Veta 3/Veta 5

Anesthesia Machine

Service Manual

Intellectual Property Statement

Version Information

The version of this Service Manual is subject to update without notice due to changes in software or technical specifications. The version information of this Service Manual is as follows:

- Version: 1.0
- Issue date: 2021-04

Foreword

Description

This Service Manual details the hardware components, installation, disassembly, testing and troubleshooting of the product and its related accessories so that service personnel can effectively deal with common problems. The product structure and design principle are not described in depth in this Service Manual. For issues that could not be addressed, contact our Customer Service Department.

This Service Manual describes this product based on the most complete configuration. Therefore, some content may not be applicable to your product. If you have any questions, contact Mindray Customer Service Department. Before product maintenance, read this Service Manual carefully and make sure that you fully understand the content so as to conduct maintenance correctly and avoid product damage or personal injury.

Intended Audience

This Service Manual is geared for professional biomedical engineers, authorized service personnel, and after-sales representatives responsible for maintaining the product.

Password

The passwords for accessing relevant settings of the anesthesia machine are as follows:

- System menu: 1234
- Service menu: 789789

Contents

1 Safety

1.1 Safety Information

⚠WARNING

- **Indicates a potential hazard or unsafe practice that, if not avoided, could result in death or serious injury or property damage.**

⚠CAUTION

- **Indicates a potential hazard or unsafe practice that, if not avoided, could result in minor personal injury or product/property damage.**

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.**
- **Before operation, ensure that the machine, connection cables, and accessories can work properly and safely.**
- **The equipment must be connected to a power outlet with protective earth contacts only. If no protective earth conductor is provided, operate the machine on its internal battery power.**
- **Connect the anesthesia machine to an AC power supply in time before the internal battery power is about to be depleted.**
- **Do not use the machine in the presence of flammable or explosive materials to prevent fire or explosion.**
- **Do not open housings of the machine as you may suffer an electric shock. Only the personnel trained and authorized by Mindray are qualified to repair and upgrade the machine.**
- **Do not cut off fresh gas before the anesthetic vaporizer is switched off. Do not start the anesthetic vaporizer when there is no fresh gas flow. Otherwise, anesthetic agent vapor at a high concentration can enter the machine's pipelines and ambient air, causing harm to people and materials.**
- **Before moving the anesthesia machine, remove objects from the top plate and bracket to prevent the anesthesia machine from toppling.**
- **Cut off power before repairing the machine.**
- **Do not use the anesthesia machine when there is leakage in the breathing system.**
- **Check the specifications of the Anesthesia Gas Scavenging System (AGSS) and anesthesia machine, to ensure their compatibility and prevent system mismatch.**
- **Using improper connectors may cause hazards. Ensure that all assemblies use proper connectors.**
- **Single-use breathing tubes, soda lime, watertraps, sampling tubes, and other single-use items may be considered to have potentially biological hazards. Do not reuse them. Dispose of these items in accordance with the hospital's regulations and local pollutant and biological hazard regulations.**
- **Do not push or lift the machine via the top plate.**
- **Do not use antistatic masks or breathing tubes.**
- **Cross infection may be caused if the anesthesia machine is not disinfected in a timely manner after use.**
- **The power plug is used to isolate the anesthesia machine from a power supply. Do**

⚠WARNING

not place the anesthesia machine in a place where it is difficult to remove/insert the plug.

- **When this machine is being used on an animal, do not maintain the machine.**
- **All analog or digital equipment connected to this system must pass specified IEC certification (such as IEC60950 for data processing equipment and GB9706.1 for medical electrical equipment). All configurations should comply with the valid version of GB9706.15. Personnel responsible for connecting optional devices to the I/O signal ports must configure the medical system and ensure that the medical system complies with GB9706.15.**
- **Do not touch the animal when connecting the equipment to external devices through the I/O signal ports. The animal leakage current may exceed the specified requirement.**

1.1.2 CAUTION

⚠CAUTION

- **To ensure animal safety, use only accessories specified in this manual.**
- **When the machine and its accessories approach the end of their service life, be sure to dispose of them in accordance with applicable local laws and regulations or the hospital's regulations.**
- **The electromagnetic field will affect performance of the equipment. Therefore, other devices used around this equipment must conform to the corresponding EMC requirements. Mobile phones, X-rays, or MRI machines are possible sources of interference as they emit higher levels of electromagnetic radiation.**
- **This system is capable of operating properly at the interference level indicated in this manual. If the interference level is higher than this level, an alarm may be triggered and mechanical ventilation may be stopped. Keep the equipment away from high-intensity electric fields, which may cause the equipment to issue false alarms.**
- **Before connecting the equipment to a power supply, check that the voltage and frequency of the power supply are the same as those indicated on the equipment's label or in this manual.**
- **Install or transfer the machine properly to prevent machine falling, collision, violent vibration, or other damage caused by external mechanical force.**
- **Under standard configuration, the anesthesia machine can keep stable when it is tilted at 10 degrees. Do not hang objects to both sides of the anesthesia machine to prevent toppling.**

⚠CAUTION

- **Fasten devices placed on the top plate securely to prevent hazards caused by unexpected sliding.**
- **Do not use or store the gas supply hose assembly in an environment exposed to ultraviolet light, oxidizing agents, or in a high-temperature or moist environment. Aged gas supply hose assembly may cause the release of pressure in the assembly, resulting in damage to people and materials.**
- **This machine is not suitable for use in a Magnetic Resonance Imaging (MRI) environment.**
- **Use the power cord delivered with the machine.**
- **The machine may move unexpectedly if casters are not locked. Ensure that casters are locked when using the machine.**

1.1.3 NOTE

NOTE

- **Install the machine in a place that facilitates observation, operation, and maintenance. Stay right in front of the anesthesia machine within 4 m away from the display screen to observe information displayed on the machine.**
- **Keep this manual somewhere near the machine for convenient and prompt access.**
- **This manual describes the product based on the most complete configuration. The product you purchase may not support some configuration or functions.**
- **The battery of this equipment is not a user-serviceable component. Only an authorized service representative can replace the battery. If the system is not used for a long time, contact Mindray Technical Support to disconnect the battery power. When the battery has reached its service life, dispose of it in accordance with local regulations.**
- **Some alarm settings of this machine cannot be modified by users.**
- **When the compliance compensation function is disabled, the tidal volume may not reach the set value.**

1.2 Equipment Symbols

	Refer to the operator's manual		Warning
SN	Serial number		Protective earth (ground)
	Battery indicator		Alternating current
	Power switch		Input/output connector
	Not autoclavable	IPX1	Degree of protection against harmful ingress of water
O_2	Oxygen supply connector	AIR	Air supply connector
	Lock		Unlock

	Manual ventilation		Auto ventilation
MIN	Minimum value	MAX	Maximum value
	Gas outlet		Flow or pressure control knob
	Gas inlet		Manual bag connector
	Date of manufacture		Manufacturer
	Keep dry		Temperature limitation
	Humidity limitation		Atmospheric pressure limitation
	This way up		Fragile, handle with care
	Recyclable		Stacking limit by number
	ACGO switch		Defibrillation-proof type BF applied part
O_2+	O2 flush button		No push
	MR unsafe - unsuitable for use in an Magnetic Resonance Imaging (MRI) environment		
	The following definition of the WEEE label applies to EU member states only. This symbol indicates that this product should not be treated as household waste. By ensuring that this product is disposed of correctly, you will help prevent bringing potential negative consequences to the environment and human health. For more detailed information with regard to returning and recycling this product, please consult the distributor from whom you purchased it. * For system products, this label may be attached to the main unit only.		
CE	The product complies with the Low Voltage Directive 2014/35/EU and the EMC Directive 2014/30/EU.		

2 Installation Guide

2.1 Preparations

2.1.1 Required Accessories

Prepare the following additional materials prior to installation. Customers are responsible for providing the materials. Missing materials may result in a delay or incomplete installation and/or additional on-site service.

- Effective oxygen and air supplies (280 kPa to 600 kPa (40 psi to 87 psi)) and connectors matching the gas supply of the hospital

2.1.2 Required Tools

- Phillips screwdriver
- Scissors

2.2 Installation Steps of Veta 5

NOTE

- **When unpacking the equipment, keep the plastic covering on the equipment. After taking out all the parts, put the packing materials into the original packing box and small boxes into large boxes.**

2.2.1 Check Before Installation

Upon receipt of Veta 5, check the packing box for any damage immediately.

a. If the packing box is not damaged, sign and date the bill of lading or air waybill to acknowledge that the anesthesia machine has been received safely.

b. If the packing box is damaged or the two anti-tilt labels on the outside of the packing box indicate abnormal, accept the equipment conditionally and clearly state the damage on the bill of lading or air waybill. Both the carrier and consignee must sign and date the bill of lading or air waybill. Keep all the damaged packages till Mindray gives further explanation. The consignee should contact Mindray Customer Service Department immediately.

2.2.2 Installing the Trolley

1. Cut, remove, and discard the white packing strap on the packing box. Open the trolley packing box, as shown in Figure A and Figure B.

Figure A

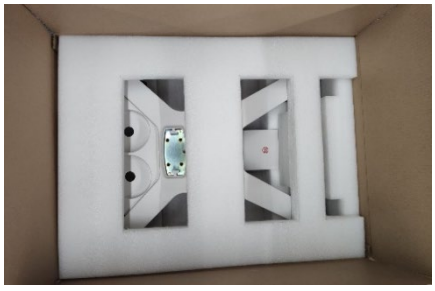


Figure B

2. Take out the base plate of trolley and then insert the trolley column into the base plate of the trolley. Pay attention to the direction and keep the trolley label side on the back side of the base plate, as shown in Figure C.

3. Put down the trolley (with two long legs touching the ground) and use an Allen wrench provided in the packing box to tighten the four M8×25 stainless steel hexagon socket combination screws, as shown in Figure D.

Figure C

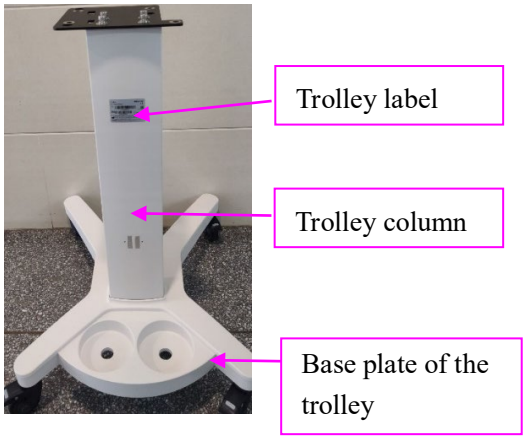


Figure D

2.2.3 Installing the Main Unit of Veta 5

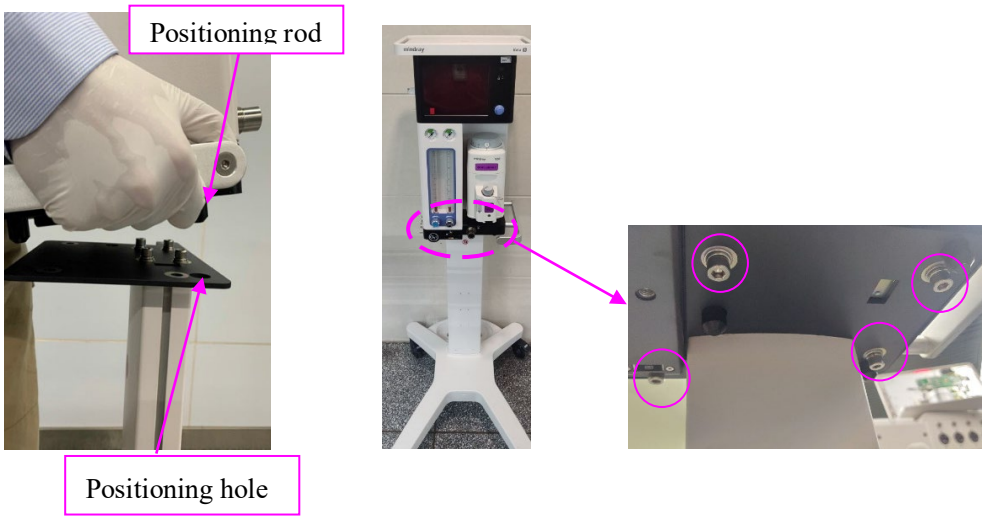
1. Cut off the white packing strap on the packing box. Open the packing box of Veta 5 and take out the foam, as shown in Figure A.

Figure A

2. Lock the four casters of the trolley. Take the main unit of Veta 5 out of the package, align the three positioning rods at the bottom of the main unit with the three positioning holes on the trolley, and then place the main unit on the trolley, as shown in Figure A

and Figure B. Use an Allen wrench to fasten the main unit to the trolley by using four M8×25 stainless steel hexagon socket combination screws, as shown in Figure C.

Figure A Figure B Figure C



2.2.4 Installing the Circuit of Veta 5

1. Install the circuit of Veta 5 in place through two stop pins on the main unit (as shown in Figure A) and keep the circuit closely attached to the bracket of the main unit (as shown in Figure B).
2. Use three M8×25 stainless steel hexagon socket combination screws to fasten the circuit assembly (Veta 5) to the main unit and insert the microswitch cable plug into the wiring groove, as shown in Figure C.
3. Turn the CO2 absorber canister counterclockwise to install it in place, as shown in Figure D.

Figure A Figure B

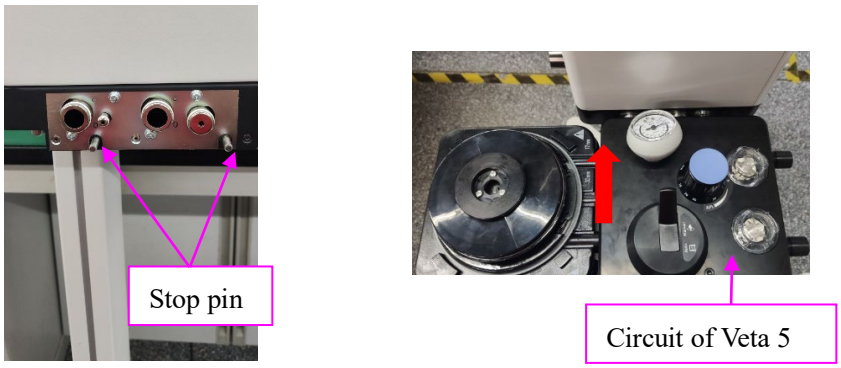
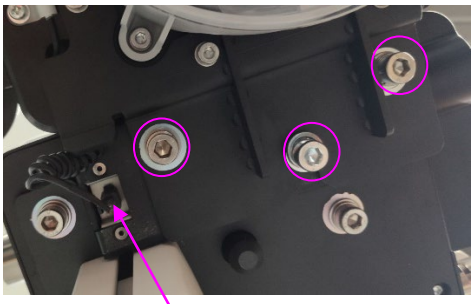
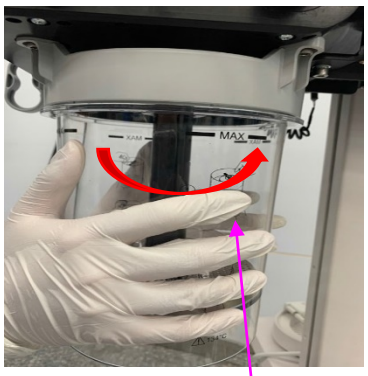


Figure C



Microswitch cable plug

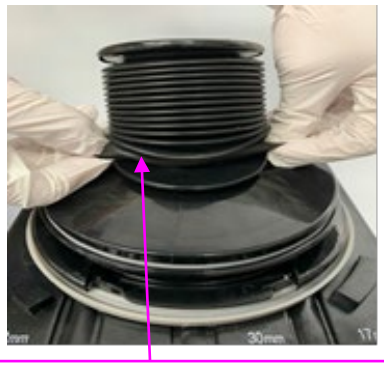
Figure D



CO2 absorber canister

4. Nest the last ring of the bellows assembly to the edge of the pop-off cover plate of the upper cover assembly. Perform this operation gently to avoid tearing the bellows. See Figure E. Install the bellows housing on the upper cover assembly, and screw the stop rib on the bellows housing into the slot of the upper cover assembly, as shown in Figure F.

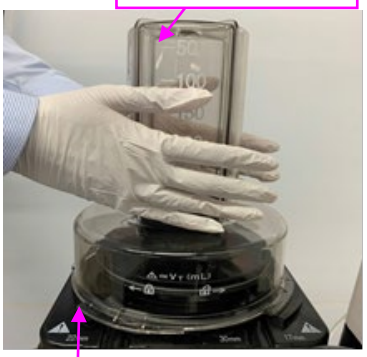
Figure E



Nest the last ring of the bellows to the edge of the pop-off cover plate.

Figure F

Bellows housing



Stop rib

5. Use one M4×12 combination screw to fasten the snap hook to the base plate of the main unit and then insert an Allen wrench into the snap hook. The position is shown in Figure G and Figure H.

Figure G

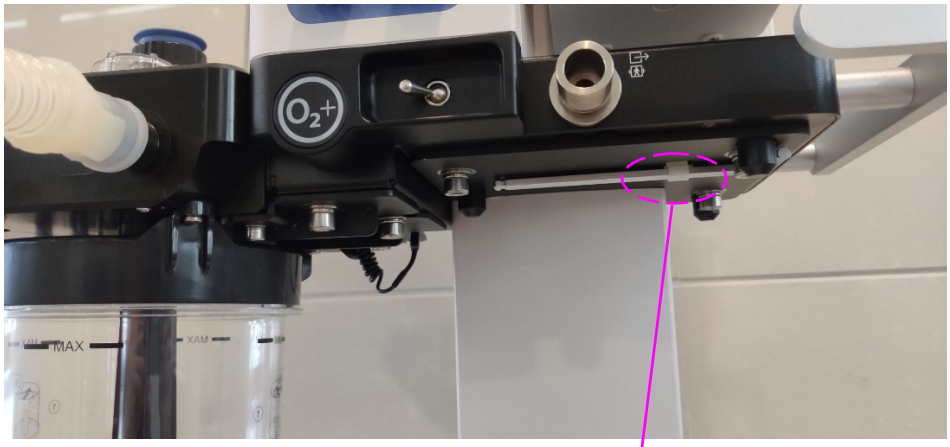
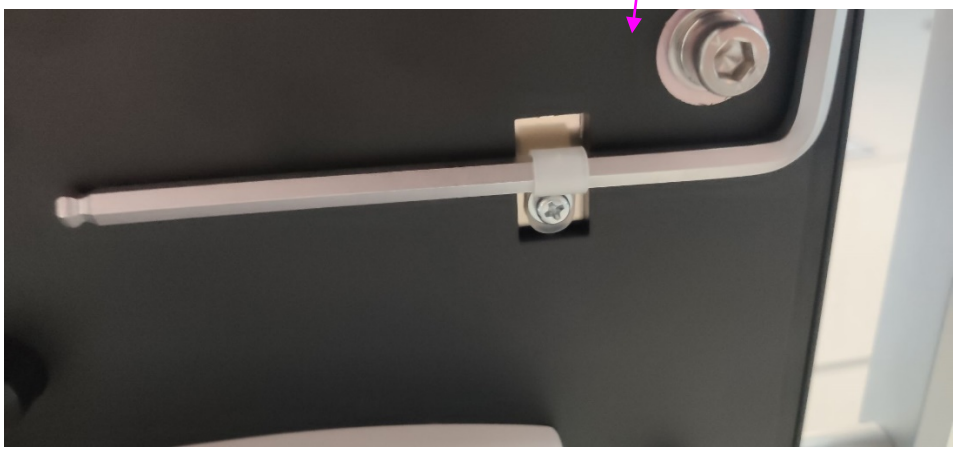


Figure H



2.2.5 Installing the Basket

The basket can be installed in two positions. Select an appropriate position for installation based on your actual need.

1. Hang the basket to the armrest, as shown in Figure A.
2. Use a Phillips screwdriver to install the basket to the trolley column by using four M4×12 cross head combination screws. The installation height of the basket can be adjusted based on actual needs, as shown in Figure B.

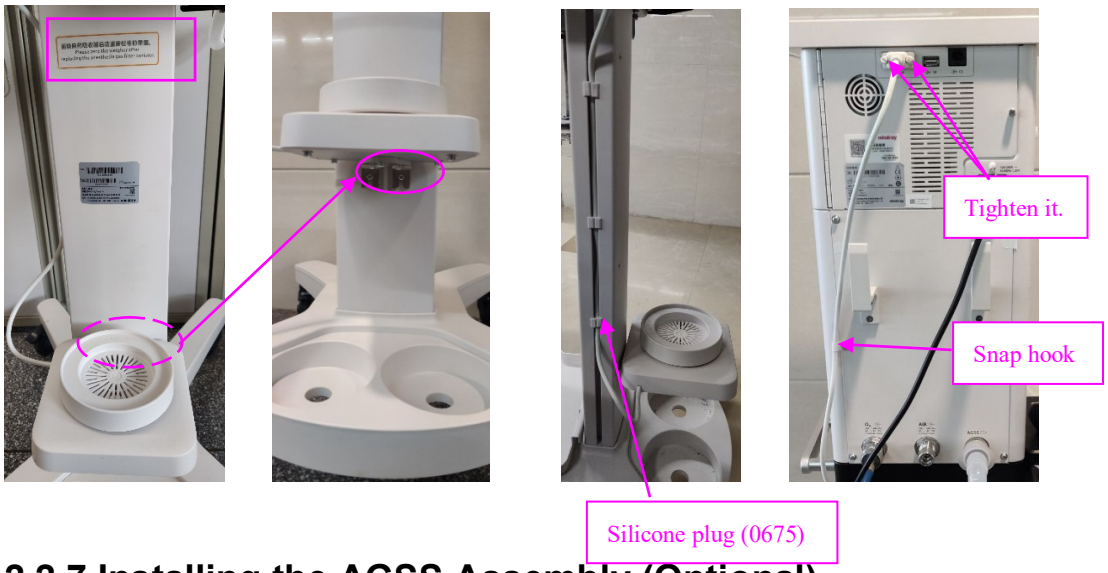
Figure A

Figure B

2.2.6 Installing the Electronic Scale (Optional)

1. Attach the zeroing reminder label of the 0675 anesthetic agent canister weigher to the back of the trolley column, as shown in the box in Figure A.
2. Use a Phillips screwdriver to install the electronic scale to the trolley column by using two M4×12 combination screws, as shown in Figure A and Figure B.
3. Install three silicone plugs (0675) on the cable and then insert them together into the gap on the side of the trolley column. Adjust the spacing and cable, as shown in Figure C.
4. Thread the cable of the electronic scale through the snap hook and fasten the snap hook to the second screw hole on the left, as shown in Figure D.
5. Insert the plug of the electronic scale into the socket of the ventilator and tighten the plug, as shown in Figure D.

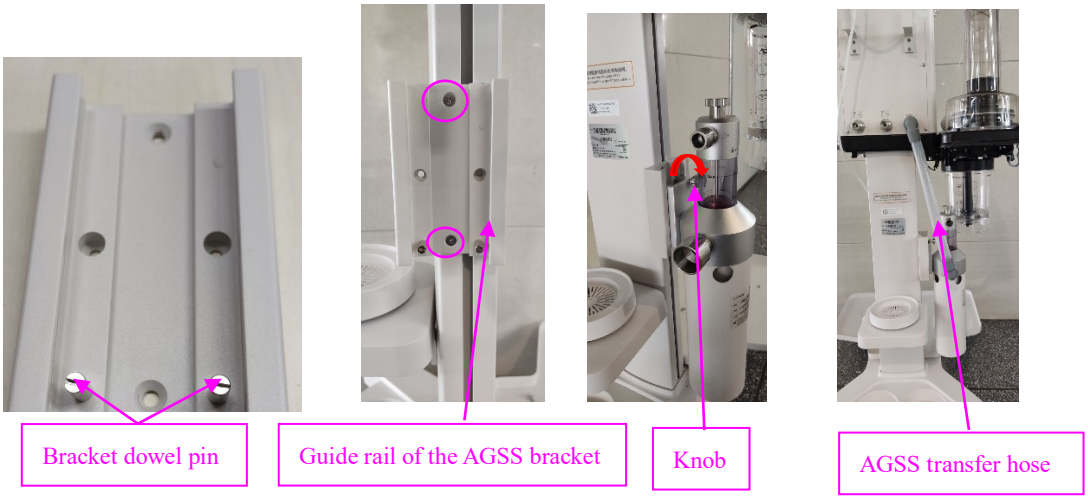
Figure A Figure B Figure C Figure D



2.2.7 Installing the AGSS Assembly (Optional)

1. Install two bracket dowel pins on the guide rail of the AGSS bracket, as shown in Figure A.
2. Use two M4×12 countersunk head screws to install the guide rail of the AGSS bracket on the left plate of the trolley column, as shown in Figure B.
3. Put the AGSS assembly on the AGSS bracket guide rail on the side plate of the trolley along the guide rail slot and tighten the knob, as shown in Figure C.
4. Install the AGSS transfer hoses at the exhaust gas outlet of the main unit and the AGSS assembly outlet, as shown in Figure D.

Figure A Figure B Figure C Figure D



2.2.8 Installing the Oxygen Generator Tray (Optional)

1. Use two M4×12 cross head combination screws to fasten the oxygen generator tray assembly to the column.
2. Place the fixing plate of the oxygen generator tray from the bottom of the tray (the direction of the threaded holes is the same as that of the tray holes, as shown in Figure B), as shown in Figure C.
3. Use four M4×12 cross head combination screws to fasten the fixing plate to the oxygen generator tray assembly.

Figure A

Figure B

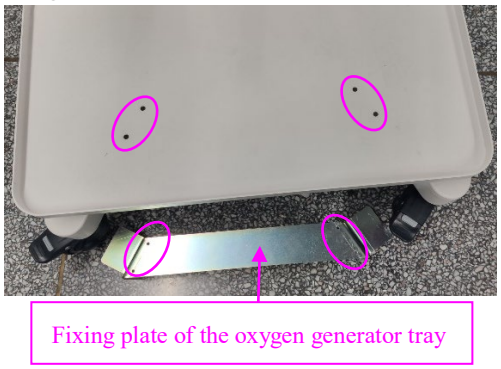


Figure C

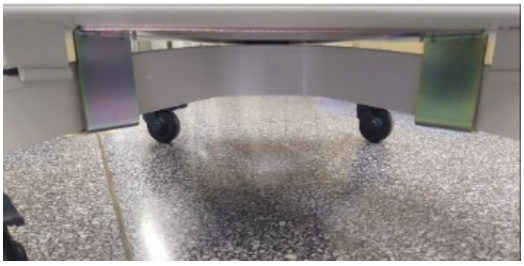


Figure D

NOTE

- **The anesthesia system must be electrified (using AC rather than the battery) before the ventilation test is performed.**

2.2.9 Post-installation Testing (Veta 5)

See *7.1 Power-on Self-Test (Veta 5)* and *7.2 Breathing System Leak Test* for details.

2.3 Installation Steps of Veta 3

NOTE

- **When unpacking the equipment, keep the plastic covering on the equipment. After taking out all the parts, put the packing materials into the original packing box and small boxes into large boxes.**

2.3.1 Check Before Installation

Upon receipt of Veta 3, check the packing box for any damage immediately.

a. If the packing box is not damaged and the two anti-tilt labels on the outside of the packing box are in good condition, sign and date the bill of lading or air waybill to acknowledge that the anesthesia machine has been received safely.

b. If the packing box is damaged, accept the equipment conditionally and clearly state the damage on the bill of lading or air waybill. Both the carrier and consignee must sign and date the bill of lading or air waybill. Keep all the damaged packages till Mindray gives further explanation. The consignee should contact Mindray Customer Service Department immediately.

2.3.2 Installing the Trolley

1. Cut, remove, and discard the white packing strap on the packing box. Open the trolley packing box, as shown in Figure A and Figure B.

Figure A

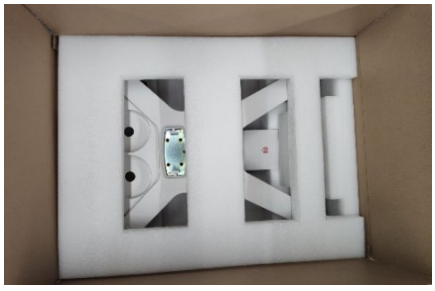


Figure B

2. Take out the base plate of trolley and then insert the trolley column into the base plate of the trolley. Pay attention to the direction and keep the trolley label side on the back side of the base plate, as shown in Figure C.

3. Put down the trolley (with two long legs touching the ground) and use an Allen wrench provided in the packing box to tighten the four M8×25 stainless steel hexagon socket combination screws, as shown in Figure D.

Figure C

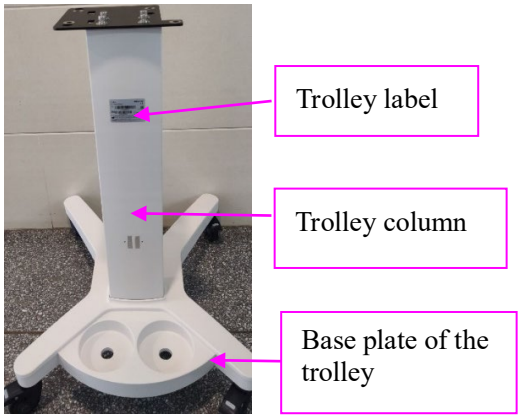


Figure D

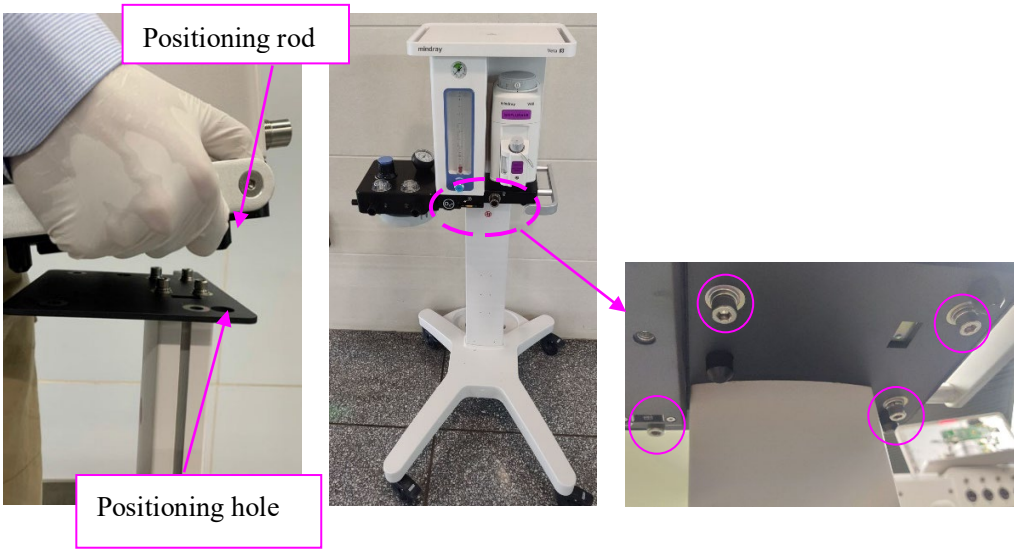
2.3.3 Installing the Main Unit of Veta 3

1. Cut off the white packing strap on the packing box. Open the packing box of Veta 3 and take out the foam, as shown in Figure A.

Figure A

2. Lock the four casters of the trolley. Take the main unit out of the package, align the three positioning rods at the bottom of the main unit with the three positioning holes on the trolley, and then place the main unit on the trolley, as shown in Figure A and Figure B. Use an Allen wrench to fasten the main unit to the trolley by using four M8×25 stainless steel hexagon socket combination screws, as shown in Figure C.

Figure A Figure B Figure C



3. Use one M4×12 combination screw to fasten the snap hook to the base plate of the main unit and then insert an Allen wrench into the snap hook. The position is shown in Figure E and Figure F.

Figure E

Figure F

2.3.4 Installing the CO2 Absorber Canister

1. Turn the CO2 absorber canister counterclockwise to install it in place, as shown in Figure A and Figure B.

Figure A

Figure B

CO2 absorber canister

2.3.5 Installing the Basket

The basket can be installed in two positions. Select an appropriate position for installation based on your actual need.

1. Hang the basket to the armrest, as shown in Figure A.
2. Use a Phillips screwdriver to install the basket to the trolley column by using four M4×12 cross head combination screws. The installation height of the basket can be adjusted based on actual needs, as shown in Figure B.

Figure A

Figure B

2.3.6 Installing the Tray

1. Use two M4×12 combination screws to fasten the tray to the back side of the trolley column, as shown in Figure A and Figure B.

Figure A

Figure B

2.3.7 Installing the AGSS Assembly (Optional)

1. Install two bracket dowel pins on the guide rail of the AGSS bracket, as shown in Figure A.
2. Use two M4×12 countersunk head screws to install the guide rail of the AGSS bracket on the left plate of the trolley column, as shown in Figure B.
3. Put the AGSS assembly on the AGSS bracket guide rail on the side plate of the trolley along the guide rail slot and tighten the knob, as shown in Figure C.
4. Install the AGSS transfer hoses at the exhaust gas outlet of the main unit and the AGSS assembly outlet, as shown in Figure D.

Figure A

Figure B

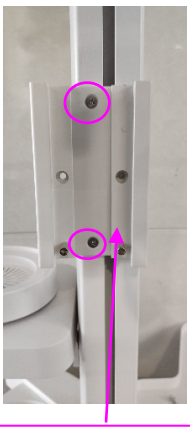


Figure C

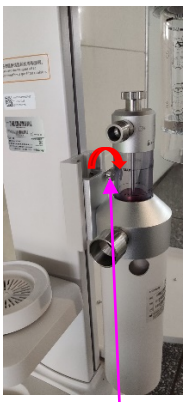


Figure D

2.3.8 Installing the Oxygen Generator Tray (Optional)

1. Use two M4×12 cross head combination screws to fasten the oxygen generator tray assembly to the column.
2. Place the fixing plate of the oxygen generator tray from the bottom of the tray (the direction of the threaded holes is the same as that of the tray holes, as shown in Figure B), as shown in Figure C.

3. Use four M4×12 cross head combination screws to fasten the fixing plate to the oxygen generator tray assembly.

Figure A

Figure B

Figure C

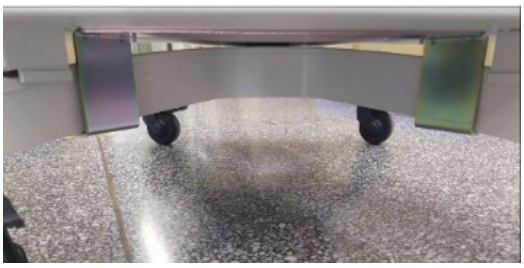
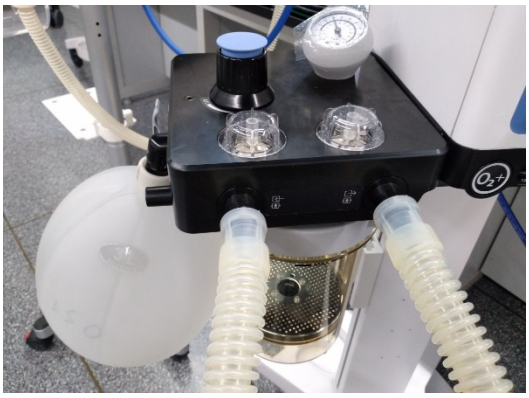


Figure D

2.3.9 Post-installation Selftest (Veta 3)



1. As shown in the figure, install the manual bag and use a corrugated hose to connect the inspiratory port to expiratory port.
2. Adjust the APL valve to the maximum 70 cmH2O.
3. Hold down the O2 flush button to inflate the manual bag till the reading of the pressure gauge reaches 30 cmH2O.
4. Press the bag manually till the gauge reading reaches 40 cmH2O. Then, release the bag and press the bag six times repeatedly.
5. After releasing the bag, check that the reading of the pressure gauge is not lower than 25 cmH2O.

6. Adjust the APL valve to the minimum level. The bag is deflated and becomes smaller, and the reading of the pressure gauge should be smaller than 5 cmH2O.

3 Equipment Maintenance

3.1 Overview

3.1.1 Precautions for Maintenance

- **When it comes to testing and maintaining the equipment, make sure that the animal is disconnected from the equipment.**
- **The equipment may have been used on animals carrying infectious diseases. Before testing or maintaining the equipment, wear sterile rubber gloves to reduce the risk of infection.**
- **When the equipment to be maintained has blood or other secretion, clean, disinfect, and sterilize the equipment by strictly following the control and safe handling procedures for infectious diseases.**

3.1.2 Maintenance Principles

Conduct physical inspection, consumable replacement, and performance inspection regularly at the interval specified in this chapter. The manufacturer shall not be liable for component damage or loss caused by the failure to replace consumables at the recommended interval.

3.2 Maintenance Periods

Periodical service kit: Basic service kit (Veta 3), P/N: 115-077057-00
Periodical service kit: Basic service kit (Veta 5), P/N: 115-075329-00

3.3 Appearance Check

1. Check that the equipment is in good condition.
2. Check that the breathing circuit and canister are connected correctly.
3. Check that there is an appropriate amount of anesthetic agent in the vaporizer.
4. Check that the AGSS transfer hose is not damaged. Empty water.
5. Check that the AC power cable is not damaged.

3.4 Components Contained in the Service Kit and Description

To ensure the long-term reliability and stability of the anesthesia machine, authorized professional service personnel must be required to periodically maintain the anesthesia machine and replace components.

NOTE

- **The schedule provides the minimum intervals based on typical usage of 2000 hours per year. The equipment should be maintained more frequently if it is used longer than the typical duration every year.**
- **After the parts that need to be replaced are due, they must be replaced with new ones even if they are not worn or damaged, to prevent equipment damage or personal injury.**

■ Replaceable Parts

The replaceable parts vary with the machine configuration. The following replaceable parts are described in terms of Veta 3 and Veta 5.

Codes of basic service kits:

115-077057-00 Basic service kit (Veta 3)

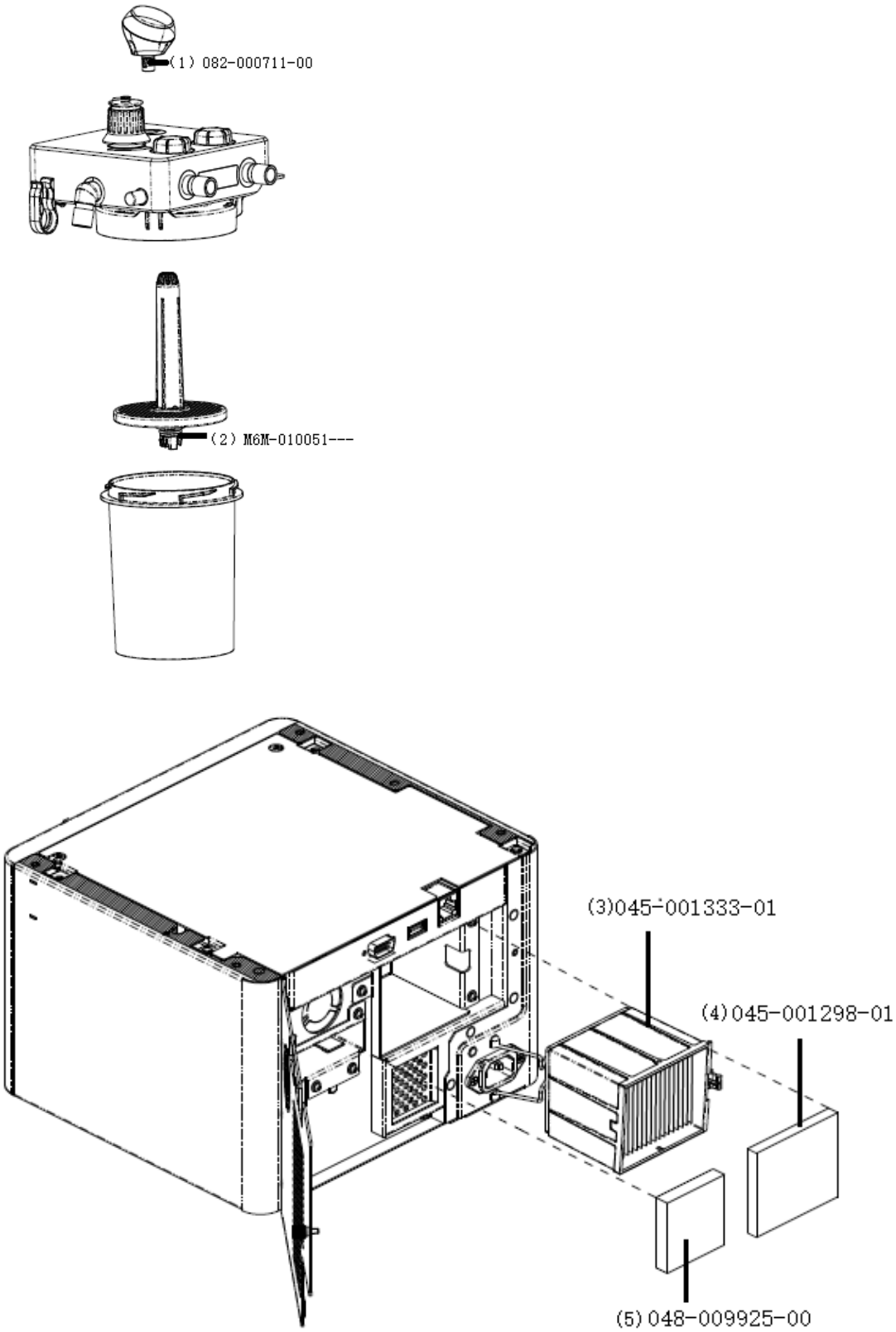
115-075329-00 Basic service kit (Veta 5)

For Veta 3, replace parts regularly according to the following list of the 115-077057-00 basic service kit.

No.	Material Code	Description	Quantity	Purpose	Remarks
1	082-000711-00	O-ring 10×1.8 Viton A70	1	For sealing the airway pressure gauge	Veta 3
2	M6M-010051---	O-ring 18×2.5 Viton, brown, A50	1	For sealing the soda lime tank assembly	Veta 3

For Veta 5, replace parts regularly according to the following list of the 115-075329-00 basic service kit.

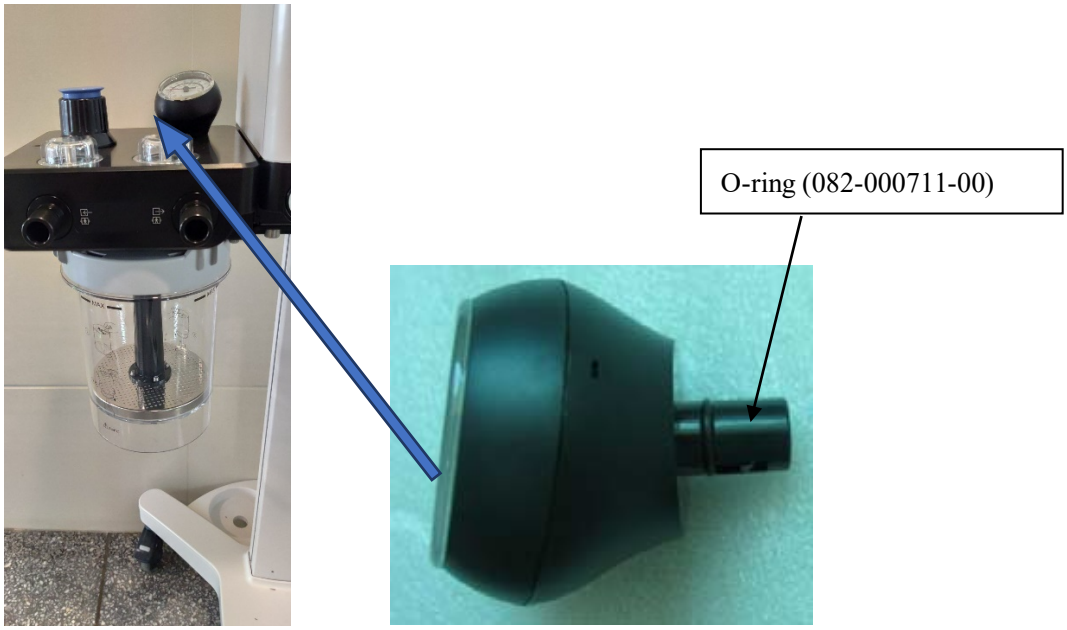
No.	Material Code	Description	Quantity	Purpose	Remarks
1	082-000711-00	O-ring 10×1.8 Viton A70	1	For sealing the airway pressure gauge	Veta 5
2	M6M-010051---	O-ring 18×2.5 Viton, brown, A50	1	For sealing the soda lime tank assembly	Veta 5
3	045-001333-01	HEPA filter	1	For filtering air	Veta 5
4	045-001298-01	Air inlet dust screen	1	For filtering air	Veta 5
5	048-009925-00	Dust screen (0675)	1	For filtering air	Veta 5


(1) 082-000711-00
(2) M6M-010051---
(3)045-001333-01
(4)045-001298-01
(5)048-009925-00

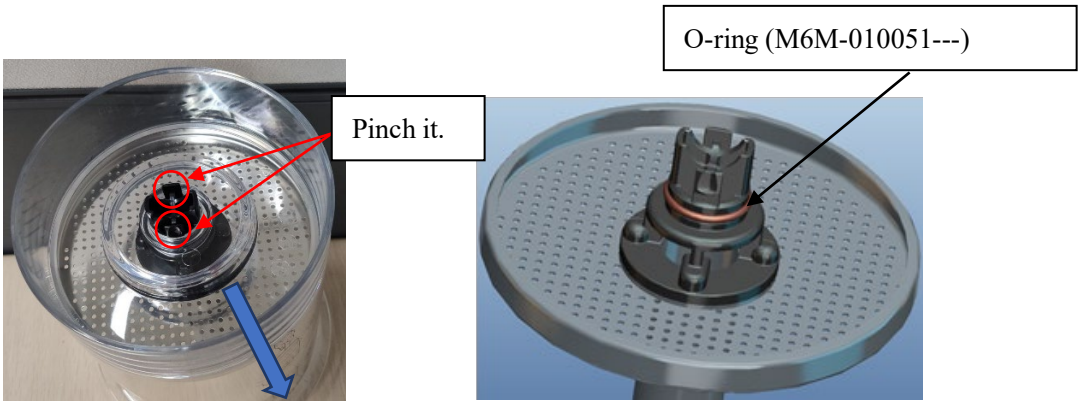
3.4.1.1 Parts Replacement

- Veta 3

1. Pull out the airway pressure gauge and replace the O-ring (082-000711-00) in the airway pressure gauge.

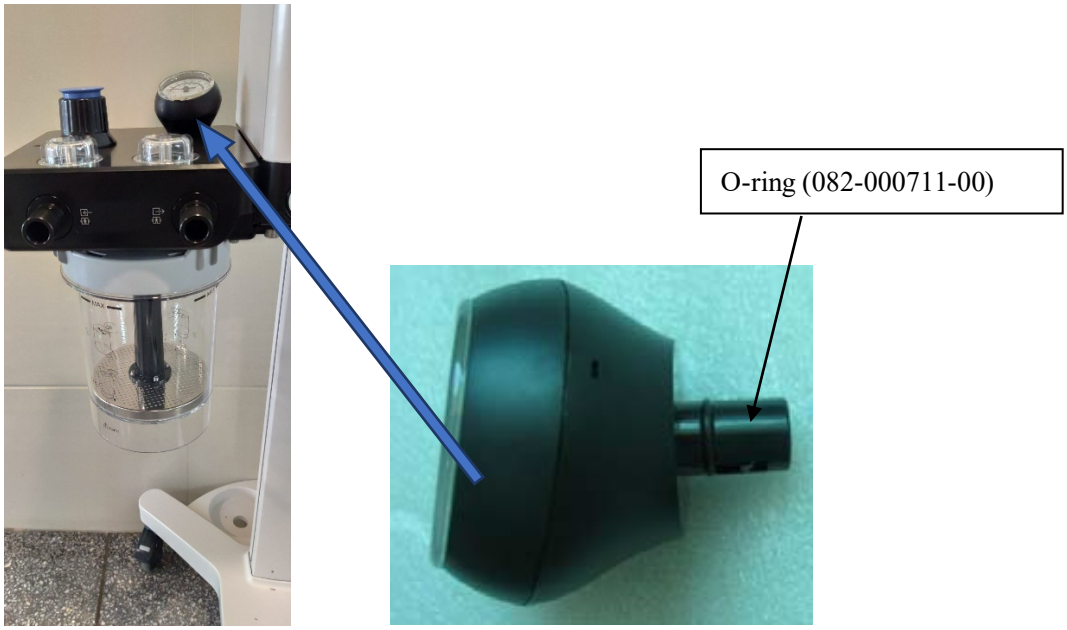


2. Replace the O-ring (M6M-010051---) of the support bracket of the CO2 absorber canister.
3. Remove the soda lime tank.
4. Pinch the fastening snap hook at the bottom of the soda lime tank and pull out the support bracket of the soda lime tank downward.
5. Replace the O-ring.

