3.8 Bar]) supplied to anesthesia machine, slowly open flowmeter to register 30cm H₂O on anesthesia machine pressure gauge.
- Turn off flowmeter when pressure reaches 30cm H₂O. (If pressure holds steady the system is leak free but if pressure drops, proceed to step (F).)
- Slowly open flowmeter until pressure stabilizes at 30cm. H₂O setting. (This determines the magnitude of the leak. If leak rate is greater than 300ml/min; proceed to step (G).)
- Refer to: "What if machine leaks?"
- Replace reservoir bag. Repeat step (B) and steps (D) through (F). This will determine the integrity of breathing bag.



Equipment Alert
 Do not activate the oxygen flush during any part of this leak test.

What if Machine Leaks?

- Breathing Bag** - If leak occurs, replace.
- Breathing Circuit** - Install new breathing circuit or obstruct inhalation / exhalation openings to determine if leak originates from breathing circuit.
- Vaporizer Fittings** - Verify fittings and tubing are securely attached.
- Canister Gasket** - Check for loose absorbent grains between canister housing gasket.
- Verify Canister** is seated properly.
- APL Valve** - Remove valve and obstruct opening to determine if leak originates from APL valve. Check the o-ring under valve for damage.
- O-Rings** under dome and clamp. Check the o-rings for damage.

Models:	All VME & VME2
Serial Numbers:	

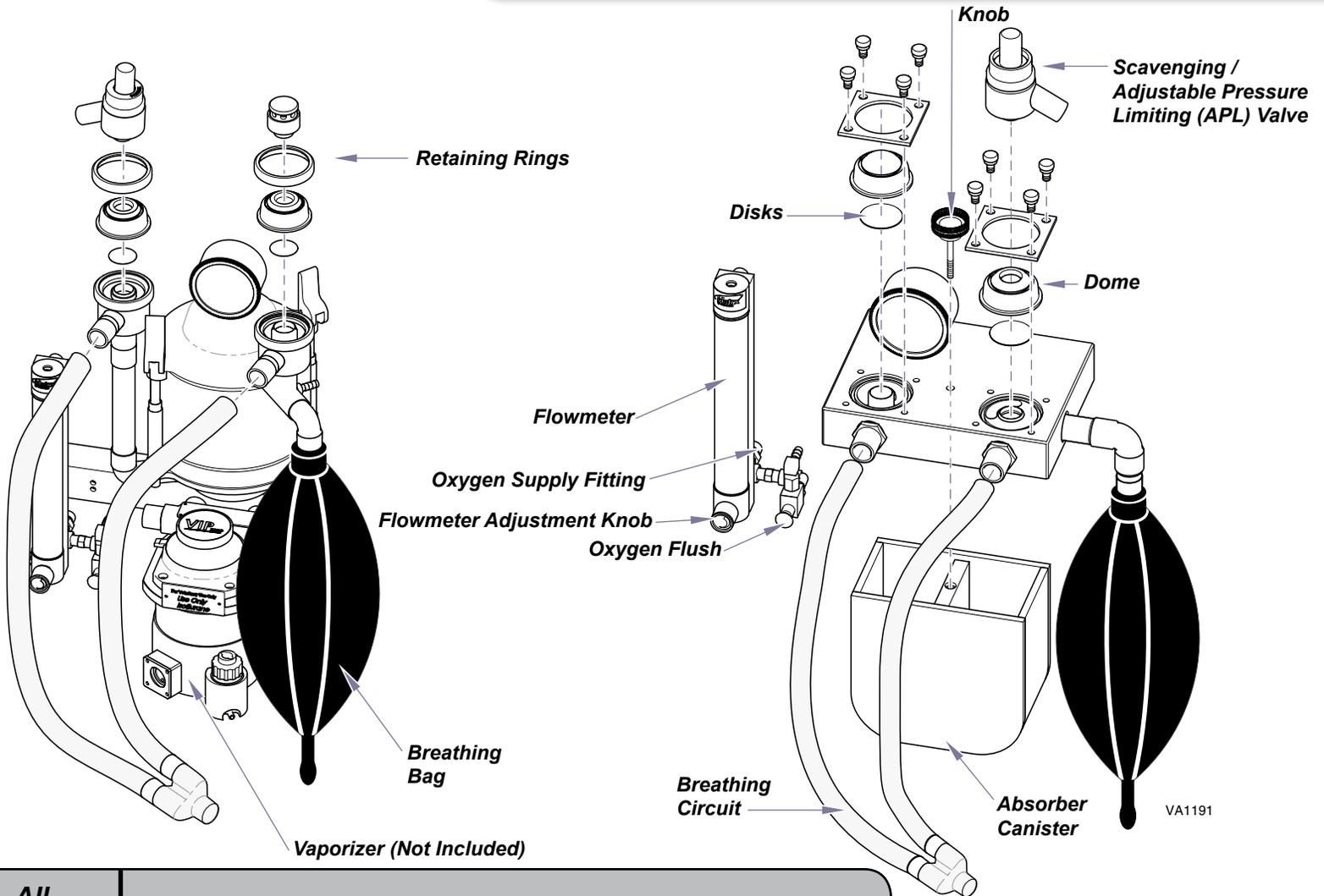
Testing & Repair

Cleaning

To Clean Anesthesia Machines...

- A) Remove breathing bag and breathing circuit.
- B) Wash with warm water and mild soap, rinse well and hang to dry.
- C) Remove white disks from inhalation and exhalation valves.
- D) Wipe disks with soft cloth, wipe out valves and reassemble.
- E) Remove absorber canister and wipe off gaskets, canister and absorber housings.

Note: Anesthesia machines should be cleaned daily.

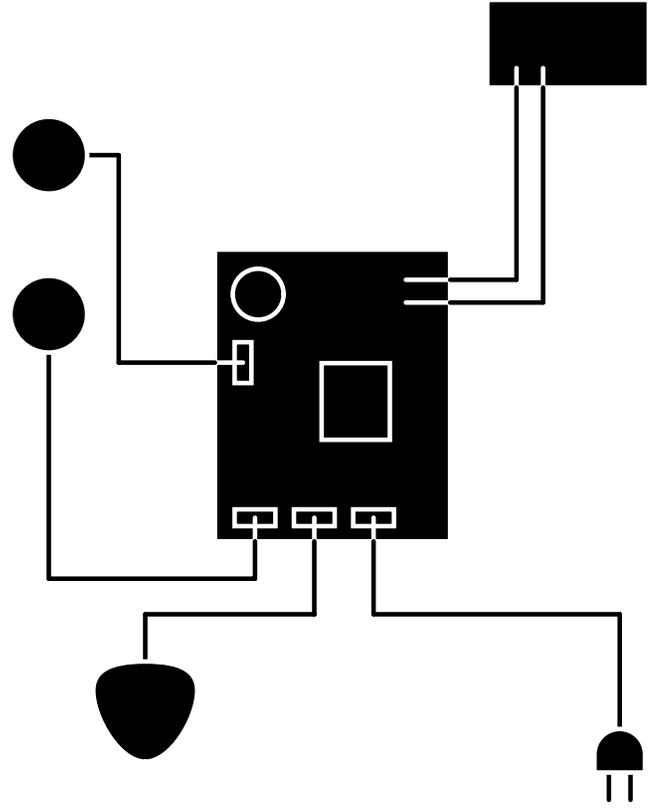


Models:	All
Serial Numbers:	