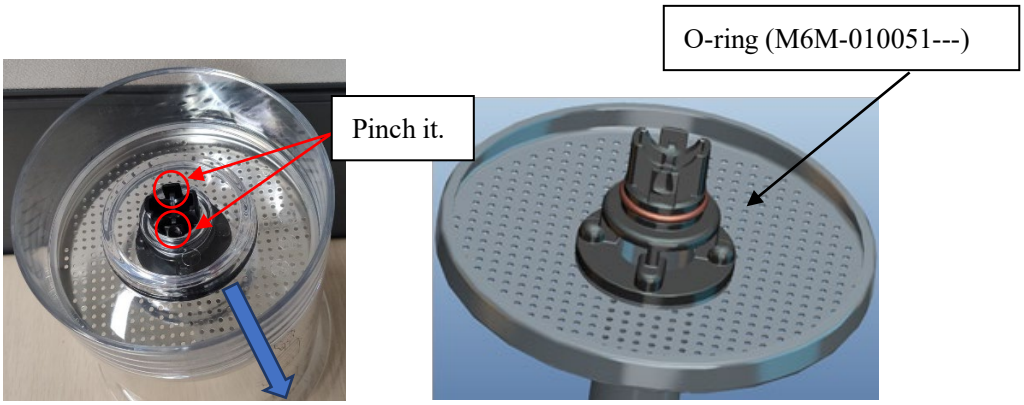


■ Veta 5

1. Pull out the airway pressure gauge and replace the O-ring (082-000711-00) in the airway pressure gauge.

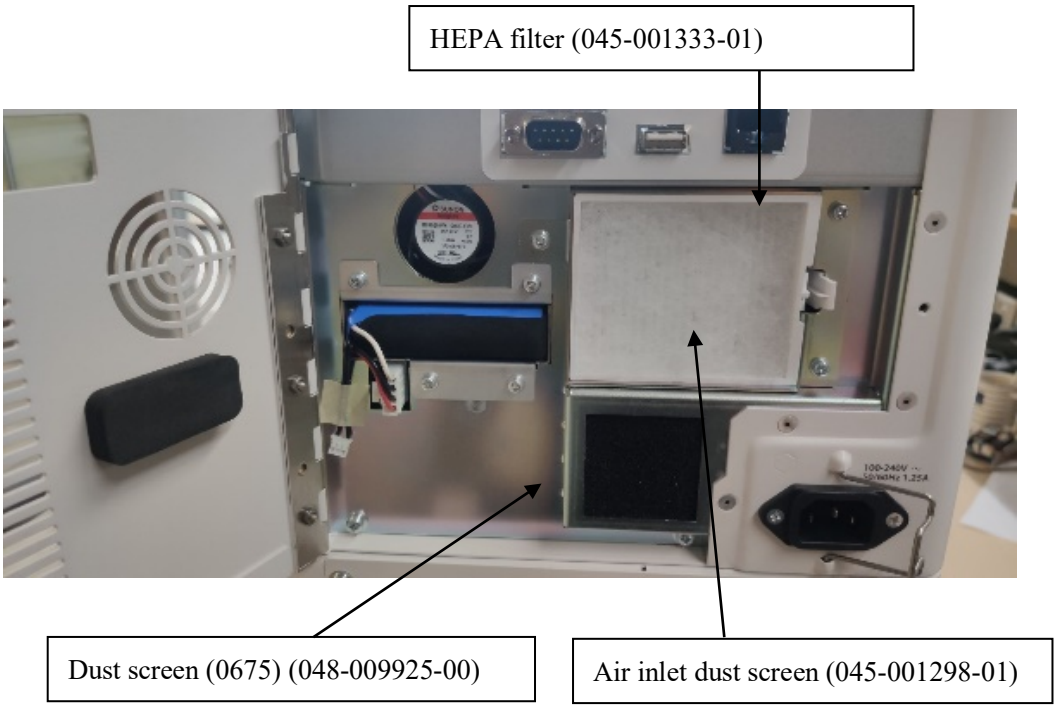


2. Replace the O-ring (M6M-010051---) of the support bracket of the CO2 absorber canister.
3. Remove the soda lime tank.
4. Pinch the fastening snap hook at the bottom of the soda lime tank and pull out the support bracket of the soda lime tank downward.
5. Replace the O-ring.



6. Open the access door of the ventilator.
7. Replace the air inlet dust screen (045-001298-01).
8. Replace the HEPA filter (045-001333-01).

9. Replace the dust screen (0675) (048-009925-00).



3.5 Post-Maintenance Tests (Veta 5)

After the anesthesia machine at the customer site are maintained, some routine tests are required to check whether the machine functions properly. The following table lists the routine tests.

No.	Test Item	Function Description	Test Interval
1	Breathing system leak test in mechanical ventilation mode	Test whether the mechanical ventilation airway leaks and whether the connection joints are airtight.	After each maintenance
2	Breathing system leak test in manual ventilation mode	Test whether the manual ventilation airway leaks and whether the connection joints are airtight.	After each maintenance
3	Mechanical ventilation state test	1. Check whether the machine provides normal mechanical ventilation and whether an alarm is triggered. 2. Check whether the measured pressure or tidal volume values are consistent with the preset values. 3. Check whether the pressure measured by the pressure sensor on the machine is consistent with the reading of the airway pressure gauge, and whether the tidal volume measured by the flow meter is consistent with the bellows graduation. 4. Roughly judge whether there is serious	After each maintenance

		leakage on the breathing system by checking the amount of the fresh gas supplement and whether the bellows collapses.	
4	Sensor zero check	Check whether the zero of each sensor is within the normal range.	After each maintenance
5	Accuracy test on the bidirectional flow sensor	Test the accuracy of the bidirectional flow sensor.	After each maintenance
6	Accuracy test on the fresh gas differential pressure sensor	Test the accuracy of the fresh gas differential pressure sensor.	After each maintenance
7	Pressure sensor accuracy test	Test the accuracy of the pressure sensor.	After each maintenance
8	Electronic scale accuracy test	Test the accuracy of the electronic scale.	After each maintenance

3.5.1 Breathing System Leak Test in Mechanical Ventilation Mode

The test item aims to test whether the mechanical ventilation airway leaks (including the bellows, drive gas airway, soda lime tank, patient tube, flow sensor, and other components) and whether the connection joints are airtight.

For detailed operation steps and precautions of this test item, see *7.2 Breathing System Leak Test* and complete the auto circuit leak test by following the guidance on screen.

3.5.2 Breathing System Leak Test in Manual Ventilation Mode

The test item aims to test whether the manual ventilation airway leaks (including the APL valve, one-way valve, soda lime tank, patient tube, and other components) and whether the connection joints are airtight.

For detailed operation steps and precautions of this test item, see *7.2 Breathing System Leak Test* and complete the manual circuit leak test by following the guidance on screen.

3.5.3 Mechanical Ventilation State Test

The main function of the anesthesia machine is to provide patients with breathing support in line with doctors' settings — mechanical ventilation. The test in this section aims to ensure that the machine is capable of providing proper mechanical ventilation. It can help judge whether the anesthesia machine functions properly.

This test is used to comprehensively determine whether the machine functions properly by:

Checking whether the pressure measured by the pressure sensor on the machine is consistent with the reading of the airway pressure gauge;

Checking whether the measured tidal volume is consistent with the bellows graduation;

Checking whether measured values are consistent with preset values;

Testing whether the machine works properly and whether alarms are generated;
Roughly judging whether there is serious leakage on the breathing system by checking the amount of the fresh gas supplement and whether the bellows collapses.

3.5.3.1 Volume Control Ventilation Test

Volume control ventilation (VCV) is the standard ventilation mode of this anesthesia machine and the basic mechanical ventilation mode.

This test item aims to test whether the anesthesia machine can provide VCV properly, including whether the control, feedback, and measurement of the tidal volume are normal, whether the airway pressure sensor and airway pressure gauge perform measurement properly, whether the bellows assembly works properly, whether the bellows graduation is normal, whether there is obvious leakage on the machine, whether the fresh gas supplement is normal, and whether the machine reports a ventilation failure alarm and other alarms.

Follow the operations below to perform the VCV test:

1. Ensure that the gas supply pressure is normal and the tubes in the breathing circuit are correctly connected for mechanical ventilation. Connect the Y-piece of the patient circuit to a 2 L bag, use the bag as a simulated lung, and use the 1500 mL bellows.
2. Ensure that the auto/manual switch is turned to the auto position.
3. Set the ventilation mode to VCV mode.
4. Adjust the total fresh gas amount to 0.5 L/min.
5. Press the O2 flush button so that the bellows and bag are full of gas.
6. Set alarm limits: Set the high alarm limits of MV, PEAK, Vt, and RR to maximum values, low alarm limits to minimum values or Off.
7. Set the following tidal volume (TV) and breath frequency (Rate) combinations separately: (300 mL, 15 bpm), (600 mL, 15 bpm), (900 mL, 15 bpm), and (1200 mL, 15 bpm). Use default settings for other parameters and record the displayed tidal volume, peak pressure, peak airway pressure gauge reading in the stable state under each combination.
8. Judge whether the above measured data meets the following conditions:
   - The tidal volume control and measurement are normal: The displayed tidal volume value should be the tidal volume set value × (1±10%) mL.
   - The circuit leakage is within the acceptable range: The bellows can reach the top of the bellows housing each time and the minimum drop graduation is approximate to the tidal volume set value each time.
   - The pressure is measured properly. The PEAK value should be close to the peak airway gauge reading and should not exceed 2 cmH2O.
   - No other ventilation failure occurs: The pressure and flow waveforms are displayed normally without abnormality and no technical alarm occurs.
   - If the above test requirements are not met, perform subsequent tests and do the test again. If any error occurs during the VCV test, troubleshoot the fault based on the abnormality and then perform the test again until the system passes the test.

3.5.3.2 Pressure Control Ventilation Test

Pressure Control Ventilation (PCV) is one of the basic mechanical ventilation modes of this anesthesia machine. The configuration in this mode varies with users and models. If this mode is not configured on the anesthesia machine under test, skip this test.

This test item aims to test whether the anesthesia machine can provide PCV properly, including whether the control, feedback, and measurement of the pressure are normal, whether the tidal volume and bellows graduation are measured normally, whether the bellows assembly works properly, whether there is obvious leakage on the machine, whether the fresh gas supplement is normal, and whether the machine reports a ventilation failure alarm and other alarms.

Follow the operations below to perform the PCV test:

1. Ensure that the gas supply pressure is normal and the tubes in the breathing circuit are correctly connected for mechanical ventilation. Connect the Y-piece of the patient circuit to a 2 L bag and use the bag as a simulated lung.
2. Ensure that the auto/manual switch is turned to the auto position.
3. Set the ventilation mode to PCV mode.
4. Adjust the total fresh gas amount to 0.5 L/min.
5. Set the following combinations of inspiratory pressure, breath frequency, and Positive End Expiratory Pressure (PEEP) separately: (10 cmH2O, 15 bpm, OFF), (15 cmH2O, 12 bpm, 5 cmH2O), (20 cmH2O, 10 bpm, 8 cmH2O). Use default settings for other parameters and record the displayed peak pressure, PEEP, maximum airway pressure gauge reading, and minimum airway pressure gauge reading in the stable state under each combination.
6. Judge whether the above measured data meets the following conditions:
   - Pressure control and measurement are normal: The displayed peak pressure should be within ±2 cmH2O of the inspiratory pressure set value.
   - The circuit leakage is within the acceptable range: The bellows can reach the top of the bellows housing each time.
   - The pressure measurement is normal: In one breathing cycle, the peak pressure should be close to the maximum airway pressure gauge reading (the deviation is not more than 2cmH2O), and the displayed PEEP should be close to the minimum airway pressure gauge reading (the deviation is not more than 2cmH2O).
   - No other ventilation failure occurs: The pressure and flow waveforms are displayed normally without abnormality and no technical alarm occurs.

If the above test requirements are not met, perform subsequent tests and do the test again. If any error occurs during PCV test, perform subsequent tests and maintenance based on the abnormality and then perform the test again until the system passes the test.

3.5.4 Sensor Zero Check

This test item aims to test whether the zero of each sensor is within the normal range. For detailed operation steps and precautions, see *7.15.1 Sensor Zero Check*.

3.5.5 Flow Sensor Accuracy Test

This test item aims to test the accuracy of the fresh gas flow sensor. For detailed operation steps and precautions, see *7.15.2 Flow Sensor Accuracy Test*.

3.5.6 Pressure Sensor Accuracy Test

This test item aims to test the accuracy of the pressure sensor. For detailed operation steps and precautions, see *7.15.3 Pressure Sensor Accuracy Test*.

3.5.7 Electronic Scale Accuracy Test

Place a 500 g weight in the middle of the weigher, go to the **Data Monitors**, tab **VCM**, and check whether the actual value of **AA Weight** is within the range of 490 g to 510 g.

3.6 Post-Maintenance Tests (Veta 3)

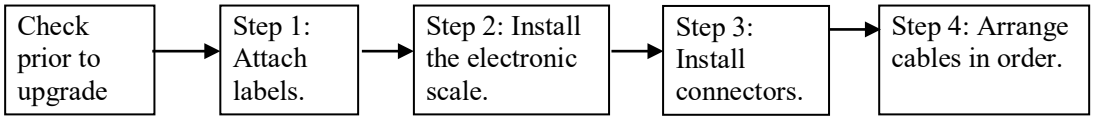
See *2.3.9 Post-installation Testing (Veta 3)*.

4 Function Upgrade

4.1 Hardware Upgrade

4.1.1 Upgrading the Electronic Scale

4.1.1.1 Block Diagram of Assembly Installation Sequence



4.1.1.2 Check Prior to Upgrade

Required tools

Phillips screwdriver

Materials required for upgrade

No.	Code	Description	Quantity	Remarks
1	115-076000-00	Electronic scale material package (0675)	1	This function can be upgraded only for Veta 5.

Check items

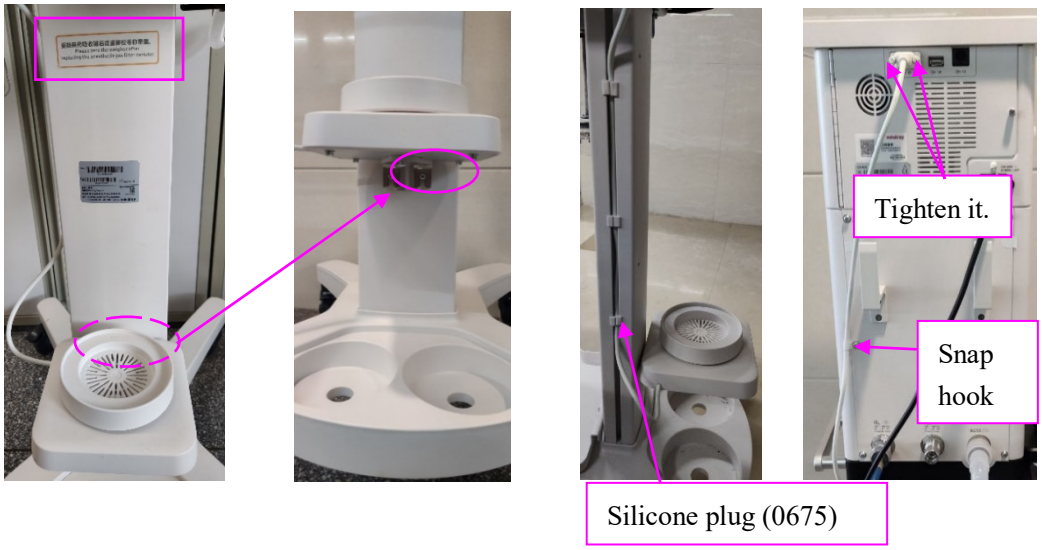
- Check whether the packing list of materials required for upgrade is consistent with the material codes and quantity.
- Check whether all required upgrade tools are ready.

4.1.1.3 Upgrading the Electronic Scale Module

1. Attach the zeroing reminder label of the 0675 anesthetic agent canister weigher to the back of the trolley column, as shown in the box in Figure A.
2. Use a Phillips screwdriver to install the electronic scale to the trolley column by using two M4×12 combination screws, as shown in Figure A and Figure B.
3. Install three silicone plugs (0675) on the cable and then insert them together into the gap on the side of the trolley column. Adjust the spacing and cable, as shown in Figure C.
4. Thread the cable of the electronic scale through the snap hook and fasten the snap hook to the second screw hole on the left, as shown in Figure D.

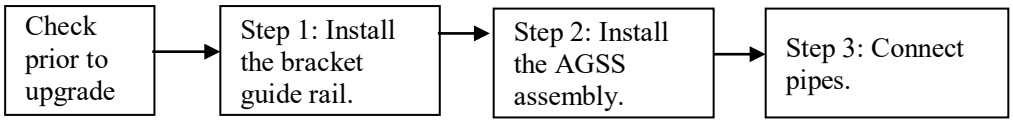
5. Insert the plug of the electronic scale into the socket of the ventilator and tighten the plug, as shown in Figure D.

Figure A Figure B Figure C Figure D



4.1.2 Upgrading the AGSS Assembly

4.1.2.1 Block Diagram of Assembly Installation Sequence



4.1.2.2 Check Prior to Upgrade

Required tools

Phillips screwdriver, flat head screwdriver

Materials required for upgrade

No.	Code	Description	Quantity	Remarks
1	115-076015-00	AGSS material package (high flow/for the market in China/0675)	1	/
2	115-076017-00	AGSS material package (low flow/for the market in China/0675)	1	

Check items

- Check whether the packing list of materials required for upgrade is consistent with the material codes and quantity.
- Check whether all required upgrade tools are ready.

4.1.2.3 Installing the AGSS Assembly

1. Install two bracket dowel pins on the guide rail of the AGSS bracket, as shown in Figure A.
2. Use two M4×12 countersunk head screws to install the guide rail of the AGSS bracket on the left plate of the trolley column, as shown in Figure B.

3. Put the AGSS assembly on the AGSS bracket guide rail on the side plate of the trolley along the guide rail slot and tighten the knob, as shown in Figure C.
4. Install the AGSS transfer hoses at the exhaust gas outlet of the main unit and the AGSS assembly outlet, as shown in Figure D.

Figure A

Figure B

Figure C

Figure D

Bracket dowel pin

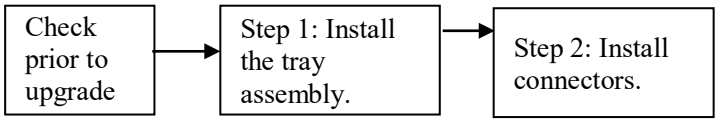
Guide rail of the AGSS bracket

Knob

AGSS transfer hose

4.1.3 Upgrading the Oxygen Generator Tray Assembly

4.1.3.1 Block Diagram of Assembly Installation Sequence



4.1.3.2 Check Prior to Upgrade

Required tools

Phillips screwdriver

Materials required for upgrade

No.	Code	Description	Quantity	Remarks
1	115-076055-00	Oxygen generator installation package (NIST/for the market in China)	1	Select an upgrade package based on customer requirements.
2	115-076054-00	Oxygen generator installation package (DISS)	1	
3	115-076053-00	Oxygen generator installation package (NIST)	1	

Check items

- Check whether the packing list of materials required for upgrade is consistent with the material codes and quantity.
- Check whether all required upgrade tools are ready.

4.1.3.3 Installing the Oxygen Generator Tray Assembly

1. Use two M4×12 cross head combination screws to fasten the oxygen generator tray assembly to the column, as shown in the figure.
2. Place the fixing plate of the oxygen generator tray from the bottom of the tray (the direction of the threaded holes is the same as that of the tray holes, as shown in Figure B), as shown in Figure C.
3. Use four M4×12 cross head combination screws to fasten the fixing plate to the oxygen generator tray assembly, as shown in the figure.

Figure A

Figure B

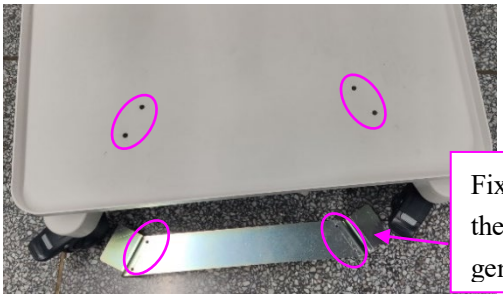


Figure C

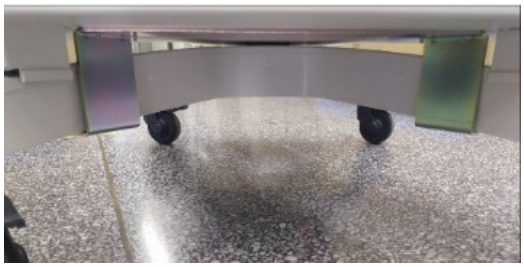


Figure D

4. Pay attention to connectors applicable to different configurations, as shown in Figure E. Screw the oxygen generator connector clockwise into the gas supply inlet assembly, as shown in Figure F.

Figure E

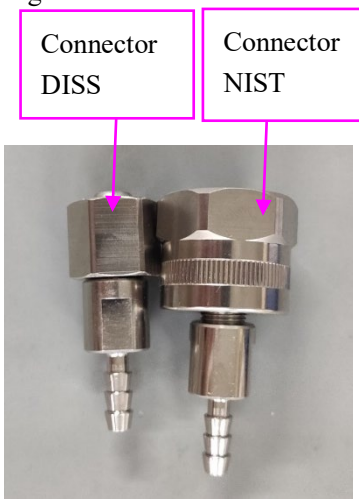
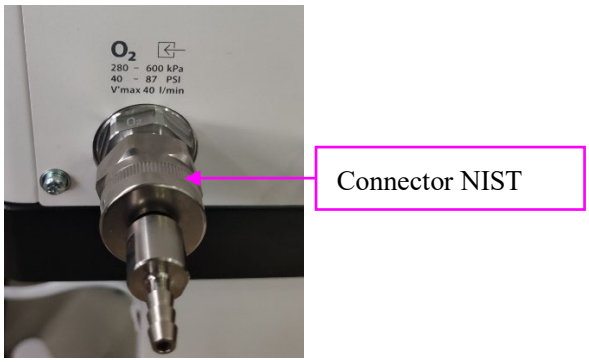
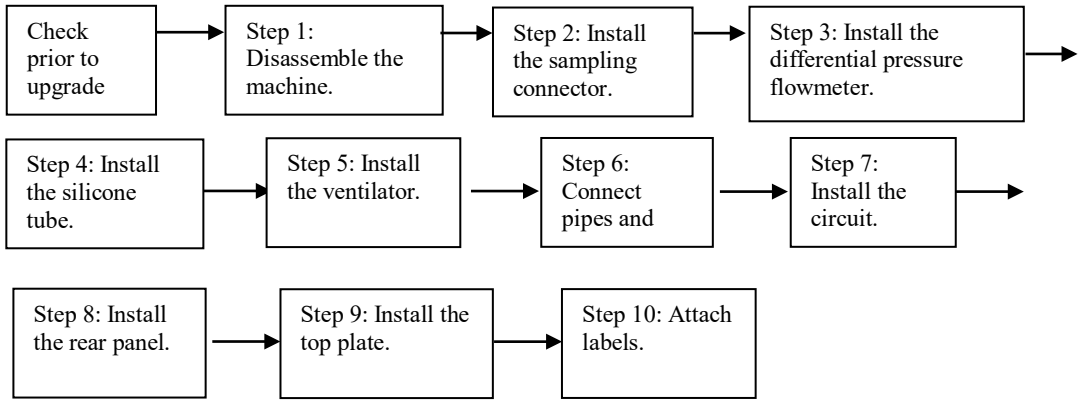


Figure F



4.1.4 Upgrading the Veta 3 Assembly

4.1.4.1 Block Diagram of Assembly Installation Sequence



4.1.4.2 Check Prior to Upgrade

Required tools

Phillips screwdriver, scissors

Materials required for upgrade

No.	Code	Description	Quantity	Remarks
1	082-003245-00	O-ring 17.93×2.46 Viton, A70, white	1	
2	082-003266-00	O-ring 4.7×1.8 Viton A70 white	1	
3	041-044144-00	Pressure sampling connector (0675)	1	
4	041-044133-00	Drive gas connector (0675)	1	
5	042-031636-00	Gas connector fixing plate (0675)	1	
6	M04-051139---	Cross recessed small pan head screw assembly GB/T9074.8 M4×12 zinc electroplating with eco-friendly iridescent yellow chromate conversion coating	7	
7	009-011018-00	Connection cable of Veta 3 using fresh gas and auto/manual control (0675)	1	
8	115-071428-00	Fresh gas flow differential pressure gauge assembly (0675)	1	
9	A21-000007---	Silicone tube, 3/32"×7/32"×100 ft	0.38 m	
10	082-003706-00	Silicone tube, PU (polyether) 6 mm×6 mm transparent	0.5 m	
11	049-002181-00	Three-way connection tube	1	

12	049-002183-00	Drive gas inlet fitting	1	
13	082-002365-00	Silicone tube, outer diameter 25 mm, inner diameter 20 mm	0.504 m	
14	040-001759-00	Throwaway straight connector, 22M/22M	4	
15	115-071475-00	Circuit assembly (Veta 5)	1	
16	115-071609-00	Ventilator (without CO2 module)	1	
17	042-031748-00	Cover plate of the ventilator (0675)	1	
18	M04-051140---	Cross recessed small pan head screw assembly GB/T9074.8 M3×8 zinc electroplating with eco-friendly iridescent yellow chromate conversion coating	3	
19	047-037243-00	Veta 5 label (0675)	1	

Check items

- Check whether the packing list of materials required for upgrade is consistent with the material codes and quantity.
- Check whether all required upgrade tools are ready.

4.1.4.3 Installing the Veta 3 Assembly

1. Disassembling the machine

Perform the following operations described in the Service Manual to remove the covers of Veta 3:

Remove the cover plate from Veta 3 by referring to section *10.1.2 Removing the Top Plate from Veta 3/Veta 5*.

Remove the rear panel assembly from Veta 3 by referring to section *10.1.5 Removing the Rear Panel Assembly from Veta 3*.

Remove the circuit assembly of Veta 3 by referring to section *10.18.2 Removing the Circuit Assembly*.

Pull out the corrugated hose (M6G-020051---) and 25# pipe, as shown in Figure A and Figure B.

Figure A

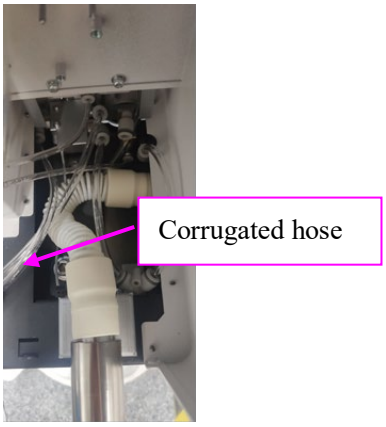
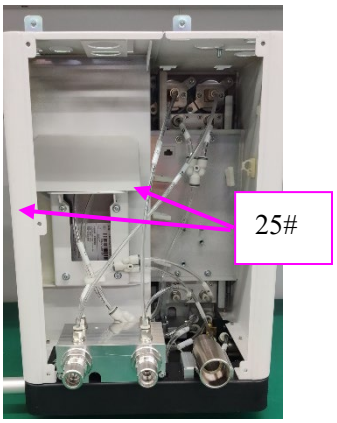


Figure B



2. Installing the sampling connector

a. Install the O-ring (082-003266-00) and O-ring (082-003245-00) in the grooves of the pressure sampling connector (0675) and drive gas connector (0675) respectively, as shown in Figure A.

b. Install the gas connector fixing plate (with the notch downward and pin outward) in the grooves of the pressure sampling connector and drive gas connector, as shown in Figure A.

c. Install the assembled pressure sampling connector and drive gas connector assembly inside the framework of Veta 3, and use two M4×12 combination screws to fasten the assembly to the framework of the main unit, as shown in Figure B.

Figure A

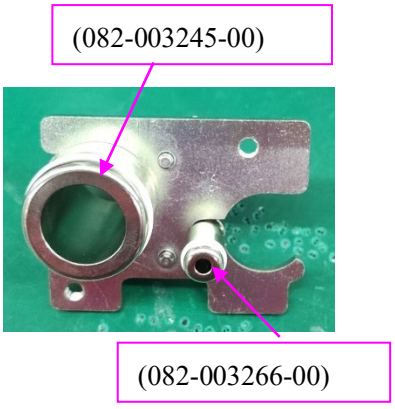
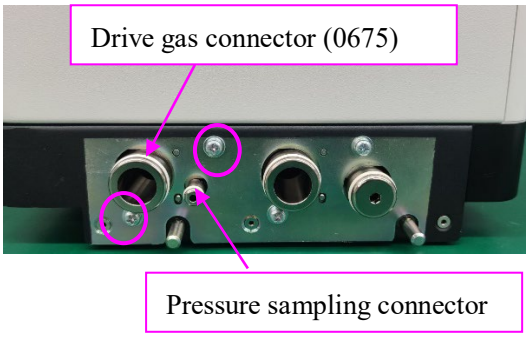


Figure B



3. Installing the differential pressure flowmeter

a. Place the connection cable (009-011018-00) in the wiring groove of the differential pressure flowmeter assembly, and then use three M4×12 combination screws to install the differential pressure flowmeter on the framework of the main unit, as shown in Figure A.

b. Arrange the connection cable (009-011018-00) along the positions of the pre-installed snap hooks and connect the plug to the ACGO plug, as shown in Figure B.

c. Tear the backing from the adhesive tape. Paste the shielding cloth between the upper and middle two snap hooks (straighten out the cable), and then fasten the magnetic ring between the middle and lower two snap hooks. Insert the plug close to the magnetic ring into the metal sheet hole, as shown in Figure C.

Figure A

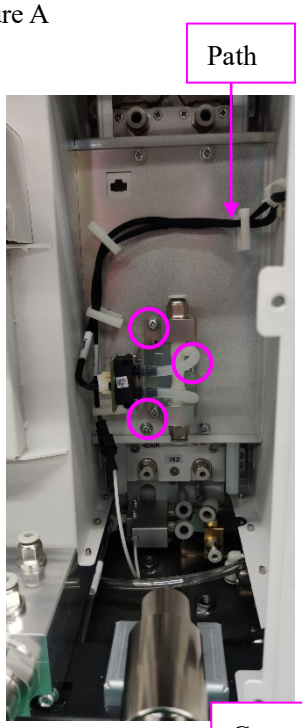
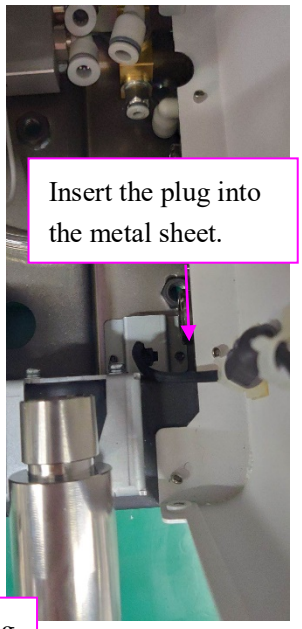


Figure B

Figure C



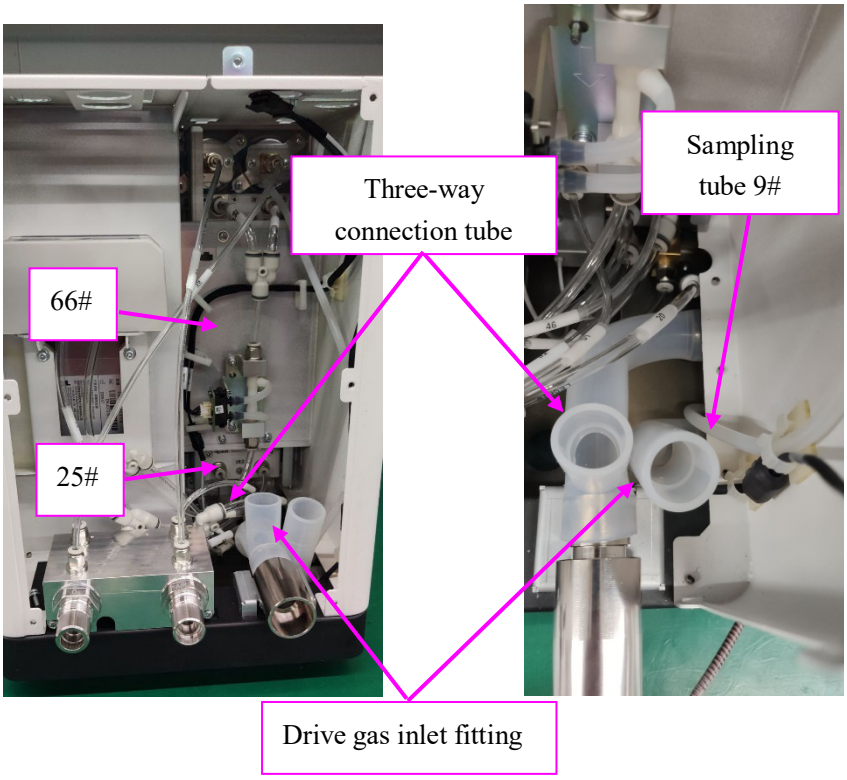
4. Installing the silicone tube

a. Connect one end of sampling tube 9# to the sampling connector and thread it through snap hooks, as shown in Figure A and Figure B.

b. Connect one end of the drive gas inlet fitting into the drive gas inlet, and connect one end of the three-way connection tube to the exhaust gas outlet and the other end to the circuit drive vent, as shown in Figure A and Figure B.

Figure A

Figure B



5. Installing the ventilator

a. Align the four positioning rods (circled shown in Figure B) on the base plate of the ventilator with the four positioning holes (circled shown in Figure A) on the framework of the main unit, and push the ventilator forward from its back to install it in place, as shown in Figure C.

b. Use two M4×12 combination screws to fasten the ventilator assembly to the main unit, as shown in Figure D.

Figure A

Figure B

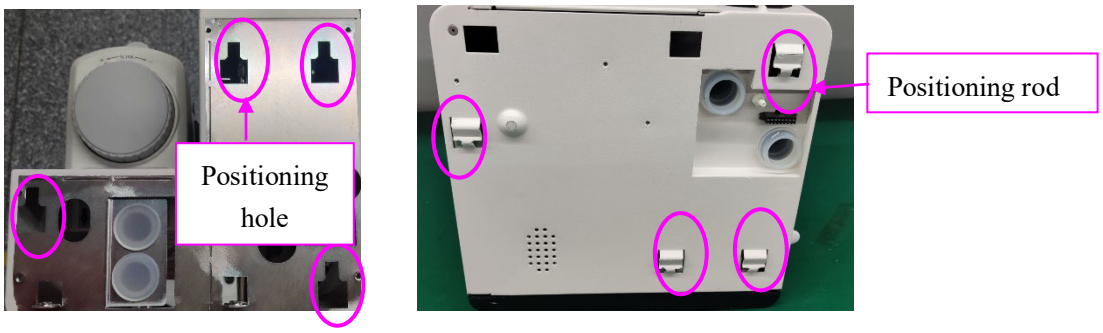


Figure C

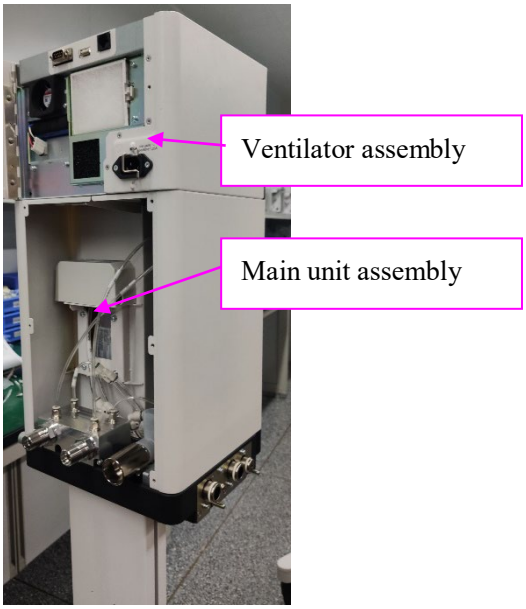
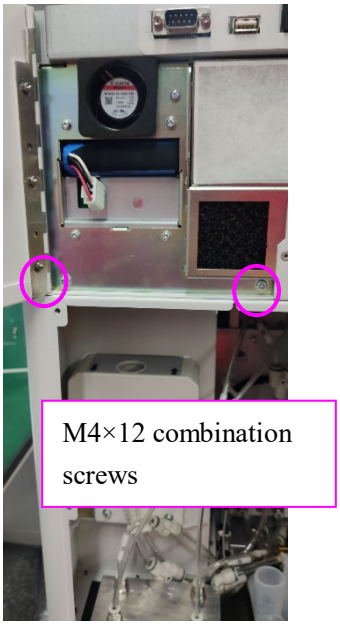


Figure D



6: Connecting pipes and lines

a. Connect pipe 9# to the connector, and install the connection cable (009-011018-00) in the wiring groove, as shown in Figure A.

b. Cut both ends of tubes 18# and 19# and insert the tubes into throwaway straight connectors, as shown in Figure B.

c. Connect one end of the two silicone tubes having connectors to the three-way silicone tube and drive gas inlet connection fitting separately, and the other end to the ventilator. After connection, the two silicone tubes are parallel to each other, as shown in Figure C.

Figure A

Figure B

Figure C

7. Installing the circuit

a. Align the circuit assembly positioning holes (as shown in Figure B) of Veta 5 with the two stop pins (as shown in Figure A) on the main unit assembly and install them in place so that the circuit is closely attached to the bracket of the main unit. Use three M8×25 stainless steel hexagon socket combination screws to fasten the circuit assembly (Veta 5) to the main unit, as shown in Figure C and Figure D.

b. Insert the microswitch cable plug into the wiring groove, as shown in Figure D.

Figure A

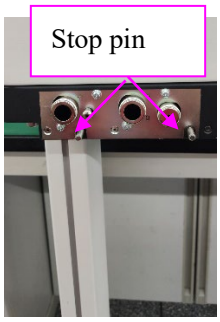


Figure B

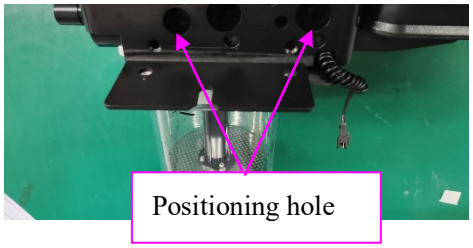
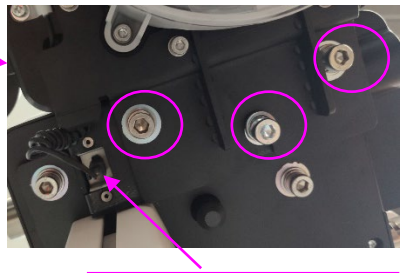


Figure C

Figure D



8. Installing the real panel

a. Use six M4×12 combination screws to fasten the rear panel assembly to the framework of the main unit, as shown in Figure A.

Figure A

9. Installing the top plate

a. Use three M3×8 combination screws to install the cover plate on the ventilator housing assembly, as shown in Figure B.

b. Use four M4×12 combination screws to install the top plate (0675) on the ventilator housing assembly, as shown in Figure C.

c. Use five silicone plugs 2 (049-001747-00) to block the holes on the top plate, as shown in Figure D.

Figure A

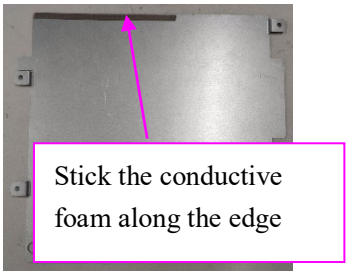


Figure B

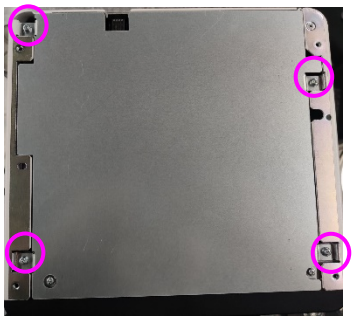


Figure C

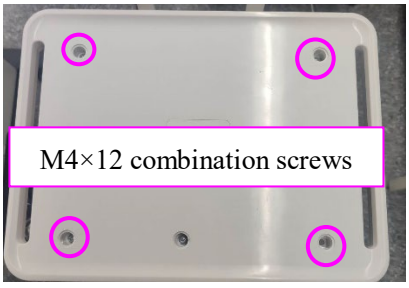
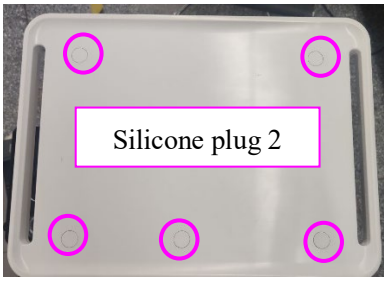


Figure D



10. Attaching the Veta 5 label

Attach the Veta 5 label (047-037243-00) to a position on the top plate (cover the original Veta 3 label), as shown in Figure A.

Figure A

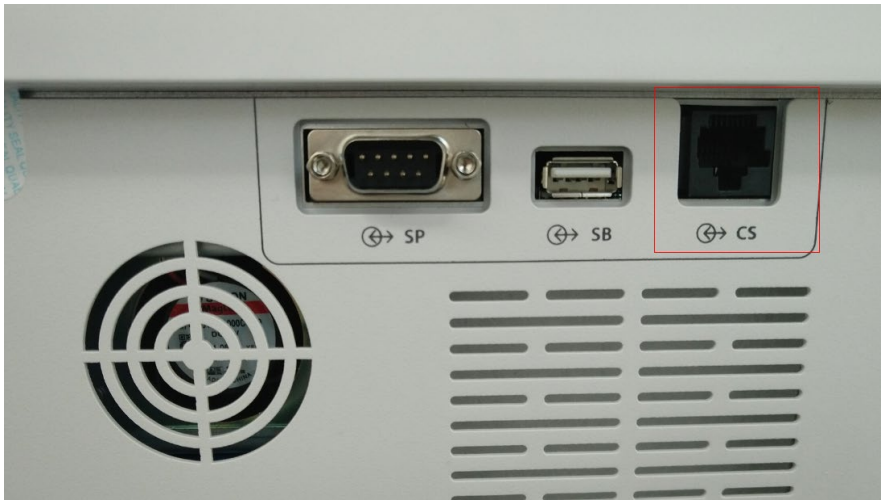
4.2 Software Upgrade

List of module software contained in the software upgrade package

Software Upgrade Package	Contained Module
Optimus.mpkg	Bundle Version
	Host Software
	Linux Kernel
	Ventilator Control Module
	Ventilator Protect Module
	Power Board
	Touch Screen

4.2.1 Preparations for Iterative Upgrade of Software

1. Use a crossover network cable to connect the network port of the PC to the network CS port of Optimus, as shown in the figure below.



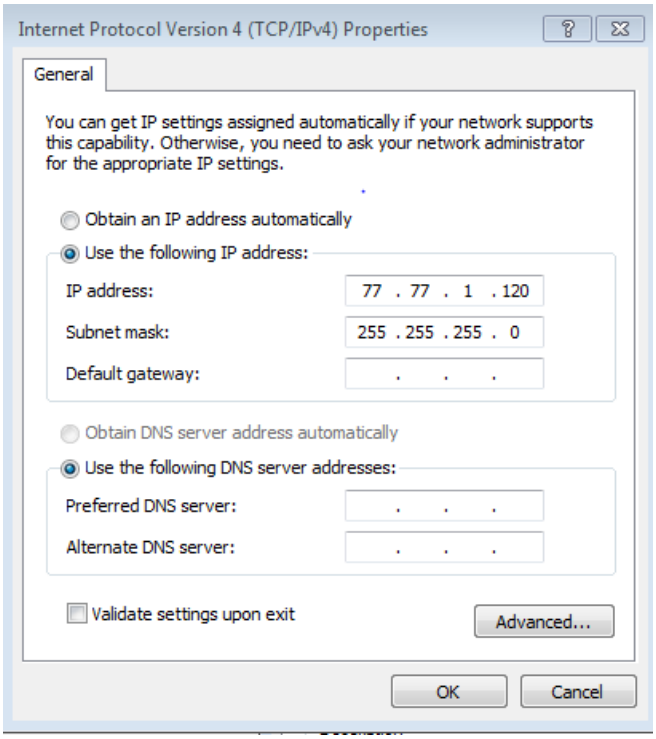
2. Before running Mindray software upgrade tool for anesthesia ventilation products, check that the IP address of the PC is set to 77.77.1.1 and subnet mask is set to 255.255.255.0. Perform the following operations to check and set the IP address of the PC:

   (1) On the PC, click start, select **Control Panel**, and then click **Network and Sharing Center**.

   (2) Click **Change adapter settings**, double-click **Local Area Connection**, and then click **Properties**.

   (3) Scroll down to **Internet Protocol Version 4 (TCP/IPv4)**, click **Internet Protocol Version 4 (TCP/IPv4)**, and then click **Properties**.

   (4) Click the **Use the following IP address** radio button, set **IP address** and **Subnet mask**, and then click **OK**.



3. Check that the upgrade tool contained in the software package is installed on the PC and the version is the consistent with the target version. If the upgrade tool is not installed, perform the following steps:

   (1) Run the **SystemUpdateTool.exe** file.

   (2) If a language prompt is displayed, select **English** and then click **OK**.

   (3) If the welcome dialog box is displayed, click **Next**.

   (4) If the customer information dialog box is displayed, enter the following content:

   (5) Username: Mindray

   (6) Company name: Mindray

   (7) Serial number: 26582640

   (8) Click **Next**.