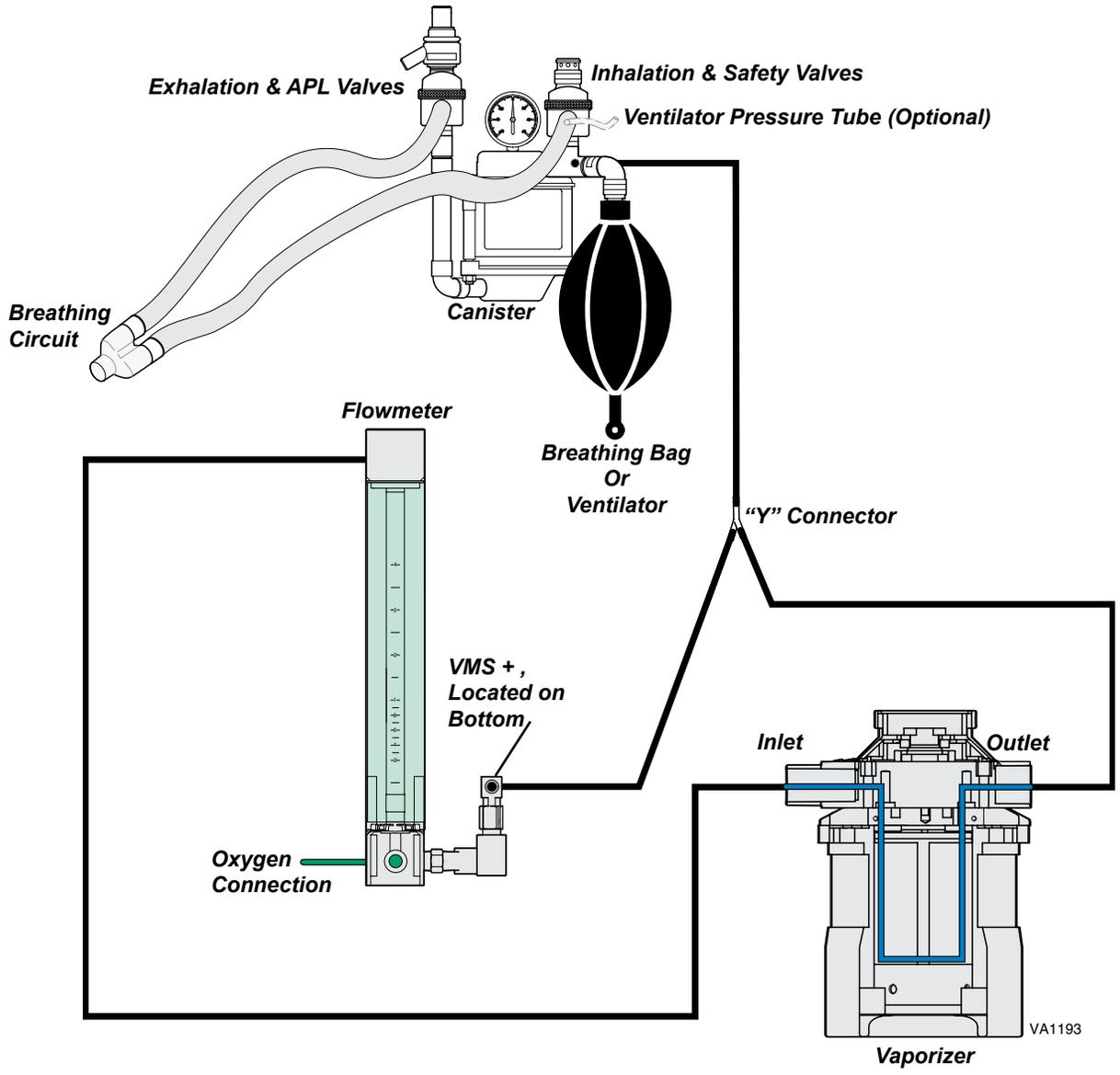
Section D

Tubing Diagrams

Diagrams	Page
VMS, VMS Plus	D-2
VMC.....	D-3
VME, VME2	D-4



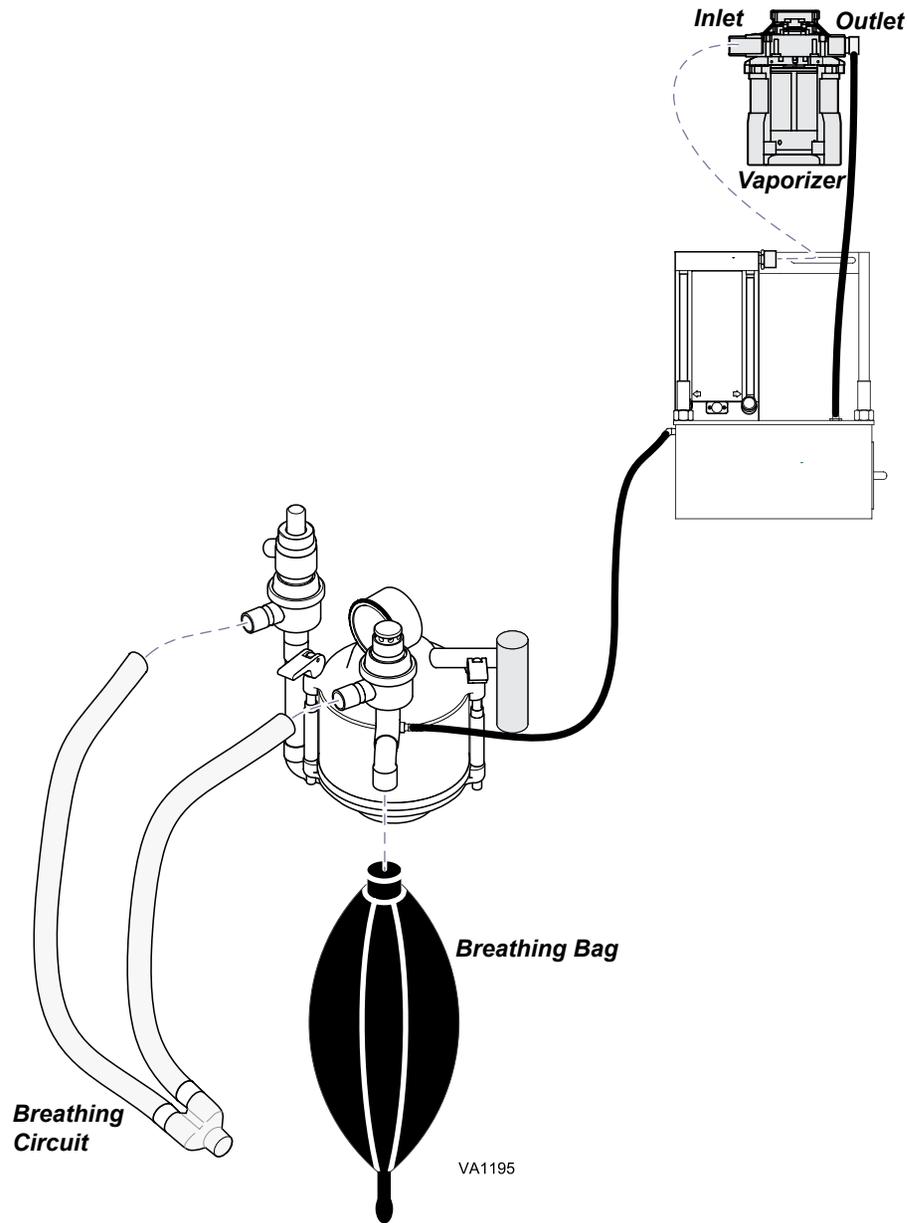
Tubing Diagrams



Models:	VMS	VMS Plus	
Serial Numbers:	<i>all</i>	<i>all</i>	

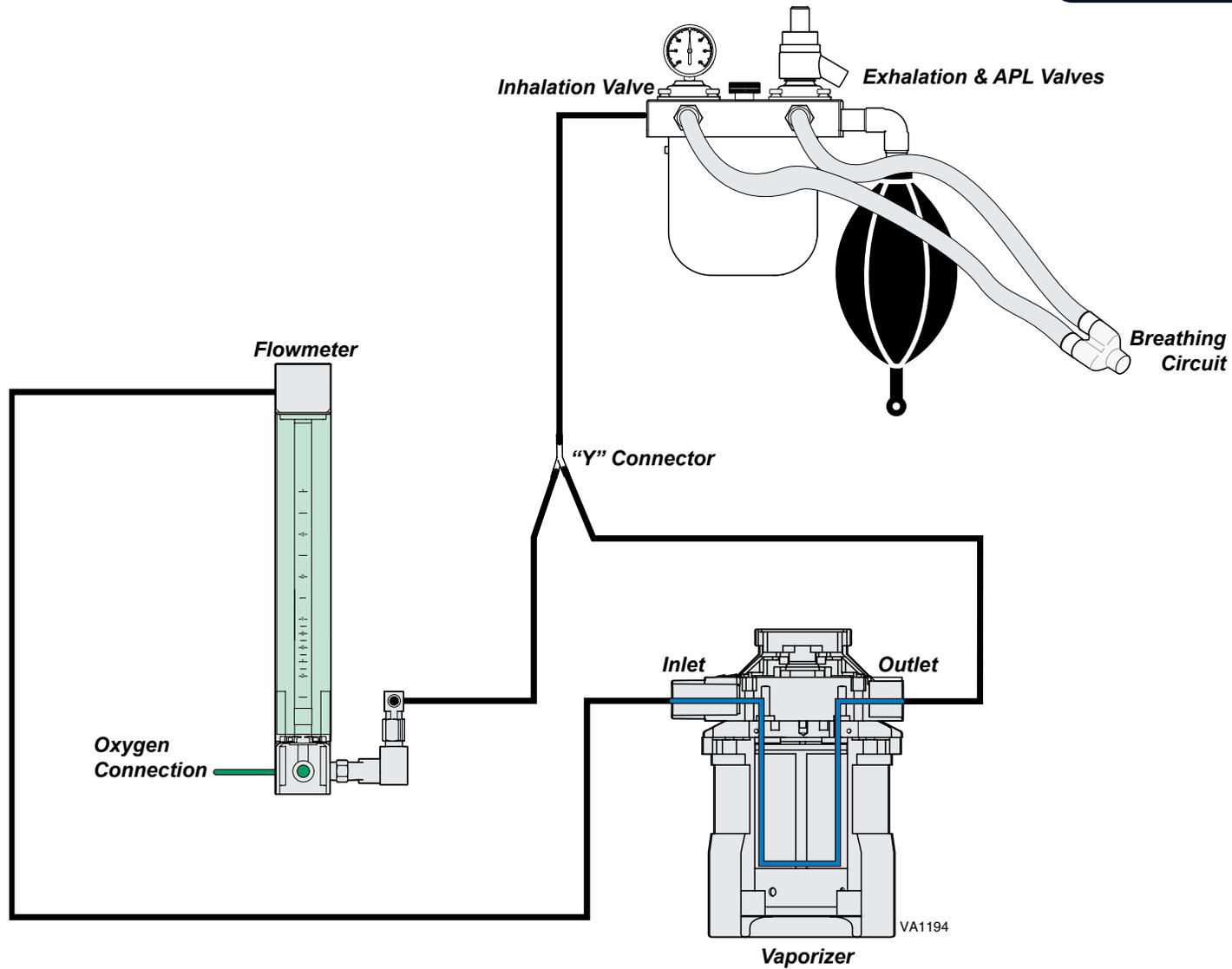
Tubing Diagrams

Refer To: Page
Exploded View / Part Numbers..... E-1



Models:	VMC	
Serial Numbers:	<i>all</i>	

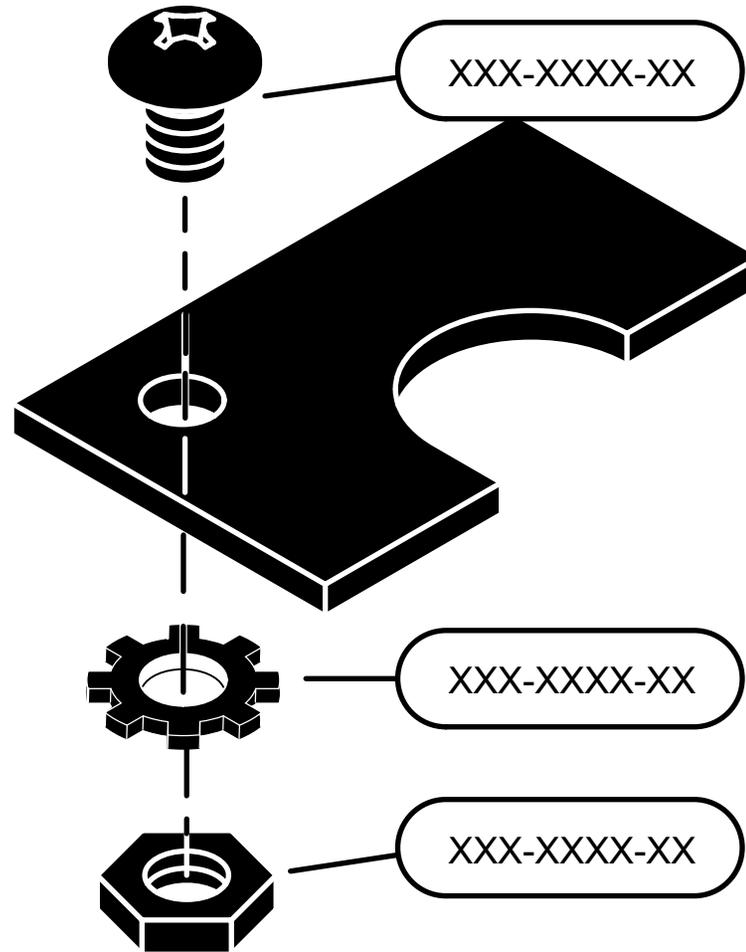
Tubing Diagrams



Models:	VME	VME2	
Serial Numbers:	<i>all</i>	<i>all</i>	

Section E

Exploded Views & Parts Lists



Veterinary Anesthesia Machines

*Click on Button to Activate Link to Parts Lists

VMC Models

VMC Drawer Assembly..... E-3

VMC Stand Assembly..... E-4

Absorber AssemblyE-14

VML Model

VML Anesthesia Machine E-15

VML Basic Assembly E-16

Absorber AssemblyE-17

Maintenance Kits E-19
VME Post Mount Maintenance Kit..... E-20

VMS Models

VMS Wall Mount..... E-5

VMS Plus..... E-6

VMS E-7

VMS - Inhalation / Exhalation Valve Parts
..... E-8

Absorber AssemblyE-14

VMR Model

VMR Non-rebreathing System..... E-18

Sodasorb E-21

VME Models

VME2 E-9

VME Tabletop E-10

VME - Inhalation / Exhalation Valve Parts
with Canister Assembly E-11

VME Post Mount..... E-20

Flowmeter

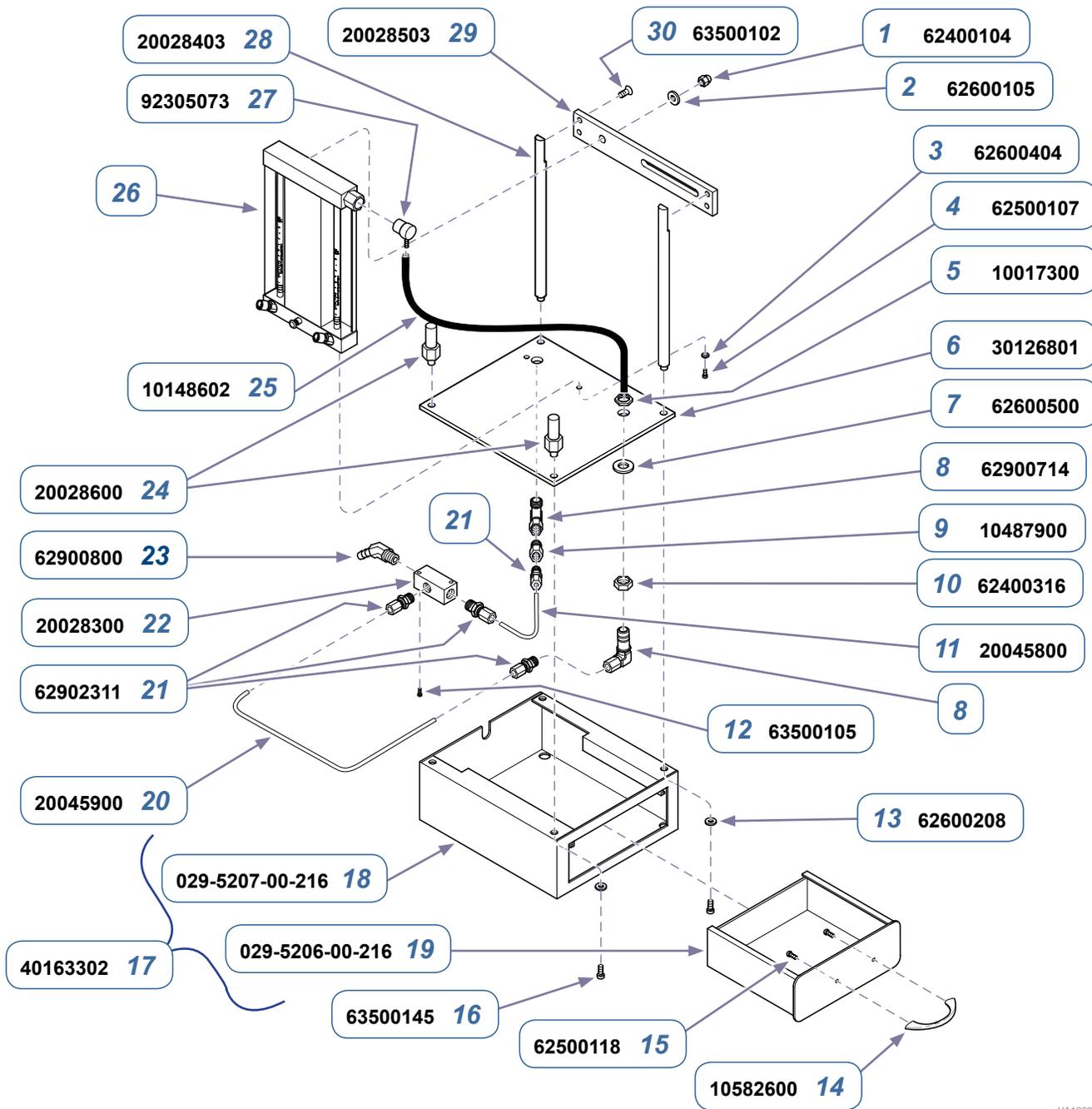
Flowmeter Assembly (Present Models) ...E-12