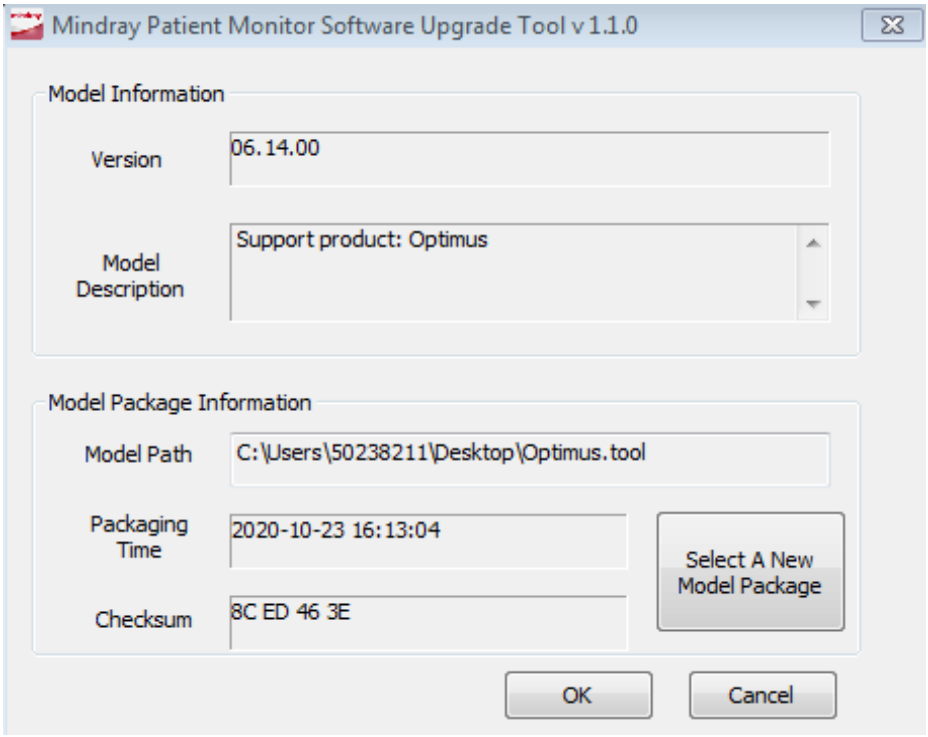
   (9) If a dialog box for selecting the destination location is displayed, use the default destination folder and click **Next**.

   (10) If a dialog box for selecting the program folder is displayed, use the default program folder and click **Next**.

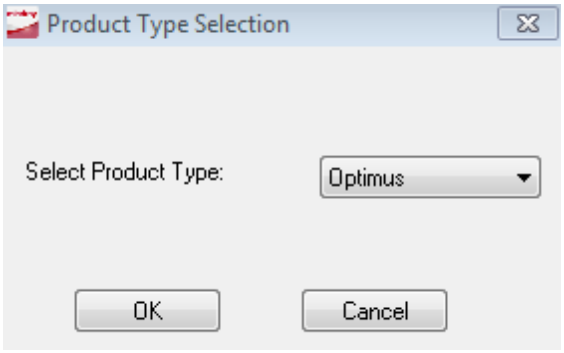
   (11) If the shield installation wizard dialog box is displayed, click **Finish** to complete the installation.

4.2.2 Iterative Upgrade of the Software

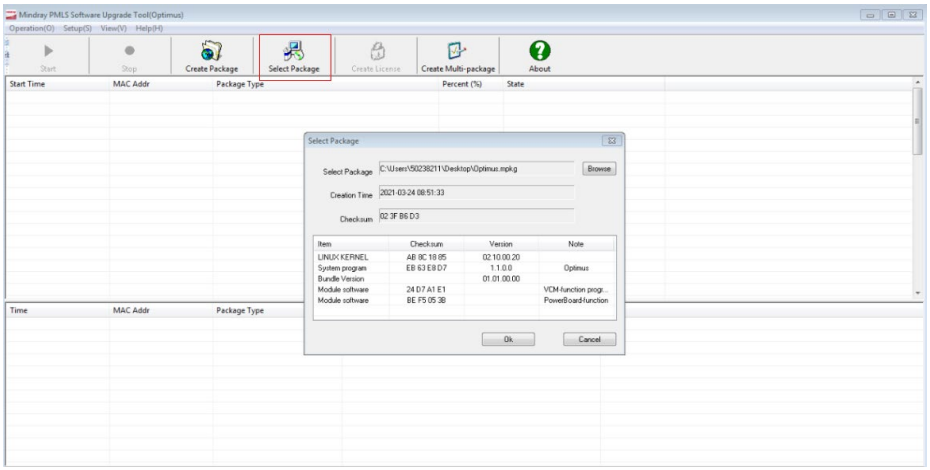
1. Start the network upgrade tool and select the new model package **Optimus.tool** to go to a screen as shown in the figure below.



2. Click **OK** to go to a screen as shown in the figure below. Select **Optimus** from the machine type drop-down list and click **OK** to go to the upgrade tool screen.

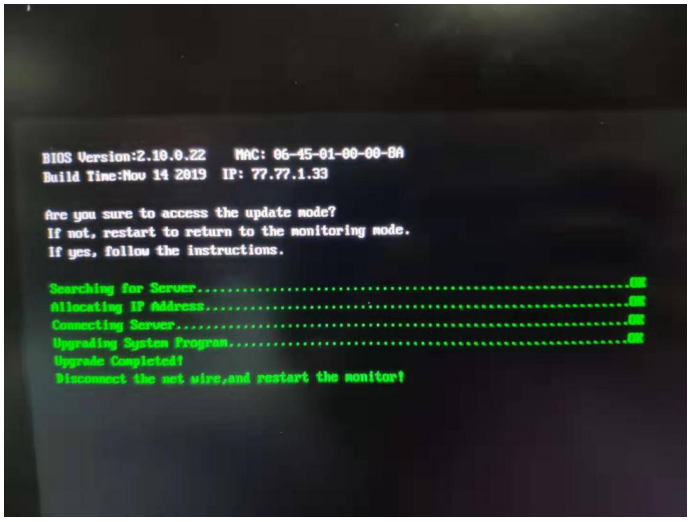


3. Click **Select Package**, select the **.mpkg/.pkg** upgrade package file, and then click **OK**.

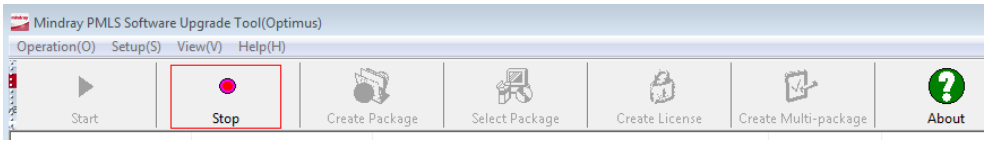


4. After the PC and anesthesia machine are connected via a network, ensure that the anesthesia machine is powered off. Click **Start**. Then, power on the anesthesia machine.

The upgrade screen is displayed on the anesthesia machine. When "Upgrade Completed!" and "Disconnect the net wire, and restart the monitor!" are displayed on the main screen of the anesthesia machine, the upgrade is complete.



5. Click **Stop** on the upgrade tool and shut down the PC.



6. The anesthesia machine needs to be restarted after the system software is completely upgraded.

NOTE

- **The software needs to be upgraded after the main monitoring board is replaced.**
- **The latest version shown above is just an example for reference. You are required to check the technical announcement to obtain the correct software version.**

7. Tap **Setup** and then tap **Service**. Check the software version of the anesthesia machine. Enter the service password **789789** and then press **Enter** to go to the service screen. Check **System Info** and view the bundle version. Confirm that the bundle version of the anesthesia machine is consistent with the bundle version in the upgrade tool.

4.2.3 Upgrade Using a USB Drive

1. Create a folder named **UPGRADE_AMP** in the root directory of a USB drive.
2. In the **UPGRADE_AMP** file, create a folder named **Optimus**.
3. Place the prepared upgrade tool **Optimus_Installer.pkg** and software upgrade package (**MPKG**) in the **Optimus** folder.

4. Insert the USB drive into the anesthesia machine and start the machine. Knock the display continuously with your finger. The system displays the screen for selecting the USB drive-based upgrade. Tap **OK Enter**. The system starts upgrading.
5. After the upgrade is completed, restart the machine.

4.2.4 Post-Upgrade Test

Perform the system check.

4.3 Software Function Activation

The manufacturer can upgrade and activate the following functions. If you need to activate one of them, apply to the manufacturer for purchasing and activating this function.

Configuration Item That Can Be Activated	Function Description
PCV	Pressure control ventilation
SIMV	Synchronized intermittent mandatory ventilation

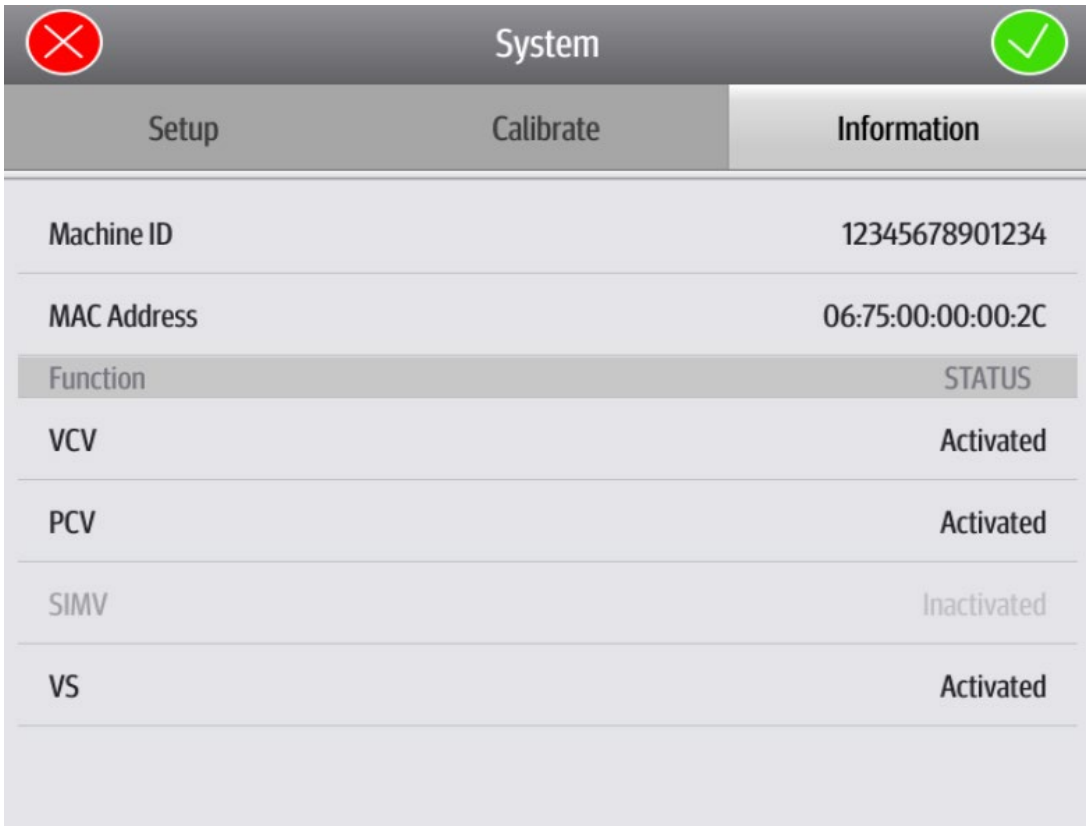
4.3.1 Activation Code Application for Software Functions

NOTE

- **To apply for an activation code, you must provide information about the anesthesia machine that needs function configuration activation: machine serial number, MAC address of the machine, existing configuration, and configuration to be activated.**

When you need the above paid function configuration, apply to Mindray Customer Service Department. The steps are as follows:

1. Record the machine serial number.
2. Select the  hot key > **System** (enter the correct password) > **Information** to open the **Information** menu item. Record the MAC address and existing configuration of the anesthesia machine.



3. Record the configuration to be activated and search for the material code.
4. Send the preceding records to Mindray Customer Service Department when placing a software function upgrade order.

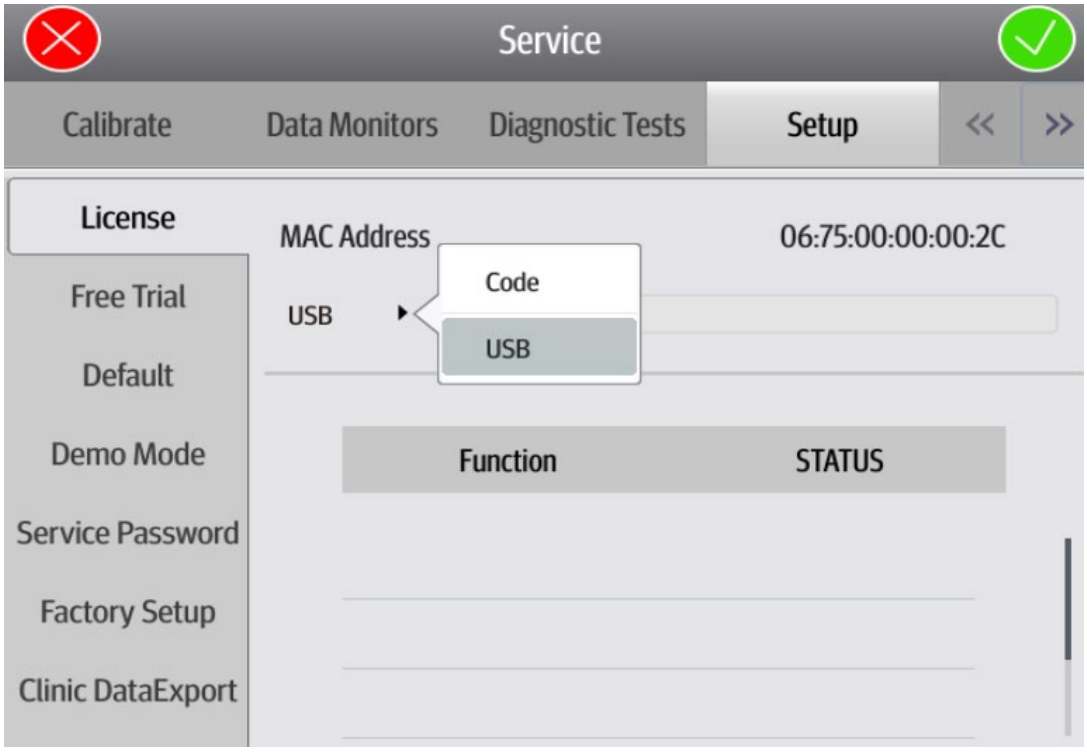
4.3.2 Software Function Activation Process: Using a USB Drive

NOTE

- **Check and record the user's existing function configuration and function configuration to be added before activation.**
- **Make the required function configuration based on the model and store the configuration in a USB drive.**
- **When making function configuration to be activated using a USB drive, ensure that the MAC address is the same as that of the machine to be upgraded. Otherwise, the activation will fail.**

Perform the following steps to activate the software function configuration by using a USB drive:

1. Create a folder named **PMLS** in the root directory of the USB drive and then create a folder named after the MAC address of the machine in the **PMLS** folder.
2. Place the *XX* **key** file (*XX* indicates the function to be activated) in the folder named after the MAC address of the machine.
3. Insert the USB drive into the machine that needs function configuration activation.
4. Open the **License** menu item of the software: Select hot key > **Service** (enter the correct password) > **Setup** >**License**, as shown in the figure below.



5. Select **USB** from the drop-down list.

6. Tap **Install** to activate the function configuration by using the USB drive. After activation is complete, the system displays the message "New functions activated, please restart!"

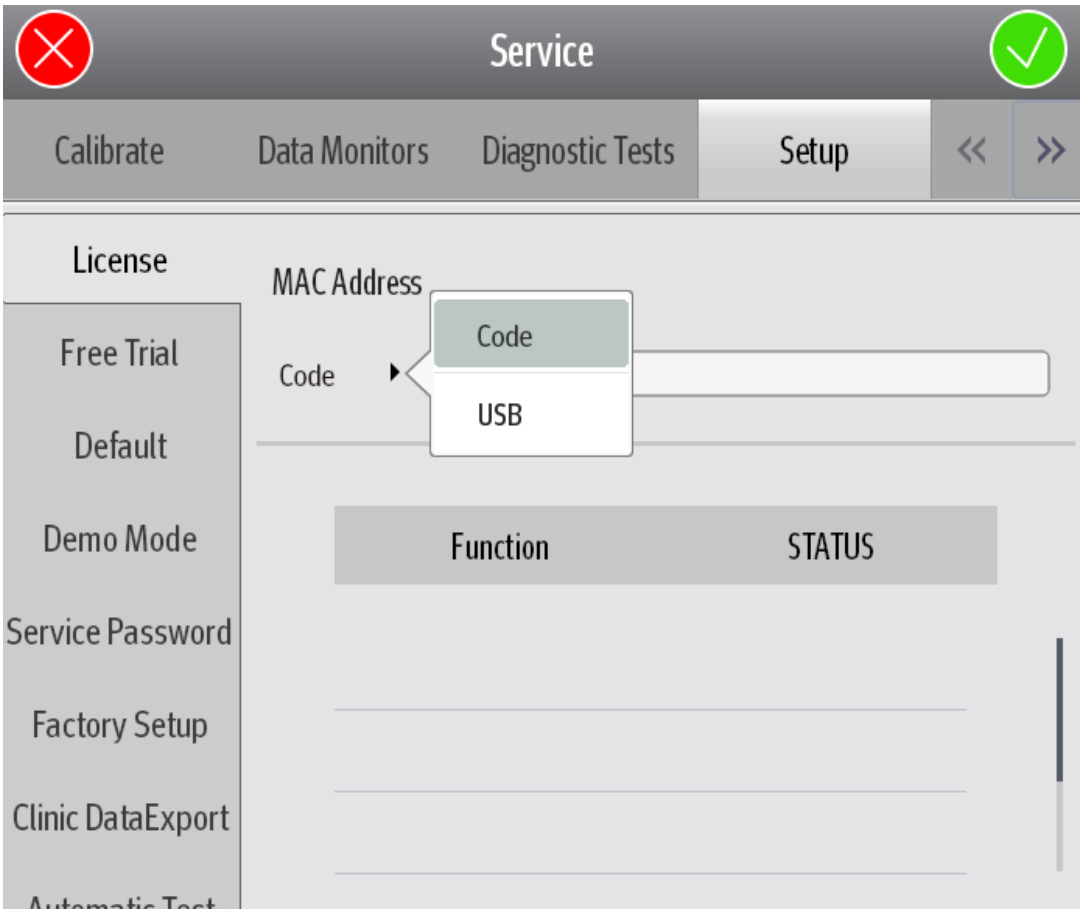
4.3.3 Software Function Activation Process: Using an Activation Code

NOTE

- **Check and record the user's existing function configuration and function configuration to be added before activation.**
- **When making function configuration to be activated using an activation code, ensure that the MAC address is the same as that of the machine to be upgraded. Otherwise, the activation will fail.**

Perform the following steps to activate the software function configuration by using a USB drive:

1. Open the **License** menu item of the software: Select hot key > **Service** (enter the correct password) > **Setup** >**License**, as shown in the figure below.



2. Select **Code** from the drop-down list.

3. Enter the activation code provided by the Customer Service Department in the text box on the right side.
4. Tap **Install** to activate the function configuration by using the activation code. After activation is complete, the system displays the message "New functions activated, please restart!"

NOTE

- **Before the activation is completed or an error prompt is provided, ensure that the power supply of the anesthesia machine is not cut off. Otherwise, the BIOS program of the main control board of the anesthesia machine will be damaged.**
- **After an activation success prompt is displayed, the anesthesia machine must be restarted for the new function to take effect.**

5 Troubleshooting

5.1 Service Safety Precautions

Before opening the machine for internal testing and service, be sure to turn off the anesthesia machine and disconnect the power cable and gas supply of the machine. Otherwise, safety hazards or equipment damage may be incurred.

5.2 Power-on Self-Test

The anesthesia machine automatically performs power-on self-test after startup. After the power-on self-test is successful, the system check screen is displayed. If maintenance is needed because the power-on self-test or system check fails, troubleshoot the fault and repair the machine according to the descriptions in ***5.2.1Power-on Test*** and ***5.2.2System Check***.

5.2.1 Power-on Test

If the power-on test fails, the machine triggers relevant technical alarms (except in the case that the main monitoring board fails). For the troubleshooting of technical alarms, see ***1.3 "Technical Alarms"***.

If a power-on test failure is caused by the power-on test failure occurring on the main monitoring board, flow sensor, blower, etc., the machine displays the power-on test failure screen. In this case, you can conduct fault diagnosis only on the **Service** screen.

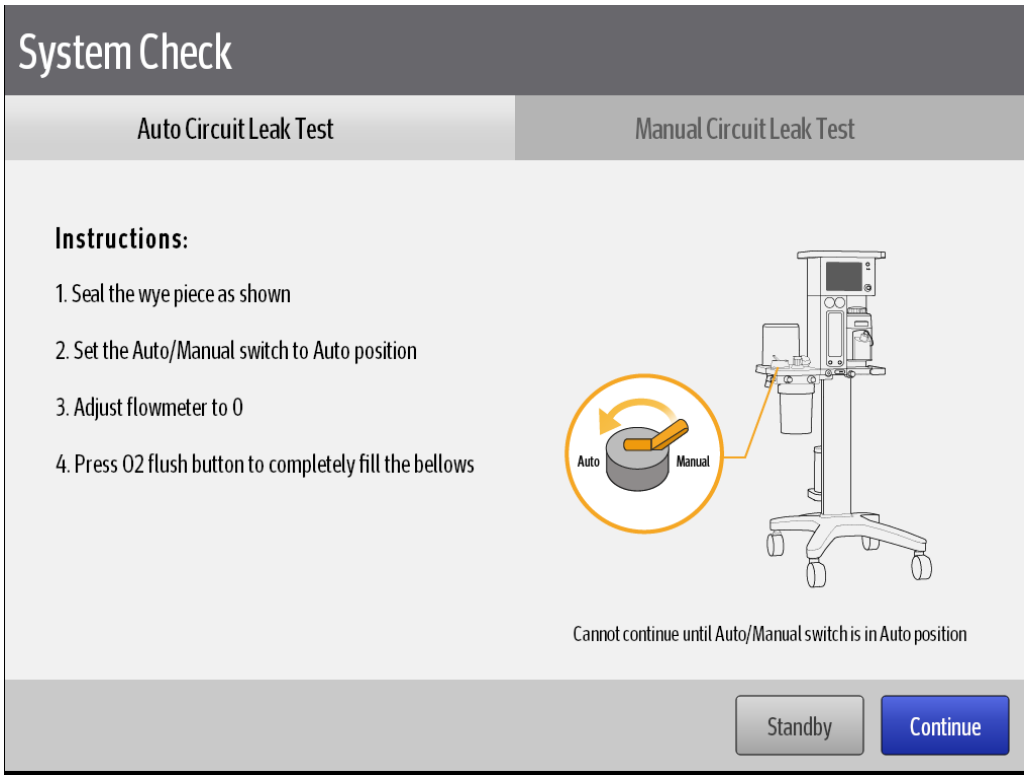
5.2.2 System Check

System check aims to test the pipeline of the anesthesia machine for leaks. It includes the auto circuit leak test and manual circuit leak test.

5.2.2.1 Auto Circuit Leak Test

This test checks the circuit for leaks in mechanical ventilation mode. Test items include the bellows, patient circuit, soda lime tank, and patient tube.

The figure below shows the auto circuit leak test.



Follow prompts on the screen to perform operations, and then tap **Continue** to perform the auto circuit leak test.

Compare the test result with the following description and perform operations accordingly.

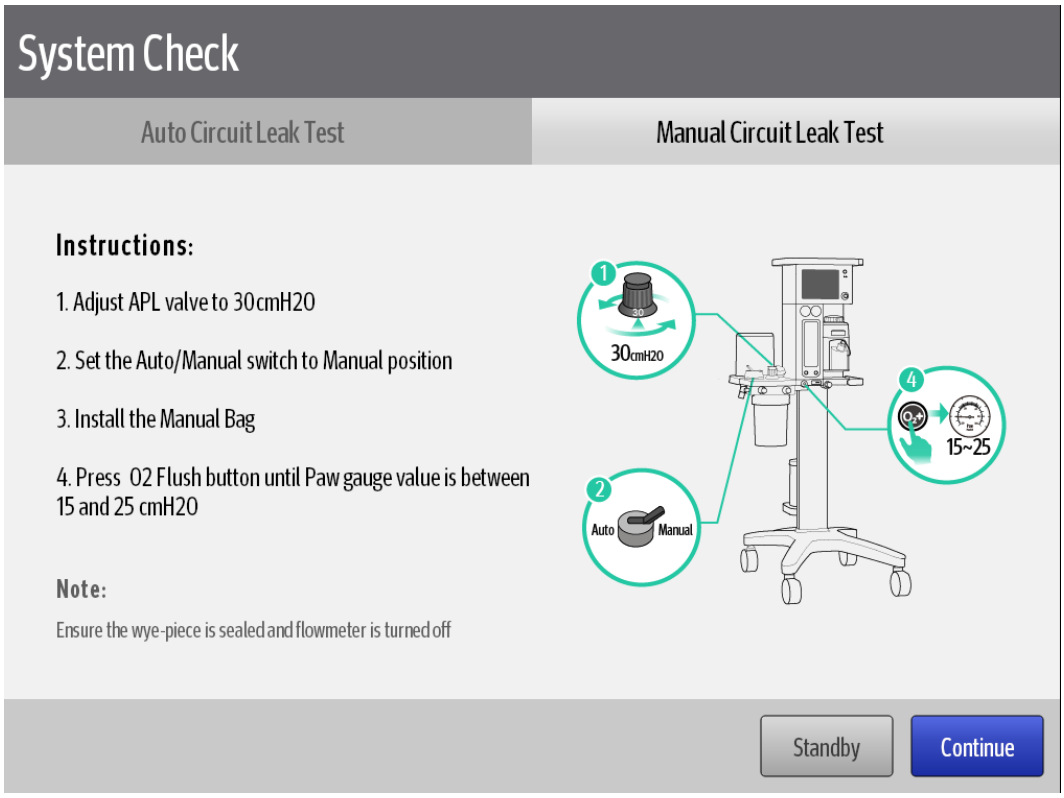
Result	**Description/Option**
Auto circuit leak test: passed Compliance test: XX.X mL/cmH2O	Auto circuit leakage: ≤ 200 mL/min The compliance test result is displayed in green. Tap **Continue** to perform the manual circuit leak test. Alternatively, tap **Standby** to enter the standby mode.
Auto circuit leakage: XXX mL/min Compliance test: failed	200 mL/min < auto circuit leakage ≤ 1000 mL/min The compliance test fails. Tap **Continue** to perform the manual circuit leak test. Alternatively, tap **Retry** to repeat the auto circuit leak test. Handling measures: 1. Check whether pipelines are connected properly. 2. Check whether the Y-piece is clogged. 3. Check whether the sampling tube is connected properly.

Auto circuit leak test: failed Compliance test: failed	Auto circuit leakage: > 1000 mL/min The compliance test fails. Tap **Continue** to perform the manual circuit leak test. Alternatively, tap **Retry** to repeat the auto circuit leak test. Handling measures: 1. Check whether pipelines are connected properly. 2. Check whether the Y-piece is clogged. 3. Check whether the sampling tube is connected properly.

5.2.2.2 Manual Circuit Leak Test

After the auto circuit leak test is completed, you can perform the manual circuit leak test to check whether leaks exist in manual ventilation mode. Test items include the manual bag, manual connector, patient circuit, soda lime tank, and patient tube.

The figure below shows the manual circuit leak test.



Follow prompts on the screen to perform operations, and then tap **Continue** to perform the manual circuit leak test.

Compare the test result with the following description and perform operations accordingly.

Result	Description/Option
Manual circuit leak test: passed	Manual circuit leakage: ≤ 1000 mL/min Tap **Standby** to enter the standby mode.
Manual circuit leak test: failed	Manual circuit leakage: > 1000 mL/min Tap **Retry** to repeat the manual circuit leak test. Alternatively, tap **Standby** to enter the standby mode. Handling measures: 1. Check whether pipelines are connected properly. 2. Check whether the manual bag is connected properly. 3. Check whether the sampling tube is connected properly.

5.3 Technical Alarms

When the machine reports a technical alarm, handle it by using the solution provided in the table below. For the handling of non-technical alarms and prompts, refer to the user manual.

5.3.1 Alarms About the Functions of the Main Monitoring Board

Alarm	Cause	FRU	Solution
Manual Only	When the auto/manual switch is in the manual position, the following faults will trigger this technical alarm: 1. The power-on self-test fails and the result is "Manual Only." 2. The "Blower Temp Too High" alarm is triggered.	N/A	1. Repeat the power-on self-test. 2. If the fault persists, contact Mindray technical support personnel. 3. If the "Blower Temp Too High" alarm is triggered, wait for the blower to cool down till the "Blower Temp Too High" alarm disappears.

Auto Ventilation is Non-Functional	When the auto/manual switch is in the auto position, the following faults will trigger this technical alarm: 1. The power-on self-test fails. 2. The "Blower Temp Too High" alarm is triggered.	N/A	1. Repeat the power-on self-test. 2. If the fault persists, contact Mindray technical support personnel. 3. If the "Blower Temp Too High" alarm is triggered, wait for the blower to cool down till the "Blower Temp Too High" alarm disappears.
Bundle Version Error	The current software version does not match the bundle version file.	N/A	Upgrade the software to the latest version.
Bundle Version: Time out	The version self-test result cannot be obtained due to an internal communication error.	N/A	Check self-test records to find out the module that encounters the self-test timeout error. Troubleshoot the fault according to the solution to the module self-test timeout alarm in this section.
RT Clock Needs Battery	There is no button battery in the system or the button battery has run out of power.	Main monitoring board	1. Replace the button battery with a new one on the main control board. 2. If the fault persists, replace the main monitoring board.
RT Clock Failure	The real-time chip is faulty.	Main monitoring board	1. Restart the anesthesia machine. 2. If the fault persists, replace the main monitoring board.

Ventilator Selftest: Time out	The self-test result cannot be obtained due to an internal communication error.	Main monitoring board	1. Restart the system for the system to perform power-on self-test. 2. If the fault persists, replace the main monitoring board.
Ventilator Initialization: Time out	The self-test result cannot be obtained due to an internal communication error.	Main monitoring board	1. Restart the system for the system to perform power-on self-test. 2. If the fault persists, replace the main monitoring board.
Storage Error	The data service is disconnected for 60 seconds.	Main monitoring board	1. Restart the machine. 2. If the fault persists, upgrade the software to a new version. 3. If the fault persists after the software upgrade, replace the main monitoring board.
Ventilator Voltage Error	The 5 V, 12 V, –5 V, or 10.5 V voltage is incorrect.	Main monitoring board	1. Restart the anesthesia machine. 2. Measure the supply voltage of the monitoring board and ensure that the supply voltage is within the specified range. Check whether the cables fail. 3. If the fault persists, replace the main monitoring board.
Flow Sensor Failure	1. The flow sensor at the machine end is out of range. 2. It is detected that the flow sensor at the machine end is faulty during the power-on self-test.	Flow sensor, main monitoring board	1. Check whether the monitoring value output by the flow sensor is within the specified range. 2. Replace the flow sensor.

	3. It is detected that the flow sensor cable is disconnected.		3. Check the cable connection of the internal flow sensor, remove and then insert the cable, and replace the flow sensor when necessary. 4. Replace the main monitoring board.
Pinsp Not Achieved	The peak pressure does not reach the set inspiratory pressure in pressure mode.	Main monitoring board	1. Check ventilation settings, including the inspiratory pressure and PEEP. 2. Check whether the circuit and breathing tube leak. 3. Check the accuracy of the pressure sensor. 4. If the accuracy of the pressure sensor does not meet specifications, replace the main monitoring board.
Vt Not Achieved	The tidal volume does not reach the preset tidal volume in capacity mode.	Flow sensor	1. Check ventilation settings, including the tidal volume and high pressure alarm limit. 2. Check whether the circuit and breathing tube leak or whether they are clogged. 3. Check the accuracy of the flow sensor. 4. If the accuracy does not meet specifications, replace the flow sensor.

Pressure Monitoring Channel Failure	1. The reading of the airway pressure sensor/blower outlet pressure sensor exceeds the upper limit for a period of time. 2. The zero point of the airway pressure sensor/blower outlet pressure sensor is out of the normal range.	Main monitoring board	1. Disconnect the gas supply and airway, and observe the sampling value of the pressure sensor. 2. If the zero error is large, check whether the pressure sampling tube is connected reversely, clogged, or compressed. 3. Perform manual zeroing. 4. Restart the machine. 5. If the fault persists, replace the main monitoring board.
Patient Circuit Leak	1. Check whether the Y-piece falls off during ventilation. 2. Check whether the pipeline is damaged.	N/A	1. Reconnect the patient tube. 2. Perform a leak test to check whether the machine leaks.
Ventilator Comm Stop	The communication with the CPU of the main control module on the main monitoring board is interrupted.	Main monitoring board	1. Restart the anesthesia machine. 2. If the fault persists, replace the main monitoring board.
Calibrate Pressure Sensor	1. No pressure calibration table is found in the EEPROM. 2. The checksum in the calibration table does not match.	Main monitoring board	1. Perform the pressure calibration again. 2. If the alarm persists after the calibration succeeds, replace the main monitoring board.
Ventilator Selftest Error	1. No data can be read from or written into the EEPROM of the monitoring module on the main monitoring board during power-on test. 2. The voltage of the	Main monitoring board	1. Restart the anesthesia machine. 2. Check whether the voltage of the monitoring board is abnormal on the **Data Monitors** screen.

	monitoring module on the main monitoring board is detected to be abnormal during the power-on test. 3. The watchdog function of the monitoring module on the main monitoring board cannot work normally.		3. If the fault persists, replace the main monitoring board.
Ventilator Initialization Error	The CPU fails to send parameter settings to the main monitoring board after power-on.	Main monitoring board	1. Restart the anesthesia machine. 2. If the fault persists, replace the main monitoring board.
Replace HEPA Filter	The HEPA filter is clogged and the resistance increases.	HEPA	Replace the HEPA filter and enable the system to perform system check again.
Blower Temperature High	The blower temperature exceeds the threshold.	Fan	1. Check whether the ambient temperature exceeds the maximum operating temperature claimed by the manufacturer. 2. Check whether the air intake vent and air exhaust vent of the fan are clogged. If yes, clear the foreign matters and dust. 3. Check the operation of the fan. If an abnormality is found (for example, abnormal sound is produced or the speed is abnormal), replace the fan.
Blower Temp Sensor Failure	The blower temperature sensor is faulty.	Blower assembly	Replace the blower assembly.
Blower Failure	The blower speed does not reach the expected speed.	Blower assembly	1. Restart the anesthesia machine. 2. If the fault persists,

			replace the blower assembly.
Blower Temp Too High	The blower temperature is too high and mechanical ventilation is stopped.	N/A	1. Start manual ventilation in case of emergency. 2. Stop using mechanical ventilation till the blower temperature drops and the "Blower Temp Too High" alarm disappears. 3. If the fault persists, contact Mindray technical support personnel.
Weigher Failure	The weigher malfunctions.	Weigher	Replace the weigher.
No Fresh Gas	No fresh gas flow is detected in non-standby mode.	N/A	Adjust the flowmeter to turn on the fresh gas supply.
CO2 Module Error	1. The communication of the CO2 module is stopped. 2. The hardware of the CO2 module is faulty. 3. A system error occurs on the CO2 module. 4. An initialization error occurs on the CO2 module.	CO2 module	1. Remove and then insert the CO2 module. 2. If the fault persists, replace the CO2 module.
CO2 Module High Temp	The temperature of the CO2 sensor is higher than 63°C.	CO2 module	1. Remove and then insert the CO2 module. 2. If the fault persists, replace the CO2 module.
CO2 Sampleline Occluded	The CO2 sample line is clogged.	N/A	1. Check whether the sampling tube is clogged. 2. Replace the sampling tube. 3. If the fault persists, contact Mindray

			technical support personnel.
CO2 No Watertrap	The CO2 watertrap falls off or is not connected.	N/A	Check the watertrap connection.
EtCO2 Over Range	The monitored value is out of the measurement range.	CO2 module	1. Remove and then insert the CO2 module. 2. If the fault persists, replace the CO2 module.
FiCO2 Over Range	The monitored value is out of the measurement range.	CO2 module	1. Remove and then insert the CO2 module. 2. If the fault persists, replace the CO2 module.
CO2 Zero Failed	The CO2 module is faulty.	CO2 module	1. Remove and then insert the CO2 module. 2. If the fault persists, replace the CO2 module.
CO2 Change Watertrap	The watertrap needs to be replaced.	N/A	Check the watertrap connection and reconnect the watertrap.
CO2 Self Test Error	A CO2 self-test error occurs.	CO2 module	1. Remove and then insert the CO2 module. 2. If the fault persists, replace the CO2 module.
CO2 Self Test: Time out	The CO2 self-test result cannot be obtained due to an internal communication error.	CO2 module	1. Remove and then insert the CO2 module. 2. If the fault persists, replace the CO2 module.

5.3.2 Alarms About the Power Board

Alarm	Cause	FRU	Solution
Power System Comm Stop	The communication between the power module and the main control module is interrupted.	Main monitoring board	Re-upgrade the firmware of the power module or replace the main monitoring board.
Power Supply Voltage Error	VCCA (5 V), VCCB (5 V) VPP (12.5 V), VZZ (28 V) The voltage is abnormal.	Main monitoring board	Replace the main monitoring board.
Low Battery Voltage!	The battery voltage is lower than 9.82 V.	N/A	Connect the AC cable.
System shutting down, Battery depleted!	The battery voltage is lower than or equal to 9.28 V.	N/A	Connect the AC cable.
Battery Undetected	No battery is detected.	N/A	Install the battery or check whether the battery is loose.
Battery in Use	No AC power is connected.	N/A	Connect the AC cable or check whether the AC cable is loose.

5.4 Typical Faults

5.4.1 Black Screen

Fault Description	Fault Cause Confirmation	Fault Confirmation Result	Solution
The screen is still black after the power button is pressed.	1. Check whether the external power supply is normal.	The external power supply is abnormal.	Connect the AC power supply.
	2. Check whether the internal power supply is normal.	The display screen cable is not connected properly/The main monitoring board is	1. Remove the top cover, reconnect the cable of the display screen or replace the display screen assembly. 2. If the fault persists, replace the main monitoring board.

		abnormal.	
		The ACDC board/power button board/connection cable from the main monitoring board to the power button board is abnormal.	Check whether the AC indicator on the indicator board is steady on. If no, the output of the ACDC board is abnormal. Replace the ACDC board. If the fault persists after the ACDC board is replaced, replace the power button board or the connection cable from the main monitoring board to the power button board.

5.4.2 The Screen Can Light Up but Nothing Is Displayed

Fault Description	**Fault Cause Confirmation**	**Fault Confirmation Result**	**Solution**
The screen can light up but nothing is displayed.	Check whether the cable of the display screen is in good contact.	The cable of the display screen is in poor contact.	Remove the top cover and reconnect the cable of the display screen.
		The cable of the display screen is in good contact.	Replace the display screen assembly. If the fault persists, replace the main monitoring board.

5.4.3 The System Cannot Exit Standby Mode

Fault Description	**Fault Cause Confirmation**	**Fault Confirmation Result**	**Solution**
The system cannot exit standby mode.	1. Select **Standby** on the touchscreen or by turning the encoder.	The operation cannot be performed on the touchscreen.	Remove the top cover and check whether the connection cable of the touchscreen is in good condition. If the fault persists, replace the display screen assembly.
		The operation cannot be performed on the encoder.	Check whether the connection cable of the encoder is in good condition. If the fault persists, replace the encoder board.
		Neither the touchscreen nor encoder responds.	If other operations are not responded, replace the main monitoring board.
	2. check whether the system check is	System check is failed.	Troubleshoot the fault by referring to ***System Check***.

	passed.		
	3. Check whether a technical alarm is generated.	A technical alarm is generated.	Troubleshoot the fault by referring to ***Technical Alarms***.

5.5 Diagnostic Tool

5.5.1 Sensor Zero Abnormality Diagnosis

The diagnostic tool can conveniently detect whether the zero points of all pressure or flow sensors on the machine are abnormal. You can perform the following steps to diagnose whether the sensor zero point is abnormal.

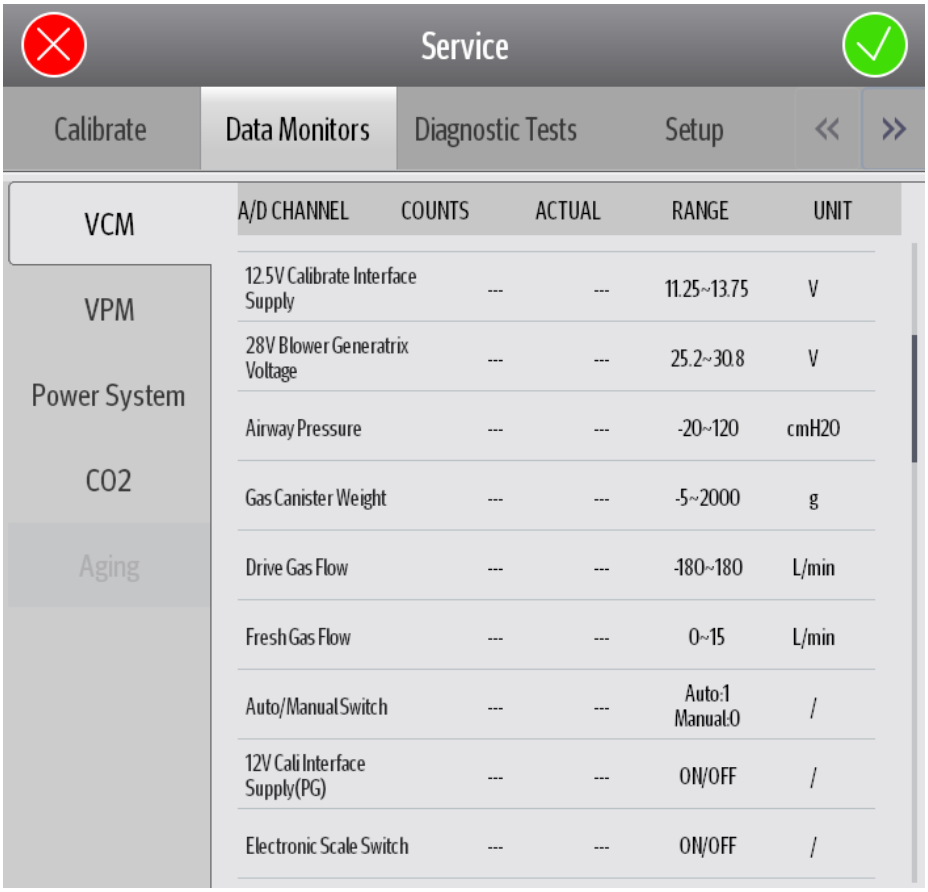
1. Disconnect all gas supplies and disconnect the patient from the tubes. Ensure that the pressure and flow sensors are at zero point.
2. Select > **Service** > **Data Monitors** and check the actual values measured by all sensors. If the actual values of the airway pressure sensor and blower outlet pressure sensor are greater than 1 cmH2O or the actual value of the fresh gas flow sensor is greater than 0.5 L/min, the pressure sensor or flow sensor needs to be zeroed. In this case, select > **System** > **Calibration** > **Zero Sensors** and perform the zeroing operation.
3. If the actual measured value of each sensor approaches 0, check its zero point AD (sampling) value. If the zero point AD value of a sensor is out of the normal range, the sensor is faulty.

The normal range of the zero point of each sensor is as follows:

Zero point AD value of the airway pressure sensor: 1200–1600 AD

Zero point AD value of the blower outlet pressure sensor: 1200–1600 AD

Zero point AD value of the fresh gas flow sensor: –0.1 L/min to +0.1 L/min

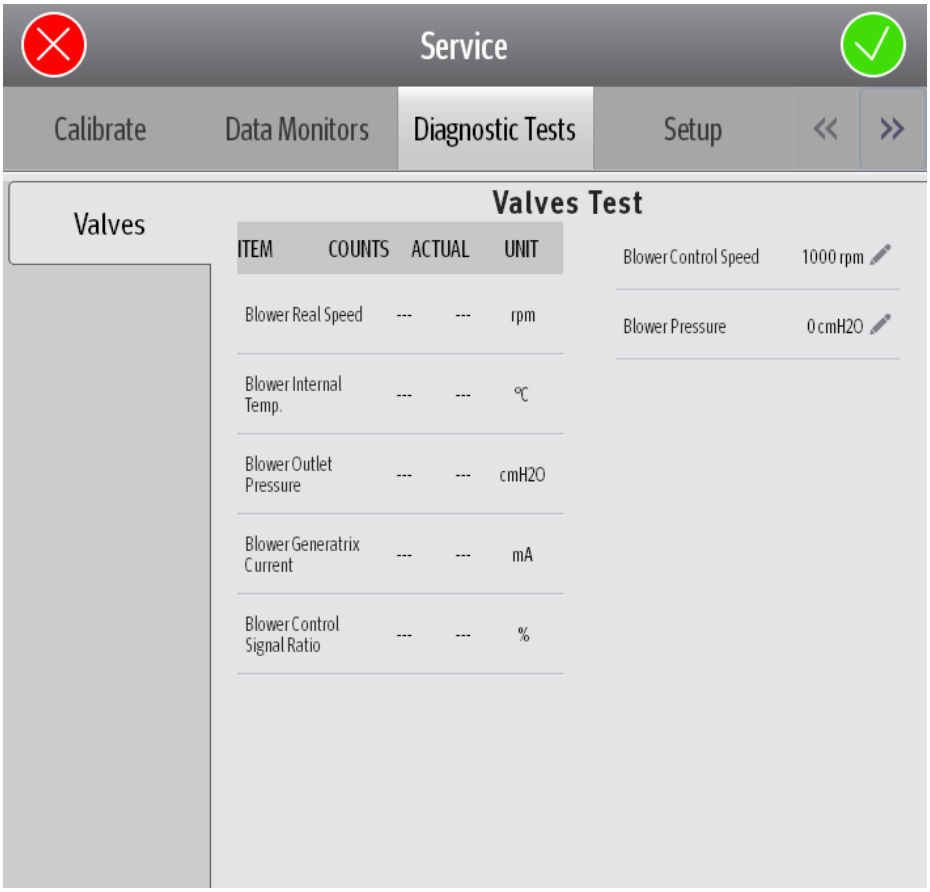


5.5.2 Blower Diagnosis

The diagnostic tool can help check whether the blower works properly.

1. Select > **Service** > **Diagnostic Tests** > **Valves** and set **Blower Control Speed** to **1000 rpm**. Check the actual speed of the blower. If the speed is zero, the blower is faulty. Check whether the wiring of the blower is in good condition.

2. Select **Service** > **Diagnostic Tests** > **Valves** and set **Blower Pressure** to**10 cmH2O**. Check whether the actual pressure of the blower outlet pressure sensor is greater than 5 cmH2O. If no, the blower is faulty or the blower outlet pressure sensor malfunctions. Check whether the sampling tube of the pressure sensor is connected properly.


Service
Calibrate
Data Monitors
Diagnostic Tests
Setup
Valves
Valves Test
ITEM
COUNTS
ACTUAL
UNIT
Blower Real Speed

---
rpm
Blower Internal Temp.