Flowmeter Assembly (Older Models)E-13

Note:

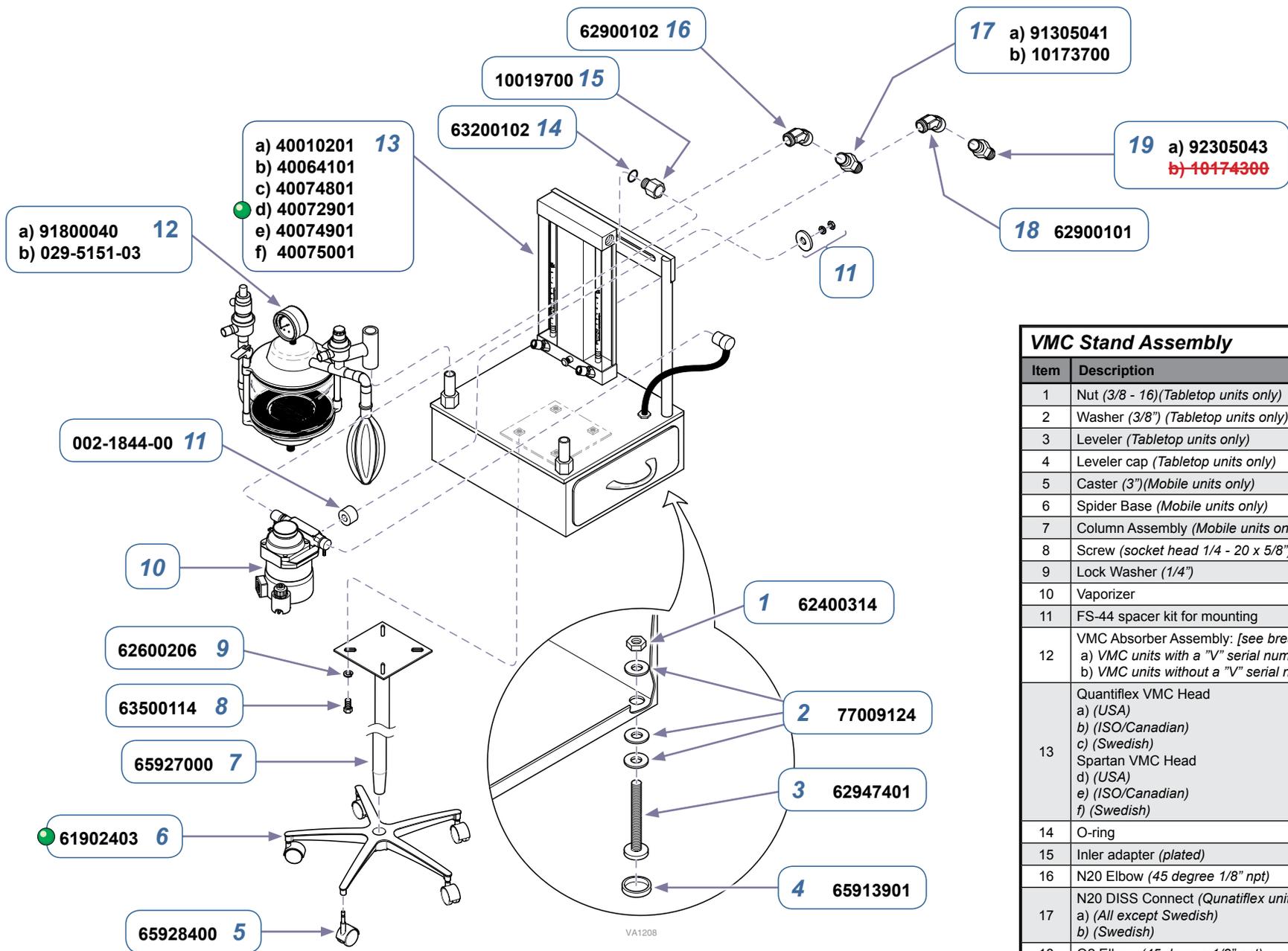
Look at Item 7 (older models page) and Item 14 (present models page) to determine if you have an older or newer model flowmeter assembly. Older models use a plastic cover and present models use a lens.

* Indicates multiple pages due to a serial number break for the parts illustration.



VMC Drawer Assembly		
Item	Description	Qty.
1	Acorn nut (1/4 - 20)	1
2	Washer (1/4")	1
3	Lock Washer (#8)	4
4	Screw (pan head 6-32 x 1/2")	2
5	Hose Connector	1
6	Table top	1
7	Lock Washer (1/2" external tooth)	1
8	Elbow (1/8 npt, apply teflon tape and adhesive)	2
9	Oriface Assembly	1
10	Nut (1/2" - 20)	1
11	Tube (O2 flush)	1
12	Screw (socket head 6 - 32 x 1")	2
13	Lock Washer (3/8")	4
14	Drawer Handle	1
15	Screw (pan head 8 - 32 x 1/4")	2
16	Screw (socket head 3/8 - 16 x 1")	4
17	Drawer Unit (includes item 18 & 19)	1
18	• Drawer Unit Housing	1
19	• Drawer Assembly	1
20	Tube (flowmeter outlet)	1
21	Connector (1/8" mnpt x 1/4 t)(apply adhesive)	4
22	Manifold block (apply adhesive to secure block)	1
23	Connector (45 deg. 1/8 npt x 1/4 t plated)	1
24	Mounting post	2
25	Black Neoprene Rubber Tubing (5/16" dia)	AR
26	Refer to: Flowmeter Assembly	Ref
27	FS-2 outlet adapter	1
28	Upright bar (painted)	2
29	Cross bar (painted)	1
30	Screw (socket head 6 - 32 x 3/8")	4

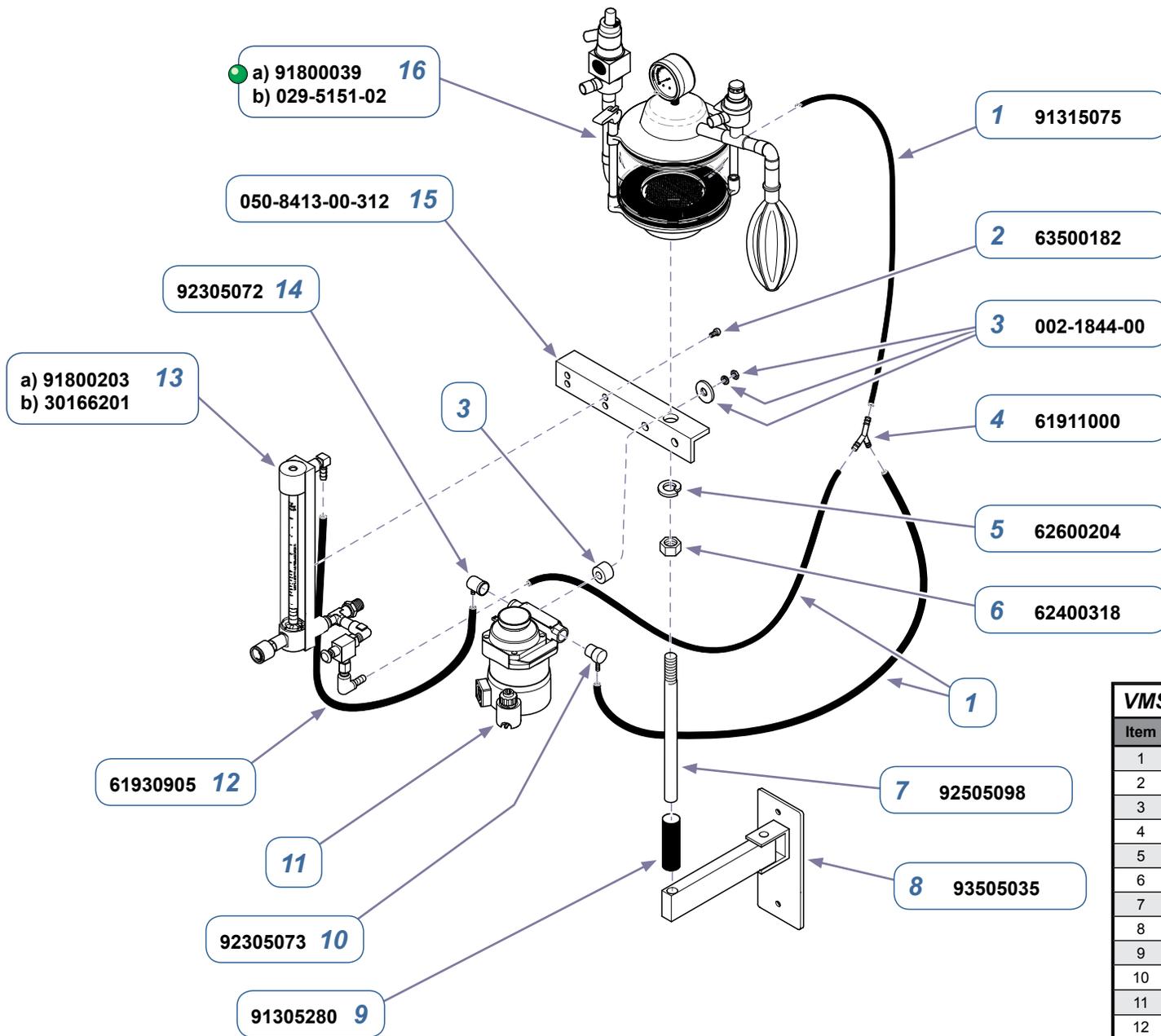
Models:	VMC
Serial Numbers:	<i>all</i>



VMC Stand Assembly

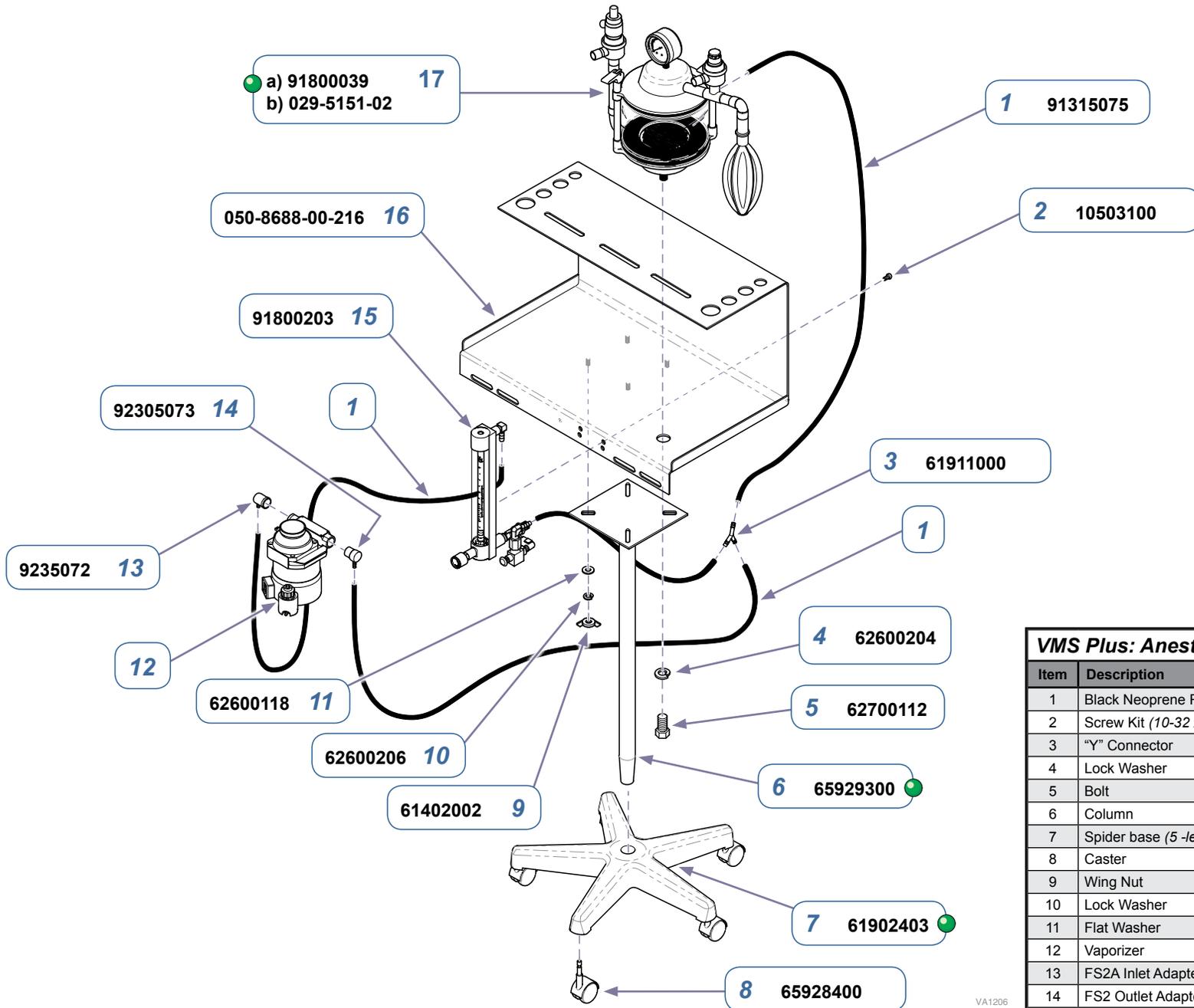
Item	Description	Qty.
1	Nut (3/8 - 16)(Tabletop units only)	4
2	Washer (3/8") (Tabletop units only)	12
3	Leveler (Tabletop units only)	4
4	Leveler cap (Tabletop units only)	4
5	Caster (3") (Mobile units only)	5
6	Spider Base (Mobile units only)	1
7	Column Assembly (Mobile units only)	1
8	Screw (socket head 1/4 - 20 x 5/8")	4
9	Lock Washer (1/4")	4
10	Vaporizer	1
11	FS-44 spacer kit for mounting	1
12	VMC Absorber Assembly: [see breakdown] a) VMC units with a "V" serial number prefix b) VMC units without a "V" serial number prefix	Ref
13	Quantiflex VMC Head a) (USA) b) (ISO/Canadian) c) (Swedish) Spartan VMC Head d) (USA) e) (ISO/Canadian) f) (Swedish)	AR
14	O-ring	1
15	Inler adapter (plated)	1
16	N20 Elbow (45 degree 1/8" npt)	AR
17	N20 DISS Connect (Qunatiflex units only) a) (All except Swedish) b) (Swedish)	AR
18	O2 Elbow (45 degree 1/8" npt)	AR
19	O2 DISS Connect a) (All except Swedish) b) (Swedish)	AR
Items 20 & 21 are not shown and also included with item 13		
20	30020200 Back Cover	1
21	20013100 Stand Off	1

Models:	VMC
Serial Numbers:	<i>all</i>



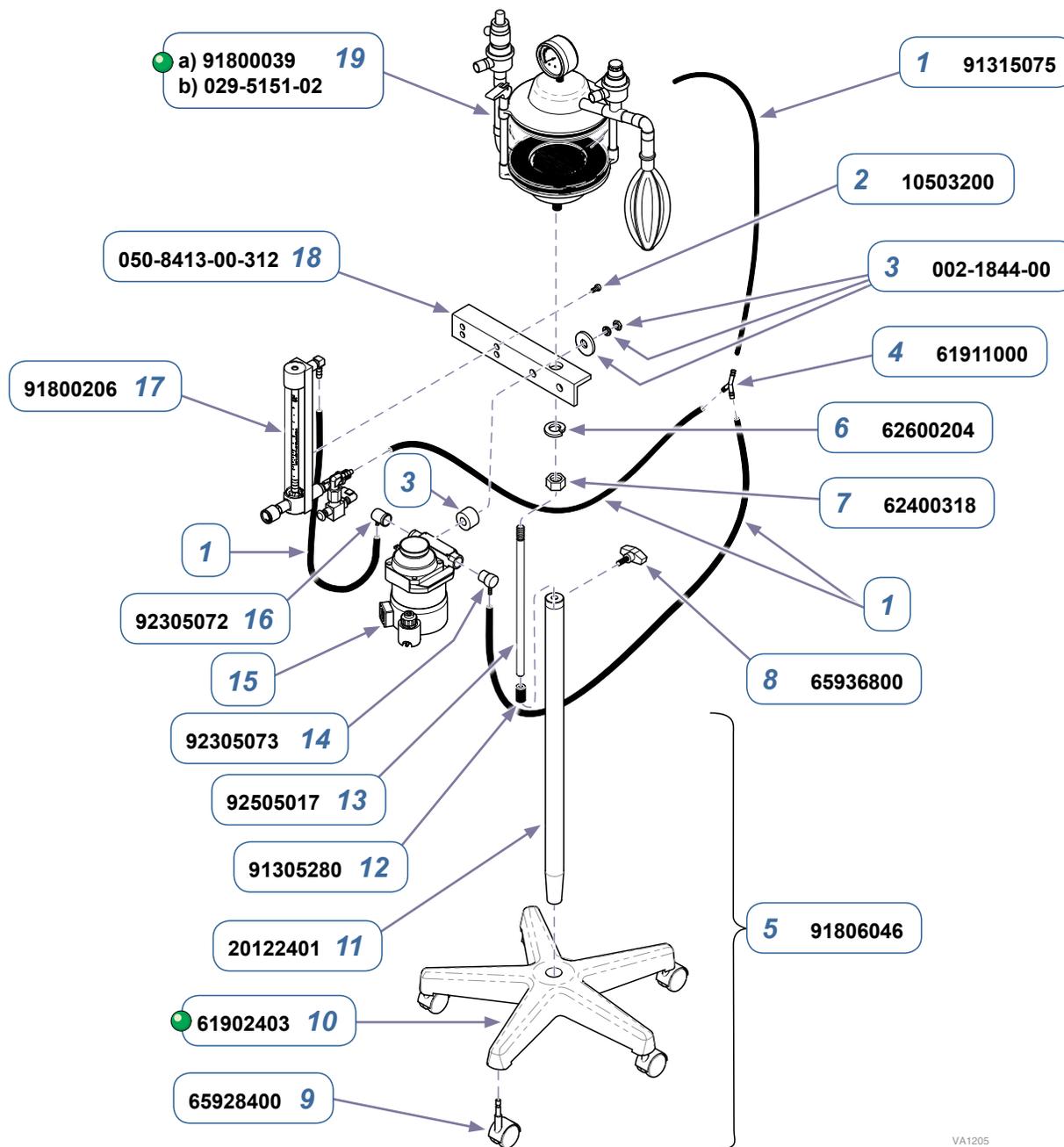
VMS Wall Mount		
Item	Description	Qty.
1	Black Neoprene Rubber Tubing	AR
2	Screw Kit for Flowmeter (10-32 x 5/16" socket hd)	2
3	Screw Kit for Vaporizer Mounting	2
4	"Y" connector fitting	1
5	Lock Washer (5/8")	1
6	Nut (5/8" -18)	1
7	Mounting Stud	2
8	Mounting Bracket	1
9	Post spacer	1
10	FS-2 outlet adapter	1
11	Vaporizer	1
12	Black Neoprene Rubber Tubing (24 in long)	1
13	O2 Flowmmeter with flush assy.	1
14	a) FS-2A inlet adapter b) FS-2A inlet adapter (without fittings)	1
15	Mounting bracket	1
16	VMS Absorber Assembly: [see breakdown] a) VMS units with a "V" serial number prefix b) VMS units without a "V" serial number prefix	Ref

Models:	VMS
Serial Numbers:	<i>all</i>



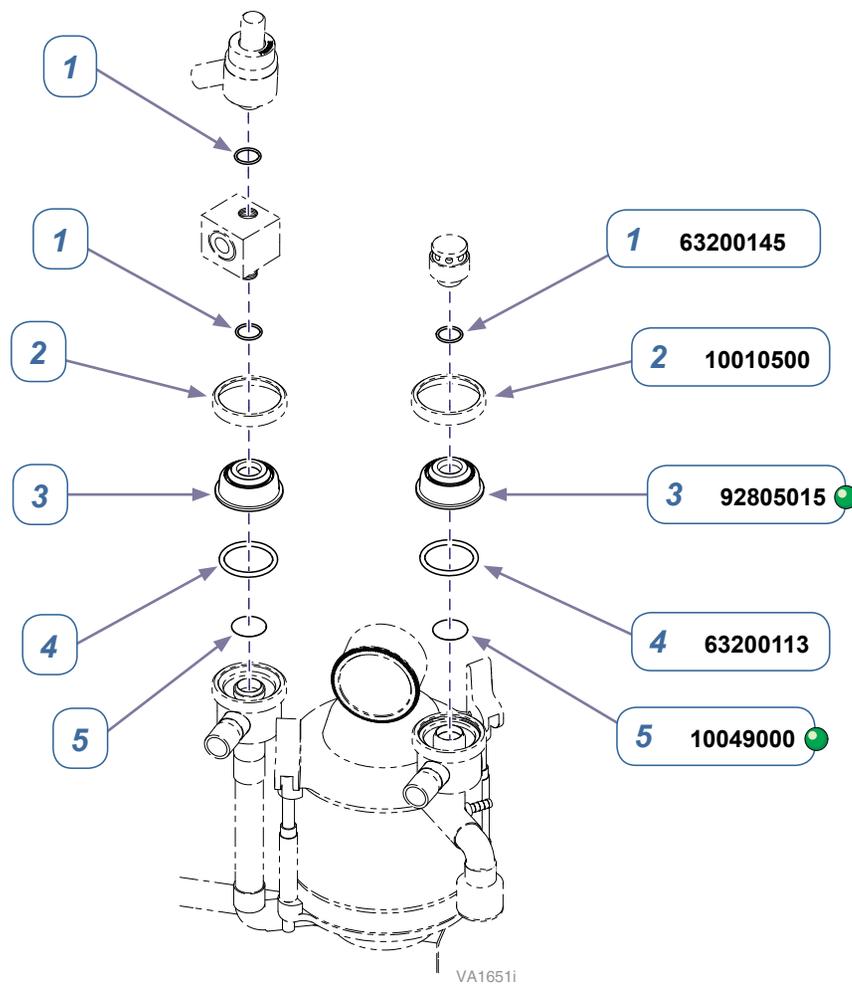
VMS Plus: Anesthesia Machine		
Item	Description	Qty.
1	Black Neoprene Rubber Tubing 1/4" I.D.	AR
2	Screw Kit (10-32 x5/6")	2
3	"Y" Connector	1
4	Lock Washer	1
5	Bolt	1
6	Column	1
7	Spider base (5 -leg)	1
8	Caster	5
9	Wing Nut	4
10	Lock Washer	4
11	Flat Washer	4
12	Vaporizer	1
13	FS2A Inlet Adapter	1
14	FS2 Outlet Adapter	1
15	O2 Flowmeter Assembly with Flush	1
16	Shelf	1
17	VMS Absorber Assembly: [see breakdown] a) VMS units with a "V" serial number prefix b) VMS units without a "V" serial number prefix	Ref

Models:	VMS Plus
Serial Numbers:	<i>all</i>



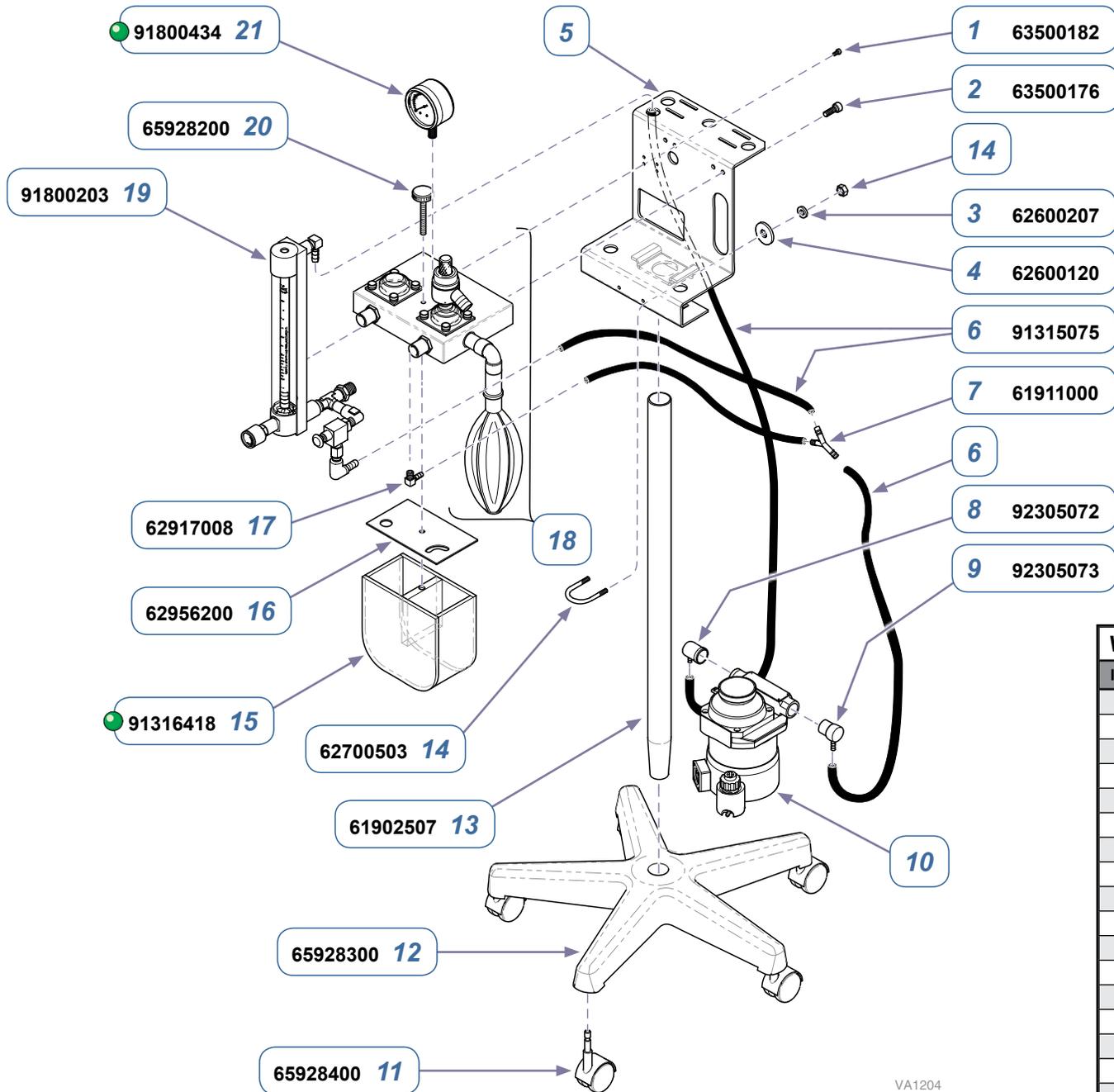
VMS		
Item	Description	Qty.
1	Black Neoprene Rubber Tubing (1/4" dia)	AR
2	Screw Kit for Flowmeter (10-32 x 5/16")	2
3	Vaporizer Mounting Kit	2
4	Nylon "Y" Connector	1
5	VMS 40" Stand Assy (Includes items 6 thru 13)	1
6	• Lock Washer (5/8")	1
7	• Nut (5/8" -18)	1
8	• Stand Tee-Handle	1
9	• Caster (3")	5
10	• Spider Base (5 leg)	1
11	• Column	1
12	• Post Spacer	1
13	• Mounting Stud (15")	1
14	FS-2 Adapter	1
15	Vaporizer	1
16	FS-2A Adapter	1
17	O2 Flowmeter with Flush Assembly	1
18	Mounting Bracket	1
19	VMS Absorber Assembly: [see breakdown] a) VMS units with a "V" serial number prefix b) VMS units without a "V" serial number prefix	Ref