℃
Blower Outlet Pressure

---
cmH2O
Blower Generatrix Current

---
mA
Blower Control Signal Ratio

%
Blower Control Speed
1000 rpm
Blower Pressure
0 cmH2O

6 Theory of Operation

6.1 Introduction

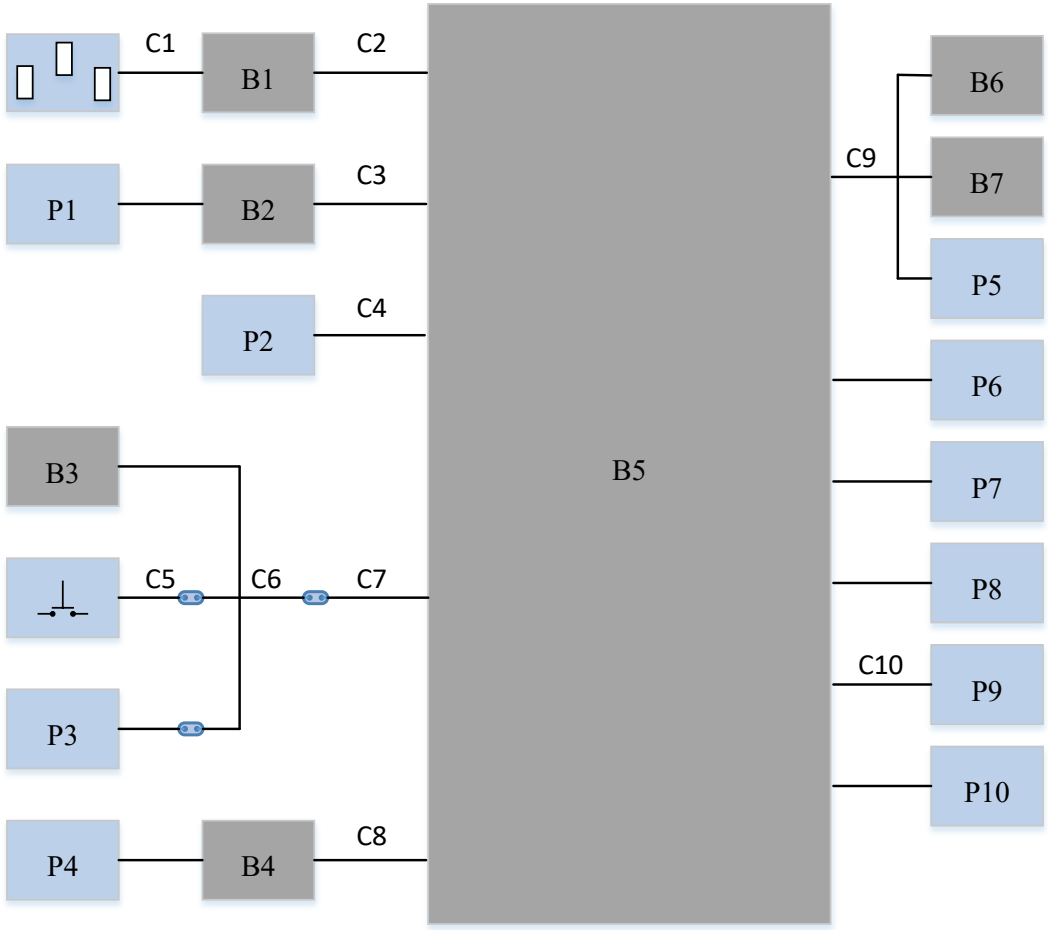
The hardware system of the veterinary anesthesia machine can be classified into the following function blocks according to the principle of function and test independence: power function block, main control function block, monitoring function block, blower function block, electronic scale function block, and other function block. The function blocks are described as follows:

1. Power function block: includes the AC input, AC-DC board, DC-DC circuit module (located on the main monitoring board), internal battery, and battery adapter board. This function block supplies stable and reliable power to the whole veterinary anesthesia machine.
2. Main control function block: includes the main control circuit module (located on the main monitoring board), power button board, main encoder board, display screen, touchscreen, and speaker. This function block implements the GUI and man-machine interaction of the veterinary anesthesia machine, and exchanges data with other modules.
3. Monitoring function block: includes the monitoring circuit module (located on the main monitoring board), drive gas flow sensor, and fresh gas differential pressure sensor board. This function bock implements power-on/off monitoring, flow collection, and pressure collection of the ventilator system.
4. Blower function block: includes the blower circuit module (located on the main monitoring board) and blower. This function block provides stable and reliable drive gas for the whole ventilator system.
5. Electronic scale function block: includes the electronic scale sensor board and weighing sensor. This function block implements the anesthetic agent canister weighing and overweight alarm functions.
6. Other function block: cooling fan. This function block dissipates internal heat of the ventilator system during its working, to reduce the internal temperature.

6.2 Electrical Circuit Part

6.2.1 Electrical Circuit Principle

6.2.1.1 Schematic Block Diagram

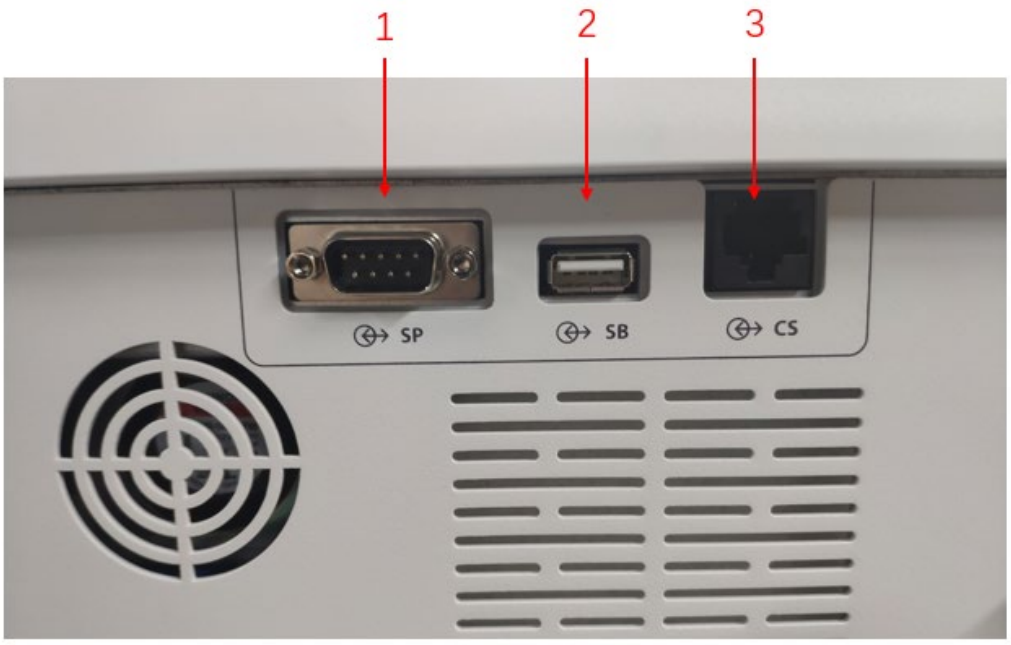


6.2.1.2 List of Hardware Components

Symbol	Name	Symbol	Name
B1	AC-DC power board	B2	Battery adapter board
B3	Fresh gas differential pressure sensor board	B4	Electronic scale sensor board
B5	Main monitoring board	B6	Power button and indicator board
B7	Encoder board	/	/
P1	Battery	P2	CO2 module
P3	ACGO switch	P4	Weighing sensor
P5	Touchscreen	P6	Display screen
P7	Speaker	P8	Blower
P9	Flow sensor	P10	Fan
C1	AC power input cable	C2	Output connection cable of AC-DC board

C3	Battery adapter cable	C4	CO2 module connection cable
C5	Auto/manual switch and cable	C6	Connection cable of Veta 3 using fresh gas and auto/manual control
C7	Connection cable of the ventilator using fresh gas and auto/manual control	C8	Serial cable of the electronic scale
C9	Connection cable of the front housing	C10	Flow sensor connection cable

6.2.2 External Interfaces



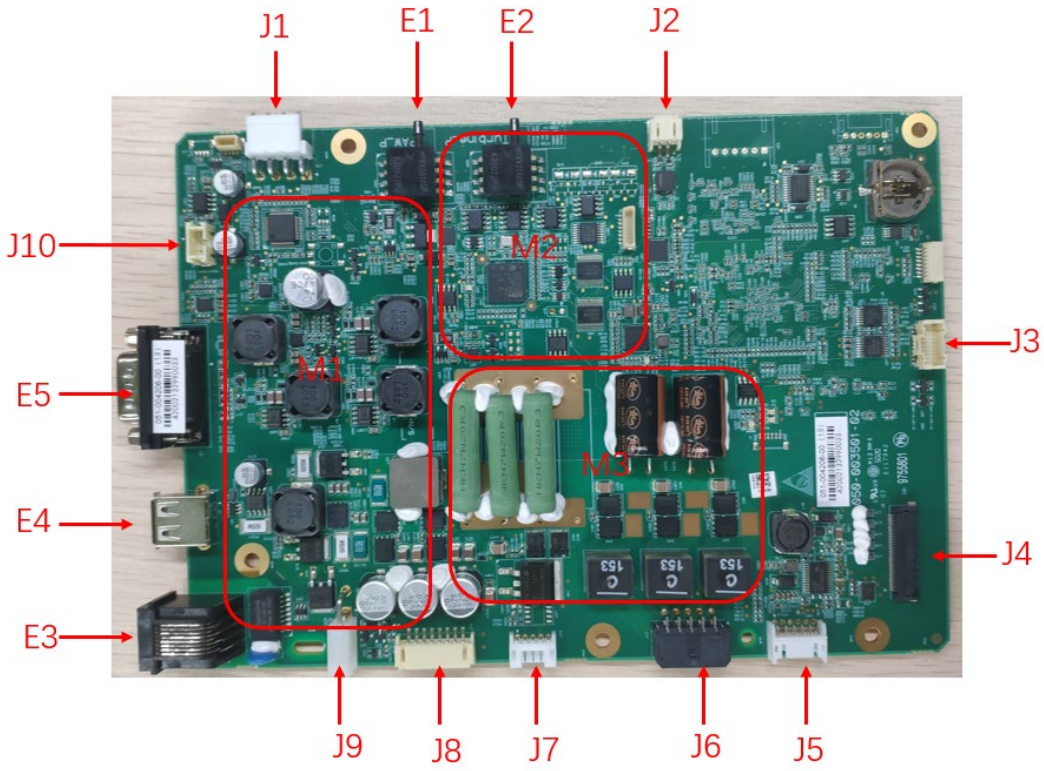
No.	Interface Name	Board	Interface Attribute	Function
1	Serial port	Main monitoring board	DB-9, male connector	Connects to a calibration device. Connects to an electronic scale.
2	USB interface	Main monitoring board	Single-way type A socket	Exports data. Connects to a mouse.
3	Network interface	Main monitoring board	RJ-45	Implements online upgrade. Exports data.

6.2.3 Main Monitoring Board

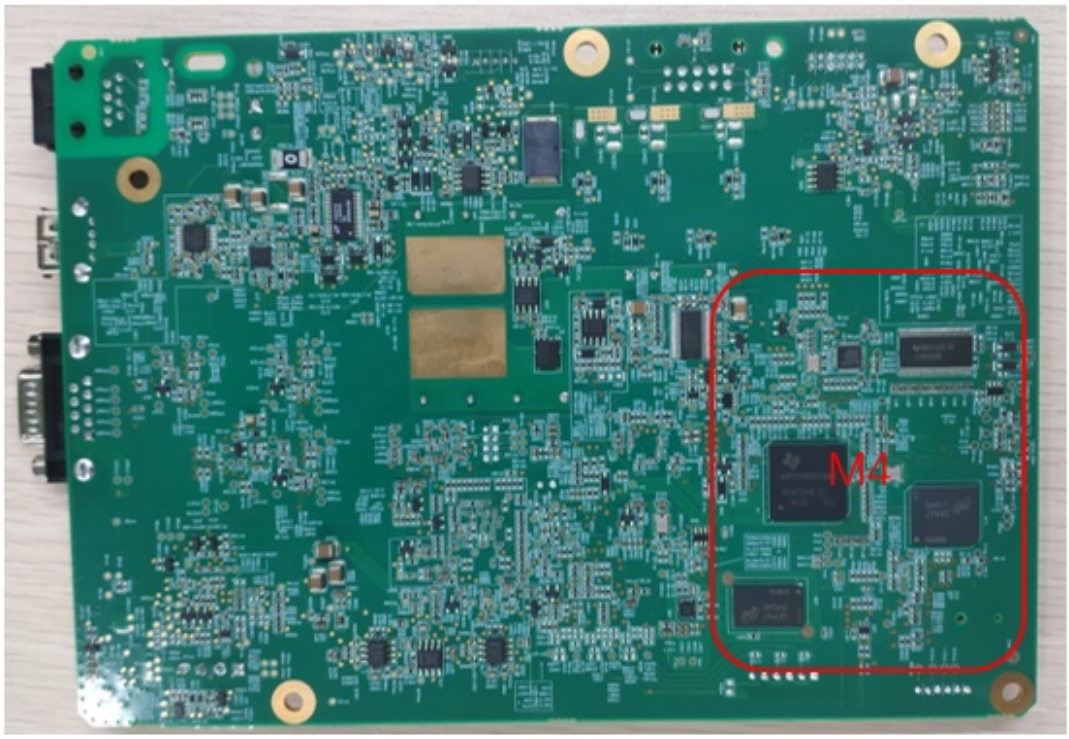
The main monitoring board, as the core control board of the veterinary anesthesia machine,

integrates the DC-DC circuit, main control circuit, monitoring circuit, and blower drive circuit.

1. The DC-DC circuit converts the DC power outputted by the AC-DC board and lithium battery power into DC power required by the system to produce the 3.3 V, 5 V, 12.5 V, and 24 V power. It also manages the charging of the lithium battery. This circuit is controlled by power software.
2. The main control circuit part implements GUI man-machine interaction and communicates with VCM and power management board. It mainly consists of the core system of the main control CPU and peripheral interface circuit. This circuit part is controlled by the main control software.
3. The monitoring circuit part detects the pressure and flow of the anesthesia breathing system, controls the blower, monitors and collects the status, reads the power-on/off status, monitors the flow, and accurately controls the tidal volume. This circuit part is controlled by the monitoring software.
4. The blower drive circuit mainly controls the blower and monitors the blower status, speed, current, and temperature in real time, to ensure stable operation of the blower, so as to provide stable and reliable drive gas for the whole ventilator system.



Main Monitoring Board (Top Side)



Main Monitoring Board (Bottom Side)

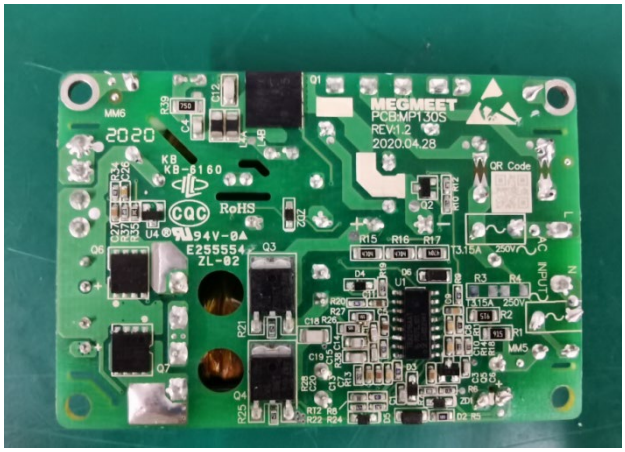
No.	Description	No.	Description
J1	Battery connection port	J2	Speaker connection port
J3	Front cover assembly connection port	J4	Display screen connection port
J5	CO2 module connection port	J6	Blower connection port
J7	Connection port of the drive gas flow sensor	J8	Connection port of fresh gas differential pressure sensor/auto/manual switch/ACGO switch
J9	AC-DC power input connection port	J10	Cooling fan connection port
E1	Airway pressure sensor	E2	Blower outlet pressure sensor
E3	RJ-45 network interface	E4	USB interface
E5	DB9 serial port	/	/
M1	DC-DC circuit	M2	Monitoring circuit
M3	Blower drive circuit	M4	Main control circuit

6.2.4 Power Supply System

6.2.4.1 AC-DC Board

The AC-DC board converts AC power into DC power to power the anesthesia machine. The output voltage of the AC-DC board is 18 V.

AC-DC Board (Top Side)

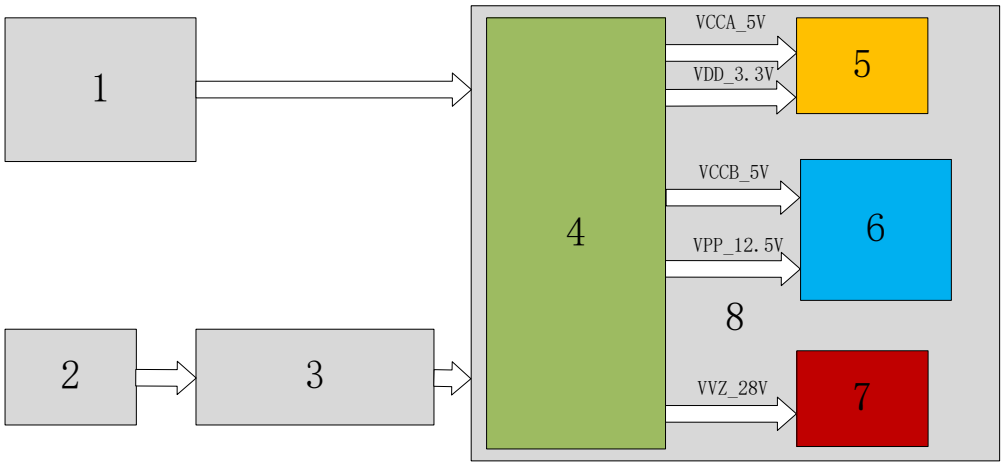


AC-DC Board (Bottom Side)

No.	Interface	Description
1	CN2	DC input terminal
2	CN1	AC input terminal

6.2.4.2 DC-DC Module

The DC-DC module is located on the main monitoring board. For details, see section 1.2.3. The figure below shows the schematic block diagram.



No.	Name
1	AC-DC power module
2	Battery
3	Battery adapter board
4	DC-DC power part of the main monitoring board
5	Main control part of the main monitoring board
6	VCM and fan of the main monitoring board
7	Blower drive part of the main monitoring board
8	Main monitoring board

6.2.4.3 Battery Adapter Board

The battery adapter board transfers battery signals to the main monitoring board through cables.

Battery Adapter Board (Top Side)　　Battery Adapter Board (Bottom Side)

No.	Interface	Description
1	J1	Connects to the main monitoring board through the connection cable.
2	J2	Connects to the lithium battery output terminal.

6.2.4.4 Internal Battery

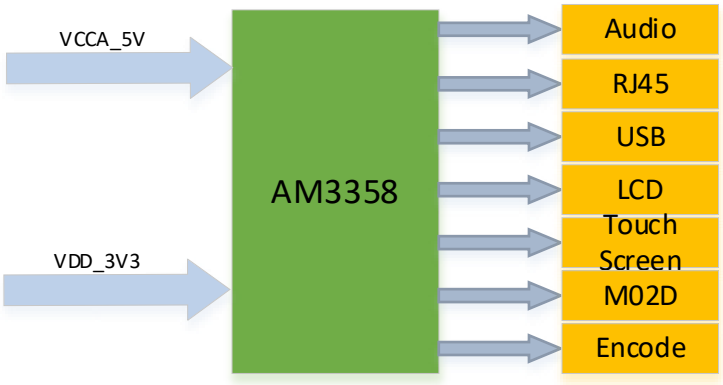
The lithium battery provides a power source for the anesthesia machine in addition to the mains power, to ensure that the anesthesia machine can work properly when the mains power

is unavailable or malfunctions.

6.2.5 Display System

6.2.5.1 Main Control Module

The main control module is located on the main monitoring board. For details, see section 1.2.3. The figure below shows the schematic block diagram.



6.2.5.2 Display Screen Assembly

The display screen assembly displays the real-time ventilation of the anesthesia machine.

The 8.0-inch display screen adopts a resolution of 1024×768, 24-bit color, and a single LVDS drive interface. Its backlight is driven by the constant current source. The display screen serves as the main output component of man-machine interaction.

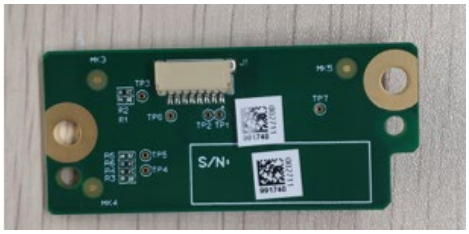
The touchscreen uses an 8.0-inch capacitive screen and I2C interface control. It serves as the main input component of man-machine interaction.

The component is installed on the display screen assembly (0675) (material code: 115-071604-00).

6.2.5.3 Power Button Board

The power button board mainly implements the power-on/off of the veterinary anesthesia machine system, and displays the status of the whole machine, power supply, and battery through the LED indicators.

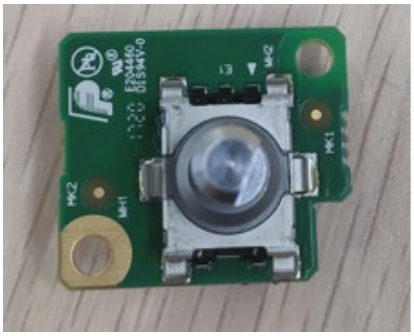
Power Button Board (Top Side)



Power Button Board (Bottom Side)

6.2.5.4 Encoder Board

The encoder board allows users to perform leftward rotation, rightward rotation, and pressing operations on the display screen.



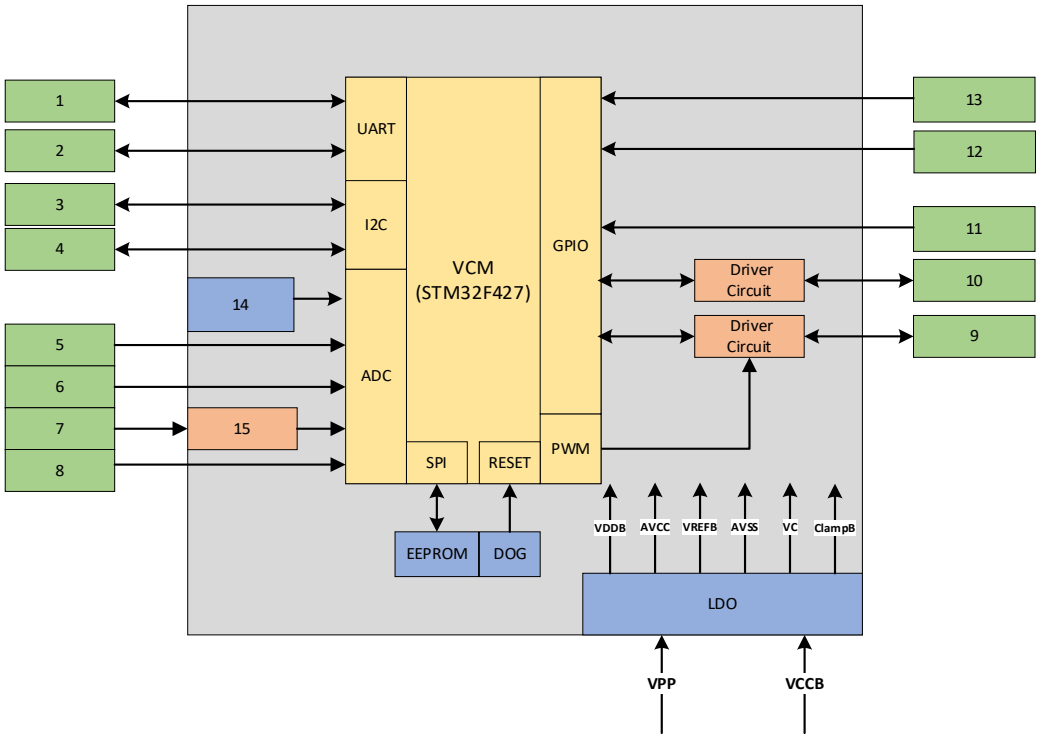
Encoder Board (Top Side)

Encoder Board (Bottom Side)

6.2.6 Monitoring System

6.2.6.1 Monitoring Module

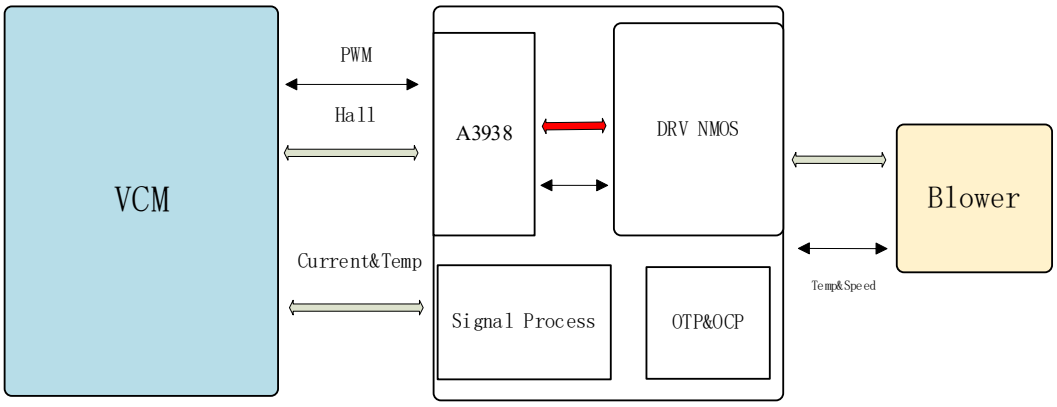
The monitoring module is located on the main monitoring board. For details, see section 1.2.3. The figure below shows the schematic block diagram.



No.	Name
1	Upper computer
2	Calibration device
3	Flow sensor
4	Differential pressure sensor
5	Blower current
6	Blower temperature
7	Pressure sensor × 2
8	Electronic scale
9	Blower
10	Cooling fan
11	ACGO switch
12	Auto/manual switch
13	Electronic scale in position
14	Voltage monitoring
15	Operational amplifying and conditioning circuit

6.2.6.2 Blower Drive Module

The blower drive module is located on the main monitoring board. For details, see section 1.2.3. The figure below shows the schematic block diagram.



6.2.6.3 Drive Gas Flow Sensor

The bidirectional flow sensor is used to monitor the flow of the drive gas and report the monitored signals to the monitoring module through the I2C bus. The inspiratory tidal volume and expiratory tidal volume can be calculated based on the feedback signals.

Flow Sensor (Top Side)

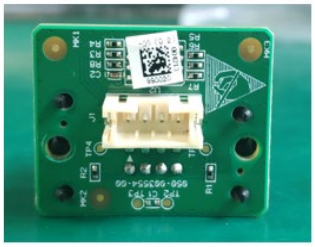
Flow Sensor (Lateral Side)

6.2.6.4 Fresh Gas Differential Pressure Sensor Board

The differential pressure sensor board is used to monitor the flow of fresh air and report the monitored signals to the monitoring module through the I2C bus.

This board is installed on the fresh gas flow differential pressure gauge assembly (material code: 115-071428-00)

Fresh Gas Differential Pressure Sensor Board (Top Side)



Fresh Gas Differential Pressure Sensor Board (Bottom Side)

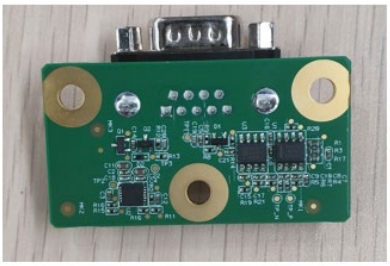
6.2.7 Electronic Scale System

6.2.7.1 Electronic Scale Sensor Board

The electronic scale sensor board is used to amplify and adjust signals of the weighing sensor, and report the adjusted signals to the monitoring module through the serial cable.

This board is installed on the electronic scale assembly (material code: 115-070799-00)

Electronic Scale Sensor Board (Top Side)

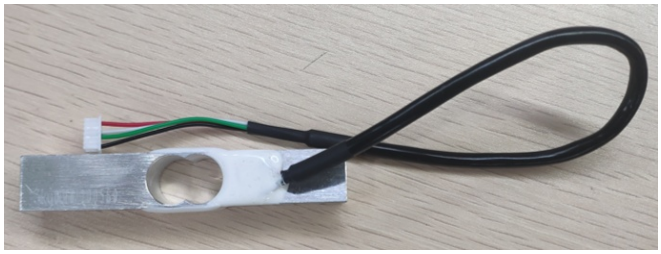


Electronic Scale Sensor Board (Bottom Side)

6.2.7.2 Weighing Sensor

The weighing sensor weighs the soda lime tank and transmits the weight to the electronic scale sensor board in the form of differential signals, for signal adjustment.

This component is installed on the electronic scale assembly (material code: 115-070799-00)



Weighing Sensor

6.2.8 Others

6.2.8.1 Cooling Fan

The cooling fan dissipates internal heat of the ventilator system during its working, to reduce the internal temperature.

6.2.8.2 Ventilator

The ventilator mainly implements automatic ventilation during surgery and can display the ventilation situation and alarms in real time. It also allows you to set the ventilation mode.

6.3 Pneumatic Part

6.3.1 Pneumatic Principle of the System (Veta 5)

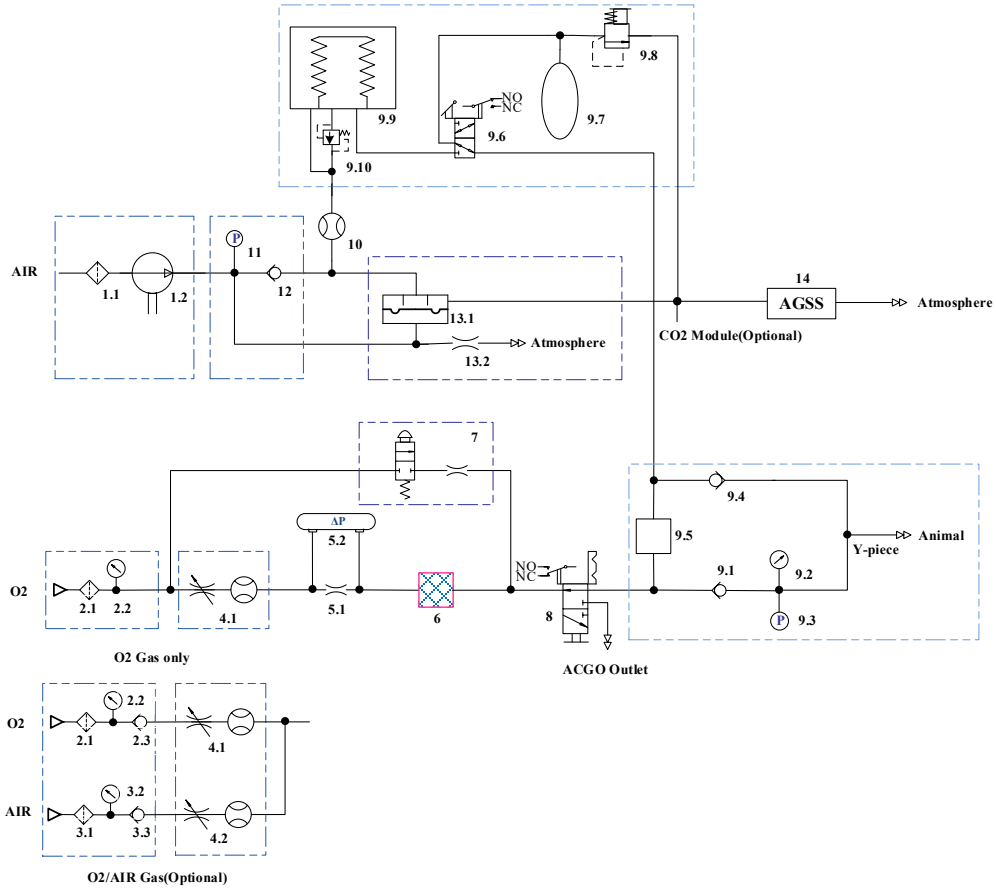


Figure 1 Pneumatic Principle Diagram (Veta 5)

No.	Name	No.	Name
1.1	HEPA filter	9.2	Airway pressure gauge
1.2	O2 supply pressure gauge	9.3	Airway pressure sensor
2.1	Filter	9.4	Expiratory one-way valve
2.2	O2 supply pressure gauge	9.5	Canister
2.3	One-way valve	9.6	Auto/manual switch
3.1	Filter	9.7	Manual bag
3.2	Air supply pressure gauge	9.8	APL valve
3.3	One-way valve	9.9	Bellows
4.1	O2 flowmeter (with needle valve)	9.10	Pop-off valve
4.2	Air flowmeter (with needle valve)	10	Bidirectional flow sensor
5.1	Fresh gas differential pressure gauge	11	Blower pressure sensor
5.2	Fresh gas differential pressure sensor	12	Damping one-way valve
6	Evaporator	13.1	Expiratory valve
7	Flushing O2	13.2	Expiratory valve resistor
8	ACGO	14	AGSS
9.1	Inspiratory one-way valve	/	/

6.3.2 Pneumatic Principle of the System (Veta 3)

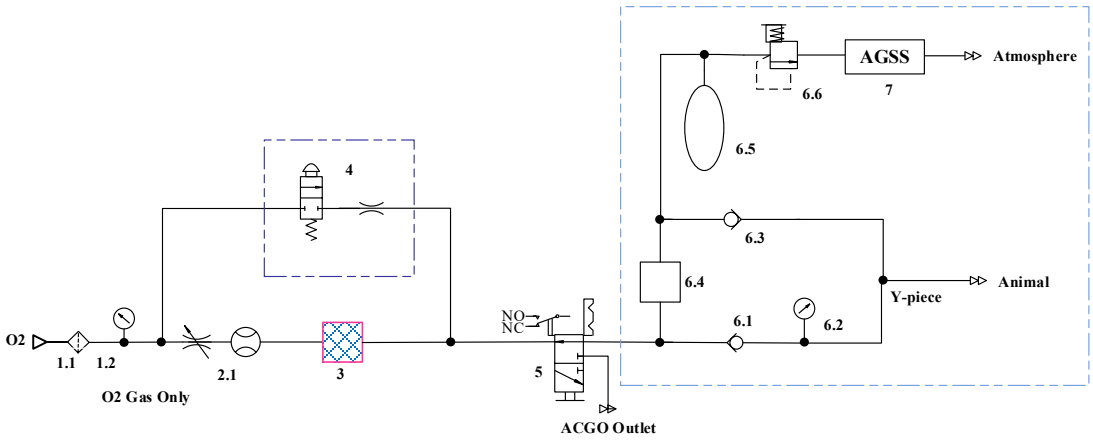


Figure 2 Pneumatic Principle Diagram (Veta 3)

No.	Name	No.	Name
1.1	Filter	6.2	Airway pressure gauge
1.2	O2 supply pressure gauge	6.3	Expiratory one-way valve
2.1	O2 flowmeter (with needle valve)	6.4	Canister
3	Evaporator	6.5	Manual bag
4	Flushing O2	6.6	APL valve
5	ACGO	7	AGSS
6.1	Inspiratory one-way valve	/	/

6.3.3 Structure of the Pneumatic System

The pneumatic system of the anesthesia machine can be classified into the following by function: anesthesia gas transport system, evaporator, anesthesia breathing system, anesthesia ventilator, and Anesthesia Gas Scavenging System (AGSS).

The airway in the anesthesia gas transport system is used to produce mixed anesthesia gases. The input of the system is one channel of O2 and one channel of air while the output is anesthetic agent gas mixture and flushing O2.

The evaporator provides a controllable concentration of anesthetic agent vapor. It supports sevoflurane and isoflurane.

The anesthesia breathing system provides a closed loop for the anesthesia gas. The CO2 in the exhaled air of animals can be absorbed in the inspiration phase so that the exhaled gas can be inhaled in a circular way, thereby maintaining the gas temperature and humidity. The breathing system allows you to select manual ventilation or mechanical ventilation mode through the auto/manual switch. It also outputs electrical signals to inform the main control board of its status changes.

The airway in the anesthesia ventilator part mainly drives the breathing process of animals.

The main function of the AGSS is to discharge the waste gas from the anesthesia machine to the hospital's disposal system.

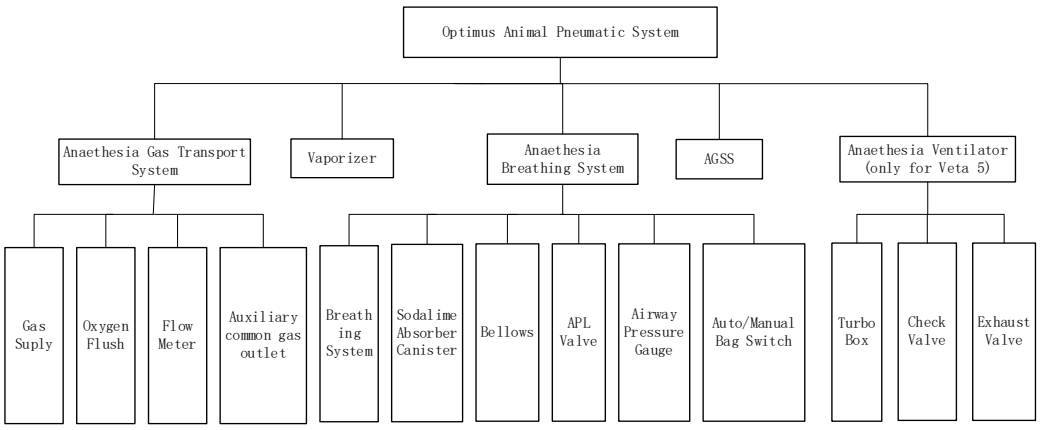


Figure 3 Structure of the Pneumatic System

6.3.4 Anesthesia Gas Transport System

6.3.4.1 Gas Supply Subsystem

Gas supply subsystem provides O2 and air for anesthesia machine. Depending on configurations, the subsystem can be available with oxygen supply inlet assembly and oxygen/air supply inlet assembly. The two assemblies are different in that the latter is equipped with the one-way valve. Depending on configurations and categories, schematic diagram of the air supply inlet assembly is as follows:

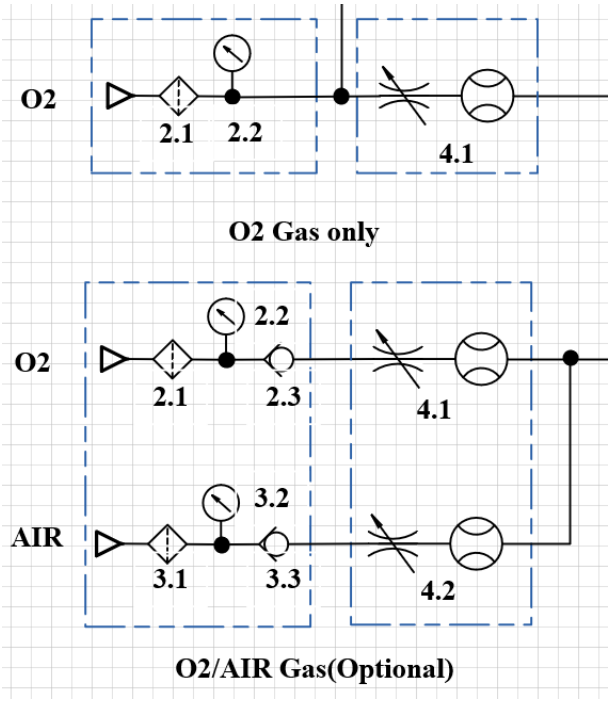


Figure 4 Pneumatic principle of the gas supply subsystem

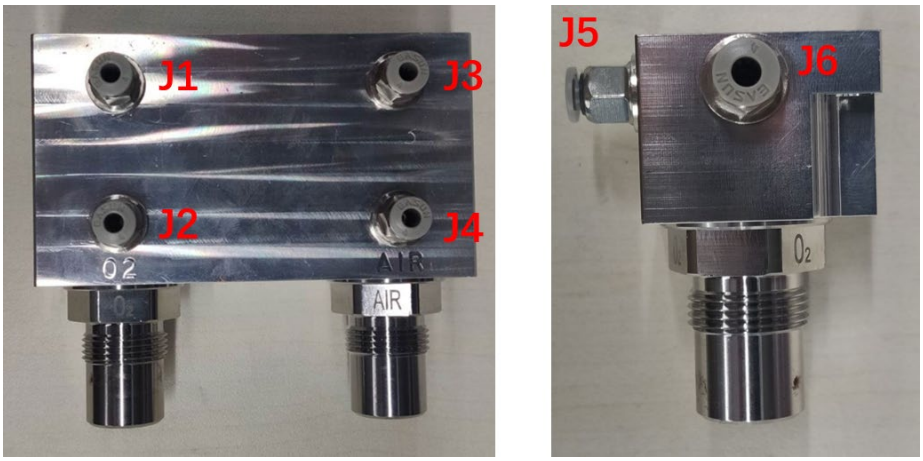


Figure 5 Structural diagram of oxygen supply inlet assembly and oxygen/air supply inlet assembly

No.	Interface	Description
1	J1	Oxygen outlet, connected to oxygen flowmeter and oxygen flush
2	J2	Oxygen supply pressure monitoring port, connected to

		oxygen supply pressure gauge
3	J3	Air outlet, connected to air flowmeter
4	J4	Air supply pressure monitoring port, connected to air supply pressure gauge
5	J5	Oxygen outlet, connected to oxygen flowmeter and oxygen flush
6	J6	Oxygen supply pressure monitoring port, connected to oxygen supply pressure gauge

6.3.4.2 Flushing O2 Subsystem

The flushing O2 subsystem consists of two connectors that respectively connect the output end of the gas supply subsystem and the front end of the ACGO assembly. The flushing O2 subsystem is equipped with a manually operated valve to supply or disconnect the supply of oxygen. The oxygen is supplied to the breathing system at 10-15 L/min (when the air supply pressure is at 280 kPa).

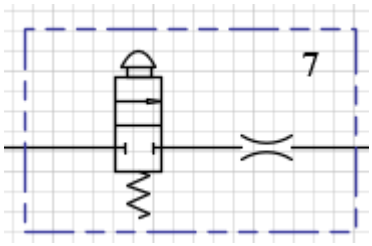


Figure 6 Pneumatic principle of flushing O2 subsystem

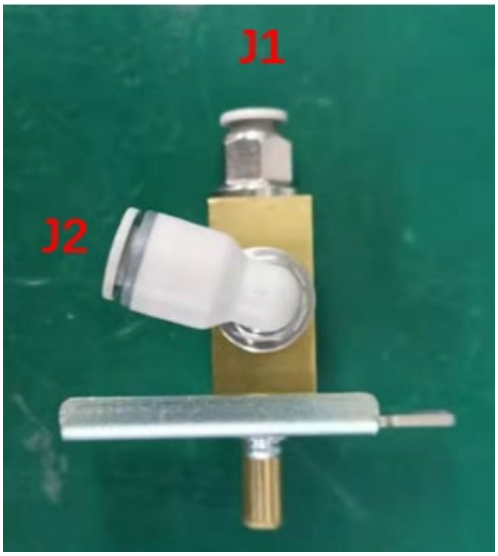


Figure 7 Structural diagram of flushing O2 subsystem

No.	Interface	Description
1	J1	Oxygen flush inlet, connected to the outlet of oxygen supply inlet assembly
2	J2	Oxygen flush outlet, connected to the inlet of ACGO switch

6.3.4.3 Glass Tube Flowmeter

Composed of needle valve and float-type glass tube flowmeter, this subsystem is used to regulate and display the flow of O2 and air. By regulating the knob of the needle valve, the flow of both gases can be regulated and displayed by the flowmeter. The flowmeter can fall into three types below: oxygen only flowmeter, oxygen-air flowmeter, and air-oxygen flowmeter.

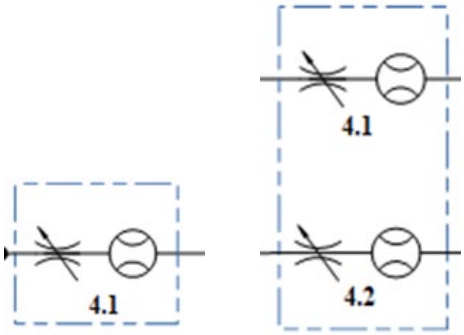


Figure 8 Principle diagram of glass tube flowmeter subsystem

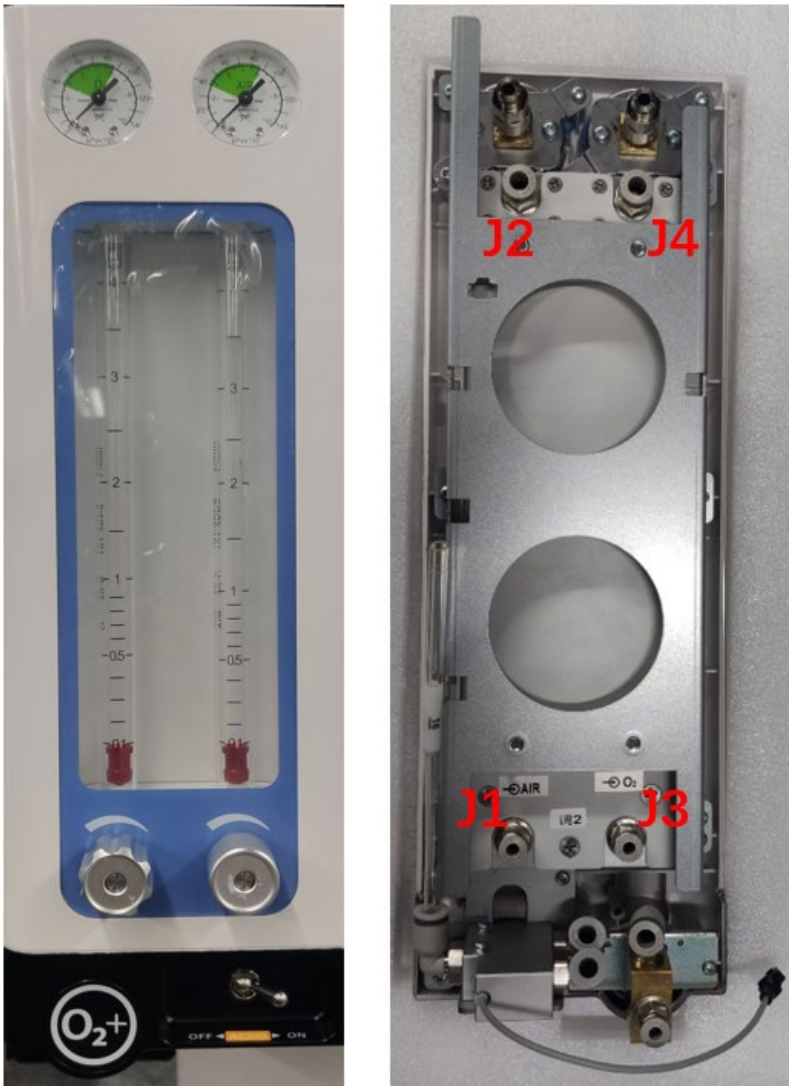


Figure 9 Structural diagram of glass tube flowmeter

No.	Interface	Description
1	J1	Air flowmeter inlet, connected to the outlet of air supply inlet assembly
2	J2	Air flowmeter outlet, connected to the inlet of differential pressure gauge assembly (Veta5) or the inlet of evaporator (Veta3)
3	J3	Oxygen flowmeter inlet, connected to the outlet of oxygen supply inlet assembly
4	J4	Oxygen flowmeter outlet, connected to the inlet of differential pressure gauge assembly (Veta5) or the inlet of evaporator (Veta3)

6.3.4.4 Fresh Gas Flowmeter Subsystem (Veta 5)

The subsystem is used to measure the fresh gas flow, consisting of a separate differential pressure gauge and a differential pressure flow sensor.