Models:	VMS
Serial Numbers:	all



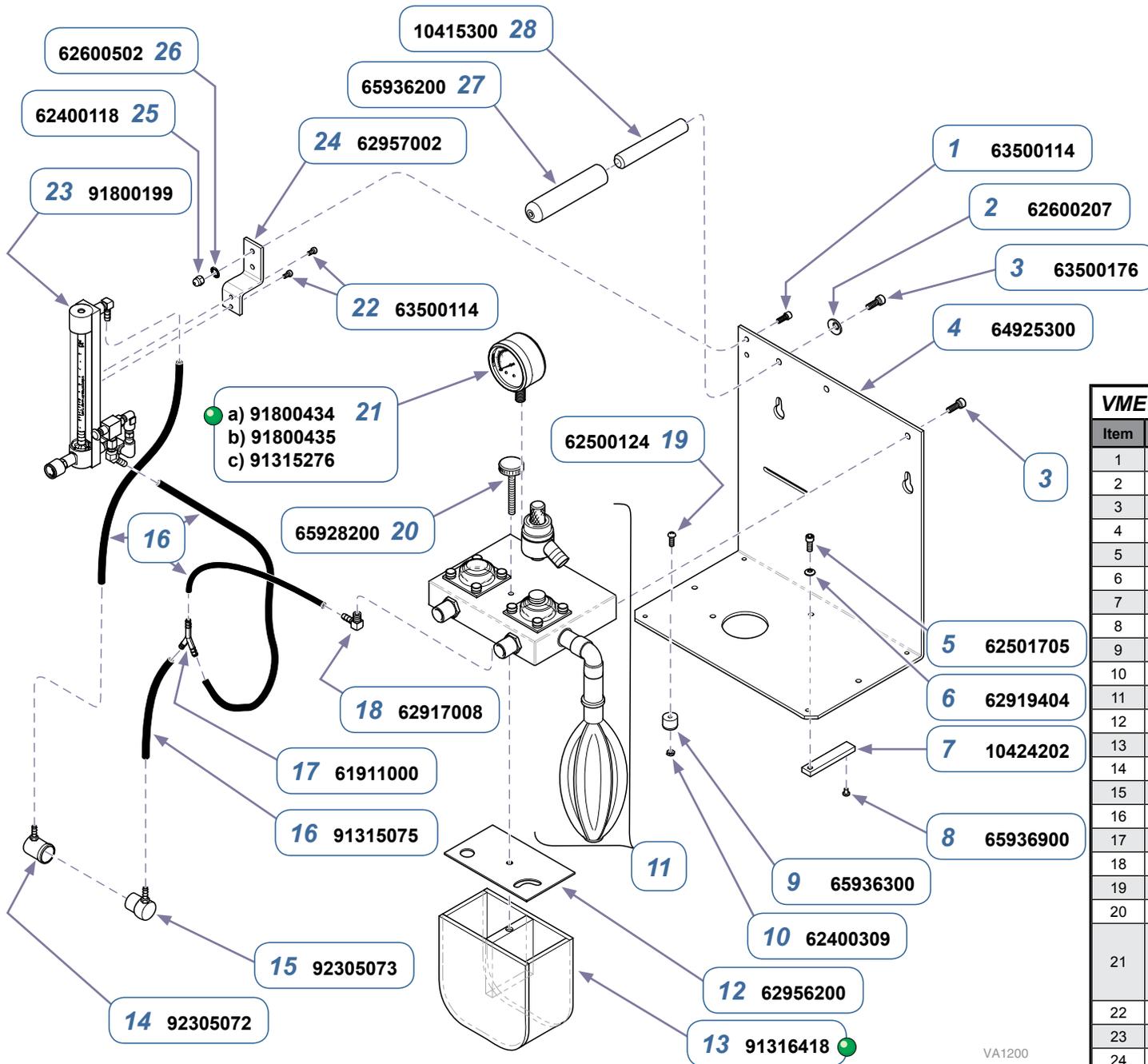
Models:	VMS
Serial Numbers:	<i>all</i>

VMS - Inhalation / Exhalation Valve Parts		
Item	Description	Qty.
1	O-ring	3
2	Dome Retainer Ring	2
3	Dome Clamp	2
4	O-ring	2
5	White Nylon Valve Disc	2



VME2: Anesthesia Machine		
Item	Description	Qty.
1	Socket Head Bolt (1/4 - 20 x 5/8")	1
2	Screw(5/16 - 18 x 3/4")	2
3	Washer (lock)	2
4	Washer (flat 5/16)	2
5	Base Plate (not available)	1
6	Black Neoprene Rubber Tubing 1/4" I.D.	AR
7	"Y" Connector	1
8	FS2A Inlet Adapter	1
9	FS2 Outlet Adapter	1
10	Vaporizer	Ref
11	Caster	5
12	Spider base (5 -leg)	1
13	Column	1
14	U clamp (includes 5/16" x 18 nuts)	1
15	Absorber Canister (w/decal)	1
16	Gasket	1
17	Elbow (90 Deg Male - 1/4 HB x 1/8 NPT Plated)	1
18	Inhalation / Exhalation Valves	1
19	O2 Flowmeter Assembly with Flush	1
20	Canister Knob	1
21	Pressure Gauge	1

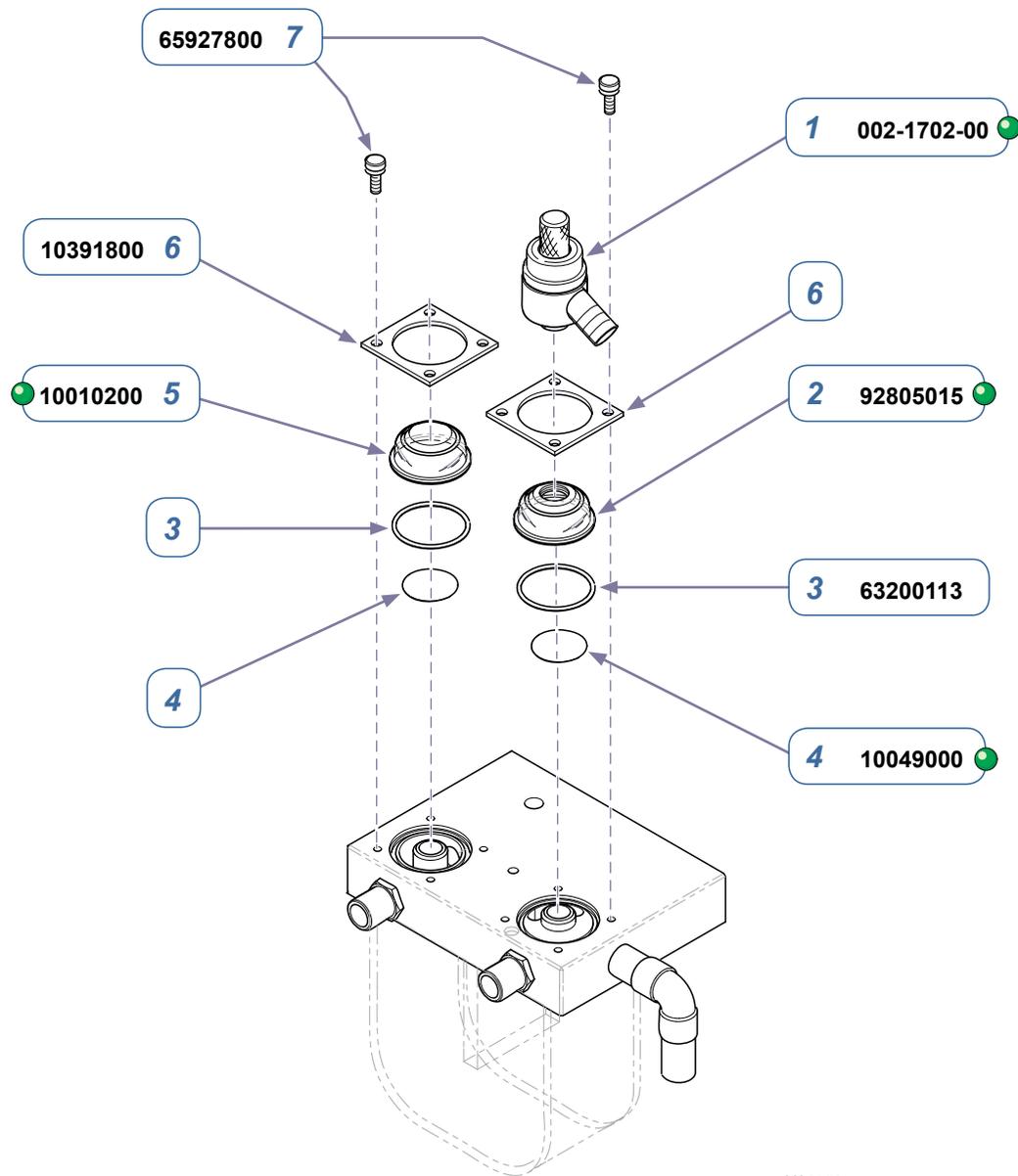
Models:	VME 2
Serial Numbers:	<i>all</i>



VME Table Top: Anesthesia Machine		
Item	Description	Qty.
1	Socket head bolt (1/4 - 20 x 5/8", Plated)	1
2	Washer (HLCL Spring Washer 5/16", Plated)	1
3	Screw (5/16 - 18 x 3/4")	3
4	Panel	2
5	Should Bolt (10 - 32)	2
6	Spring Washer (1/4")	1
7	Anodized Leg	1
8	Bumper	1
9	Foot	4
10	Nut (10-32 Plated)	4
11	Inhalation / Exhalation Valves	1
12	Gasket	1
13	Absorber Canister (w/decal)	1
14	FS2A Inlet Adaptor	1
15	FS2 Outlet Adaptor	1
16	Black Neoprene Rubber Tubing (1/4" dia)	AR
17	"Y" Connector	1
18	Elbow (90 Deg Male - 1/4 HB x 1/8 NPT Plated)	1
19	Screw (1/4" - 20 x 5/8", Plated)	4
20	Canister Knob	1
21	a) Pressure gauge b) Pressure gauge replacement cover - Wexler (included with 91800434) c) Pressure gauge replacement cover - Marshall	1
22	Screw (10 - 032 x 5/16")	2
23	O2 Flowmeter Assembly with Flush	1
24	Mounting Bracket	1
25	Acorn Nut *1/4 - 20)	2
26	Washer (1/4")	2
27	Handle Grip	1
28	Handle	1