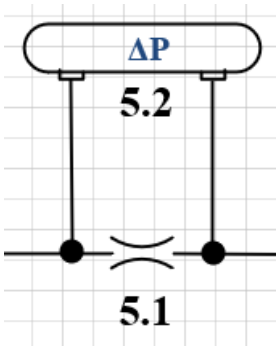


Figure 10 Principle diagram of fresh gas flowmeter

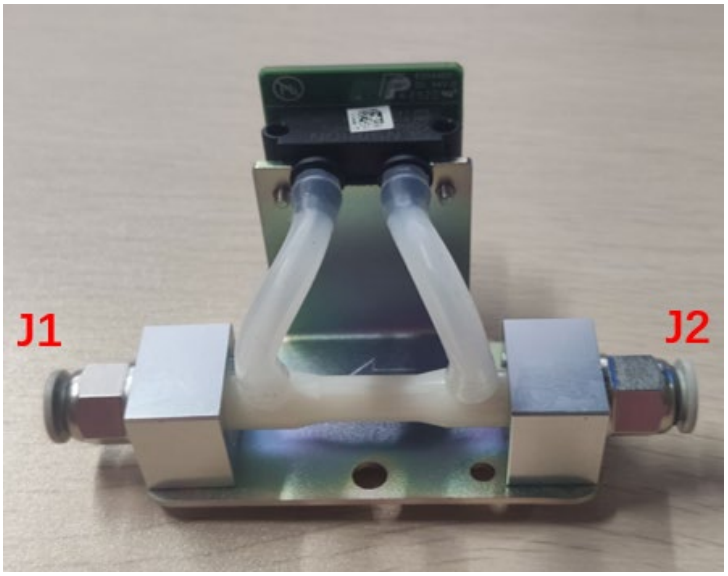


Figure 11 Structural diagram of fresh gas flowmeter

No.	Interface	Description
1	J1	Outlet of differential pressure gauge assembly, connected to the inlet of evaporator
2	J2	Inlet of differential pressure gauge assembly, connected to the outlet of flowmeter

6.3.4.5 Auxiliary Common Gas Outlet Subsystem (ACGO)

It delivers the gas flowing through the evaporator and flushing O2 to the breathing circuit or directly to the independent ACGO outlet, which is a coaxial joint with 22 mm outer cone and 15 mm inner cone. The principle diagram of the ACGO assembly is as follows:

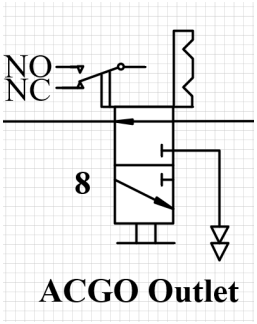


Figure 12 Principle diagram of the ACGO assembly

Figure 13 Structural diagram of ACGO switch valve

No.	Interface	Description
1	J1	ACGO inlet, connected to the evaporator outlet and the oxygen flush outlet
2	J2	ACGO outlet 1, connected to fresh gas connector
3	J3	ACGO outlet 2, connected to ACGO 22 mm conical interface

6.3.5 Mechanical Evaporator System

It accurately delivers anaesthetic at a given concentration to the anesthesia breathing circuits. The gas supply enters the evaporation tank from the inlet and then flows into two channels. Gas of one channel will enter the drug pool to bring out the anaesthetic gas as carrier gas, while gas of the other channel will act as bypass fresh gas and mix with the carrier gas and enter the ACGO from the outlet. User can rotate the hand wheel at the top to adjust the gas concentration. Fixed by metal sheet in the machine, the evaporation tank connects the gas circuits by using two quick connectors. Its structure is as follows:

Figure 14 Structural diagram of mechanical evaporator

No.	Interface	Description
1	J1	Evaporator outlet, connected to ACGO inlet
2	J2	Evaporator inlet, connected to the outlet of differential pressure gauge assembly (Veta5) or the outlet of flowmeter (Veta3)

6.3.6 Anesthesia Breathing System

It is an inspiratory and expiratory passage through which gas flows under breathing pressure between a fresh gas inlet, an animal connection port, and an exhaust valve/port. It provides a closed loop for the anesthesia gas, allowing the carbon dioxide breathed out by animals to be absorbed and to re-enter the breathing circuit to ensure anesthetic depth in animals is under control. The principle diagram is as follows:

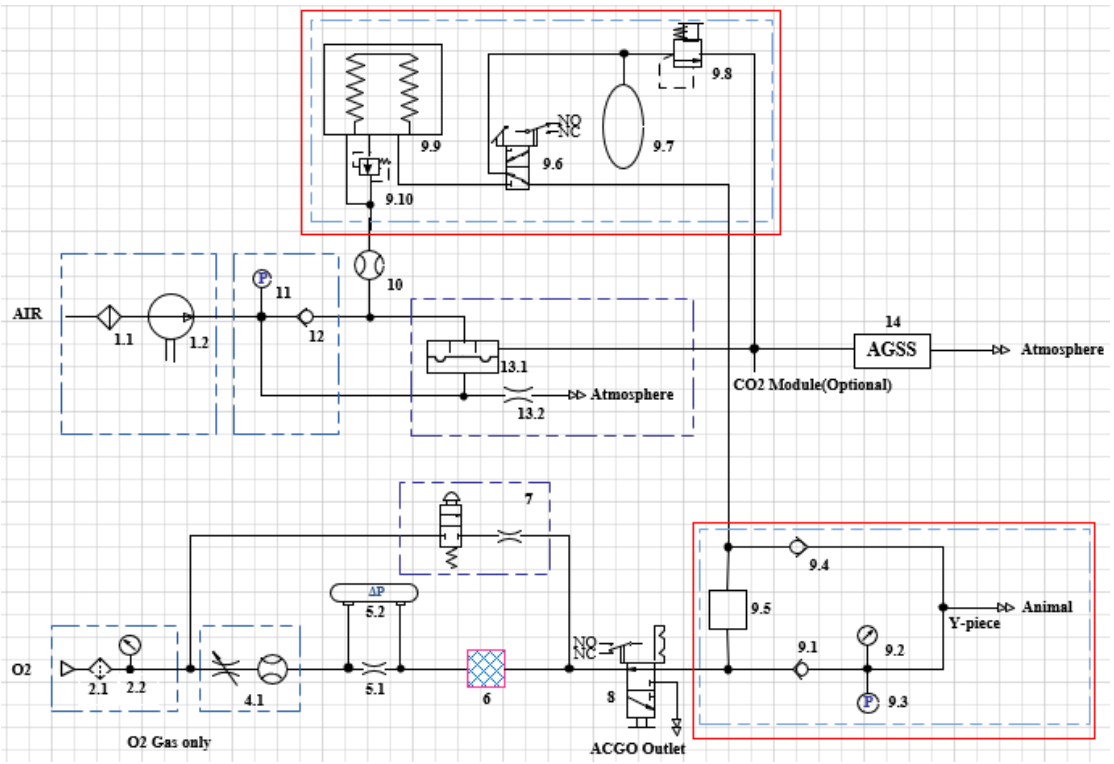


Figure 15 Principle diagram of anesthesia breathing system (Veta5)

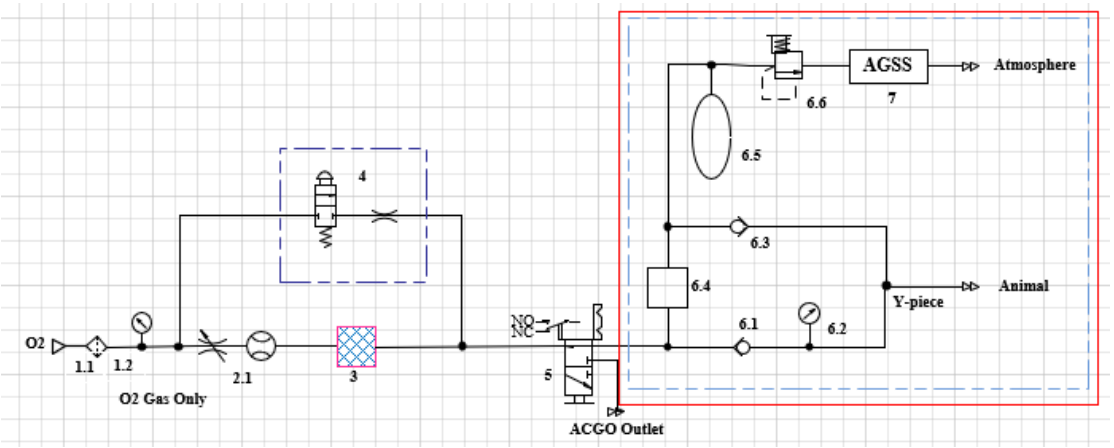


Figure 16 Principle diagram of anesthesia breathing system (Veta3)

In mechanical mode, when air is inhaled, the drive gas pushes mixed gases inside the bellows (9.9). After passing auto/manual valve (9.6) and canister (9.5), it mixes with fresh gas and the mixed gas passes through the inspiratory one-way valve (9.1) and the breathing circuit connected to the suction interface and finally enters the lungs of animals. The CO2 in the mixed gas will be removed by the absorbent contained in the canister (for example, soda lime), so that CO2 will not be inhaled by animals repeatedly. When air is exhaled, the mixed gas from animals' lungs passes through the breathing circuit connected to the expiration interface; after flowing through the expiratory one-way valve (9.4) and manual valve (9.6), it returns to the bellows (9.9) and pushes out the drive gas generated from the previous

inspiratory cycle through the expiratory valve (13.1), therefore completing a respiratory cycle. In manual mode, the manual valve (9.6) is switched to the manual position. At this time, press the manual bag (9.7) to control the patient's breathing, and the excess gas will overflow through the APL valve (9.8).

Figure 17 Structural diagram of loop (Veta5)

No.	Interface	Description
1	J1	Expiration interface, connected to the expiration side of the patient tube
2	J2	Inspiration interface, connected to the inspiration side of the patient tube
3	J3	Fresh gas inlet, connected to ACGO outlet 1
4	J4	Exhaust gas outlet of APL valve, connected to AGSS
5	J5	Airway pressure sensor monitoring port, connected to airway pressure sensor
6	J6	Drive gas inlet, connected to expiratory valve outlet
7	J7	Auto/manual switch cable

Figure 18 Structural diagram of loop (Veta3)

No.	Interface	Description
1	J1	Expiration interface, connected to the expiration side of the patient tube
2	J2	Inspiration interface, connected to the inspiration side of the patient tube
3	J3	Fresh gas inlet, connected to ACGO outlet 1
4	J4	Exhaust gas outlet of APL valve, connected to AGSS

6.3.7 Anesthesia Ventilator

It mainly consists of blower box assembly, one-way valve assembly, expiratory valve assembly, and bidirectional flow sensor. It has the following functions:

- Driving the inspiration of animals
- Monitoring and regulating ventilation parameters of animals

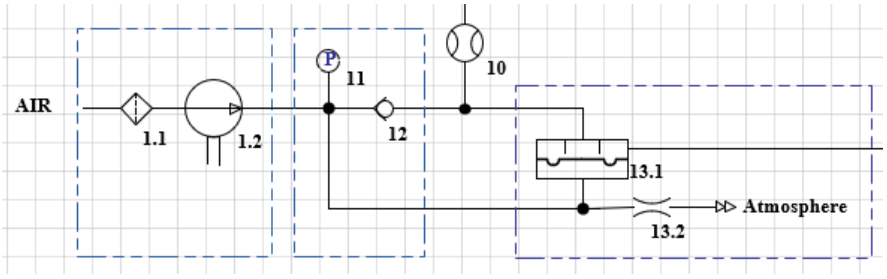


Figure 19 Pneumatic principle of anesthesia ventilator

After passing through the HEPA filter 1.1, the air enters the blower 1.2. After being compressed by the blower, it passes through the one-way valve 12 and flow sensor 10 and enters and squeezes the bellows so that the gas inside the bellows enters the animals' lungs. The blower pressure sensor 11 is intended for monitoring the output pressure of the blower. The one-way valve 12 is intended for forming a differential pressure. It acts on both sides of the expiratory valve diaphragm inside the expiratory valve 13.1 to control the inspiratory branch pressure. When gas is inhaled, as a differential pressure exists at the one-way valve, some gas will flow to PEEP control chamber of expiratory valve and therefore to realize control over the expiratory valve and inspiration. When gas is exhaled, the one-way valve will close due to impact of reverse air flow, and at the same time the expiratory valve turns on, realizing control over expiration.

6.3.7.1 Blower Assembly

It provides the anesthesia ventilator with HEPA filtered drive gas and the outlet pressure monitoring port is used to monitor the output pressure of the blower. The blower inlet also provides entrance labyrinth to reduce noise.

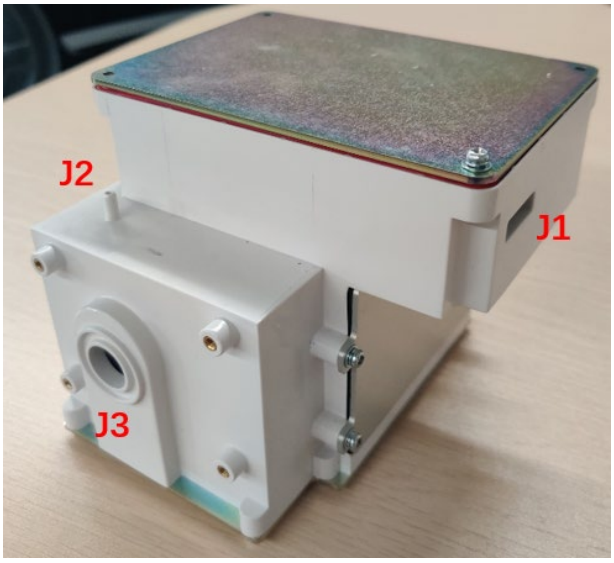


Figure 20 Structural Diagram of Blower Assembly

No.	Interface	Description
1	J1	Blower assembly inlet, connected to HEPA filter
2	J2	Blower outlet pressure monitoring port, connected to blower pressure sensor
3	J3	Blower assembly outlet, connected to one-way valve assembly

6.3.7.2 One-way valve assembly

It is used for coupling control of inspiration and expiration. When gas is inhaled, as a differential pressure exists at the one-way valve, some gas will flow to PEEP control chamber of expiratory valve and therefore to realize control over the expiratory valve and inspiration. When gas is exhaled, the one-way valve will close due to impact of reverse air flow, and at the same time the expiratory valve turns on, realizing control over expiration.

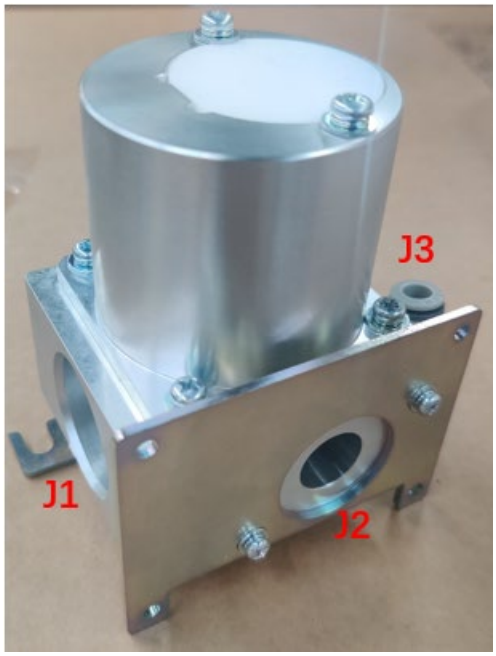


Figure 21 Structural diagram of one-way valve assembly

No.	Interface	Description
1	J1	One-way valve assembly outlet, connected to expiratory valve assembly inlet
2	J2	One-way valve assembly inlet, connected to blower assembly outlet
3	J3	PEEP drive gas interface, connected to drive gas inlet of expiratory valve PEEP

6.3.7.3 Expiratory Valve Assembly

It is used to control the exhalation of animals and provide a certain PEEP pressure. Its pneumatic principle is as follows:

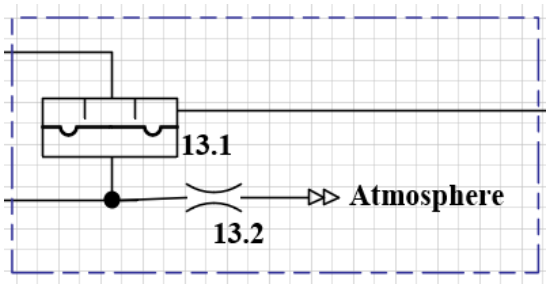


Figure 22 Principle diagram of expiratory valve assembly

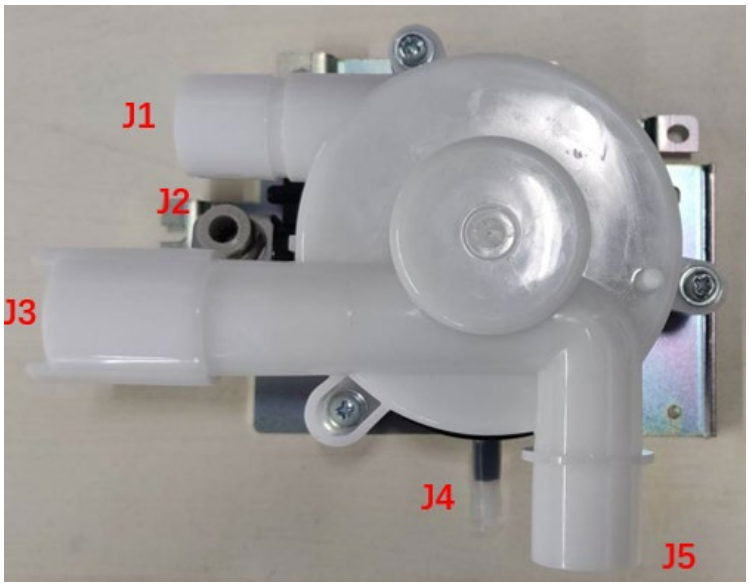


Figure 23 Structural diagram of expiratory valve assembly

No.	Interface	Description
1	J1	Exhaust gas outlet, connected to AGSS
2	J2	PEEP drive gas inlet, connected to drive gas interface of one-way valve assembly PEEP
3	J3	Expiratory valve outlet, connected to drive gas inlet of loop
4	J4	Blocked
5	J5	Expiratory valve inlet, connected to one-way valve assembly outlet

7 Tests

NOTE

- **The anesthesia system must be electrified (using AC rather than the battery) before the ventilation test is performed.**

7.1 Power-on Self-Test (Veta 5)

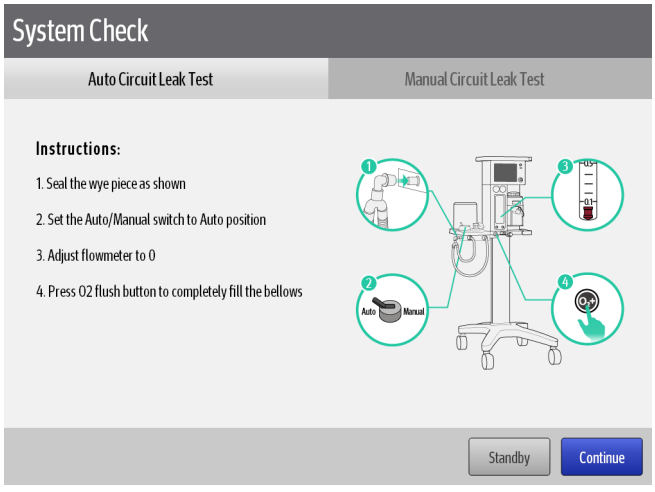
7.1.1 Test Preparations

N/A

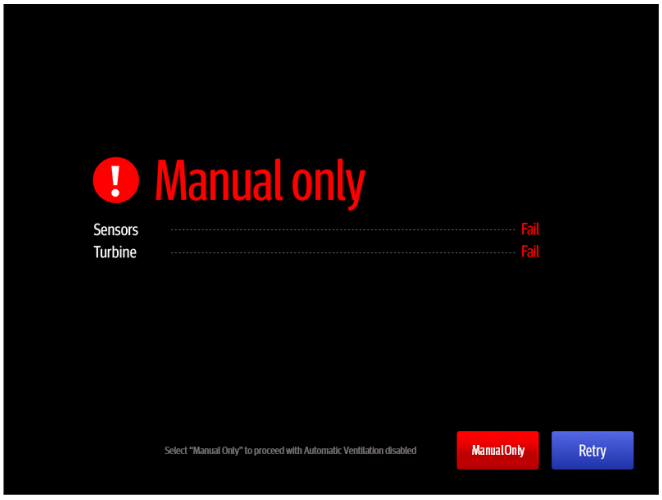
7.1.2 Test Procedure

1. Press the power button to power on the anesthesia machine.
2. A beep sound is generated when the machine starts up. An animal pattern loading screen is displayed and the system performs power-on self-test, as shown in the figure below.

3. After the power-on self-test is successful, the system check screen is displayed.



4. If the power-on self-test fails, a screen as shown in the figure below is displayed.



7.2 Breathing System Leak Test

7.2.1 Test Preparations

Required items: breathing tube, manual bag
Oxygen gas supply (pipeline gas supply or oxygen generator)

7.2.2 Test Procedure

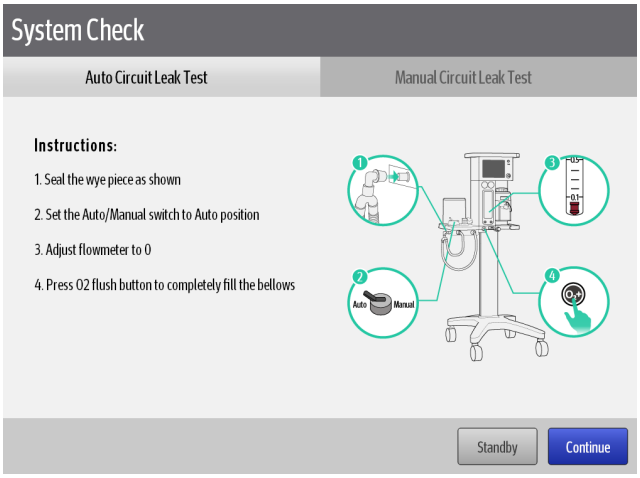
Veta 5:

1. Connect the machine to the oxygen gas supply.
2. After the system passes the power-on self-test, it automatically displays the automatic leak test screen.

Alternatively, go to the standby screen from the home screen and tap 

.

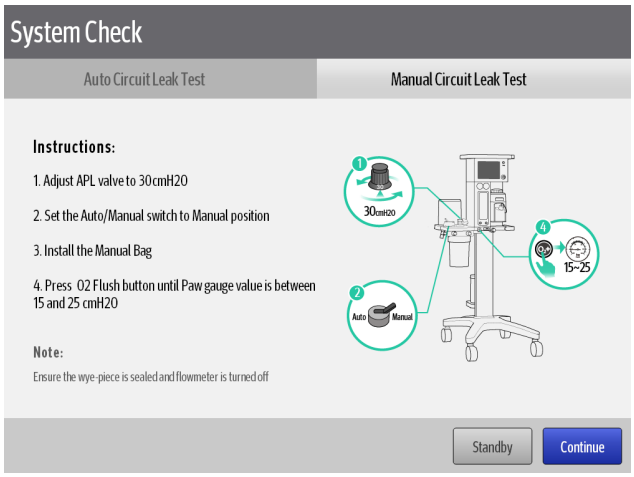
3. Follow prompts indicated on the screen to complete the automatic circuit leak test.
   A. Close the Y-piece.
   B. Turn the auto/manual switch to the auto position.
   C. Adjust the flowmeter to zero.
   D. Press the O2 flush button so that the bellows reaches the top of the bellows housing.
   E. Tap **Continue** and wait till the auto ventilation leak test is completed.



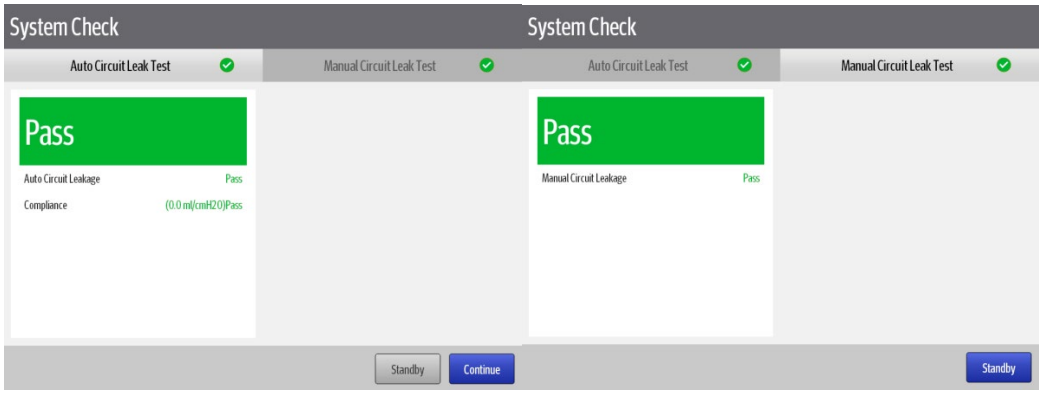
4. Follow prompts indicated on the screen to complete the manual circuit leak test.
   A. Adjust the APL valve to the 30 cmH2O position.
   B. Turn the auto/manual switch to the manual position.
   C. Install the manual bag.
   D. Hold down the O2 flush button to make the reading of the airway pressure gauge between 15 cmH2O and 25 cmH2O.
   E. Tap **Continue** and wait till the manual circuit leak test is completed.

NOTE

- **Ensure that the Y-piece and flow meter are closed.**



5. Ensure that the tests are passed: The system passes the automatic circuit leak test, compliance test, and manual circuit leak test.



Veta 3:

6. Connect the machine to the oxygen gas supply.
7. Connect the manual bag to the manual bag connector.
8. Ensure that the Y-piece and flowmeters are closed.

9. Adjust the APL valve to the 30 cmH2O position.
10. Hold down the O2 flush button to make the reading of the airway pressure gauge between 15 cmH2O and 25 cmH2O.
11. Release the O2 flush button. Observe the airway pressure gauge and ensure that the reading drop does not exceed 10 cmH2O from 20 cmH2O within 15s.

7.3 Gas Supply Test

7.3.1 Test Preparations

Air supply and oxygen supply (pipeline gas supply or oxygen generator)

7.3.2 Test Procedure

■ Oxygen supply test

12. Use an oxygen supply hose to connect the machine to the oxygen gas supply connector on the wall or oxygen generator.

13. Check that the reading of the oxygen supply pressure gauge is within the range of 280 kPa to 600 kPa.
14. Open the oxygen needle valve to the maximum. The float of the oxygen flowmeter should be at the top of the flowmeter.
15. Disconnect the gas supply of the oxygen pipeline or turn off the oxygen generator.
16. Check that the reading of the oxygen pressure gauge finally drops to zero.
17. Check that the float of the oxygen flowmeter finally drops to the bottom of the flowmeter.

■ Air supply test

18. Use an air supply hose to connect the machine to the air supply connector on the wall.
19. Check that the reading of the air supply pressure gauge is within the range of 280 kPa to 600 kPa.
20. Open the air needle valve to the maximum. The float of the air flowmeter should be at the top of the flowmeter.
21. Disconnect the gas supply of the air pipeline.
22. Check that the reading of the air pressure gauge finally drops to zero.
23. Check that the float of the air flowmeter finally drops to the bottom of the flowmeter.

7.4 Flowmeter Test

7.4.1 Test Preparations

Air supply and oxygen supply (pipeline gas supply or oxygen generator)
VT900 (applicable to Veta 3)

7.4.2 Test Procedure

Veta 5:

■ Oxygen flowmeter test

1. Connect the oxygen supply.
2. Close the oxygen needle valve.
3. Press the power button to start the machine.
4. In standby mode, tap  to open the main menu. Then, tap  and enter the service password to enable the system to enter the service mode. Tap and view the actual value of **Fresh Gas Flow** in **VCM**. Adjust the oxygen needle valve until the flowmeter displays 0.4 L/min, 2 L/min, 4 L/min, and compare the displayed actual value with the flowmeter reading.

Flowmeter Reading (L/min)	Acceptance Range of Actual Value Displayed on the Data Monitors Screen
0.4	0.3-0.5
2	1.8-2.2
4	3.6-4.4

5. If the actual value displayed on the **Data Monitors** screen corresponding to the flowmeter reading is within the range above, the flowmeter meets requirements.

■ Air flowmeter test

1. Connect the air supply.
2. Close the air needle valve.
3. Press the power button to start the machine.
4. In standby mode, tap  to open the main menu. Then, tap  and enter the service password to enable the system to enter the service mode. Tap  and view the actual value of **Fresh Gas Flow** in **VCM**. Adjust the oxygen needle valve until the flowmeter displays 0.4 L/min, 2 L/min, 4 L/min, and compare the displayed actual value with the flowmeter reading.

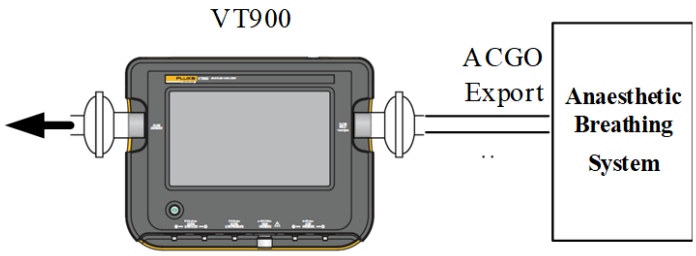
Flowmeter Reading (L/min)	Acceptance Range of Actual Value Displayed on the Data Monitors Screen
0.4	0.3-0.5
2	1.8-2.2
4	3.6-4.4

5. If the actual value displayed on the **Data Monitors** screen corresponding to the flowmeter reading is within the range above, the flowmeter meets requirements.

Veta 3:

■ Oxygen flowmeter test

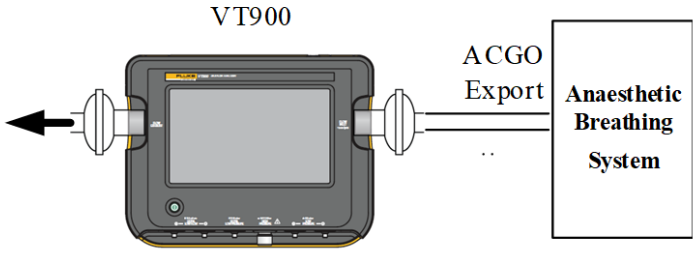
24. Connect the oxygen supply.
25. Connect VT900 to the ACGO. On the VT900, set the gas to O2, and correction mode to STPD20, and configure flow monitoring.



26. Turn on the ACGO switch.
27. Adjust the oxygen needle valve until the flowmeter displays 0.4 L/min, 2 L/min, and 4 L/min. Compare the flowmeter reading with the reading of VT900. The deviation should not be greater than ±0.1 or 10% of the flowmeter reading, whichever is greater.

■ Air flowmeter test

28. Connect the air supply.
29. Connect VT900 to the ACGO. On the VT900, set the gas to air, and correction mode to STPD20, and configure flow monitoring.



30. Turn on the ACGO switch.
31. Adjust the air needle valve until the flowmeter displays 0.4 L/min, 2 L/min, and 4 L/min. Compare the flowmeter reading with the reading on VT900. The deviation should not be greater than ±0.1 or 10% of the flowmeter reading, whichever is greater.

7.5 Vaporizer Test

7.5.1 Back Pressure Test of the Vaporizer

WARNING

- **The anesthetic agent comes from the fresh gas outlet during the test. These agents should be discharged and collected in a safe and qualified way.**
- **To avoid damage, turn the needle valve clockwise to the bottom before use.**

7.5.1.1 Test Preparations

Oxygen gas supply (pipeline gas supply or oxygen generator)

7.5.1.2 Test Procedure

32. Connect the oxygen supply.
33. Ensure that the system is in manual ventilation mode and set the APL valve to the MIN position.
34. Connect the Y-piece on the breathing circuit to the leak test end and the other two ends to the expiratory end and inspiratory end of the circuit.
35. Adjust the oxygen needle valve, set the oxygen flow to 4 L/min, and keep the oxygen flow unchanged.
36. Adjust the vaporizer concentration in the range of 0% to 1% and observe the oxygen flow change. Ensure that the oxygen flow decrease should not be greater than 1 L/min in the whole adjustment range of the vaporizer concentration test. Otherwise, use another good vaporizer and repeat this step.

NOTE

- **The output of the vaporizer is very small in the range of "OFF" to the first graduation above "0". Do not perform the vaporizer test in this range.**

7.5.2 Vaporizer Leak Test

7.5.2.1 Test Preparations

Required items: breathing tube, manual bag

Oxygen gas supply (pipeline gas supply or oxygen generator)

7.5.2.2 Test Procedure

1. Turn the auto/manual switch to the manual position. (Veta 5)
2. Connect the manual bag to the manual bag connector.

3. Connect the Y-piece on the breathing circuit to the leak test end and the other two ends to the expiratory end and inspiratory end of the circuit.

4. Set the vaporizer to at least 1% (ensure that there is no anesthetic agent inside the vaporizer).
5. Adjust the APL valve to the 30 cmH2O position.
6. Hold down the O2 flush button to make the reading of the airway pressure gauge between 15 cmH2O and 25 cmH2O.
7. Release the O2 flush button. Observe the airway pressure gauge and ensure that the reading drop does not exceed 10 cmH2O from 20 cmH2O within 15s.
8. Turn off the vaporizer.

7.6 Other Functional Tests

7.6.1 ACGO Test

7.6.1.1 Test Preparations

Oxygen gas supply (pipeline gas supply or oxygen generator)

VT900 (Set the gas to O2, and correction mode to STPD20, and configure flow monitoring.)

7.6.1.2 Test Procedure

37. Connect the oxygen supply, block the expiratory end and the manual bag connector, and ensure that the system is in manual mode.
38. Turn off the ACGO switch and set the flow of the oxygen flowmeter to 2 L/min.
39. Use VT900 to measure the oxygen flow at the inspiratory end. Compare the flowmeter reading with the reading on VT900. The deviation should not be greater than ±0.2 L/min.
40. Turn on the ACGO switch to enable the system to enter the ACGO mode. For Veta 5, ensure that the screen displays a message indicating that ACGO is open.
41. Use VT900 to measure the oxygen flow at the expiratory end. Compare the flowmeter reading with the reading on VT900. The deviation should not be greater than ±0.2 L/min.

7.6.2 O2 Flush Test

7.6.2.1 Test Preparations

Manual bag

Air supply and oxygen supply (pipeline gas supply or oxygen generator)

7.6.2.2 Test Procedure

1. Connect the 280 kPa oxygen pipeline supply or oxygen generator.
2. Turn the auto/manual switch to the manual position (Veta 5).
3. Keep the anesthesia machine in standby mode (Veta 5).
4. Use a leak test plug to block the patient connection port.
5. Connect a 3 L or 1 L manual bag to the manual bag connector.
6. Set ACGO to the closed state.
7. Make the manual bag in a completely collapsed state.
8. Adjust the APL valve to the 50cmH2O position.
9. Hold down the O2 flush button and measure the time required for the airway pressure gauge to rise to 40cmH2O.
10. Repeat this operation more than twice.
11. Check whether the time for filling the manual bag (the airway pressure gauge rises to 40 cmH2O) is within the following range.

- 3 L manual bag: 12s to 18s.
- 1 L manual bag: 4s to 6s.

NOTE

- **Empty air out of the manual bag before each inflation.**

7.7 Functional Tests Related to the Breathing Circuit

7.7.1 One-way Valve Test

⚠WARNING

- **Foreign matters in the breathing circuit will block the air flow to a patient, which may potentially lead to a fatal accident. Ensure that there is no leak test plug or other foreign matters in the breathing circuit.**
- **Do not use a leak test plug that is too small and can easily fall into the breathing system.**

7.7.1.1 Test Preparations

Breathing tube, manual bag, one-time lung

Air supply or oxygen gas supply

7.7.1.2 Test Procedure

1. Connect the air supply or oxygen gas supply.
2. Turn the auto/manual switch to the manual position (Veta 5).
3. Connect the manual bag to the manual bag connector and connect the breathing tube to the one-time lung.
4. Squeeze the manual bag and confirm that the inspiratory valve is open and the expiratory valve is closed.
5. Release the manual bag and confirm that the inspiratory valve is closed and the expiratory valve is open.

7.7.2 APL Valve Test

7.7.2.1 Test Preparations

Breathing tube, manual bag

Oxygen gas supply (pipeline gas supply or oxygen generator)

7.7.2.2 Test Procedure

1. Turn the auto/manual switch to the manual position (Veta 5).
2. Connect the manual bag to the manual bag connector.
3. Connect the Y-piece on the breathing circuit to the leak test port.
4. Turn the APL valve control knob to the 70 cmH2O position.
5. Set the fresh gas flow to 3 L/min.
6. Ensure that the reading of the airway pressure gauge is in the range of 59.5 cmH2O to 80.5 cmH2O.
7. Turn the APL valve control knob to the MIN position.
8. Set the oxygen flow to 3 L/min.
9. Ensure that the reading of the airway pressure gauge does not exceed 10 cmH2O.
10. Hold down the APL blocking key to ensure that the reading of the airway pressure gauge increases by $30cmH_2O \pm 10cmH_2O$ on the basis of the original reading.
11. Release the APL blocking key, close the oxygen flowmeter, and ensure that the reading of the airway pressure gauge does not drop below 0 cmH2O.

7.7.3 Bellows Test (Veta 5)

7.7.3.1 Test Preparations

Oxygen gas supply, breathing tube

7.7.3.2 Test Procedure

1. Press the power button to start the machine.
2. Set the system to work in standby mode.
3. Turn the auto/manual switch to the auto position.
4. Turn the oxygen flow control knob to cut off the oxygen supply.

5. Insert the leak test plugs into the Y-piece on the corrugated hose to close the Y-piece.
6. Press the O2 flush button to completely fill the bellows so that the bellows reach the top of the bellows housing.
7. The drop of the large bellows does not exceed 300 mL within 1 min, and the drop of the small bellows does not exceed 100 mL within 1 min. If a bellows drops, the bellows leaks. Reinstall the bellows.

7.8 Ventilation Performance Tests of the System

7.8.1 VCV Mode Test (Veta 5)

7.8.1.1 Test Preparations

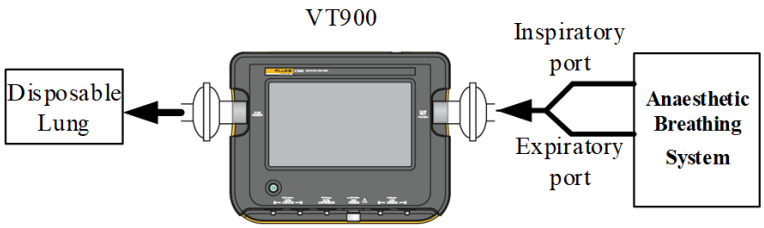
Oxygen supply

Breathing tube, one-time lung

VT900

7.8.1.2 Test Procedure

1. Connect the oxygen supply.
2. Connect the one-time lung to the Y-piece on the breathing circuit.
3. Connect VT900 between the one-time lung and Y-piece. On the VT900, set the gas to O2 and correction mode to BTPS, and configure expiratory tidal volume monitoring.



4. Set the oxygen flow to 0.5 L/min.
5. Turn the auto/manual switch to the auto position.
6. Set ventilation control parameters as follows:

Ventilation Control Parameter	Value
Ventilation mode	VCV
Tidal volume	50
Breath frequency	20
Inspiratory time:expiratory time ratio	1:2
PEEP	OFF
Trigger	Auto

7. Start ventilation.
8. Verify that the screen can properly display the pressure waveform, airway pressure, PEEP, tidal volume, breath frequency, and minute volume.

9. Compare the tidal volume displayed on the anesthesia machine and the tidal volume reading of VT900 about 1 minute after the commencement of ventilation, and verify that the deviation does not exceed ±15 mL.

7.8.2 PCV Ventilation Mode Test (Veta 5)

7.8.2.1 Test Preparations

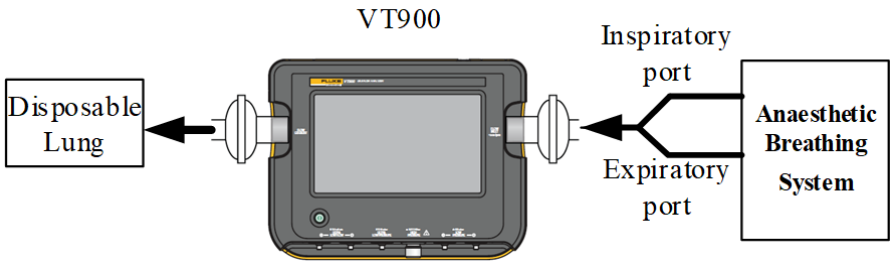
Oxygen supply

Breathing tube, one-time lung

VT900

7.8.2.2 Test Procedure

1. Connect the oxygen supply.
2. Connect the one-time lung to the Y-piece on the breathing circuit.
3. Connect VT900 between the one-time lung and Y-piece. On the VT900, configure airway pressure monitoring.



4. Set the oxygen flow to 0.5 L/min.
5. Set respiration parameters as follows:

Ventilation Control Parameter	Value
Ventilation mode	PCV
Inspiratory pressure	15
Breath frequency	10
Inspiratory time: expiratory time ratio	1:2
PEEP	OFF
Trigger	Auto

6. Start ventilation.
7. Verify that the screen can properly display the pressure waveform, airway pressure, PEEP, tidal volume, breath frequency, and minute volume.
8. Compare the peak airway pressure displayed on the anesthesia machine and the peak airway pressure reading of VT900 about 1 minute after the commencement of ventilation, and verify that the deviation does not exceed ±3 cmH2O.

7.8.3 Manual Ventilation Test

7.8.3.1 Test Preparations

Breathing tube, manual bag, one-time lung

Oxygen gas supply (pipeline gas supply or oxygen generator)

7.8.3.2 Test Procedure

1. Connect the oxygen supply and press the power button to start the machine.
2. Connect the breathing circuit and manual bag.
3. Turn the auto/manual switch to the manual position (Veta 5).
4. Adjust the APL valve to the 25 cmH2O position. Hold down the O2 flush button to completely fill the manual bag.
5. Turn the flowmeter knob to set the oxygen flow to 1 L/min.
6. Pinch the manual bag once every 3 seconds.
7. Confirm the expansion and contraction of the one-time lung.
8. For Veta 5, confirm that the screen displays the pressure waveform, airway pressure, and breath frequency during ventilation.

7.9 Blower Test (Veta 5)

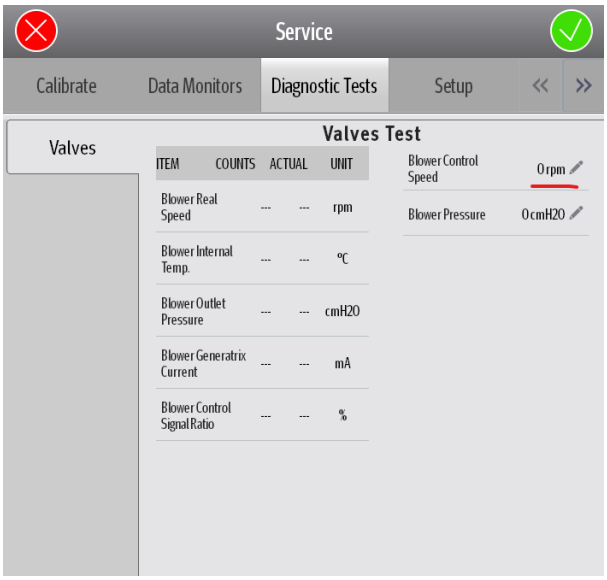
7.9.1 Test Preparations

N/A

7.9.2 Test Procedure

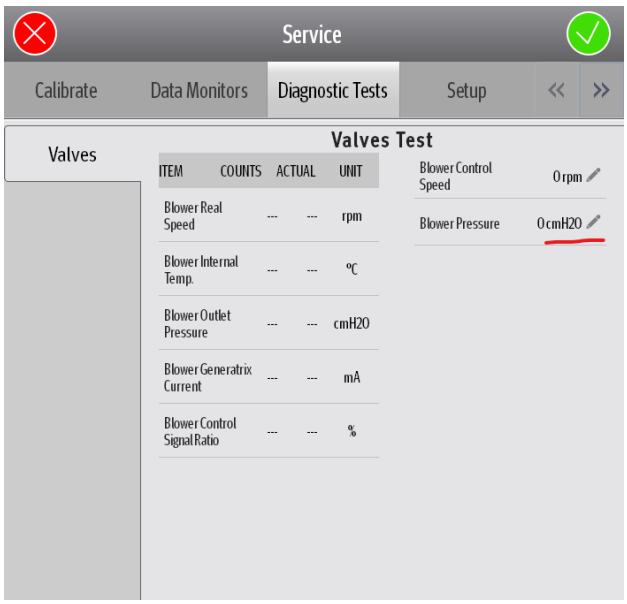
1. Press the power button to start the machine and turn the auto/manual switch to the auto position.
2. Remove the bellows, reinstall the bellows housing, block the expiratory port, and ensure that the drive gas is discharged from the inspiratory port.

3. In standby mode, tap  to open the main menu. Tap Service to enable the system to enter the service mode. Tap Data Monitors to go to the valve test screen. On the **Valves Test** screen, tap the pencil icon marked with a red line as shown in the figure below to set the blower control speed.



4. Set the blower speed to 0, 10000 rpm, 30000 rpm, and 50000 rpm separately and compare the actual value of the blower speed with the set value (allowable error ±10%). Ensure that the actual temperature inside the blower is below 80°C.

5. In standby mode, tap  to open the main menu. Tap  to enable the system to enter the service mode. Tap  to go to the valve test screen. On the **Valves Test** screen, tap the pencil icon marked with a red line as shown in the figure below to set the blower outlet pressure. Set the blower pressure to 80 cmH2O, 50 cmH2O, 20 cmH2O, and 10 cmH2O separately and compare the actual blower outlet pressure and set value (allowable error ±5 cmH2O). Ensure that the temperature inside the blower is below 80°C.



7.10 CO2 Module Test (Veta 5)

7.10.1 Test Preparations

N/A

7.10.2 Test Procedure

1. Press the power button to start the machine.
2. Set the system to work in any ventilation mode.
3. In ventilation mode, tap  to open the main menu. Tap  to enable the system to enter the service mode. Tap  to view the pump rate in  .
4. Install a neonate watertrap and check that the pump rate is 90 mL/min±15 mL/min.
5. Install an adult watertrap and check that the pump rate is 120 mL/min±18 mL/min.

7.11 Touchscreen Test (Veta 5)

7.11.1 Test Preparations

N/A

7.11.2 Test Procedure

1. Press the power button to start the machine.
2. After the system check is completed, tap **Standby**.
3. Ensure that the screen displays information normally, and no black screen, flash screen, or pixel color abnormality occurs.
4. Tap  to go to the main menu and adjust **Key Click Volume** to the maximum.