Models:	VME
Serial Numbers:	<i>all</i>

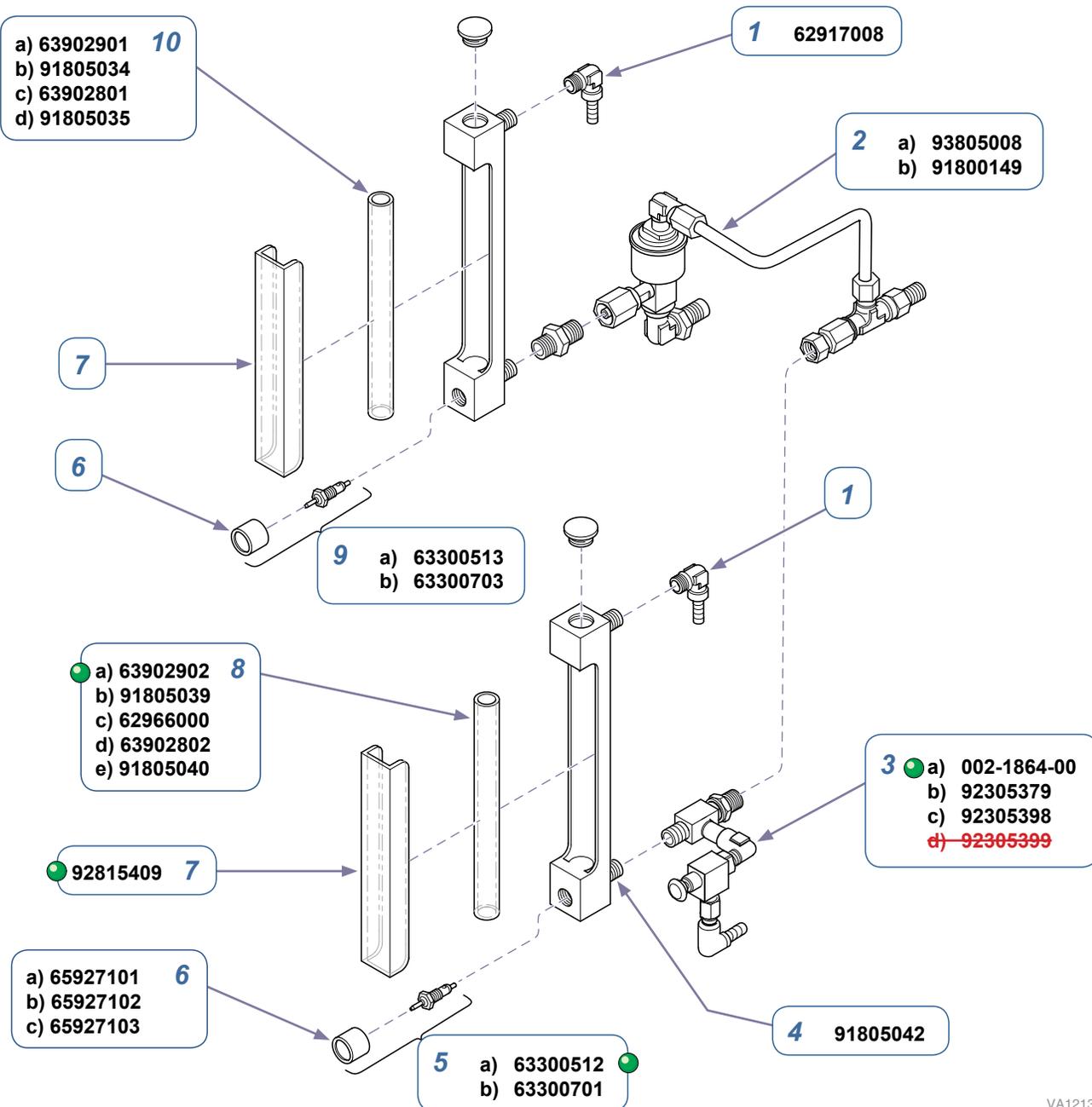
VA1200



VA1201

Models:	VME
Serial Numbers:	<i>all</i>

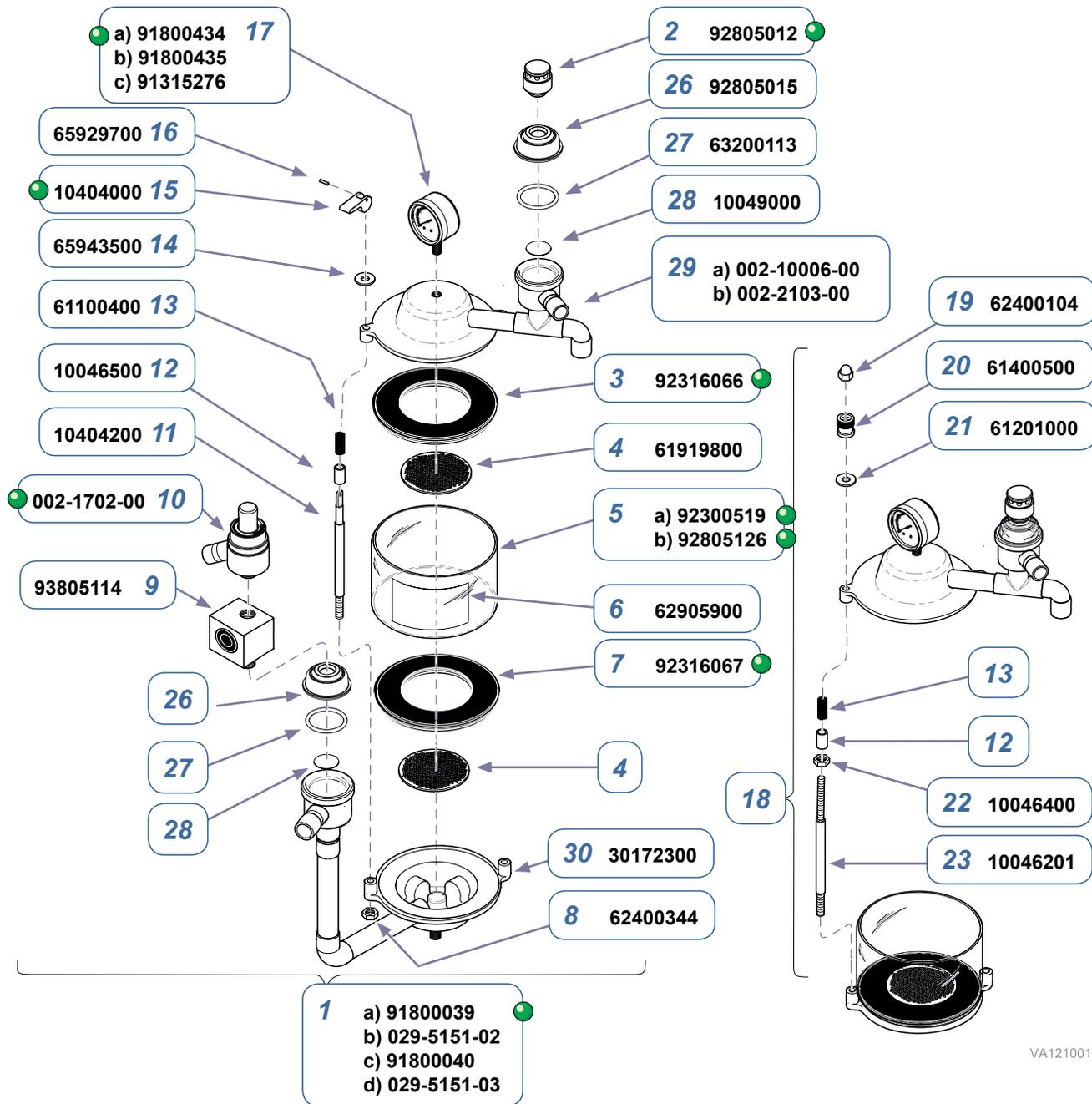
VME Table Top: Inhalation / Exhalation Valve Parts		
Item	Description	Qty.
1	APL Valve	1
2	Exhalation Valve	1
3	Gasket	2
4	White Nylon Valve Disc	2
5	Inhalation Dome	1
6	Dome Clamp	2
7	Thumb Screws	8



Note:
 Look at Item 7 (older models page) and Item 14 (present models page) to determine if you have an older or newer model flowmeter assembly. Older models use a plastic cover and present models use a lens.

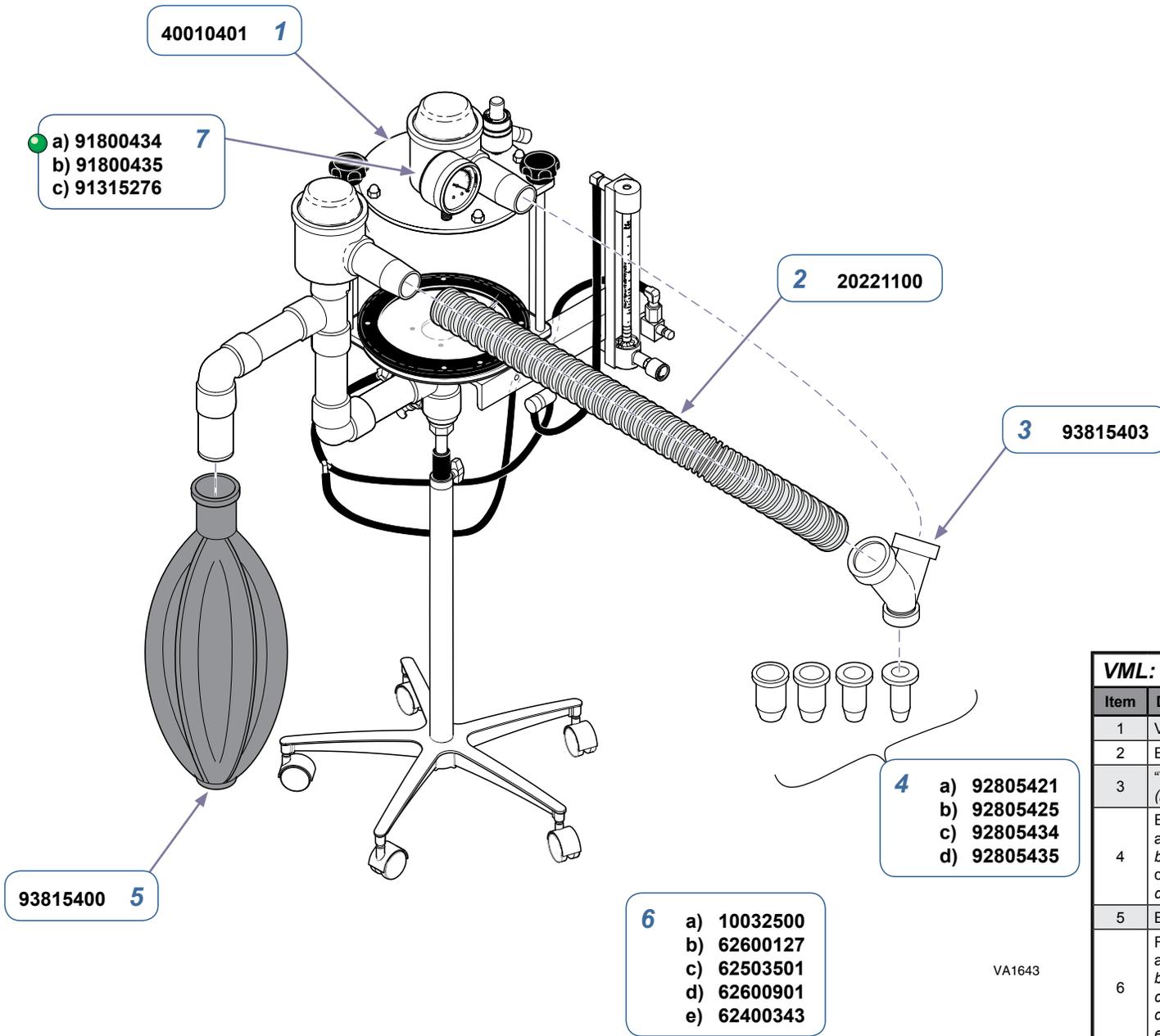
Flowmeter Assembly Older Models		
Item	Description	Qty.
1	Elbow (1/4M Hose Barb x 1/8" NPT)	1
2	N2O Fail-safe Assembly a) (USA/ISO/Canadian) b) (Swedish)	1
3	O2 Flush Assy a) (VMS/VML)(USA/ISO/Canadian) b) (VMS/VML)(Swedish) c) (VMS Plus)(USA/ISO/Canadian) d) (VMS Plus)(Swedish)	1
4	Inlet/Outlet Adapter (npt x 1/4")	1
5	O2 Needle Valve Assy w/Positive Stop a) (USA) b) (ISO/Canadian/Swedish)	1
6	Knob a) Green b) Blue c) White	1
7	Plastic Cover	1
8	O2 Flowmeter Tube Only a) (VMS/VMS Plus/VME)(USA) b) (VMS/VMS Plus/VME)(ISO/Canadian/Swedish) c) (VMS/VMS Plus/VME)(USA/ISO/Canadian/Swedish)(0-1000cc) d) (VML)(USA) e) (VML)(ISO/Canadian/Swedish)	1
9	N2O Needle Valve Assy w/Positive Stop a) (USA) b) (ISO/Canadian/Swedish)	
10	N2O Flowmeter (Flowmeter tube only) a) (VMS/VMS Plus)(USA) b) (VMS/VMS Plus)(ISO/Canadian/Swedish) c) (VML)(USA) d) (VML)(ISO/Canadian/Swedish)	1

Models:	VMS	VMS Plus	VML	
Serial Numbers:	Older Models	Older Models	Older Models	



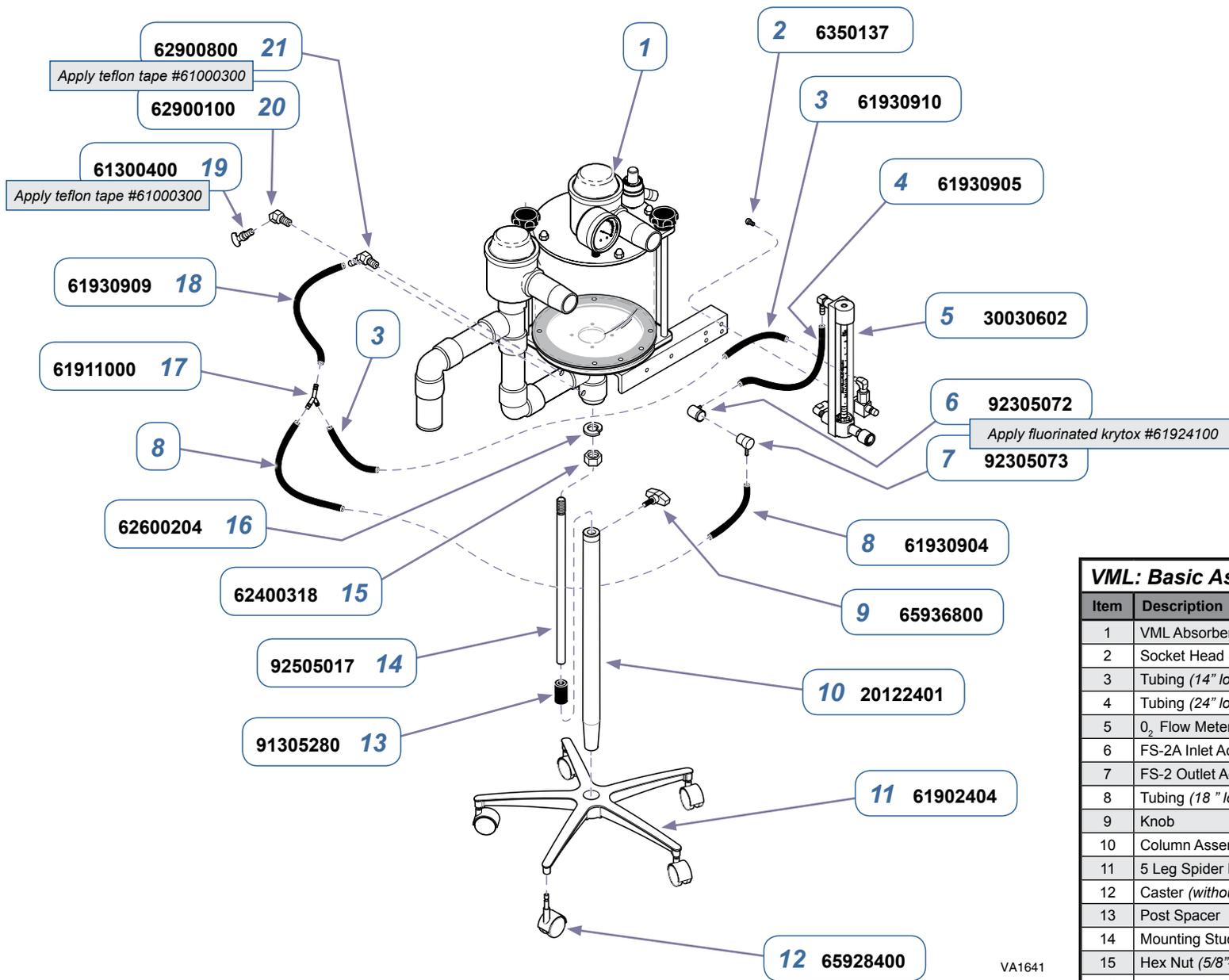
Absorber Assembly		
Item	Description	Qty.
1	Absorber Assembly: (VMS includes items 2 thru 16) a) VMS units with a "V" serial number prefix b) VMS units without a "V" serial number prefix (VMC (incl. items 2 thru 8 and 10 thru 17) c) VMC units with a "V" serial number prefix d) VMC units without a "V" serial number prefix	Ref
2	• Air intake valve	1
3	• Upper gasket	1
4	• Screen (upper and lower)	2
5	• Canister assembly a) (includes canister, lower gasket/screen, and fill label) b) (includes canister, decal and no gaskets)	AR
6	• Fill label	1
7	• Lower gasket	1
8	Hex Nut	1
9	• Occlusion Valve (VMS and VMS Plus Only)	1
10	• APL Valve	1
11	• Tie rod	2
12	• Sleeve	2
13	• Spring	2
14	• Nylon washer	2
15	• "Quick Release" lever	2
16	• "Quick Release" lever pin	2
17	• a) Pressure gauge • b) Pressure gauge replacement cover - Wexler (included with 91800434) • c) Pressure gauge replacement cover - Marshall	1
18	Thumb nut absorber replacement parts (incl. items 19 thru 23)	
19	• Acorn nut	2
20	• Thumb nut	2
21	• White nylon washer	2
22	• Adjusting screw	2
23	• Tie rod	2
24	Optional drain valve assy. (91525269 VMS only)(not shown)	AR
25	Replacement pipe plug assy. (91525270 VMS only)(not shown)	AR
26	Dome Clamp	2
27	O-ring	2
28	White Nylon Valve Disc	2
29	a)VMC Upper Housing Assembly b)VMS Upper Housing Assembly	1
30	Lower Housing Assembly	1

Models:	VMS	VMS Plus	VMC
Serial Numbers:	all	all	all



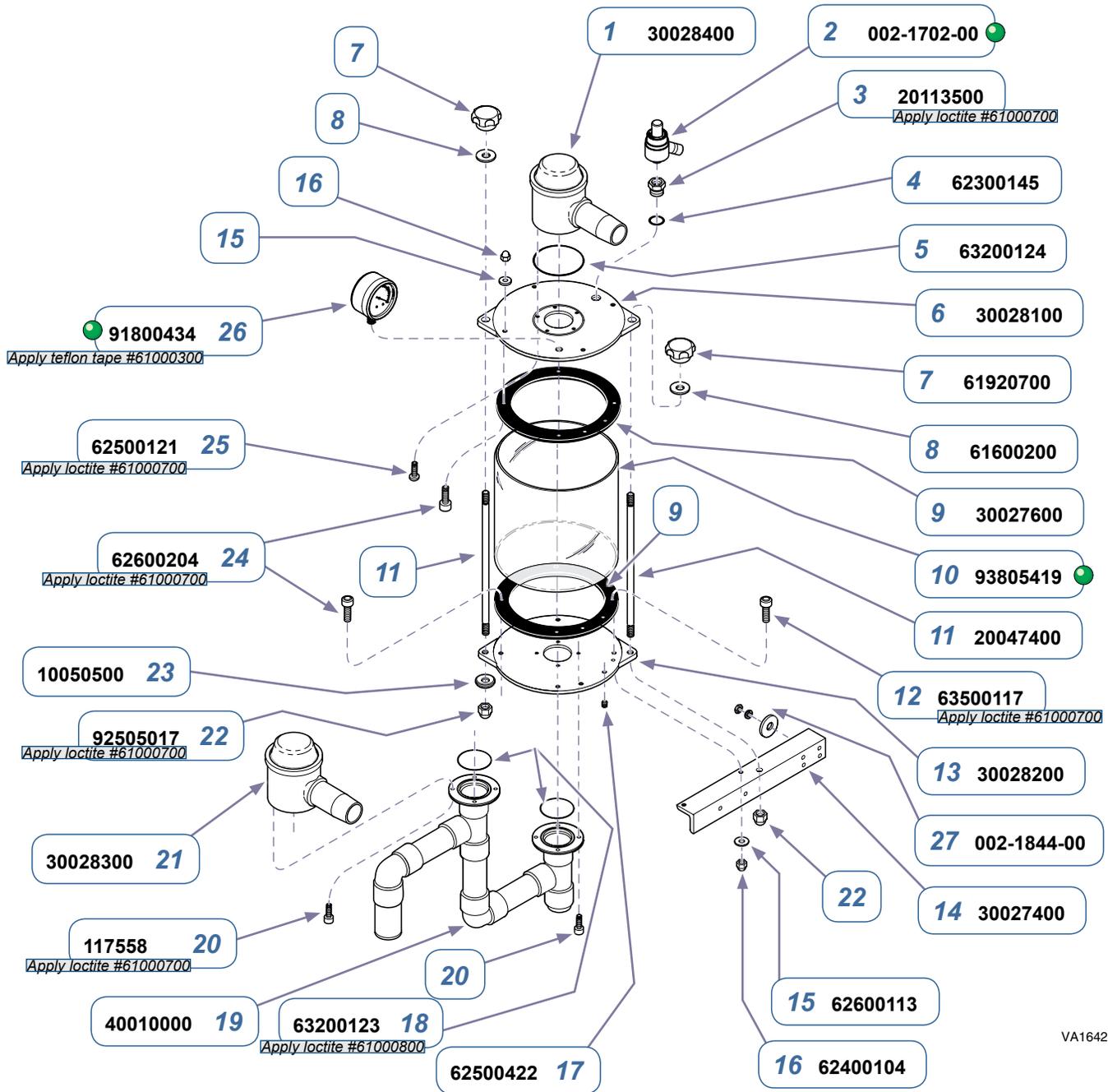
VML: Anesthesia Machine		
Item	Description	Qty.
1	VML Basic Assembly (see breakdown elsewhere)	1
2	Breathing Tubes	2
3	"Y" Piece Assembly (includes PN 10008200 Retaining Ring)	1
4	Endo Tube Connector: a) (21mm) b) (25mm) c) (30mm) d) (40 mm)	1
5	Breathing Bag (30L)	1
6	FS-44 Spacer Kit (not shown) a) (plated spacer [2]) b) (flat washer [2]) c) (socket set screw [2]) d) (lock washer [2]) e) (hex nut [2])	1
7	a) Pressure gauge b) Pressure gauge replacement cover - Wexler (included with 91800434) c) Pressure gauge replacement cover - Marshall	

Models:	VML
Serial Numbers:	Newer Models



VML: Basic Assembly		
Item	Description	Qty.
1	VML Absorber Assy. (see breakdown elsewhere)	Ref
2	Socket Head Screw (#10-32 x 3/8")	2
3	Tubing (14" long)	1
4	Tubing (24" long)	2
5	O ₂ Flow Meter with Flush Assembly	1
6	FS-2A Inlet Adapter (apply fluorinated krytox)	1
7	FS-2 Outlet Adapter (apply fluorinated krytox)	1
8	Tubing (18" long)	1
9	Knob	1
10	Column Assembly (31" long)	1
11	5 Leg Spider Base	1
12	Caster (without brake)	5
13	Post Spacer	1
14	Mounting Stud (15" long)	1
15	Hex Nut (5/8"-18)	1
16	Lock Washer (5/8")	1
17	"Y" Connector	1
18	Tubing (6" long)	1
19	Drain Valve (apply teflon tape)	1
20	45° Street Elbow (1/8" NPT [apply teflon tape])	1
21	45° Hose Connector (1/8" NPT x 1/4" tube [apply teflon tape])	1