5. Close the main menu. Touch the upper left corner, lower left corner, upper right corner, lower right corner, and center of the screen separately and ensure that the keystroke sound is produced. In addition, touch the upper left corner to display the timer, touch the lower left corner to activate the weight change option, and touch the center of the screen to trigger the ventilation mode.

6. Tap 

to exit the ventilation mode. In the displayed warning dialog box, tap **Yes** to enable the system to enter the standby mode. Ensure that the above touch operations can be performed properly.

7.12 Weigher Test (Veta 5)

7.12.1 Test Preparations

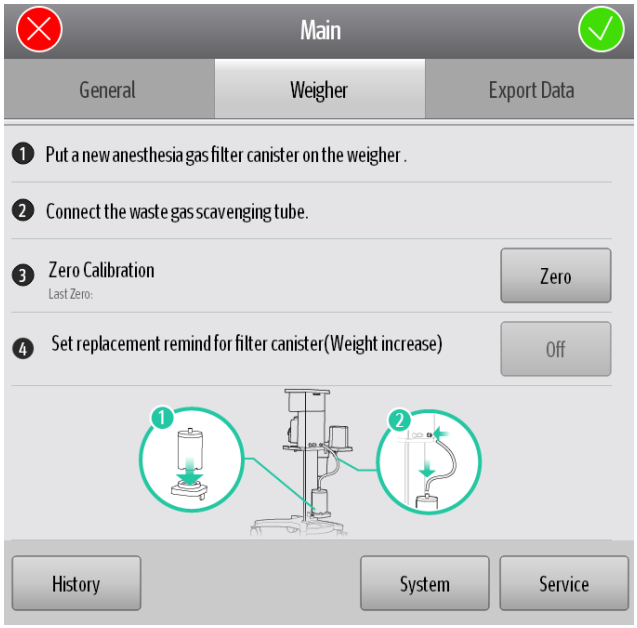
1000 g weight

7.12.2 Test Procedure

1. After completing the zeroing and calibration of the weigher, in standby mode, tap  to open the main menu and tap the **Weigher** tab. Place a new anesthetic agent canister on the weigher, connect the waste gas scavenging tube and tap 

to start zeroing.

2. Set **Set replacement remind for filter canister** to **500 g** and tap  to return to the standby screen.



3. Place 1000 g weight on the anesthetic agent canister and confirm that the prompt "Replace Anesthesia Gas Filter Canister" appears. Remove the weight and confirm that the prompt "Replace Anesthesia Gas Filter Canister" disappears.

7.13 Active AGSS Check

1. Install the AGSS, start the waste gas disposal system, and check whether the float is between the MIN line and the MAX line.
2. If the flow cannot meet requirements, check the situation of the hospital's disposal system, or turn the flow control knob (turn the knob counterclockwise to increase the flow or turn the knob clockwise to decrease the flow) to adjust the float position between the MIN line and MAX line.
3. If the float adheres to other components or is broken during motion, remove and then install the float or replace the float according to the following possible conditions.

NOTE

- **Do not block the pressure compensation port of the AGSS during check.**

If the float cannot float, the possible causes are as follows:

1. The float adheres to other components. Put the AGSS upside down to check whether the float can freely move up and down.
2. The float rises slowly. The filter screen may be clogged. Disconnect the EVAC hose from the AGSS. Remove the AGSS and its transfer hose from the machine, and take down the upper cover of the AGSS. Check the AGSS filter, shake it over a waste container, and clean it when necessary. If the filter must be replaced, dispose of the old filter in accordance with local disposal regulations;
3. The waste gas disposal system is not working or the pump rate is lower than the normal working flow rate of AGSS.

7.14 Alarm Tests (Veta 5)

7.14.1 Fresh Gas Alarm Test

7.14.1.1 Test Preparations

Oxygen gas supply or air supply

7.14.1.2 Test Procedure

1. Connect the oxygen gas supply or air supply.
2. Press the power button to start the machine and ensure that the flowmeters are all closed.
3. Set the system to work in any ventilation mode and confirm the "No Fresh Gas" alarm appears.
4. Adjust the proper gas flowmeter knob until the float rises and confirm that the "No Fresh Gas" alarm disappears.
5. Enable the system to enter standby mode and confirm that the "Fresh Gas Is On" alarm appears. Close the flowmeter knob until the float falls to the bottom, confirm that the "Fresh Gas Is On" disappears.

7.14.2 Ventilator-related Alarm Tests

7.14.2.1 Test Preparations

Watertrap, sampling tube, breathing tube, one-time lung, manual bag

Oxygen supply

7.14.2.2 Test Procedure

1. Press the power button to start the machine.
2. Connect the oxygen supply.
3. Perform the system check test according to prompts on the screen and ensure that the test is successful.
4. Connect the breathing circuit and manual bag.
5. Connect the one-time lung to the Y-piece on the breathing circuit.
6. Set the oxygen flow to 0.5 L/min.
7. Turn the auto/manual switch to the auto position.
8. Set ventilation control parameters as follows:

Ventilation Control Parameter	Value
Ventilation mode	VCV
Tidal volume	50
Breath frequency	20
Inspiratory time:expiratory time ratio	1:2
PEEP	OFF
Trigger	Auto

9. Start ventilation.

7.14.2.3 CO2 Module Alarm Test

1. Install the watertrap to the CO2 module and connect the sampling tube.
2. Move the sampling tube to the mouth and nose, and exhale normally to obtain the EtCO2 value.
3. Tap **Limits**.
4. Set the high limit of EtCO2 to a value lower than the obtained value.
5. Ensure that the "EtCO2 Too High" alarm appears on the screen.
6. Set the low limit of EtCO2 to a value higher than the obtained value.
7. Ensure that the "EtCO2 Too Low" alarm appears on the screen.

7.14.2.4 Paw Pressure Alarm Test

1. Set the PEAK limit to the minimum.
2. Set PEAK high limit to 5–8 cmH2O below the peak pressure shown on the screen.
3. Check that the following (high limit) pressure alarm appears on the screen:
   a. The **Paw Too High** alarm appears on the screen.
   b. The audible alarm signal is generated.
   c. When the pressure reaches the high alarm limit, stop inhaling and start exhaling.
4. Set the PEAK high limit to 65 (cmH2O).
5. Check that the alarm signal is stopped.
6. Set the PEAK low limit to 50 (cmH2O).
7. Check that the following (low limit) pressure alarm appears on the screen:
   a. The **Paw Too Low** alarm appears on the screen.
   b. The audible alarm signal is generated.
8. Set the PEAK low limit to 1 (cmH2O).
9. Check that the alarm signal is stopped.

7.14.2.5 Minute Volume Alarm Test

1. Set the MV low limit to the maximum.
2. Check that the following alarm appears:
   a. The **MV Too Low** alarm appears on the screen.
   b. The audible alarm signal is generated.
3. Set the MV low limit to the minimum.
4. Check that the alarm signal is stopped.
5. Set the MV high limit to the minimum.
6. Check that the following alarm appears:
   a. The **MV Too High** alarm appears on the screen.
   b. The audible alarm signal is generated.

7. Set the MV high limit to the maximum.
8. Check that the alarm signal is stopped.

7.14.2.6 Apnea Alarm Test

1. Connect the manual bag to the manual bag port.
2. Turn the auto/manual switch to the manual position.
3. Turn the APL valve control knob to the 15 cmH2O position.
4. Pinch the manual bag and ensure that a complete breathing cycle appears.
5. Stop pinching the manual bag, wait at least 20 seconds, and ensure that the "Apnea" alarm appears on the screen.
6. Pinch the manual bag several times and ensure that the "Apnea" alarm disappears.

7.14.2.7 Sustained Airway Pressure Alarm Test

1. Connect the manual bag to the manual bag port.
2. Turn off the fresh gas supply.
3. Adjust the APL valve control knob to set the APL valve to the 30 cmH2O position.
4. Turn the auto/manual switch to the manual position.
5. Hold down the O2 flush button for about 15s and ensure that the "Continuous Airway Pressure" alarm appears on the screen.
6. Adjust the APL valve back to the MIN position and ensure that the "Continuous Airway Pressure" alarm disappears.

7.14.3 Power Failure Alarm Test

7.14.3.1 Test Preparations

N/A

7.14.3.2 Test Procedure

1. Press the power button to start the machine.
2. Disconnect the AC power.
3. Ensure that the AC power indicator and battery charging indicator are off. The alarm sound is produced and the **Battery in Use** alarm appears on the screen.
4. Reconnect the AC power.
5. Ensure that the alarm sound is produced and the AC power indicator and battery charging indicator are on. The "Battery in Use" alarm should not appear on the screen.
6. Press the power button again to shut down the machine.

NOTE

- **When the battery is fully charged, the battery charging indicator will be off.**

7.15 Sensor Status Check/Test

7.15.1 Sensor Zero Check

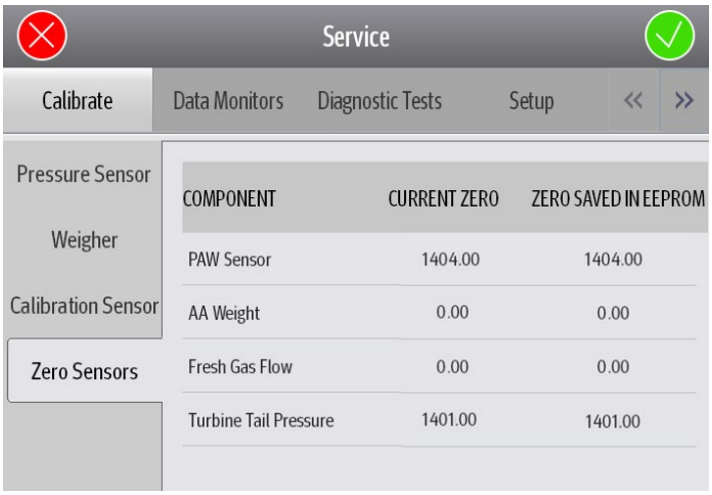
7.15.1.1 Test Preparations

N/A

7.15.1.2 Test Procedure

1. Press the power button to start the machine.
2. Ensure that the system is in standby mode.
3. Tap  to open the main screen and tap 

to enable the system to enter the service mode. On the **Calibration** screen, tap **Zero Sensors** to go to the zero display screen, as shown in the figure below. The second column shows the zero point of the current sensor and the third column shows the zero point saved before delivery.



The figure below lists the normal zero point range of some pressure and flow sensors.

Sensor Name	Normal Range of Zero Point (AD Value)
PAW Sensor	[1213,1573]
AA Weight	[0,1449]
Fresh Gas Flow	[-44,44]
Turbine Tail Pressure	[1213,1573]

If the current zero point of the **PAW Sensor**, **AA Weight**, **Fresh Gas Flow**, or **Turbine Tail Pressure** is out of the normal range and the actual value on the **Data Monitors** screen is greater than 1, perform zeroing again. If the actual value is smaller than 1 and their zero points are out of the normal range, replace the main monitoring board. If the zero point of **Fresh Gas Flow** is out of range, replace the differential pressure flow sensor or its interface board.

NOTE

- **If the zero point of the pressure sensor is incorrect during ventilation, the baseline of the Paw waveform is not at zero and there is a great deviation between the actual pressure control value and the measured pressure value.**
- **If the zero point AD values of all sensors are not within the normal ranges, calibration cannot be performed. The main monitoring board must be replaced.**

7.15.2 Flow Sensor Accuracy Test

7.15.2.1 Test Preparations

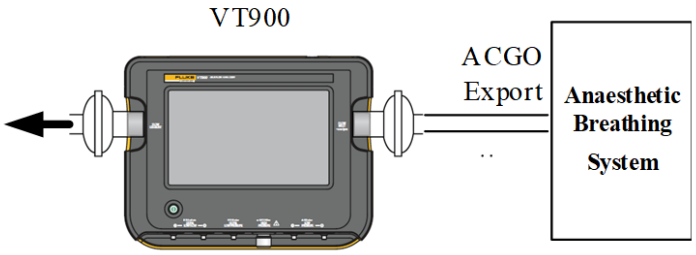
Air supply

Pipeline

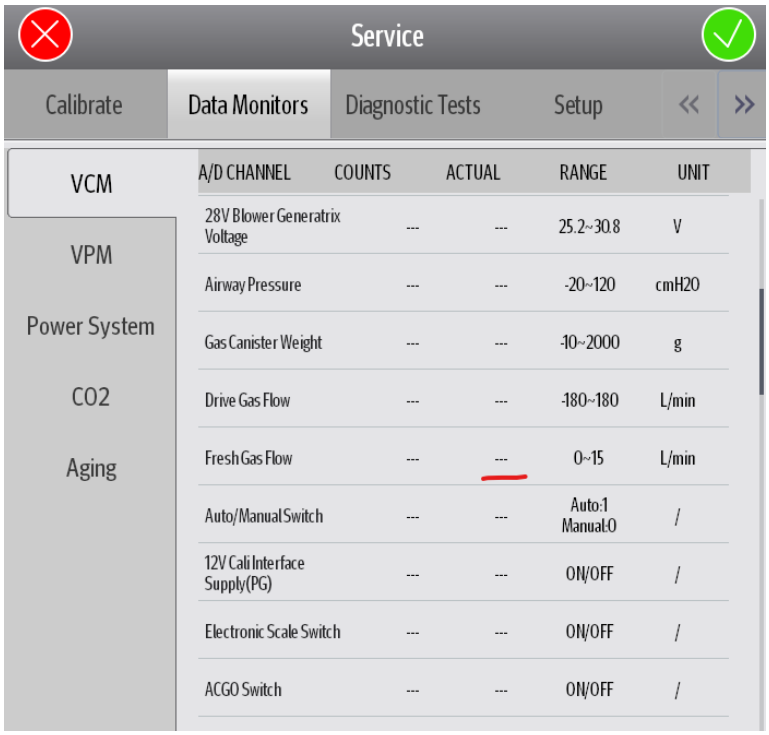
VT900

7.15.2.2 Test Procedure

1. Connect the air supply.
2. Press the power button to start the machine.
3. Connect VT900 to the ACGO. On the VT900, set the gas to air, and correction mode to STPD20, and configure flow monitoring.



4. Turn on the ACGO switch.
5. Adjust the oxygen flow knob until the flowmeter displays 0.5 L/min, 2 L/min, and 4 L/min separately. Tap  to open the main menu. Then, tap Service to enter the service mode. Tap Data Monitors and observe the actual value of **Fresh Gas Flow**. Compare the value with the reading of VT900. The deviation should not exceed ±0.1 L/min or 10% of the measured value of the flow sensor, whichever is greater.



7.15.3 Pressure Sensor Accuracy Test

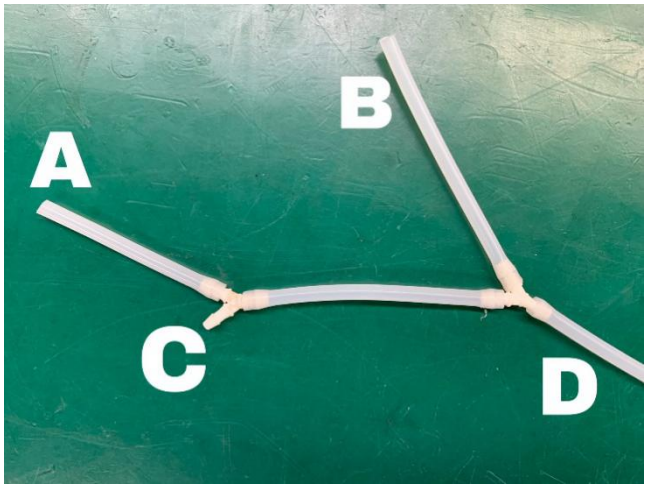
7.15.3.1 Test Preparations

Pipeline

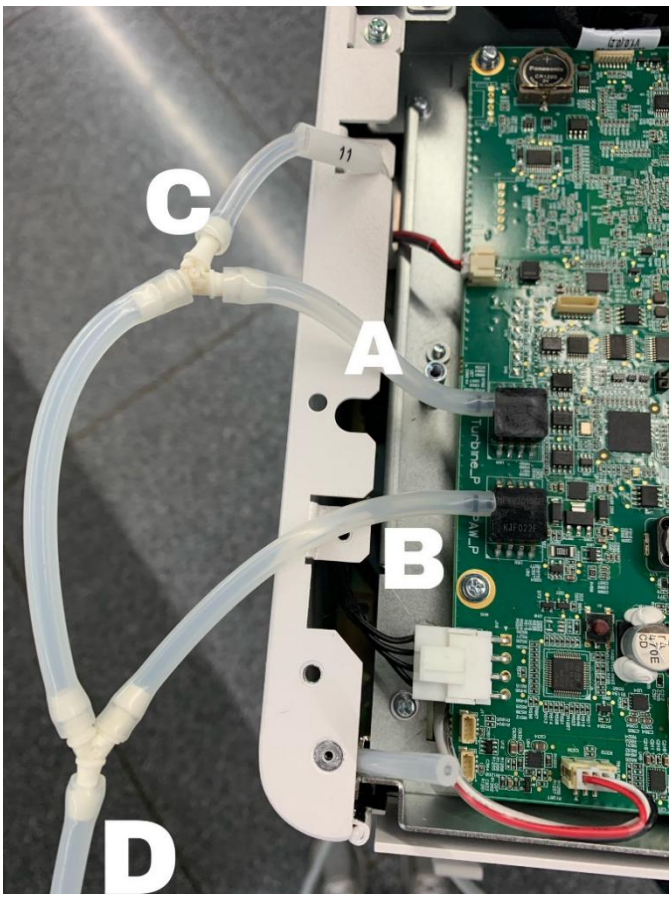
VT900

7.15.3.2 Test Procedure

1. Open the top cover of the machine and remove the metal cover plate.
2. Connect the four-way sampling tube, as shown in the figure below.



3. Connect end A to the Turbine_P sampling port, end B to the PAW_P sampling port, end C to the sampling tube that is originally used to connect to the Turbine_P sampling port of the machine, and end D to VT900 (low-pressure+ end).



4. Configure low-pressure monitoring on VT900.
5. In standby mode, tap  to open the main menu. Tap Service to enable the system to enter the service mode. Tap Data Monitors to go to the valves test screen. On the **Valves Test** screen, set **Blower Pressure** to the following separately: (10±1) cmH2O, (20±1) cmH2O, (40±1) cmH2O, (60±2) cmH2O, (80±2) cmH2O.
6. Check that the deviation between the actual airway pressure and the pressure reading of VT900 and between the actual blower outlet pressure and the pressure reading of VT900 does not exceed 3 cmH2O or 8% of the VT900 pressure reading, whichever is greater. Otherwise, perform factory pressure calibration.

7.16 Electrical Tests

7.16.1 Electrical Safety Inspection Tests

1. Perform the protective earth resistance test:
   a. Connect the two probes of the safety analyzer that are used for testing the protective earth resistance to the protection grounding terminal of the AC power cable and the equipotential pillar respectively.
   b. Test the protective earth resistance by using the test current of 25 A.
   c. Verify that the resistance does not exceed 0.1 ohms (100 mohms).

d. Connect the two probes of the safety analyzer that are used for testing the protective earth resistance to the protection grounding terminal of the AC power cable and the protection grounding terminal of any auxiliary output socket. Repeat steps b and c.

e. If the resistance is greater than 0.1 ohms (100 mohms) but smaller than 0.2 ohms (200 mohms), disconnect the AC power cable and connect the probe that is previously connected to the protection grounding terminal of the AC power cable to the protection grounding terminal of the AC power socket. Repeat steps a through d.

2. Test the earth leakage current in the following cases:

- Normal polarity
- Reverse polarity
- Normal polarity with open neutral
- Reverse polarity with open neutral

3. Verify that the maximum leakage current does not exceed 500 μA (0.5 mA) in the former two cases, and does not exceed 1000 μA (1 mA) in the latter two cases.

NOTE

- **Be sure to use a safety analyzer certified by certification organizations (such as UL, CSA, or AMAI) and follow the operation instructions to perform tests. For example, use Fluke ESA620.**

Electrical Safety Test Form

<table>
<tr><td colspan="4">Location:</td><td colspan="2">Tested by:</td></tr>
<tr><td colspan="4">EUT:</td><td colspan="2">Control No. in Hospital:</td></tr>
<tr><td colspan="3">Manufacturer:</td><td>Model:</td><td colspan="2">SN:</td></tr>
<tr><td colspan="4">Test Device/SN:</td><td colspan="2">Date of Calibration:</td></tr>
<tr><td colspan="4">Check and Tests</td><td>Passed/ Failed</td><td>Limit Value</td></tr>
<tr><td>1</td><td colspan="3">Output voltage of the auxiliary mains power</td><td></td><td></td></tr>
<tr><td>2</td><td colspan="2">Earthing impedance</td><td>Ω</td><td></td><td>Maximum: 0.1 Ω</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Earth leakage current</td><td>Normal state</td><td>____μA</td><td></td><td rowspan="2">Maximum:
Normal condition:
500 μA
Single fault condition:
1000 μA</td></tr>
<tr><td>Single fault condition</td><td>____μA</td><td></td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Patient leakage current</td><td>Normal state</td><td>____μA</td><td></td><td rowspan="2">Maximum:
Normal condition:
100 μA
Single fault condition:
500 μA</td></tr>
<tr><td>Single fault condition</td><td>____μA</td><td></td></tr>
<tr><td>5</td><td colspan="2">Mains voltage imposed on the applied part</td><td>____μA</td><td></td><td>Maximum: 5000 μA</td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">Auxiliary leakage current of patient</td><td>Normal state</td><td>____μA</td><td></td><td rowspan="2">Maximum:
Normal condition:
100 μA
Single fault condition:
500 μA</td></tr>
<tr><td>Single fault condition</td><td>____μA</td><td></td></tr>
</table>

8 Calibration

8.1 User Calibration: Pressure and Flow Zeroing

8.1.1 Calibration Time

- Zeroing is necessary when the pressure waveform deviates from the baseline. Manual zeroing can eliminate the pressure measurement deviations caused by zero point drift of the sensor.
- The "Pressure Monitoring Channel Failure" alarm is generated.

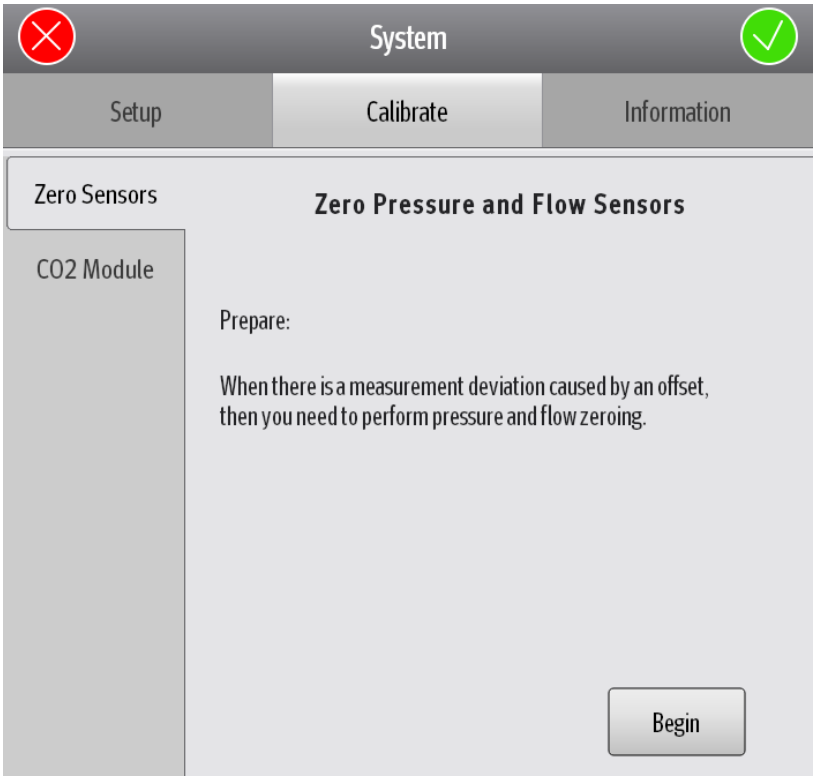
8.1.2 Calibration Preparations

N/A

8.1.3 Calibration Steps

1. Disconnect the breathing tube and turn off all flowmeters.
2. Tap  to open the main menu and tap 

to go to the **System** screen. Tap the **Calibration** tab, select **Zero Sensors**, and tap **Begin** to start the zeroing function on the user machine.



8.2 User Calibration: CO2 Module Calibration

8.2.1 Calibration Time

The CO2 module needs to be re-calibrated when the monitored CO2 concentration greatly deviates from the required concentration or the CO2 module or main monitoring board is replaced.

8.2.2 Calibration Preparations

Standard gas tank

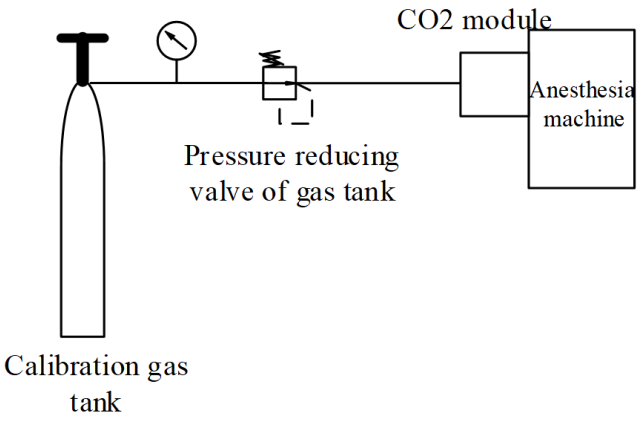
CO2 watertrap and sampling tube

8.2.3 Calibration Steps

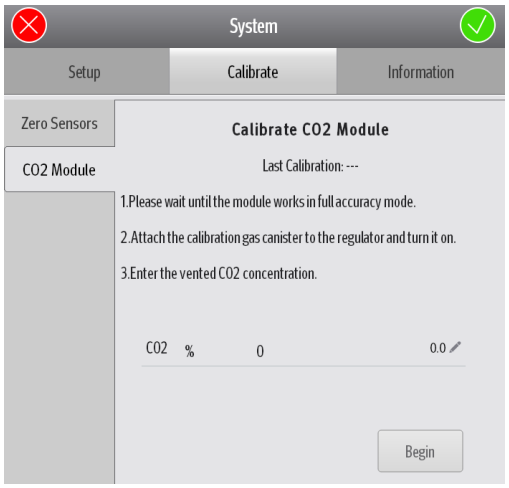
1、 Tap  to open the main menu and tap 

to go to the **System** screen. Tap the **Calibration** tab, select **CO2**, and follow prompts to complete the CO2 module calibration.

A. Connect the calibration gas tank to the sampling tube and open the pressure reducing valve of the gas tank.



B. Enter the CO2 concentration of the infused gas.



8.3 Factory Calibration: Pressure Sensor Calibration

8.3.1 Calibration Time

Zeroing is required when the pressure waveform deviates from the baseline, the main monitoring board is replaced, or the "Calibrate Pressure Sensor" alarm appears.

8.3.2 Calibration Preparations

Calibration device

Four-way sampling tube

8.3.3 Calibration Steps

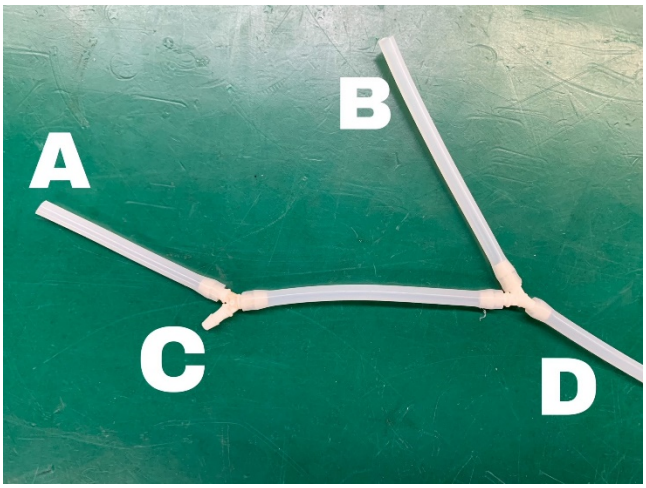
1. In standby mode, tap  to open the main menu. Tap 

and enter the service password to enable the system to enter the service mode. Tap the **Calibration** tab and select **Pressure Sensor**. Perform the following steps to complete the pressure sensor calibration.

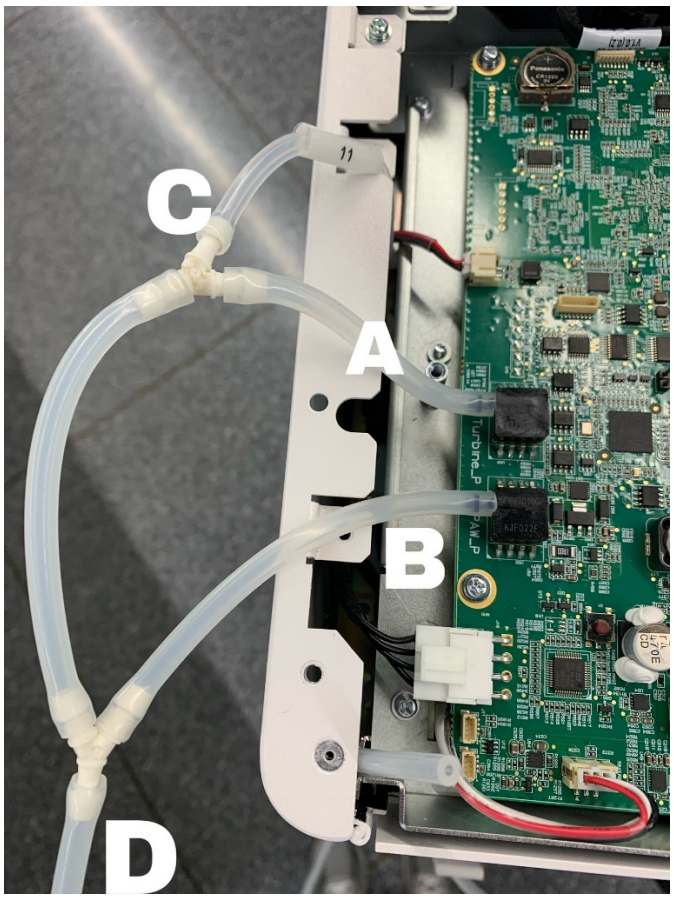
   A. Ensure that the pressure of the drive gas is adequate.

   B. Turn the auto/manual switch to the auto position.

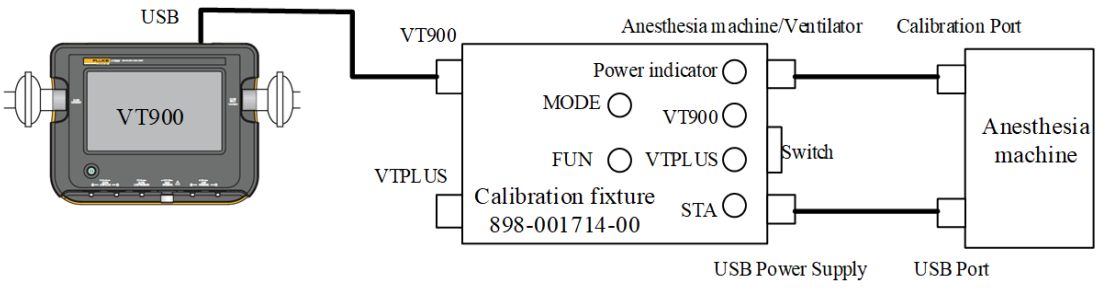
   C. Connect the four-way sampling tube, as shown in the figure below.



   D. Connect end A to the Turbine_P sampling port, end B to the PAW_P sampling port, end C to the sampling tube that is originally used to connect to the Turbine_P sampling port of the machine, and end D to VT900 (low-pressure+ end).

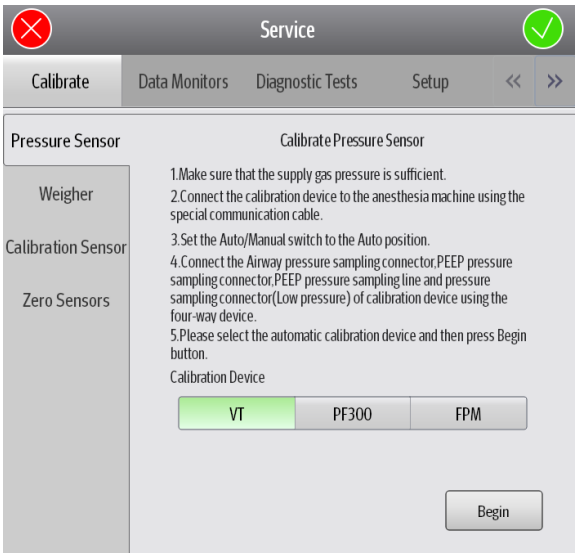


E. As shown in the figure below, use the calibration tool to connect the USB port of the VT900 to the multi-functional communication port of the anesthesia machine, press the [MODE] button to switch to the VT900 end. The indicator on the VT900 is steady on. Set the VT900 to work in low-voltage measurement mode and press [FUN] to switch to remote control.



F. Select VT as the calibration device on the screen of the anesthesia machine, tap 

for calibration, and wait until calibration is successful.



8.4 Factory Calibration: Weigher Calibration

8.4.1 Calibration Time

Calibration is required when the weigher is replaced with a new one, the main monitoring board is replaced, or the "Weigher Failure" alarm appears.

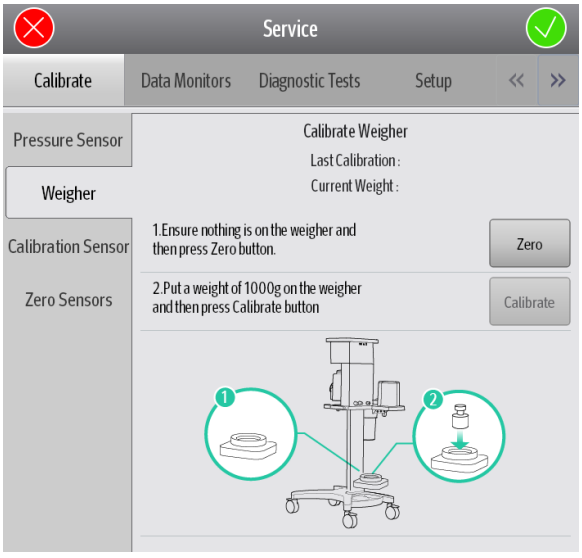
8.4.2 Calibration Preparations

1000 g weight

8.4.3 Calibration Steps

In standby mode, tap  to open the main menu. Tap 

to enable the system to enter the service mode. Tap the **Calibration** tab and select **Weigher**. Follow steps shown in the figure below to complete calibration and zeroing.



8.5 Factory Calibration: Altitude Setting

8.5.1 Setting Time

The altitude needs to be set based on the local altitude during machine installation, so as to ensure the tidal volume accuracy at extreme altitudes.

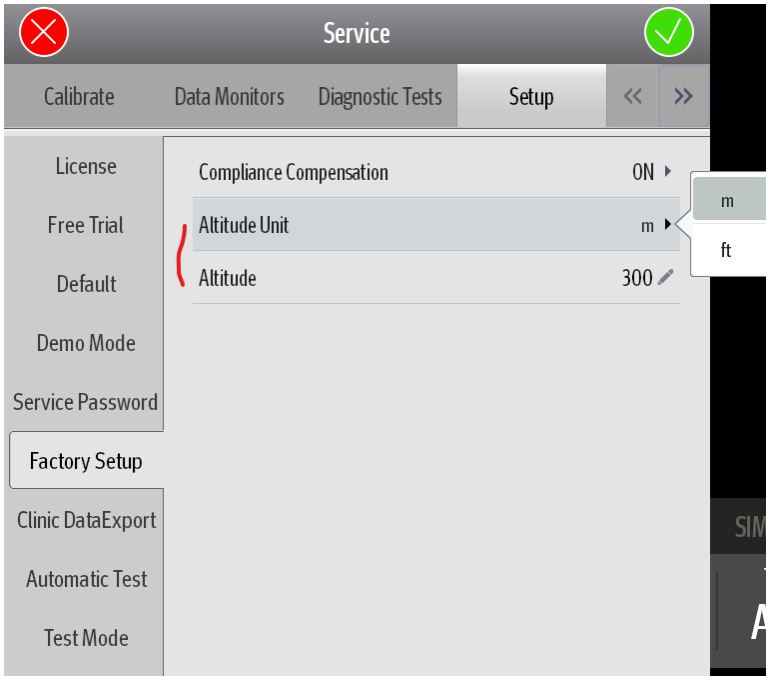
8.5.2 Preparations

N/A

8.5.3 Operation Steps

In standby mode, tap  to open the main menu. Tap 

to enable the system to enter the service mode. Tap the **Setup** tab and select **Factory Setup**. Set the altitude unit and altitude height based on the local altitude.



9 Parts Replacement

9.1 Introduction

Each portion of the Veta 5 anesthesia system contains a number of replaceable parts in terms of its structure and functions. When selecting a replaceable part, consider the properties of the part, replacement cost, and maintenance efficiency. If a faulty part has subcomponents (such as electrical components on the board) that are inconvenient to be replaced, replacing the board can improve maintenance efficiency. For example, if the pressure gauge on the flowmeter panel malfunctions, replacing the pressure gauge can reduce the cost.

9.2 Ordering Replaceable Parts

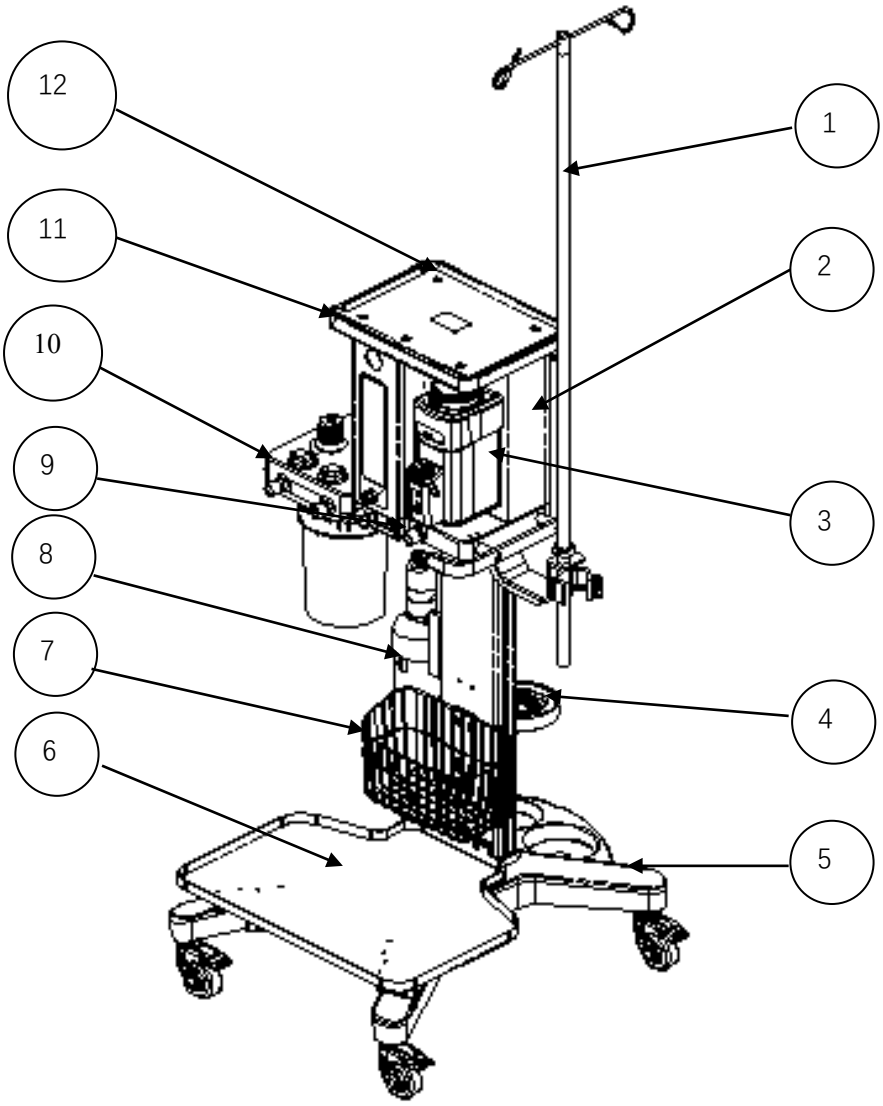
Provide the following information when ordering replaceable parts:

- FRU code of a part
- Part No. in the file table
- Feature description of the part

Example: P/N:801-0631-00001-00auxiliary gas supply, No.: 1

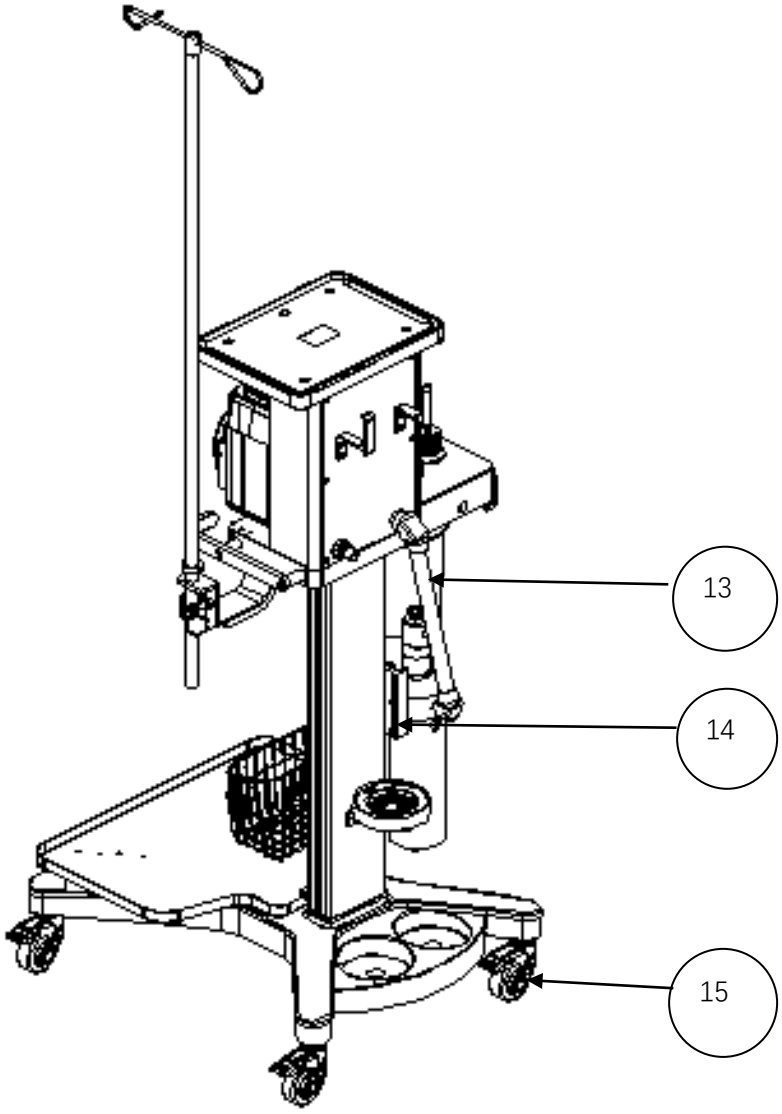
9.3 Schematic Diagrams and Tables

9.3.1 Veta 3 Anesthesia Machine



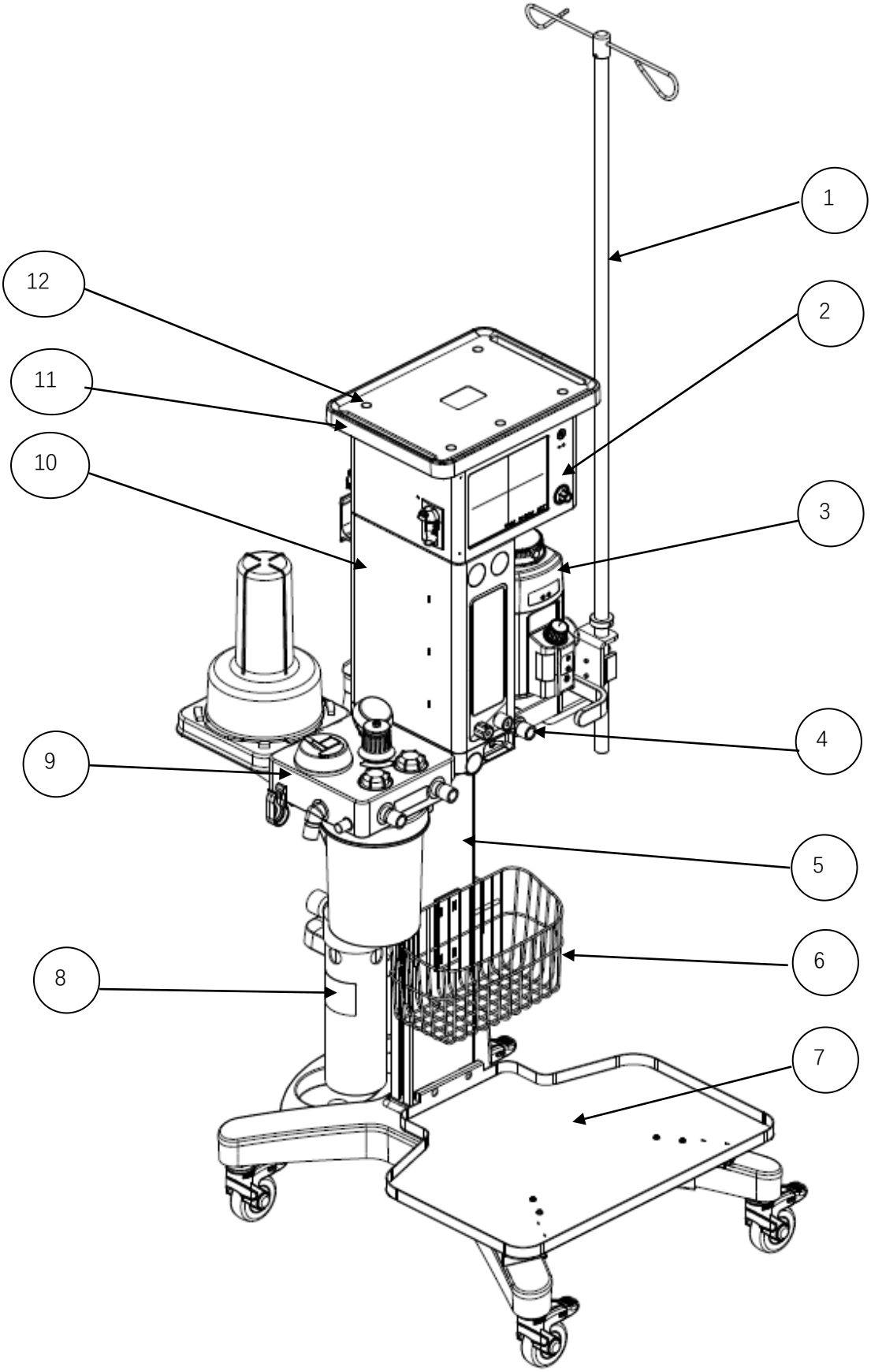
No.	Material Code	Material Description	Quantity	FRU or Not	Remarks
1	033-001250-00	Infusion pump bracket (Veta 5/for the market in China)	1	No	Optional
	033-001251-00	Infusion pump bracket (Veta 5/international)	1	No	Optional
2	115-071255-00	Veta 3 main unit (DISS/oxygen flowmeter)	1	No	Select one out of the five parts.
	115-071257-00	Veta 3 main unit (DISS/air-oxygen flowmeter)	1	No	
	115-071258-00	Veta 3 main unit (NIST/oxygen flowmeter)	1	No	
	115-071259-00	Veta 3 main unit (NIST/oxygen-air flowmeter)	1	No	
	115-071260-00	Veta 3 main unit	1	No	