Models:	VML
Serial Numbers:	Newer Models

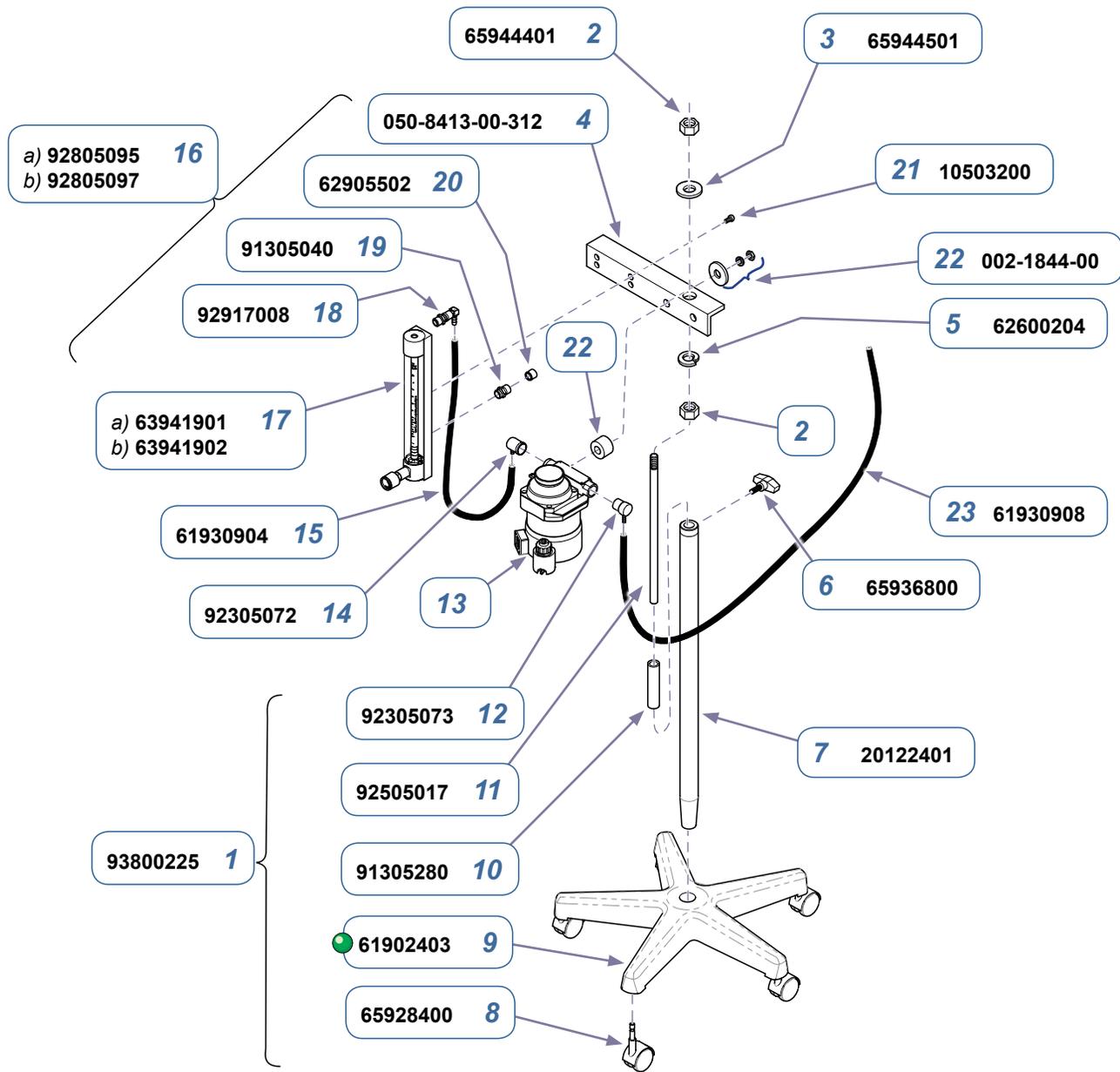


VML: Absorber Assembly

Item	Description	Qty.
1	Exhale Valve Assembly	1
2	APL Valve Assembly <i>Includes (Not Shown/Exploded)</i> 20004500 Dome Retainer Ring 20048200 Plastic Dome Assembly 61200700 Gasket 10006600 Nylon Disc 10006400 Dome Pin 63200124 Lower O-ring	1
3	APL Valve Adapter <i>(apply loctite)</i>	1
4	O-Ring	1
5	O-Ring	1
6	Upper End Plate Assembly	1
7	Fluted Knob	2
8	Thrust Washer	2
9	Gasket	2
10	Canister Assembly	1
11	Tie Rod	2
12	Socket Head Screw (1/4"-20 x 1" <i>(apply loctite)</i>)	2
13	Lower End Plate Assembly	1
14	Mounting Bracket	1
15	Flat Washer (.255" ID x .437 OD)	10
16	Acorn Nut (1/4"-20)	10
17	Set Screw (1/4"-20 x 3/4" <i>(apply loctite)</i>)	2
18	O-Ring	2
19	Plated Piping Assembly	1
20	Socket Head Screw (#10"-32 x 3/8" <i>(apply loctite)</i>)	8
21	Inhale Valve Assembly	1
22	Acorn Nut (1/2"-13 <i>(apply loctite)</i>)	2
23	Spacer	1
24	Socket Head Screw (1/4"-20 x 3/4" <i>(apply loctite)</i>)	6
25	Pan Head Screw (1/4"-20 x 3/4" <i>(apply loctite)</i>)	5
26	Pressure Gauge Manometer <i>(apply teflon tape)</i>	1
27	Spacer Kit	1

VA1642

Models:	VML
Serial Numbers:	<i>Newer Models</i>

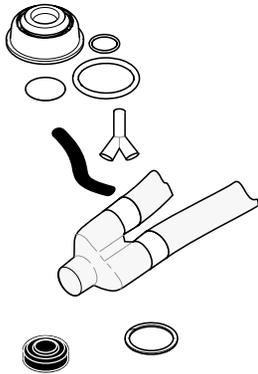


**VMR: Non-rebreather System:
 91800242 Low Flow VMR Stand
 w/o absorber
 91800250 Standard Flow VMR Stand
 w/o absorber**

Item	Description	Qty.
1	Stand Assembly (includes items 2 thru 11)	1
2	• Thin Hex Nut	2
3	• Washer	1
4	• Mounting Bracket	1
5	• Lock Washer	1
6	• Stands Knob	1
7	• Column Assembly (31")	1
8	• Caster (without brakes)	5
9	• Spider Base	1
10	• Post Spacer	1
11	• Mounting Stud	1
12	Adapter (FS-2 {PLTD})	1
13	Vaporizer	Ref
14	Adapter (FS-2A {PLTD})	1
15	Tubing (18")	1
16	Flowmeter: Assembly (includes items 17 thru 20): a) 0 to 4 lpm b) 0 to 1000 ccm.	1
17	• Flowmeter: a) 0 to 4 lpm b) 0 to 1000 ccm.	1
18	• Elbow Fitting	1
19	• Plated Piping Assembly	1
20	• Caplug	1
21	Hardware Kit	1
22	Spacer Kit	1
23	Tubing (48")	1

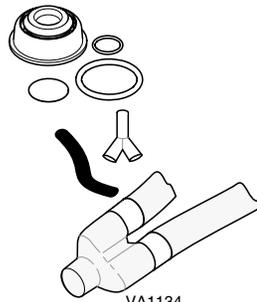
Models:	VMR
Serial Numbers:	<i>Newer Models</i>

1 91303015



VA113401

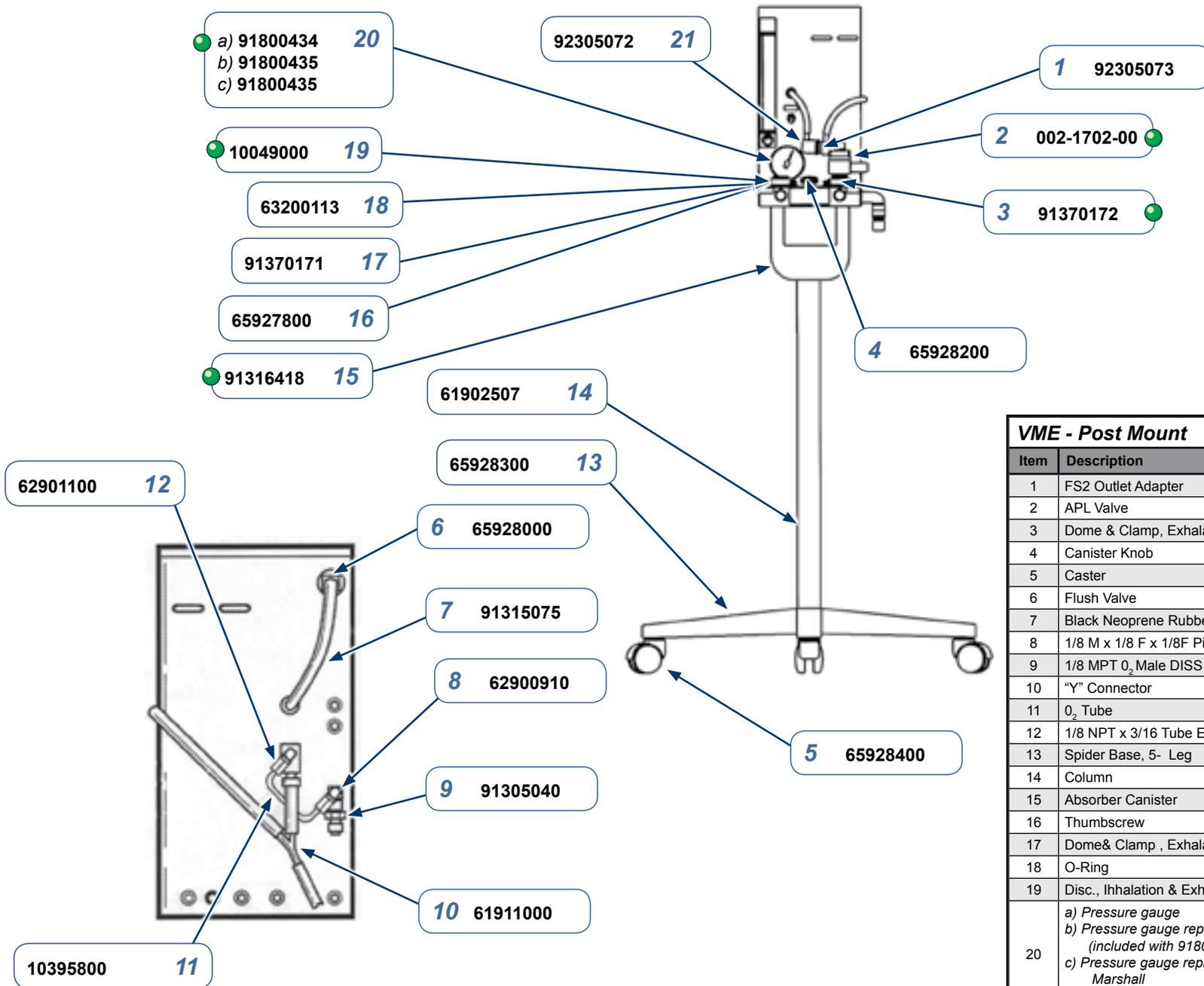
2 91303017



VA1134

Models:	VMS	VMS Plus	VMC	VME	VME2
Serial Numbers:	<i>all</i>	<i>all</i>	<i>all</i>	<i>2006 thru Present</i>	<i>all</i>

Maintenance Kits <i>(Note: not all parts shown)</i>		
Item	Description	Qty.
1	VMS, VMS Plus and VMC Maintenance Kit Includes: (2) Disc (2) Large O-ring (3) Small O-ring (2) Dome Tubing (1) Breathing Circuit Upper and Lower Gaskets Diaphragm (VMS only) Back Up Ring (VmS only)	1 kit
2	VME Tabletop and VME2 Maintenance Kit (2) Disc (2) Large O-rings (2) Small O-rings Domes 2 Liter Breathing Bag Tubing & Y Connector Breathing Circuit Reservoir Bag Gasket	1 kit



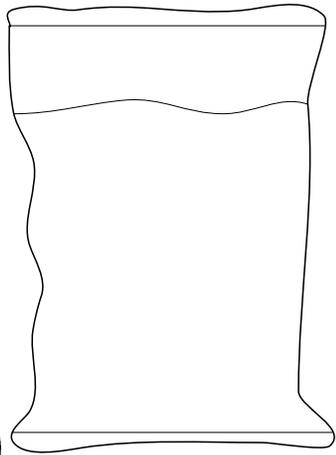
VME - Post Mount		
Item	Description	Qty.
1	FS2 Outlet Adapter	1
2	APL Valve	1
3	Dome & Clamp, Exhalation Valve	1
4	Canister Knob	1
5	Caster	3
6	Flush Valve	1
7	Black Neoprene Rubber Tubing, 1/4" ID	AR
8	1/8 M x 1/8 F x 1/8F Pipe Tee	1
9	1/8 MPT O ₂ Male DISS Connector	1
10	"Y" Connector	1
11	O ₂ Tube	1
12	1/8 NPT x 3/16 Tube Elbow	1
13	Spider Base, 5- Leg	1
14	Column	1
15	Absorber Canister	1
16	Thumbscrew	1
17	Dome & Clamp, Exhalation Valve	1
18	O-Ring	1
19	Disc., Inhalation & Exhalation Valves	1
20	a) Pressure gauge b) Pressure gauge replacement cover - Wexler (included with 91800434) c) Pressure gauge replacement cover - Marshall	
21	FS2A Inlet Adapter	1
Not Shown		
22	91303016 - Maintenance Kit	1
23	62956200 - Absorber Canister Gasket	1

Models:	VME - Post Mount
Serial Numbers:	Built from 1997 thru 2006

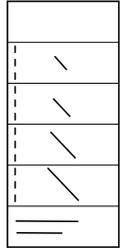
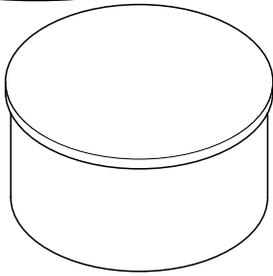
002-1765-00 1



2 a) 002-1761-00
b) 002-1762-00



a) 002-1763-00 3
b) 002-1764-00



061-1182-00 4

VA1877i

Models:	All	
Serial Numbers:		

Sodasorb		
Item	Description	Qty.
1	Sodasorb Standard	Bucket
2	a) Sodasorb LF Canister Pak b) Sodasorb Standard Canister Pak	Case of 12
3	a) Sodasorb LF Pre-Pak b) Sodasorb Standard Pre-Pak	Case of 12
4	Sodasorb LF Color Chart	1

SUBJECT TO CHANGE WITHOUT NOTICE