		(NIST/air-oxygen flowmeter)			
3	115-071418-00	Sevoflurane (Pour Fill) vaporizer (Veta 5)	1	Yes	Select one out of the five parts.
	115-071422-00	Sevoflurane (Quik Fill) vaporizer (Veta 5)	1	Yes	
	115-071423-00	Isoflurane (Pour Fill) vaporizer (Veta 5)	1	Yes	
	115-075958-00	Sevoflurane (Key Fill) vaporizer (Veta 5)	1	Yes	
	115-075959-00	Isoflurane (Key Fill) vaporizer (Veta 5)	1	Yes	
4	115-070800-00	Tray assembly (Veta 5)	1	No	/
5	045-004359-00	Veta 5 trolley assembly (for the market in China)	1	Yes	/
	045-004360-00	Veta 5 trolley assembly (International)	1	Yes	/
6	115-076053-00	Oxygen generator installation package (NIST)	1	Yes	Select one out of the three parts, optional
	115-076054-00	Oxygen generator installation package (DISS)	1	Yes	
	115-076055-00	Oxygen generator installation package (NIST/for the market in China)	1	Yes	
7	045-004746-00	Veta 5 basket	1	Yes	/
8	115-076015-00	AGSS material package (high flow/for the market in China/Veta 5)	1	Yes	Optional
	115-076017-00	AGSS material package (low flow/for the market in China/Veta 5)	1	Yes	Optional
9	041-042598-00	ACGO independent outlet (Veta 5/without pressure monitoring)	1	No	/
10	115-071476-00	Circuit assembly (Veta 3)	1	Yes	/
11	115-072824-00	Top plate (Veta 3)	1	Yes	/
12	049-001747-00	Silicone plug 2 (M4)	1	Yes	/

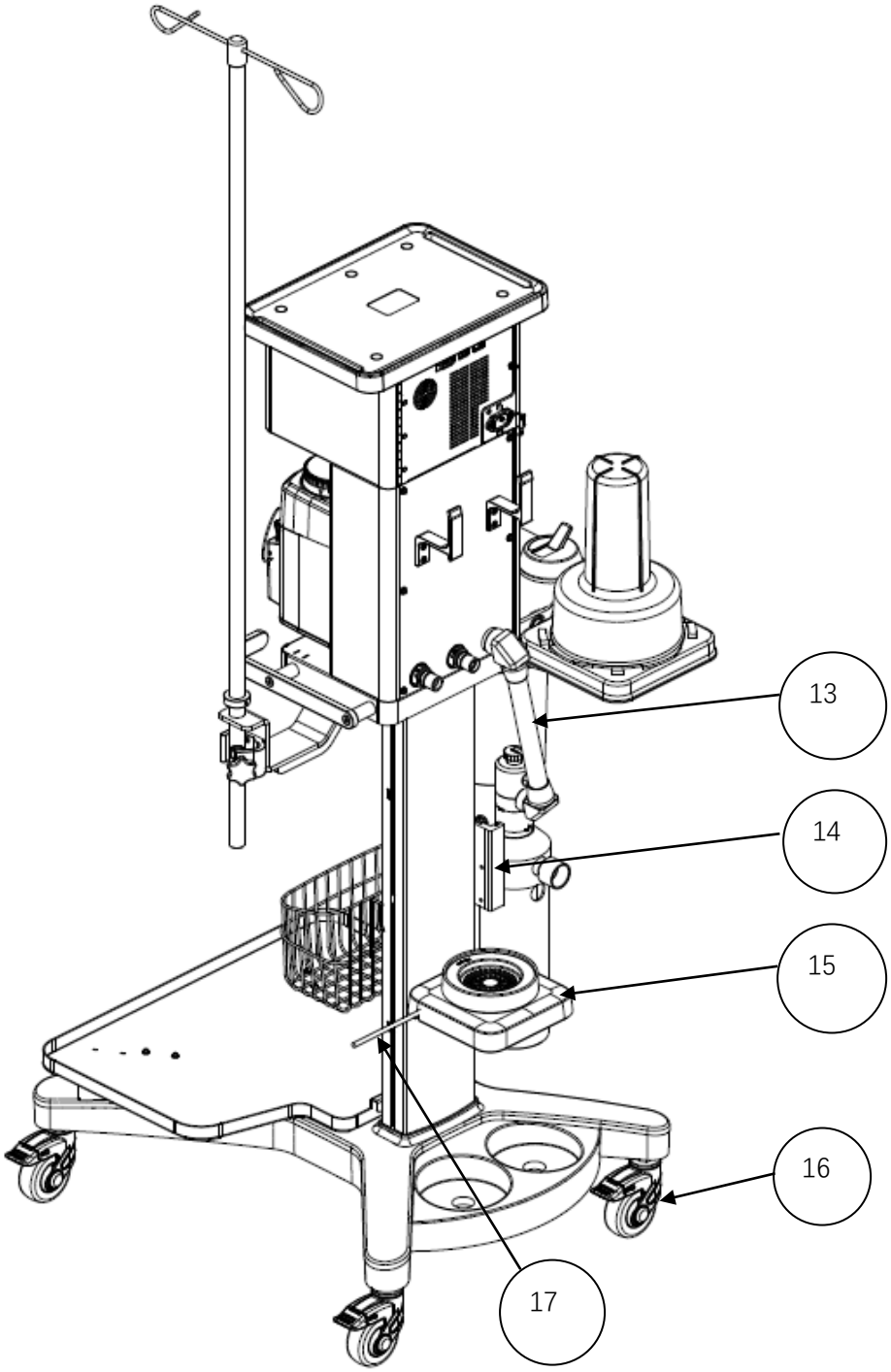


No.	Material Code	Material Description	Quantity	FRU or Not	Remarks
13	115-075146-00	AGSS transfer hose assembly (Veta 5)	1	Yes	/
14	041-007193-00	Guide rail of the AGSS bracket (new slot)	1	No	/
15	034-000728-00	3-inch caster with brake and threaded connection	4	Yes	/

9.3.2 Veta 5 Anesthesia Machine

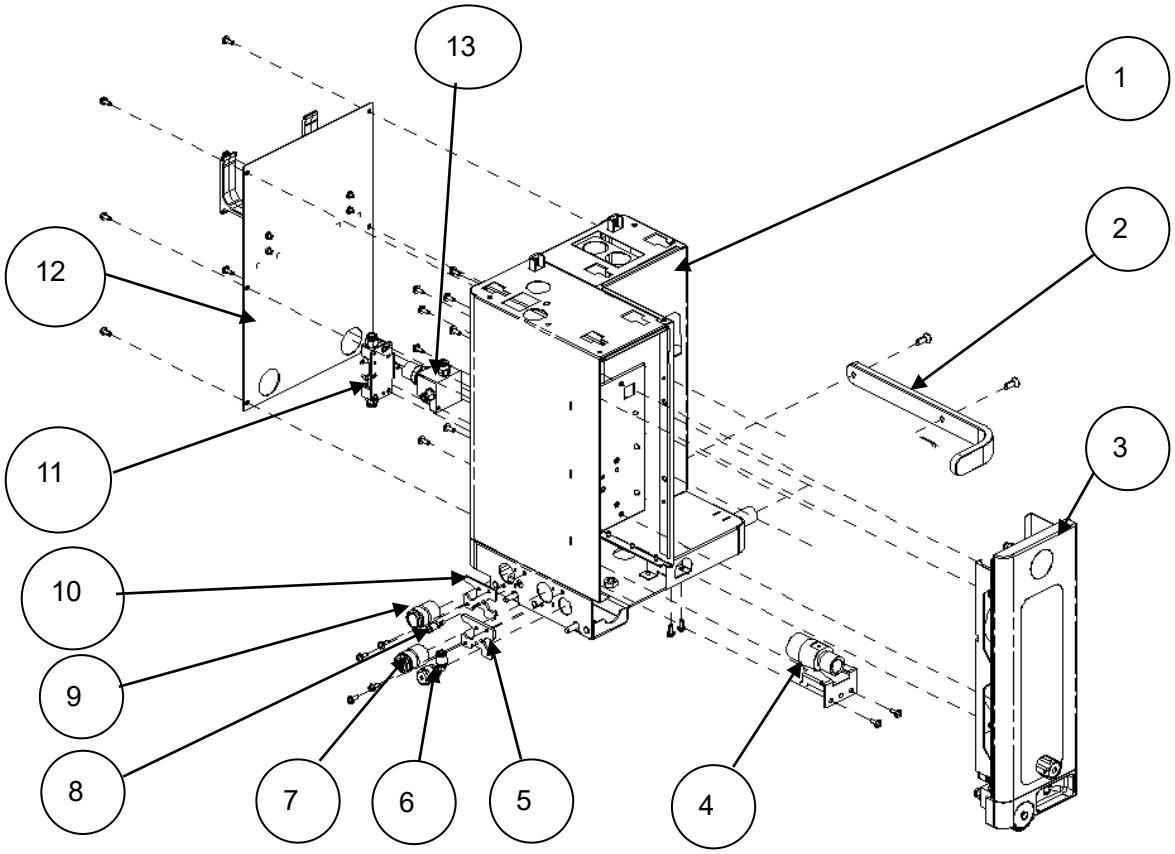


No.	Material Code	Material Description	Quantity	FRU or Not	Remarks
1	033-001250-00	Infusion pump bracket (Veta 5/for the market in China)	1	No	Optional
	033-001251-00	Infusion pump bracket (Veta 5/international)	1	No	Optional
2	115-076968-00	Ventilator FRU (sidestream CO2 module)	1	Yes	Select one out of the two parts.
	115-076969-00	Ventilator FRU (without CO2 module)	1	Yes	
3	115-071418-00	Sevoflurane (Pour Fill) vaporizer (Veta 5)	1	Yes	Select one out of the five parts.
	115-071422-00	Sevoflurane (Quik Fill) vaporizer (Veta 5)	1	Yes	
	115-071423-00	Isoflurane (Pour Fill) vaporizer (Veta 5)	1	Yes	
	115-075958-00	Sevoflurane (Key Fill) vaporizer (Veta 5)	1	Yes	
	115-075959-00	Isoflurane (Key Fill) vaporizer (Veta 5)	1	Yes	
4	041-042598-00	ACGO independent outlet (Veta 5/without pressure monitoring)	1	No	/
5	045-004359-00	Veta 5 trolley assembly (for the market in China)	1	Yes	/
	045-004360-00	Veta 5 trolley assembly (International)	1	Yes	/
6	045-004746-00	Veta 5 basket	1	Yes	/
7	115-076053-00	Oxygen generator installation package (NIST)	1	Yes	Select one out of the three parts.
	115-076054-00	Oxygen generator installation package (DISS)	1	Yes	
	115-076055-00	Oxygen generator installation package (NIST/for the market in China)	1	Yes	
8	115-076015-00	AGSS material package (high flow/for the market in China/Veta 5)	1	Yes	Optional
	115-076017-00	AGSS material package (low flow/for the market in China/Veta 5)	1	Yes	Optional
9	115-071475-00	Circuit assembly (Veta 5)	1	Yes	/
10	115-071198-00	Veta 5 main unit (DISS/oxygen flowmeter)	1	No	Select one out of the five parts.
	115-071200-00	Veta 5 main unit (DISS/air-oxygen flowmeter)	1	No	
	115-071201-00	Veta 5 main unit (NIST/oxygen flowmeter)	1	No	
	115-071202-00	Veta 5 main unit (NIST/oxygen-air flowmeter)	1	No	
	115-071203-00	Veta 5 main unit (NIST/air-oxygen flowmeter)	1	No	
11	115-072514-00	Top plate (Veta 5)	1	Yes	/
12	049-001747-00	Silicone plug 2 (M4)	1	Yes	/



No.	Material Code	Material Description	Quantity	FRU or Not	Remarks
13	115-075146-00	AGSS transfer hose assembly (Veta 5)	1	Yes	/
14	041-007193-00	Guide rail of the AGSS bracket (new slot)	1	No	/
15	115-070799-00	Electronic scale (Veta 5)	1	Yes	/
16	034-000728-00	3-inch caster with brake and threaded connection	4	Yes	/
17	009-011111-00	Veta 5 serial port connection cable	1	Yes	The cable is not completely displayed in the figure.

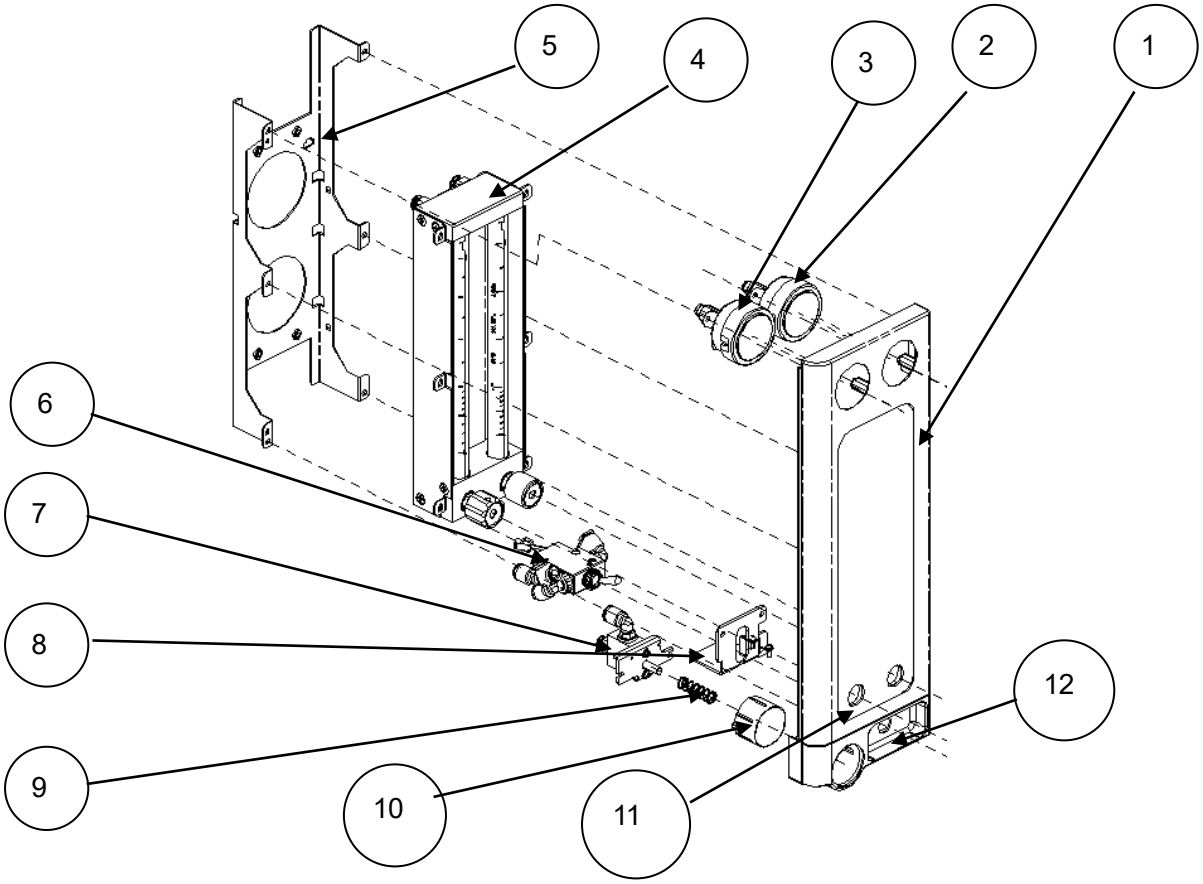
9.3.3 Main Unit of the Anesthesia Machine (Veta 5/Veta 3, DISS/NIST, O2 Flowmeter/O2-Air Flowmeter/Air-O2 Flowmeter)



No.	Material Code	Material Description	Quantity	FRU or Not	Remarks
1	042-031886-00	Framework of Veta 3 (Veta 5)	1	No	/
2	041-042795-00	Handle (Veta 5)	1	No	/
3	115-071636-00	Flowmeter panel assembly (oxygen)	1	Yes	Select one out of the three parts.
	115-071637-00	Flowmeter panel assembly (oxygen/air)	1	Yes	
	115-071638-00	Flowmeter panel assembly (air/oxygen)	1	Yes	
4	041-000107-00	Waste gas exhaust connector	1	No	Veta 3
	041-003383-00	Waste gas exhaust connector (0618)	1	No	Veta 5
5	042-031636-00	Gas connector fixing plate (Veta 5)	1	No	/
6	041-044143-00	Fresh gas connector (Veta 5)	1	No	/
7	041-044133-00	Drive gas connector (Veta 5)	1	No	/
8	041-044144-00	Pressure sampling connector (Veta 5)	1	No	Veta 5
9	041-044133-00	Drive gas connector (Veta 5)	1	No	Veta 5

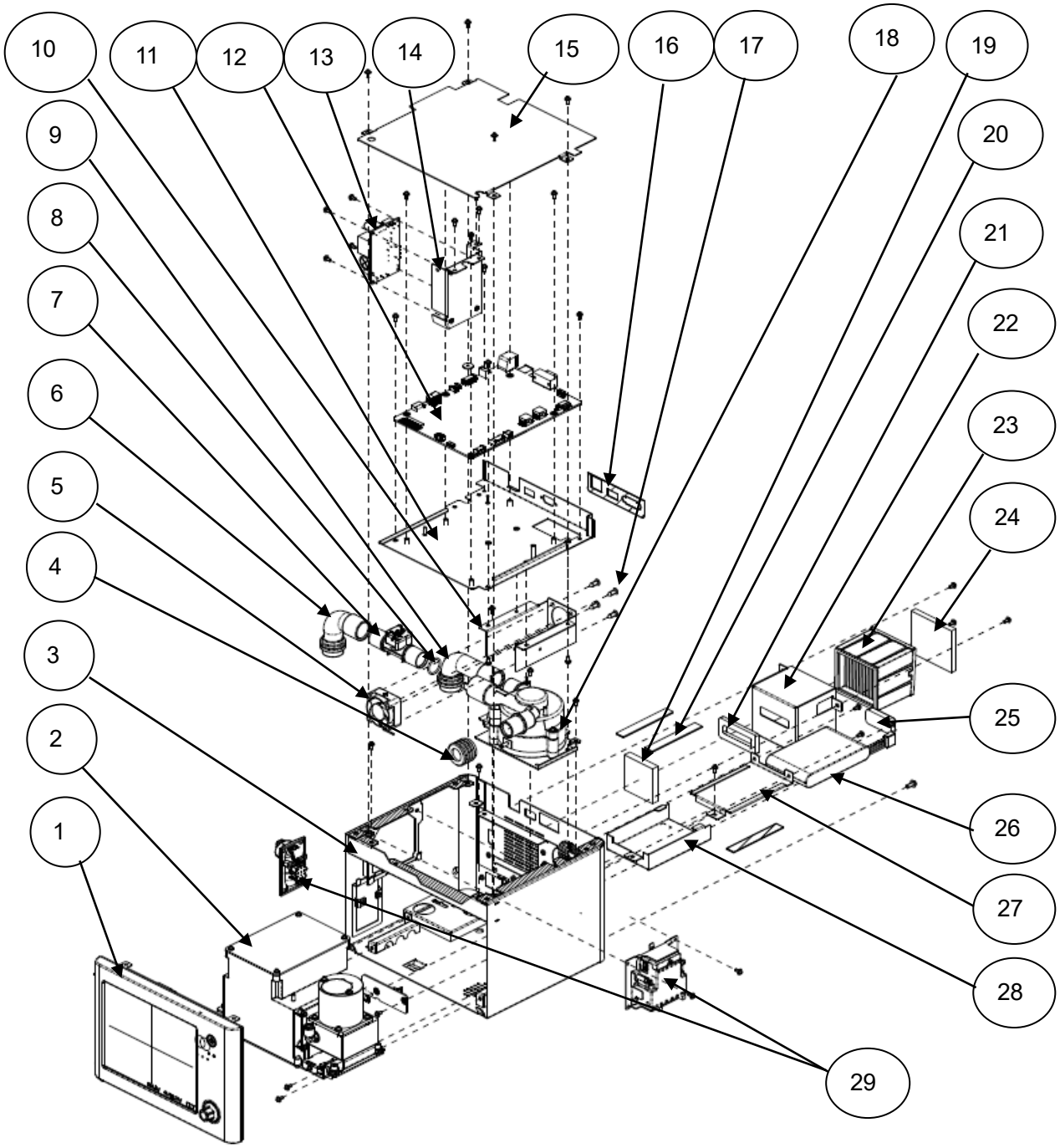
10	042-031636-00	Gas connector fixing plate (Veta 5)	1	No	Veta 5
11	115-071428-00	Fresh gas flow differential pressure gauge assembly (Veta 5)	1	Yes	Select one out of the two parts.
	043-0013566-00	Flowmeter panel (O2)	1	Yes	
12	115-071726-00	Real panel assembly of Veta 3 (1)	1	Yes	Select one out of the two parts.
	115-071727-00	Real panel assembly of Veta 3 (2)	1	Yes	
13	115-071519-00	Oxygen supply inlet assembly (Veta 5/DISS)	1	Yes	Select one out of the four parts.
	115-071520-00	Air supply inlet assembly (Veta 5/DISS)	1	Yes	
	115-071425-00	Oxygen supply inlet assembly (Veta 5/NIST)	1	Yes	
	115-071426-00	Oxygen and air supply inlet assembly (Veta 5/NIST)	1	Yes	

9.3.4 Flowmeter Panel (O2/O2-Air/Air-O2 Flowmeter)



No.	Material Code	Material Description	Quantity	FRU or Not	Remarks
1	043-013567-00	Flowmeter panel (oxygen/air)(Veta 5)	1	No	/
2	115-024868-00	Oxygen gas supply pressure gauge assembly (0635)	1	Yes	/
3	115-024870-00	Air supply pressure gauge assembly (0635)	1	Yes	Optional
4	082-003454-00	Flowmeter, oxygen only, 0–4 L/min	1	Yes	Select one out of the three parts.
	082-003455-00	Flowmeter, oxygen-air, 0–4 L/min	1	Yes	
	082-003490-00	Flowmeter, air-oxygen, 0–4 L/min	1	Yes	
	042-031638-00	Flowmeter panel fixing plate (Veta 5)	1	No	/
5	082-003672-00	ACGO manual two-position three-way valve (with electrical signal)	1	Yes	/
6	115-071427-00	O2 flush assembly (Veta 5)	1	Yes	/
7	042-031637-00	ACGO fastening metal sheet (Veta 5)	1	No	/
8	0611-20-45404	Sliding barrel spring	1	No	/
9	043-013702-00	O2 flush button silkscreen (Veta 5)	1	No	/
10	047-035894-00	Overlay silkscreen on flowmeter panel (oxygen/air)(Veta 5)	1	No	Optional
11	047-035893-00	Overlay silkscreen on flowmeter panel (oxygen)(Veta 5)	1	No	Optional
12	047-036384-00	ACGO overlay silkscreen (Veta 5)	3	No	/

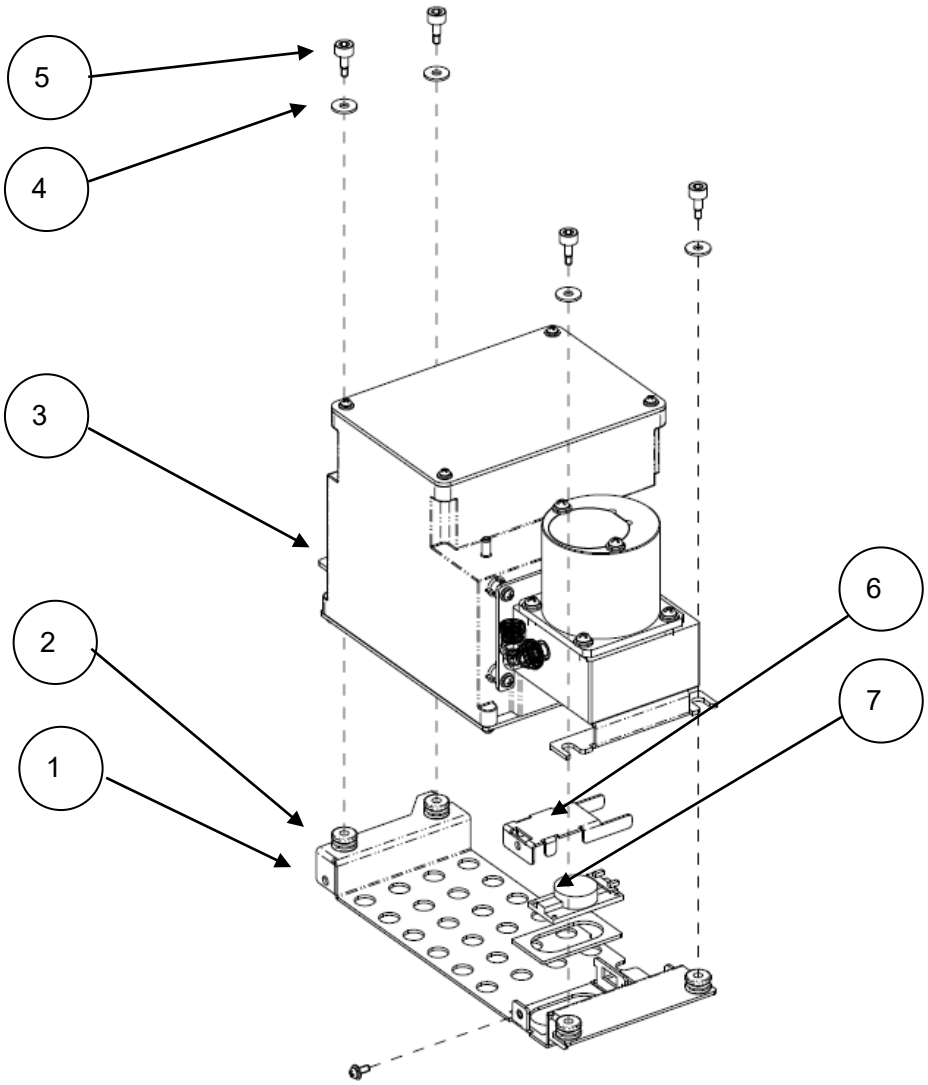
9.3.5 Ventilator (with Sidestream CO2 Module)/Ventilator (Without CO2 Module)



No.	Material Code	Material Description	Quantity	FRU or Not	Remarks
1	115-071604-00	Display screen assembly (Veta 5)	1	Yes	/
2	115-071606-00	Blower box and one-way valve assembly	1	No	/

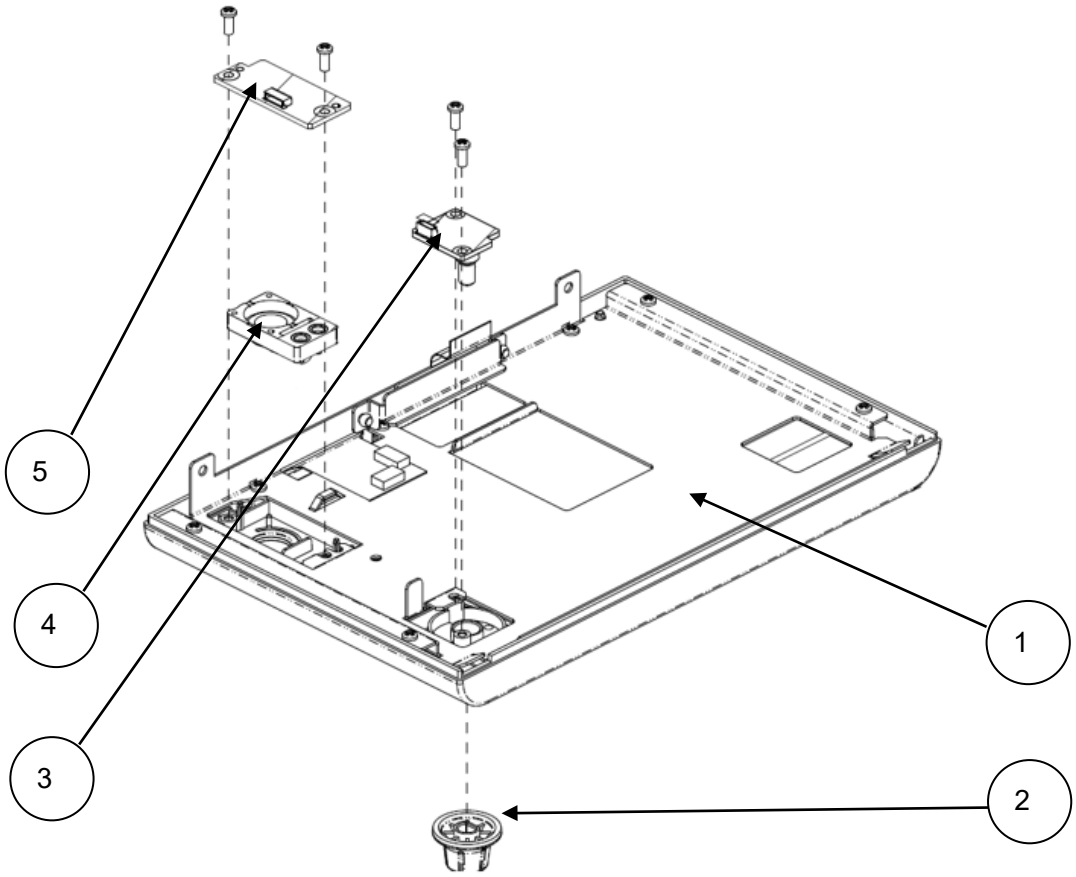
3	115-071608-00	Ventilator housing assembly (Veta 5_CO2 module)	1	No	/
4	049-002150-00	Bellows breathing port connecting piece	1	No	/
5	024-001132-00	Fan 12 V 4020 10.8 CFM 72.2 Pa 8000 RPM PHR-3	1	Yes	/
6	049-002179-00	L-shaped connection pipe for the drive gas outlet	1	No	/
7	012-000173-00	Sensor flow O2/N2O/air -200~200 slm 5VVIN	1	No	/
8	082-003232-00	O-ring 18×2 silicone rubber A70 colorless	1	No	
9	049-002180-00	L-shaped silicone connection pipe for waste gas exhaust	1	No	/
10	042-034028-00	Fan bracket (Veta 5)	1	No	/
11	042-031746-00	Base plate of monitoring board (Veta 5)	1	No	/
12	115-075190-00	Service kit of Veta 5 main monitoring board PCBA	1	Yes	/
13	022-000456-00	Power supply 100-240 V AC 18 V 100 W	1	Yes	
14	042-031747-00	AC-DC base plate (Veta 5)	1	No	/
15	042-031748-00	Cover plate of the ventilator (Veta 5)	1	No	/
16	047-036759-00	Electrical interface overlay (Veta 5)	1	No	/
17	2105-20-40127	Fastening screw of fan	4	No	/
18	115-071429-00	Expiratory valve assembly (Veta 5)	1	Yes	/
19	048-009925-00	Dust screen (Veta 5)	1	No	/
20	048-009922-00	Lithium battery protection pad (Veta 5)	3	No	/
21	048-009909-00	HEPA sealing cushion	1	No	/
22	042-031829-00	HEPA metal plate	1	No	/
23	045-001333-01	HEPA filter	1	No	/
24	045-001298-01	Air inlet dust screen	1	No	/
25	048-009924-00	Battery pressing block	1	No	/
26	022-000273-00	Lithium battery Li-ion 10.95 V 5000 mAh LI23S005A (delivered separately)	1	Yes	/
27	042-034030-00	Battery compartment cover (Veta 5)	1	No	/
28	042-034029-00	Battery compartment (Veta 5)	1	No	/
29	115-076972-00	CO2 module material package FRU (Veta 5)	1	Yes	/

9.3.6 Blower Box and One-Way Valve Assembly



No.	Material Code	Material Description	Quantity	FRU or Not	Remarks
1	042-031815-00	Base plate of blower box and one-way valve assembly	1	No	Veta 5
2	049-002166-00	Cushion	4	No	Veta 5
3	115-076088-00	One-way valve assembly of blower	1	No	Veta 5
4	M04-021043---	Big stainless steel washer - Grade A GB/T96.1-20024 passivation	4	No	Veta 5
5	030-000836-00	Stepped screw	4	No	Veta 5
6	042-031744-00	Speaker pressing plate (Veta 5)	1	No	Veta 5
7	115-076910-00	Speaker (with speaker pad)	1	Yes	Veta 5

9.3.7 Display Screen Assembly (Veta 5)



No.	Material Code	Material Description	Quantity	FRU or Not	Remarks
1	021-000624-00	TM 8-inch LCD and GT capacitive touchscreen assembly	1	No	Veta 5
2	043-013697-00	Knob (dark blue–PCTG)	1	No	Veta 5
3	115-075302-00	Service kit of encoder board PCBA	1	Yes	Veta 5
4	043-013682-00	Power button (P+R)–ESM–0675	1	No	Veta 5
5	115-075305-00	Service kit of power button and indicator board PCBA	1	Yes	Veta 5

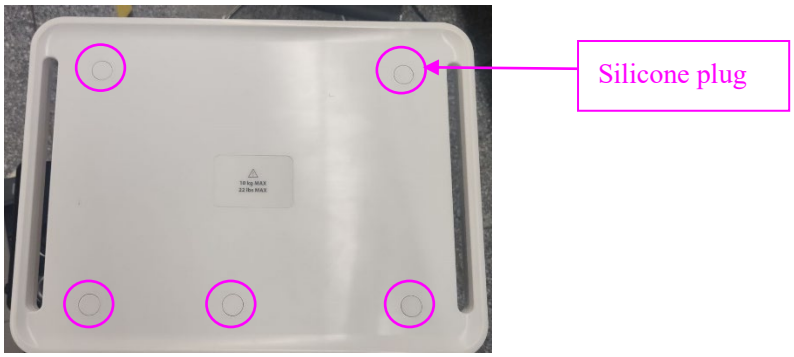
10 Repair and Disassembly

10.1 Pre-disassembly

Pre-disassembly refers to removing the general parts, mainly including the housing and some components.

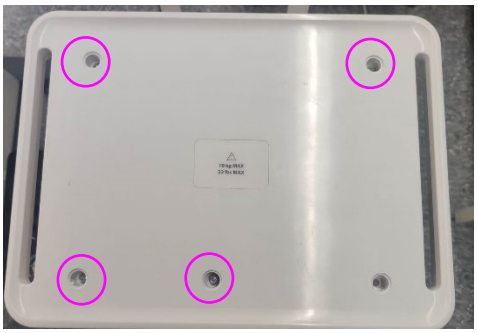
10.1.1 Removing Silicone Plugs from the Top Plate

Take down the five silicone plugs on the top plate.



10.1.2 Removing the Top Plate from Veta 3/Veta 5

1. Take down the five silicone plugs on the top plate by referring to *10.1Pre-disassembly*.
2. Use a Phillips screwdriver to remove the four screws from the top plate and take down the top plate of Veta 3/Veta 5.

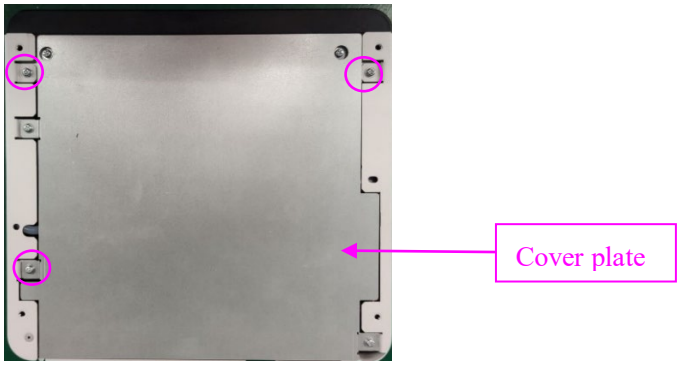


Top Plate of Veta 3

Top Plate of Veta 5

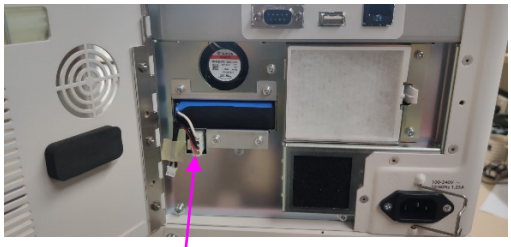
10.1.3 Removing the Cover Plate (Veta 5)

1. Take down the five silicone plugs on the top plate by referring to *10.1Pre-disassembly*.
2. Use a Phillips screwdriver to remove the four screws from the top plate and take down the top plate of Veta 5.
3. Use a Phillips screwdriver to remove the three screws from the cover plate and take down the cover plate.



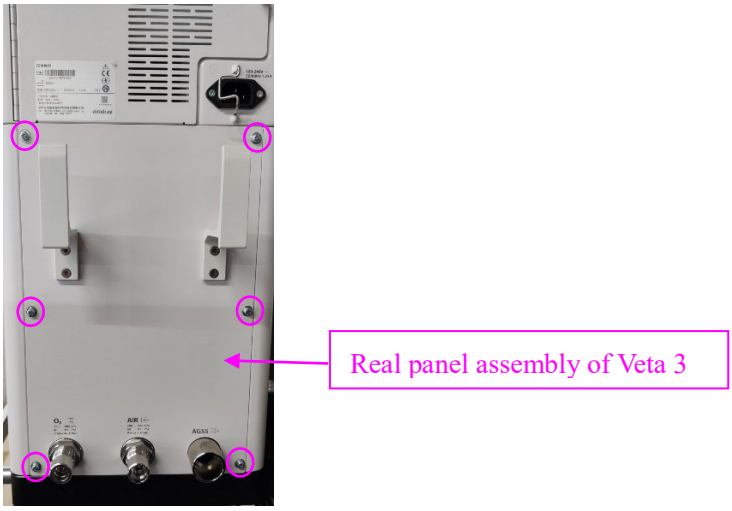
10.1.4 Removing the Lithium Battery Plug (Veta 5)

Manually loosen the captive screw on the backplane of the ventilator counterclockwise, open the backplane of the ventilator, and pull out the lithium battery plug.



10.1.5 Removing the Rear Panel Assembly from Veta 3

1. Use a Phillips screwdriver to remove the six screws from the rear panel of Veta 3 and take down the rear panel.



10.2 Removing the Electronic Scale (Veta 5) Assembly

10.2.1 Preparations

10.2.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- Phillips screwdriver

10.2.1.2 Preparations

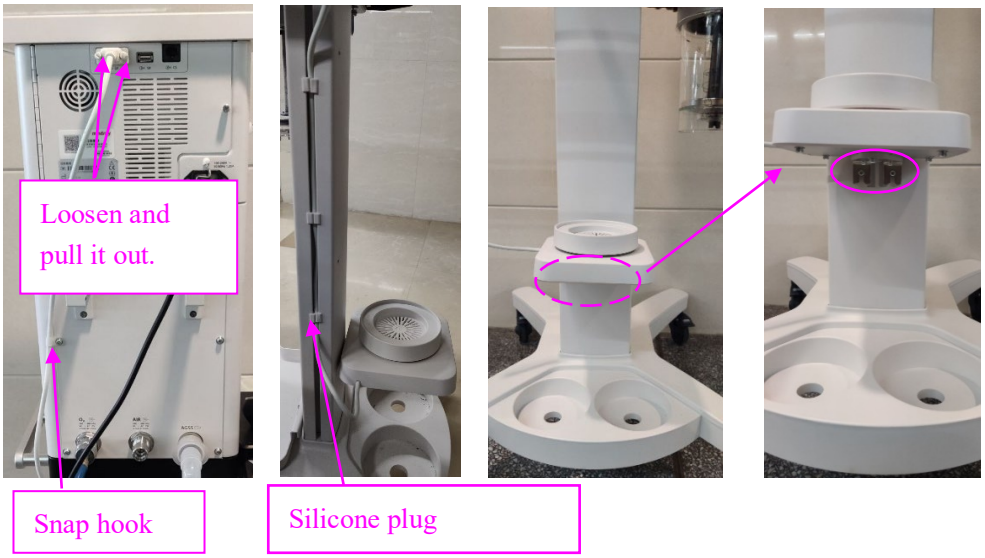
Before removing the electronic scale (Veta 5) assembly:

- Push the anesthesia machine to an appropriate position and brake the machine.

10.2.2 Removing the Electronic Scale Assembly

1. Loosen the plug of the electronic scale and pull it out of the ventilator socket, as shown in Figure A.
2. Use a Phillips screwdriver to take the electronic scale cable out of the snap hook, and then tighten the screw, as shown in Figure A.
3. Take the electronic scale cable together with three silicone plugs out of the side gap of the trolley column, as shown in Figure B.
4. Use a Phillips screwdriver to loosen the two screws on the trolley column and take down the electronic scale component, as shown in Figure C and Figure D.

Figure A Figure B Figure C Figure D



10.3 Removing the Serial Port Cable (Veta 5)

10.3.1 Preparations

10.3.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- Phillips screwdriver

10.3.1.2 Preparations

Before removing the serial port cable:

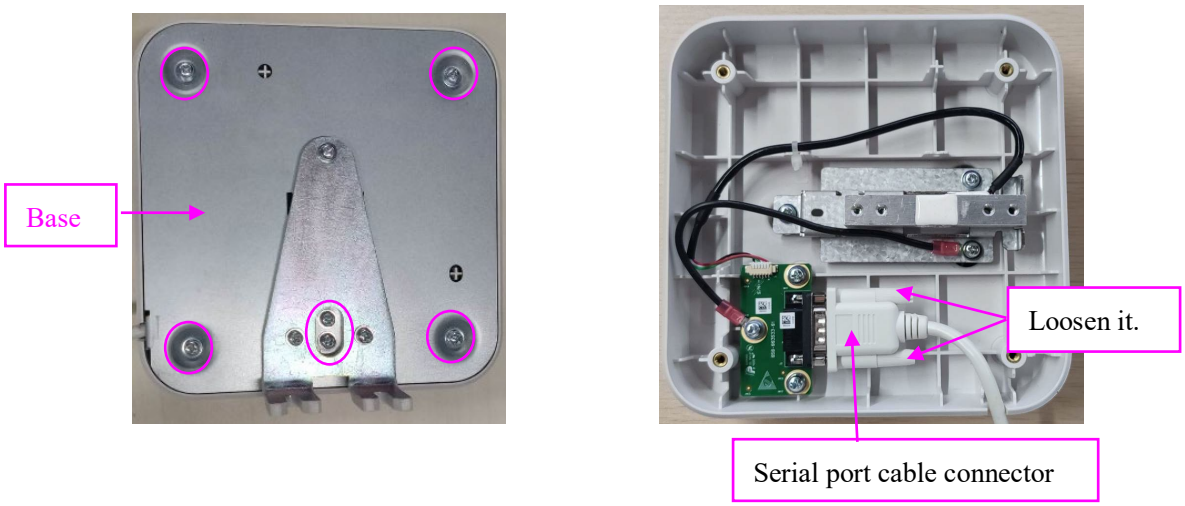
- Move the anesthesia machine to an appropriate position and brake the machine.

10.3.1.3 Pre-disassembly

Remove the electronic scale (Veta 5) assembly by referring to *10.1Pre-disassembly*.

10.3.2 Removing the Serial Port Cable

1. Use a Phillips screwdriver to remove the six screws and take down the base.
2. Loosen the connector of the Veta 5 serial port cable and remove the cable from the PCBA socket.



10.4 Removing the Ventilator Assembly (Veta 5)

10.4.1 Preparations

10.4.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- Phillips screwdriver

10.4.1.2 Preparations

Before removing the ventilator assembly:

- Shut down the anesthesia machine and disconnect the AC power.
- Lower the air pressure inside the anesthesia machine to avoid personal injury or equipment damage.
- Disconnect all pipelines and cylinder gas supplies.
- Move the anesthesia machine to an appropriate position and brake the machine.

10.4.1.3 Pre-disassembly

1. Remove the top plate of Veta 5 by referring to *10.1Pre-disassembly*.
2. Pull out the plug of the electronic scale by referring to step 1 in *10.1.2Removing the Top Plate from Veta 3/Veta 5*.
3. Open the backplane of the ventilator by referring to *10.1.4Removing the Lithium Battery Plug (Veta 5)*.
4. Remove the rear panel assembly from Veta 3 by referring to *10.1.5Removing the Rear Panel Assembly from Veta 3*.

10.4.2 Removing the Ventilator Assembly

1. Remove two silicone tubes, one sampling tube (9#), and one plug, as shown in Figure A.
2. Use a Phillips screwdriver to remove the two screws, push the ventilator backward, and then lift the ventilator upward to take it out, as shown in Figure B and Figure C.

Figure A

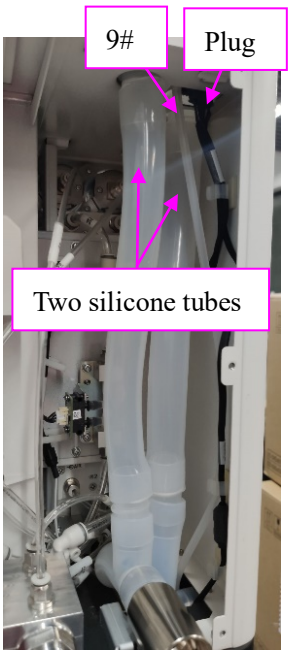


Figure B

Figure C

10.5 Removing the Display Screen Assembly (Veta 5)

10.5.1 Preparations

10.5.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- Phillips screwdriver

10.5.1.2 Preparations

Before removing the display screen assembly (Veta 5):

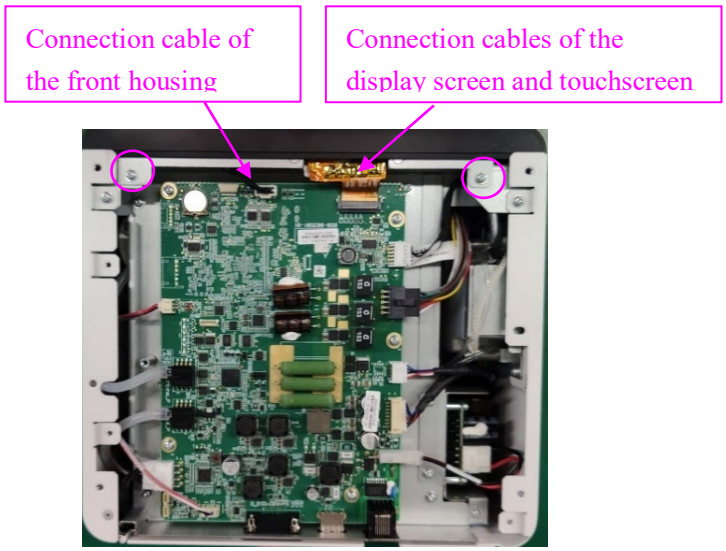
- Shut down the anesthesia machine and disconnect the AC power.
- Move the anesthesia machine to an appropriate position and brake the machine.

10.5.1.3 Pre-disassembly

1. Remove the top plate of Veta 5 by referring to *10.1.2Removing the Top Plate from Veta 3/Veta 5*.
2. Remove the cover plate by referring to *10.1.3Removing the Cover Plate (Veta 5)*.

10.5.2 Removing the Display Screen Assembly

1. Use a Phillips screwdriver to remove the two screws, pull out the Veta 5 front housing connection cable and the connection cable plugs of the display screen and touchscreen from the mainboard socket.
2. Lift the display screen assembly upward to take it out.



10.6 Removing the Encoder Board PCBA (Veta 5)

10.6.1 Preparations

10.6.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- Phillips screwdriver

10.6.1.2 Preparations

Before removing the encoder board PCBA:

- Shut down the anesthesia machine and disconnect the AC power.
- Move the anesthesia machine to an appropriate position and brake the machine.

10.6.1.3 Pre-disassembly

Remove the display screen assembly (Veta 5) by referring to *10.4Removing the Ventilator Assembly (Veta 5)*.

10.6.2 Removing the Encoder Board PCBA

1. Pull out the cable plug of the encoder board.
2. Use a Phillips screwdriver to remove the two screws from the encoder board PCBA.
3. Pull out the encoder PCBA and take down the encoder PCBA and knob.

10.7 Removing the Power Button and Indicator Board PCBA (Veta 5)

10.7.1 Preparations

10.7.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- Phillips screwdriver

10.7.1.2 Preparations

Before removing the power button and indicator board PCBA:

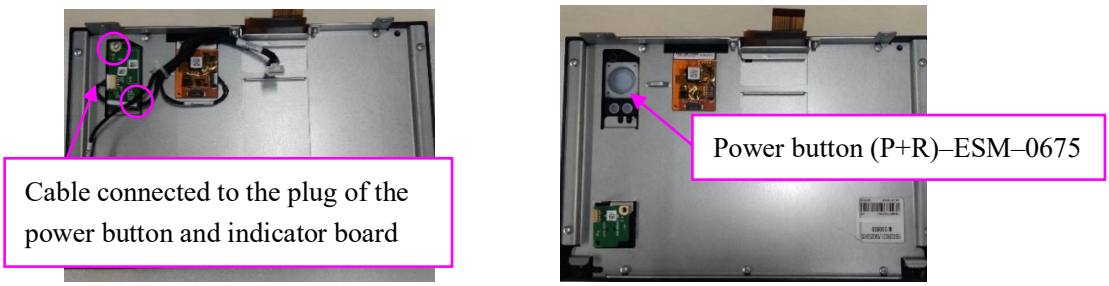
- Shut down the anesthesia machine and disconnect the AC power.
- Move the anesthesia machine to an appropriate position and brake the machine.

10.7.1.3 Pre-disassembly

Remove the display screen assembly (Veta 5) by referring to *10.4Removing the Ventilator Assembly (Veta 5)*.

10.7.2 Removing the Power Button and Indicator Board PCBA

1. Pull out the plug of the power button and indicator board.
2. Use a Phillips screwdriver to remove the two screws from the power button and indicator board PCBA.
3. Take out the power button and indicator board PCA and then remove the power button (P+R)-ESM-0675.



10.8 Removing the Lithium Battery (Veta 5)

10.8.1 Preparations

10.8.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- None

10.8.1.2 Preparations

Before removing the lithium battery:

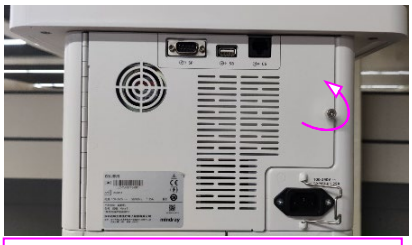
- Shut down the anesthesia machine and disconnect the AC power.
- Move the anesthesia machine to an appropriate position and brake the machine.

10.8.1.3 Pre-disassembly

None

10.8.2 Removing the Lithium Battery

1. Manually loosen the captive screw on the backplane of the ventilator.
2. Open the backplane of the ventilator, remove the adhesive tape, pull out the lithium battery plug, and take out the lithium battery.



One captive screw on the backplane

Remove the lithium battery plug.

10.9 Removing the Main Monitoring Board PCBA (Veta 5)

10.9.1 Preparations

10.9.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- Phillips screwdriver
- Scissors

10.9.1.2 Preparations

Before removing the Veta 5 main monitoring board PCBA assembly:

- Shut down the anesthesia machine and disconnect the AC power.
- Move the anesthesia machine to an appropriate position and brake the machine.

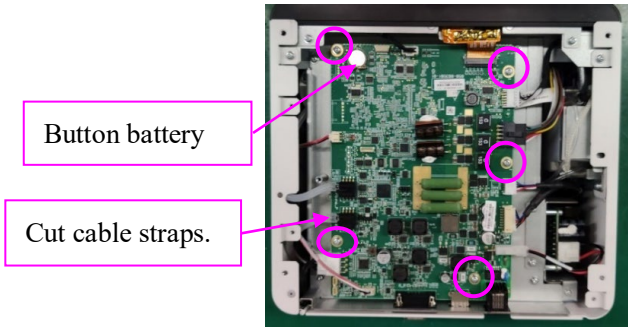
- Remove the lithium battery plug by referring to *10.1.4Removing the Lithium Battery Plug (Veta 5)*.

10.9.1.3 Pre-disassembly

1. Remove the top plate of Veta 5 by referring to *10.1.2Removing the Top Plate from Veta 3/Veta 5*.
2. Remove the cover plate by referring to *10.1.3Removing the Cover Plate (Veta 5)*.

10.9.2 Removing the Veta 5 Main Monitoring Board PCBA

1. Take out the button battery, cut cable straps, and pull all cable plugs and connection pipes out of the main monitoring board PCBA.
2. Use a Phillips screwdriver to remove the five screws from the main monitoring board PCBA and take down the main monitoring board.



10.10 Removing the 100–240 V AC 18 V 100 W Power Supply (Veta 5)

10.10.1 Preparations

10.10.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- Phillips screwdriver

10.10.1.2 Preparations

Before removing the 100–240 V AC 18 V 100 W power supply:

- Shut down the anesthesia machine and disconnect the AC power.
- Move the anesthesia machine to an appropriate position and brake the machine.
- Remove the lithium battery plug by referring to *10.1.4Removing the Lithium Battery Plug (Veta 5)*.

10.10.2 Pre-disassembly

1. Remove the top plate of Veta 5 by referring to *10.1.2Removing the Top Plate from Veta 3/Veta 5*.

2. Remove the cover plate by referring to *10.1.3Removing the Cover Plate (Veta 5)*.

10.10.3 Removing the 100–240 V AC 18 V 100 W Power Supply

1. Pull out the input and output connection cable plugs from the Veta 5 AC-DC board. Use a Phillips screwdriver to remove the three screws from the metal sheet of the power supply and take out the AC-DC base plate (Veta 5), as shown in Figure A, Figure B, and Figure C.
2. Pull out the output connection cable of the Veta 5 AC-DC board. Use a Phillips screwdriver to remove the four screws from the metal sheet of the power supply and take out the 100–240 V AC 18 V 100 W power supply, as shown in Figure C.

Figure A

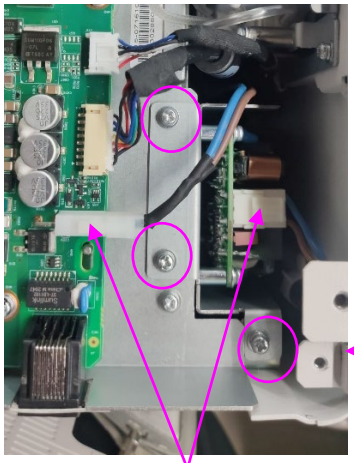


Figure B

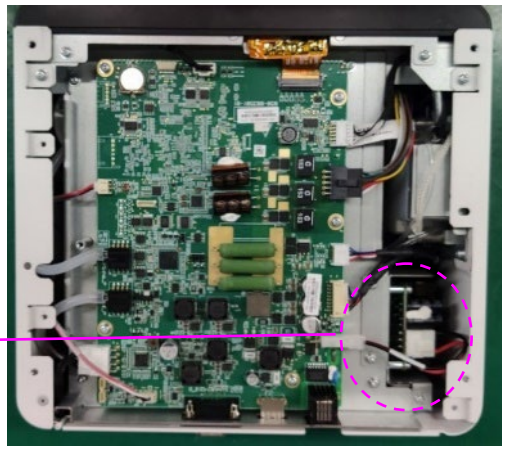
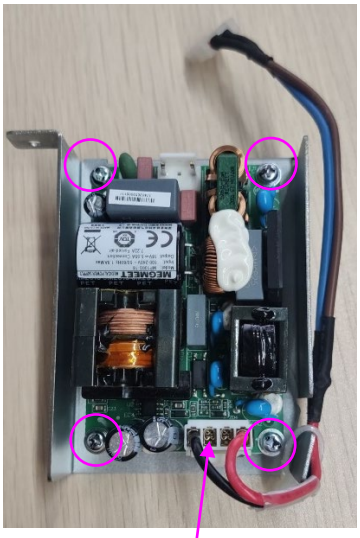


Figure C



10.11 Removing the Fan (Veta 5)

10.11.1 Tools

The following tools may be required in the removal and replacement of parts:

- Phillips screwdriver

10.11.1.1 Preparations

Before removing the fan assembly:

- Shut down the anesthesia machine and disconnect the AC power.
- Move the anesthesia machine to an appropriate position and brake the machine.
- Remove the lithium battery plug by referring to *10.1.4Removing the Lithium Battery Plug (Veta 5)*.

10.11.1.2 Pre-disassembly

1. Remove the top plate of Veta 5 by referring to *10.1.2Removing the Top Plate from Veta 3/Veta 5*.
2. Remove the 100–240 V AC 18 V 100 W power supply by referring to step 1 in *10.10.3Removing the 100–240 V AC 18 V 100 W Power Supply*.

10.11.2 Removing the Fan

1. Remove all cable plugs and pipes.
2. Use a Phillips screwdriver to remove the four screws from the metal sheet and take down the base plate and metal sheet of the monitoring board, as shown in Figure A.
3. Turn over the monitoring board together with the metal sheet. Use a Phillips screwdriver to remove the four screws that fasten the fan bracket (do not press the board with force to avoid damaging the mainboard) and take down the fan bracket, as shown in Figure B.
4. Use a Phillips screwdriver to remove the four screws on the fan and take down the fan, as shown in Figure C.

Figure A

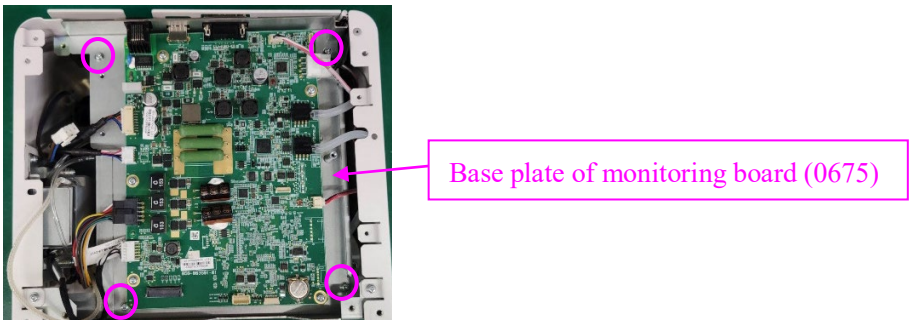


Figure B

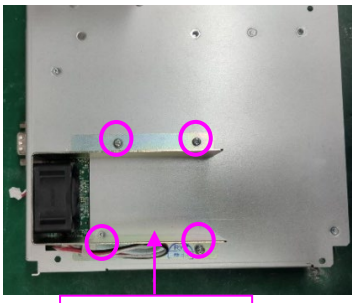
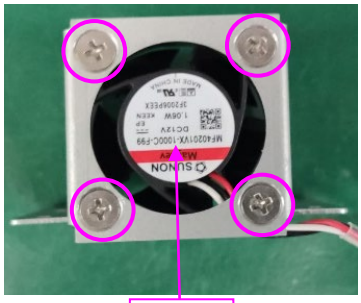


Figure C



10.12 Removing the One-Way Valve Assembly (Veta 5)

10.12.1 Preparations

10.12.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- Phillips screwdriver
- M4 Hexagon screw wrench

10.12.1.2 Preparations

Before removing the one-way valve assembly (Veta 5):

- Shut down the anesthesia machine and disconnect the AC power.
- Move the anesthesia machine to an appropriate position and brake the machine.

10.12.1.3 Pre-disassembly

Remove the display screen assembly (Veta 5) by referring to *10.4Removing the Ventilator Assembly (Veta 5)*.

10.12.2 Removing the One-Way Valve Assembly

1. Remove the blower connection cable and speaker connection cable, as shown in Figure A.
2. Remove the 11# and 15# pipes, as shown in Figure B.
3. Use a Phillips screwdriver to remove the four screws and take down the blower box and one-way valve assembly, as shown in Figure B.
4. Use an Allen wrench to remove two stepped screws (enclosed in rectangles), as shown in Figure C.
5. Use a Phillips screwdriver to remove the four screws and take out the one-way valve assembly (enclosed in circles), as shown in Figure C.

6. Use a Phillips screwdriver to remove the three screws and take out the one-way valve assembly, as shown in Figure D.

Figure A

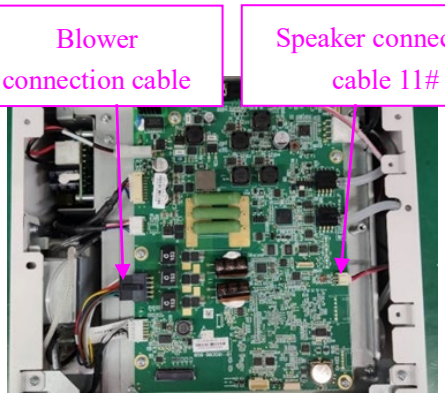


Figure B

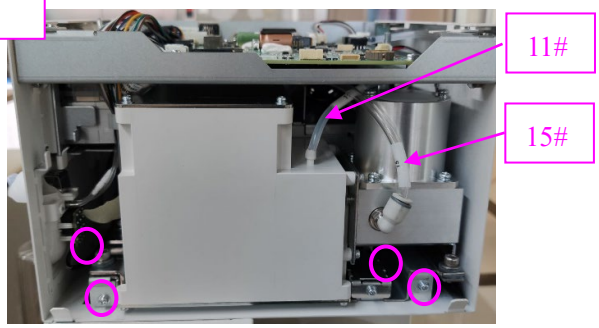


Figure C

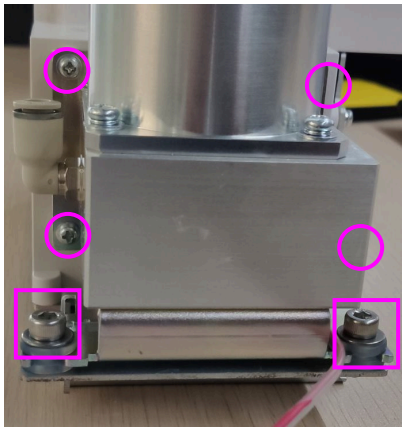
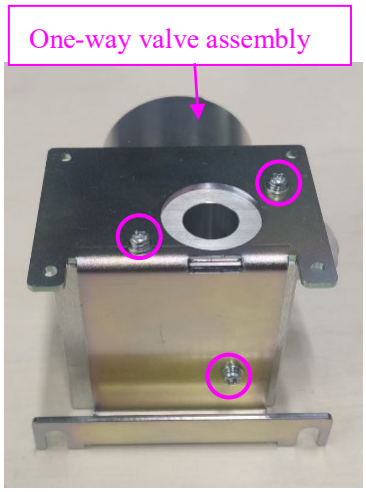


Figure D



10.13 Removing the Blower Box Assembly (Veta 5)

10.13.1 Preparations

10.13.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- Phillips screwdriver
- M4 Hexagon screw wrench

10.13.1.2 Preparations

Before removing the blower box assembly (Veta 5):

- Shut down the anesthesia machine and disconnect the AC power.
- Move the anesthesia machine to an appropriate position and brake the machine.

10.13.1.3 Pre-disassembly

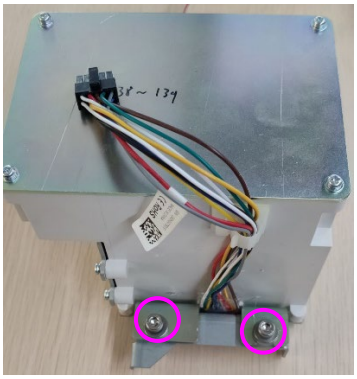
1. Remove the display screen assembly (Veta 5) by referring to *10.4Removing the*

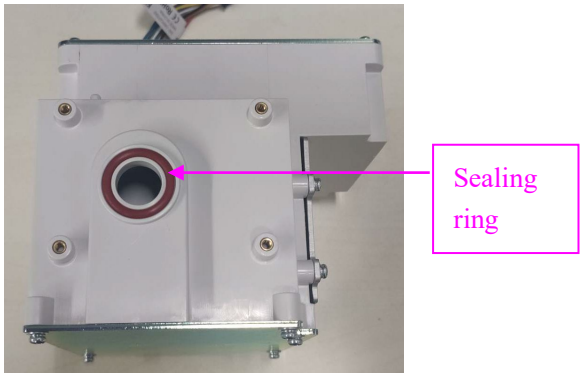
Ventilator Assembly (Veta 5).

2. Remove the one-way valve assembly (Veta 5) by referring to steps 1–4 in *10.12.2Removing the One-Way Valve Assembly*.

10.13.2 Removing the Blower Box Assembly

1. Use an M4 Allen wrench to remove two stepped screws and take down the blower box.
2. Take out the sealing ring.





10.14 Removing the Speaker (with Speaker Pad) (Veta 5)

10.14.1 Preparations

10.14.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- Phillips screwdriver

10.14.1.2 Preparations

Before removing the speaker (with speaker pad):

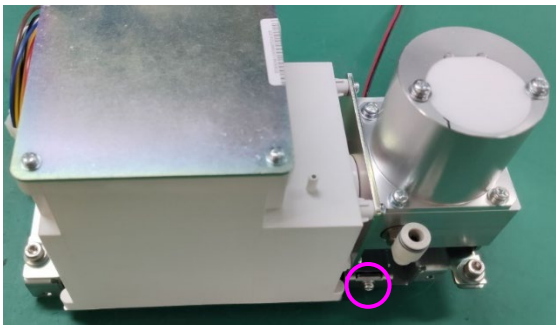
- Shut down the anesthesia machine and disconnect the AC power.
- Move the anesthesia machine to an appropriate position and brake the machine.

10.14.1.3 Pre-disassembly

Remove the one-way valve assembly (Veta 5) by referring to steps 1-3 in *10.12.2Removing the One-Way Valve Assembly*.

10.14.2 Removing the Speaker (with Speaker Pad)

1. Use a Phillips screwdriver to remove one screw and take out the speaker.



10.15 Removing the Sensirion Sensor (Veta 5)

10.15.1 Preparations

10.15.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- Scissors
- Phillips screwdriver

10.15.1.2 Preparations

Before removing the Sensirion sensor:

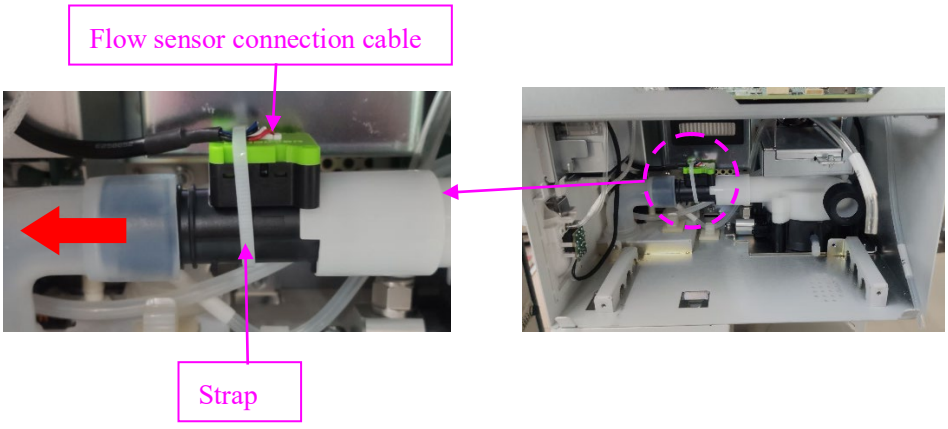
- Shut down the anesthesia machine and disconnect the AC power.
- Lower the air pressure inside the anesthesia machine to avoid personal injury or equipment damage.
- Disconnect all pipelines and cylinder gas supplies.
- Move the anesthesia machine to an appropriate position and brake the machine.

10.15.1.3 Pre-disassembly

Remove the one-way valve assembly and blower box assembly by referring to steps 1-3 in *10.12.2Removing the One-Way Valve Assembly*.

10.15.2 Removing the Sensirion Sensor

1. Pull out the Sensirion sensor from left.
2. Use a pair of scissors to cut the cable strap, pull out the plug of the flow sensor cable, and take out the Sensirion sensor.



10.16 Removing the Expiratory Valve Assembly (Veta 5)

10.16.1 Preparations

10.16.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- Phillips screwdriver

10.16.1.2 Preparations

Before removing the expiratory valve assembly:

- Shut down the anesthesia machine and disconnect the AC power.
- Lower the air pressure inside the anesthesia machine to avoid personal injury or equipment damage.
- Disconnect all pipelines and cylinder gas supplies.
- Move the anesthesia machine to an appropriate position and brake the machine.

10.16.1.3 Pre-disassembly

1. Remove the fan by referring to steps 1–2 in *10.11.2Removing the Fan*.
2. Remove the one-way valve assembly (Veta 5) by referring to steps 1-3 in *10.12.2Removing the One-Way Valve Assembly*.
3. Remove the Sensirion sensor by referring to step 1 in *10.15.2Removing the Sensirion Sensor*.

10.16.2 Removing the Expiratory Valve Assembly

1. Use a Phillips screwdriver to remove the four screws (enclosed in rectangles) from the battery compartment assembly and take out the battery compartment assembly, as shown in Figure A.
2. Use a Phillips screwdriver to remove the three screws (enclosed in circles) from the HEPA fastening metal sheet and take down the HEPA fastening metal sheet, as shown in Figure A.
3. Pull out the L-shaped silicone connection pipe used for waste gas exhaust, as shown in Figure B.
4. Use a Phillips screwdriver to remove the three screws from the expiratory valve assembly and take down the expiratory valve assembly, as shown in Figure B.

Figure A

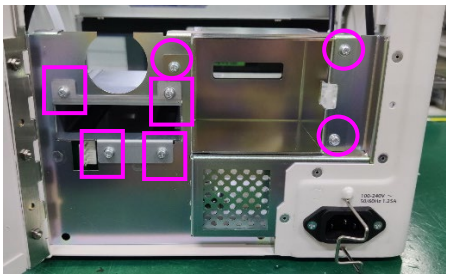
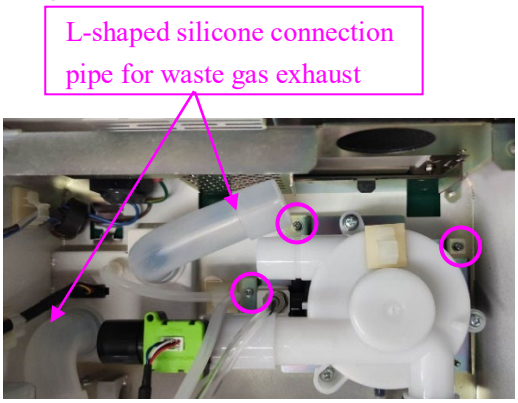


Figure B



10.17 Removing the Sidestream CO2 Assembly (Veta 5)

10.17.1 Preparations

10.17.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- Phillips screwdriver

10.17.1.2 Preparations

Before removing the sidestream CO2 assembly:

- Shut down the anesthesia machine and disconnect the AC power.
- Move the anesthesia machine to an appropriate position and brake the machine.

10.17.1.3 Pre-disassembly

Remove the top plate of Veta 5 by referring to *10.1.2Removing the Top Plate from Veta 3/Veta 5*.

Remove the cover plate by referring to *10.1.3Removing the Cover Plate (Veta 5)*.

10.17.2 Removing the Sidestream CO2 Assembly

1. Use a Phillips screwdriver to remove the two screws and take out the sidestream CO2 assembly, as shown in Figure A and Figure B.
2. Pull out the connection cable of the sidestream CO2 module.

Figure A

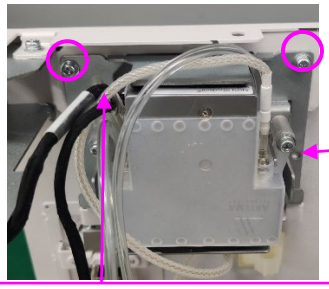
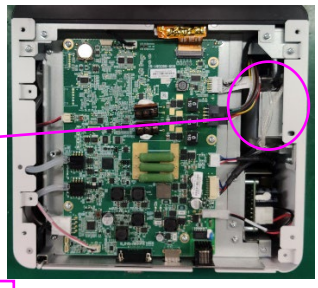


Figure B



Sidestream CO2 module connection cable

10.18 Removing the Circuit Assembly (Veta 5)

10.18.1 Preparations

10.18.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- M6 Hexagon screw wrench

10.18.1.2 Preparations

Before removing the circuit assembly (Veta 5):

- Lower the air pressure inside the anesthesia machine to avoid personal injury or equipment damage.
- Disconnect all pipelines and cylinder gas supplies.
- Move the anesthesia machine to an appropriate position and brake the machine.

10.18.1.3 Pre-disassembly

None

10.18.2 Removing the Circuit Assembly

1. Remove the microswitch cable plug.
2. Use an M6 Allen wrench to remove the three screws and pull out the circuit assembly (Veta 5).

Microswitch cable plug

10.19 Removing the Circuit Assembly (Veta 3)

10.19.1 Preparations

10.19.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- M6 Hexagon screw wrench

10.19.1.2 Preparations

Before removing the circuit assembly of Veta 3:

- Lower the air pressure inside the anesthesia machine to avoid personal injury or equipment damage.
- Disconnect all pipelines and cylinder gas supplies.
- Move the anesthesia machine to an appropriate position and brake the machine.

10.19.1.3 Pre-disassembly

None

10.19.2 Removing the Circuit Assembly

Use an M6 Allen wrench to remove the three screws and pull out the circuit assembly (Veta 3).

10.20 Removing the Soda Lime Tank Assembly

10.20.1 Preparations

10.20.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- None

10.20.1.2 Preparations

Before removing the soda lime tank assembly:

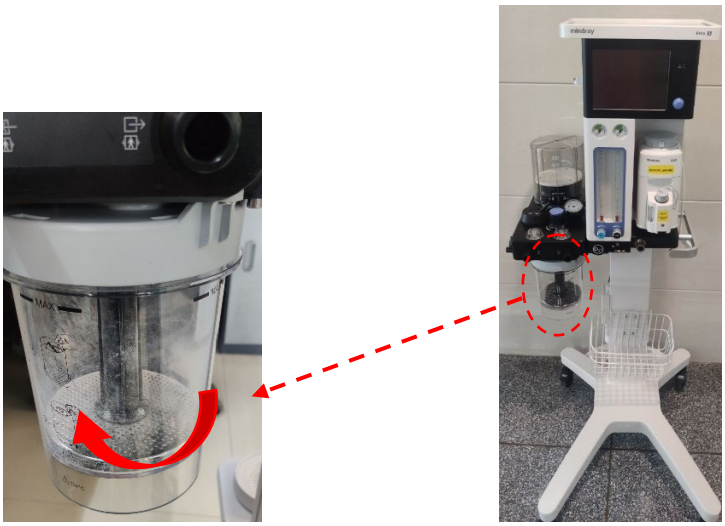
- Lower the air pressure inside the anesthesia machine to avoid personal injury or equipment damage.
- Disconnect all pipelines and cylinder gas supplies.
- Move the anesthesia machine to an appropriate position and brake the machine.

10.20.1.3 Pre-disassembly

None

10.20.2 Removing the Soda Lime Tank Assembly

Hold the soda lime tank assembly with both hands and turn it clockwise to remove the soda lime tank assembly.



10.21 Removing the Airway Pressure Gauge

10.21.1 Preparations

10.21.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- None

10.21.1.2 Preparations

Before removing the airway pressure gauge:

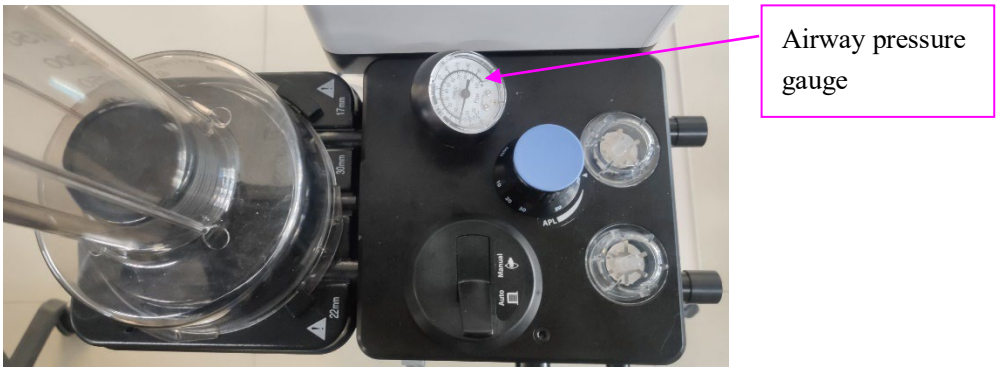
- Lower the air pressure inside the anesthesia machine to avoid personal injury or equipment damage.
- Disconnect all pipelines and cylinder gas supplies.
- Move the anesthesia machine to an appropriate position and brake the machine.

10.21.1.3 Pre-disassembly

None

10.21.2 Removing the Airway Pressure Gauge

Hold the airway pressure gauge and lift it upward to remove the airway pressure gauge, as shown in Figure A.



10.22 Removing the Valve Cover

10.22.1 Preparations

10.22.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- None

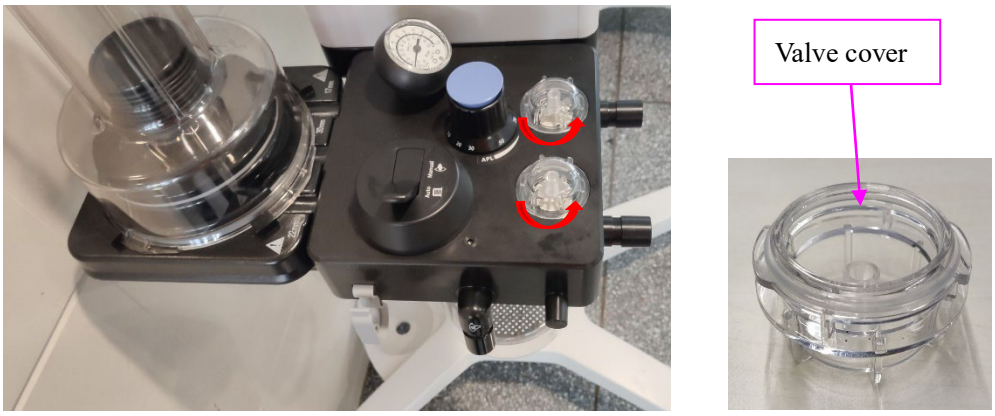
10.22.1.2 Preparations

Before removing the valve cover:

- Lower the air pressure inside the anesthesia machine to avoid personal injury or equipment damage.
- Disconnect all pipelines and cylinder gas supplies.
- Move the anesthesia machine to an appropriate position and brake the machine.

10.22.2 Removing the Valve Cover

hold down the valve cover and turn it counterclockwise to take out the valve cover.



10.23 Removing the Respiratory Valve Assembly

10.23.1 Preparations

10.23.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- None

10.23.1.2 Preparations

Before removing the respiratory valve assembly:

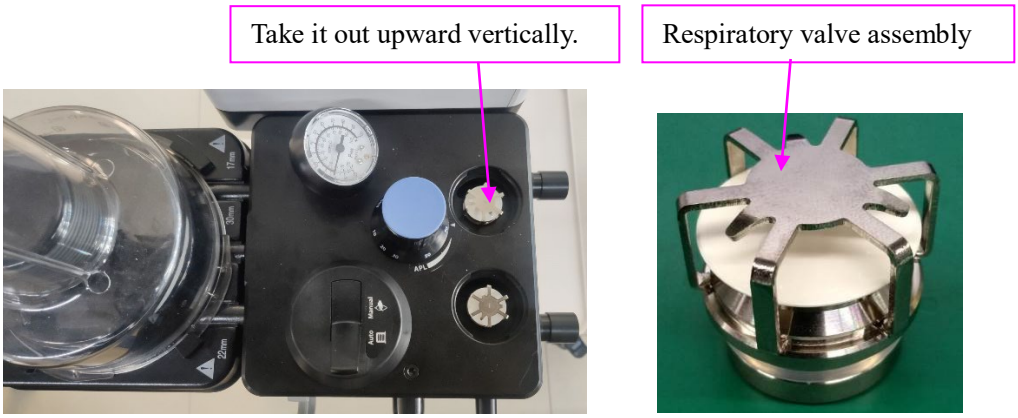
- Lower the air pressure inside the anesthesia machine to avoid personal injury or equipment damage.
- Disconnect all pipelines and cylinder gas supplies.
- Move the anesthesia machine to an appropriate position and brake the machine.

10.23.1.3 Pre-disassembly

Remove the valve cover by referring to *10.22Removing the Valve Cover*.

10.23.2 Removing the Respiratory Valve Assembly

Take out the respiratory valve assembly upward vertically.



10.24 Removing the APL Valve Assembly

10.24.1 Preparations

10.24.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- M4 Allen wrench
- Phillips screwdriver

10.24.1.2 Preparations

Before removing the APL valve assembly:

- Shut down the anesthesia machine and disconnect the AC power.
- Lower the air pressure inside the anesthesia machine to avoid personal injury or equipment damage.
- Disconnect all pipelines and cylinder gas supplies.
- Move the anesthesia machine to an appropriate position and brake the machine.

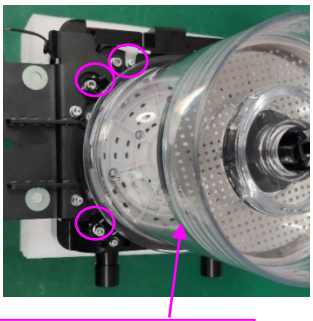
10.24.1.3 Pre-disassembly

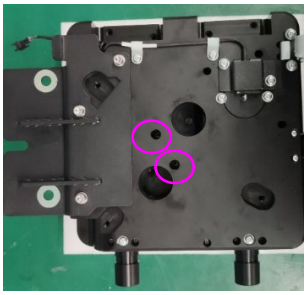
Remove the circuit assembly (Veta 5)/circuit assembly (Veta 3) by referring to *10.18Removing the Circuit Assembly (Veta 5)* or *10.19Removing the Circuit Assembly (Veta 3)*.

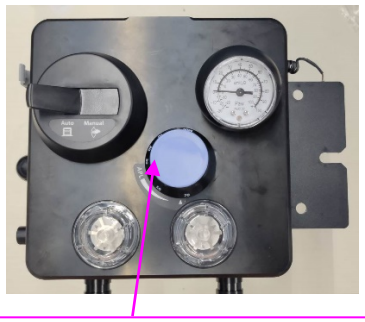
10.24.2 Removing the APL Valve Assembly

1. Use an M4 Allen wrench to remove the three screws and pull out the canister assembly upward, as shown in Figure A.
2. Use a Phillips screwdriver to remove the two screws (enclosed in circles) from the APL valve assembly and take down the APL valve assembly, as shown in Figure B and Figure C.

Figure A Figure B Figure C







Canister assembly

Take out the APL valve assembly upward.

10.25 Removing the Auto/Manual Valve Assembly (Veta 5)

10.25.1 Preparations

10.25.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- M4 Allen wrench
- Phillips screwdriver

10.25.1.2 Preparations

Before removing the auto/manual valve assembly (Veta 5):

- Shut down the anesthesia machine and disconnect the AC power.
- Move the anesthesia machine to an appropriate position and brake the machine.

10.25.1.3 Pre-disassembly

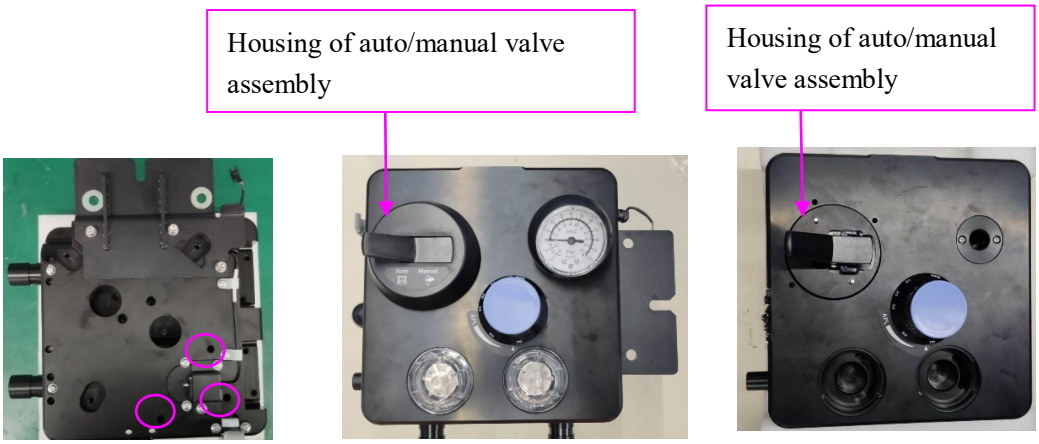
Remove the circuit assembly (Veta 5) by referring to *10.18Removing the Circuit Assembly (Veta 5)*.

10.25.2 Removing the Auto/Manual Valve Assembly

1. Use an M4 Allen wrench to remove the three screws and pull out the canister assembly upward. See Step 1 in *10.24.2Removing the APL Valve Assembly*.
2. Use a Phillips screwdriver to remove the three screws from the back and take down the auto/manual valve housing from the front, as shown in Figure A and Figure B.

3. Remove the auto/manual valve assembly from the front, as shown in Figure C.

Figure A Figure B Figure C



10.26 Removing the Microswitch OMR0ND2SW-01H (Veta 5)

10.26.1 Preparations

10.26.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- M4 Allen wrench
- Phillips screwdriver

10.26.1.2 Preparations

Before removing the microswitch OMR0ND2SW-01H:

- Shut down the anesthesia machine and disconnect the AC power.
- Lower the air pressure inside the anesthesia machine to avoid personal injury or equipment damage.
- Disconnect all pipelines and cylinder gas supplies.
- Move the anesthesia machine to an appropriate position and brake the machine.

10.26.1.3 Pre-disassembly

Remove the circuit assembly (Vtea 5) by referring to *10.18 Removing the Circuit Assembly (Veta 5)*.

10.26.2 Removing the Microswitch OMR0ND2SW-01H

1. Use an M4 Allen wrench to remove the three screws and pull out the canister assembly upward. See Step 1 in *10.24.2Removing the APL Valve Assembly*.
2. Use an M4 Allen wrench to remove the three screws (enclosed in rectangles) and take down the circuit connection board, as shown in Figure A.

3. Use a Phillips screwdriver to remove the two screws (enclosed in circles) and take down the limit switch mounting plate, as shown in Figure A.

4. Use a Phillips screwdriver to remove the two screws and take down the snap hook, as shown in Figure B.

Figure A

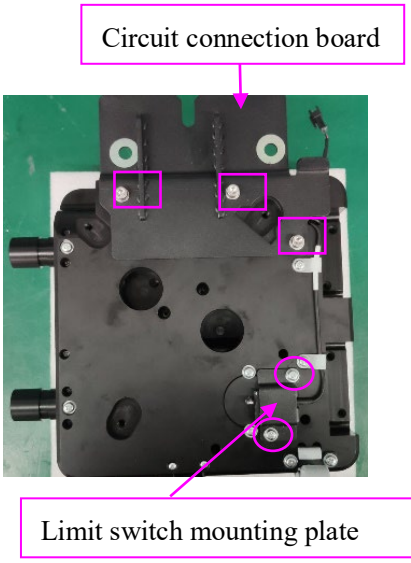
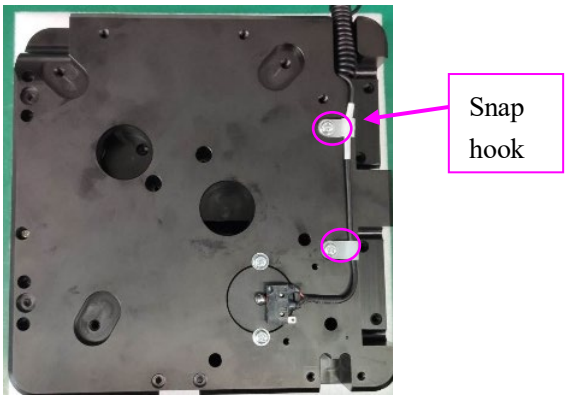


Figure B



10.27 Removing the Hook

10.27.1 Preparations

10.27.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- Phillips screwdriver

10.27.1.2 Preparations

Before removing the hook:

- Move the anesthesia machine to an appropriate position and brake the machine.

10.27.1.3 Pre-disassembly

None

10.27.2 Removing the Hook

Use a Phillips screwdriver to remove the two screws and take down the hook.

Figure A

Figure B

10.28 Removing the Bellows Assembly

10.28.1 Preparations

10.28.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- Phillips screwdriver
- M6 hex key

10.28.1.2 Preparations

Before removing the bellows assembly:

- Shut down the anesthesia machine and disconnect the AC power.
- Lower the air pressure inside the anesthesia machine to avoid personal injury or equipment damage.
- Disconnect all pipelines and cylinder gas supplies.
- Move the anesthesia machine to an appropriate position and brake the machine.

10.28.1.3 Pre-disassembly

None

10.28.2 Removing the Bellows Assembly

Use a Phillips screwdriver to remove the four screws and take down the bellows assembly, as shown in Figure A and Figure B.

Figure A

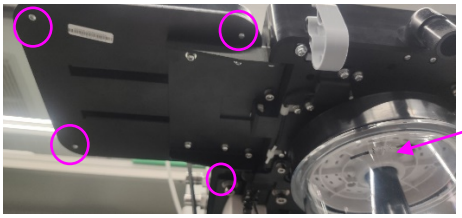


Figure B

10.29 Removing the Adult Bellows Assembly

10.29.1 Preparations

10.29.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- None

10.29.1.2 Preparations

Before removing the adult bellows assembly:

- Lower the air pressure inside the anesthesia machine to avoid personal injury or equipment damage.
- Disconnect all pipelines and cylinder gas supplies.
- Move the anesthesia machine to an appropriate position and brake the machine.

10.29.2 Removing the Adult Bellows Assembly

1. Turn the large bellows housing counterclockwise to take it down, as shown in Figure A.
2. Remove the adult bellows assembly from the pop-off cover plate gently and slowly to avoid damaging it, as shown in Figure B.

Figure A

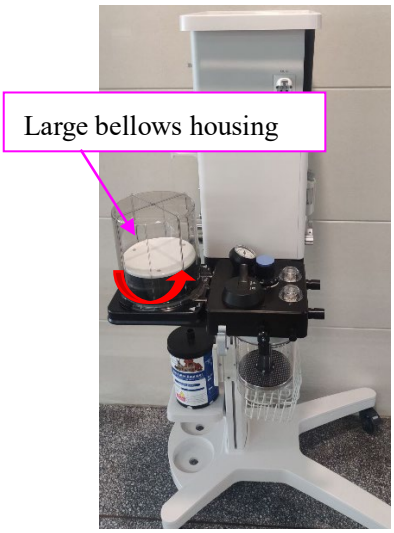


Figure B

10.30 Removing the Pediatric Bellows Assembly

10.30.1 Preparations

10.30.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- None

10.30.1.2 Preparations

Before removing the pediatric bellows assembly:

- Lower the air pressure inside the anesthesia machine to avoid personal injury or equipment damage.
- Disconnect all pipelines and cylinder gas supplies.
- Move the anesthesia machine to an appropriate position and brake the machine.

10.30.2 Removing the Pediatric Bellows Assembly

1. Turn the small bellows housing counterclockwise to take it down, as shown in Figure A.
2. Remove the pediatric bellows assembly from the pop-off cover plate gently and slowly to avoid damaging it, as shown in Figure B.

Figure A

Figure B

10.31 Removing the Fresh Gas Flow Differential Pressure Gauge Assembly

10.31.1 Preparations

10.31.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- Phillips screwdriver

10.31.1.2 Preparations

Before removing the fresh gas flow differential pressure gauge assembly (Veta 5):

- Shut down the anesthesia machine and disconnect the AC power.
- Lower the air pressure inside the anesthesia machine to avoid personal injury or equipment damage.
- Disconnect all pipelines and cylinder gas supplies.
- Move the anesthesia machine to an appropriate position and brake the machine.

10.31.1.3 Pre-disassembly

Remove the rear panel assembly from Veta 3 by referring to *10.1.5Removing the Rear Panel Assembly from Veta 3*.

10.31.2 Removing the Fresh Gas Flow Differential Pressure Gauge Assembly

1. Pull out the 99# and 25# pipes and remove the cable plug, as shown in Figure A.
2. Use a Phillips screwdriver to remove the three screws and take down the fresh gas flow differential pressure gauge assembly, as shown in Figure A and Figure B.

Figure A

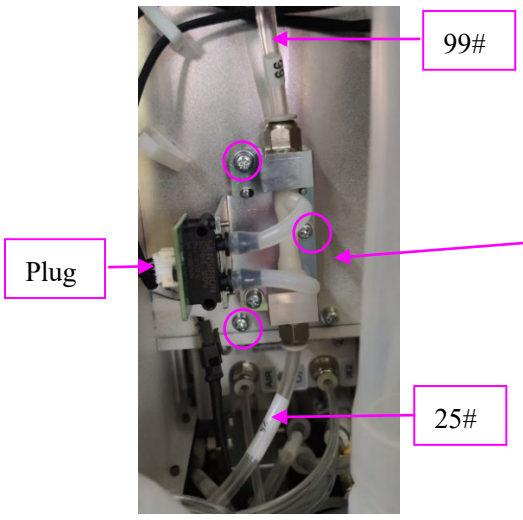


Figure B

10.32 Removing the Flowmeter Panel Assembly

10.32.1 Preparations

10.32.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- Phillips screwdriver

10.32.1.2 Preparations

Before removing the flowmeter panel assembly:

- Shut down the anesthesia machine and disconnect the AC power.
- Lower the air pressure inside the anesthesia machine to avoid personal injury or equipment damage.
- Disconnect all pipelines and cylinder gas supplies.
- Move the anesthesia machine to an appropriate position and brake the machine.

10.32.1.3 Pre-disassembly

Remove the rear panel assembly from Veta 3 by referring to *10.1.5Removing the Rear Panel Assembly from Veta 3*.

10.32.2 Removing the Flowmeter Panel Assembly

1. If a single flowmeter is configured, pull out the following pipes: 39#, 14#, 25#, 53#, 22#, 44#, and 46#, as shown in Figure A (enclosed in rectangles).
2. If dual flowmeters are configured, pull out the following pipes: 39#, 41#, 66#, 46#, 51#, 25#, 53#, 22#, and 44#, as shown in Figure A (enclosed in circles).
3. Use a Phillips screwdriver to remove the four screws and take down the flowmeter panel assembly, as shown in Figure B and Figure C.

Figure A

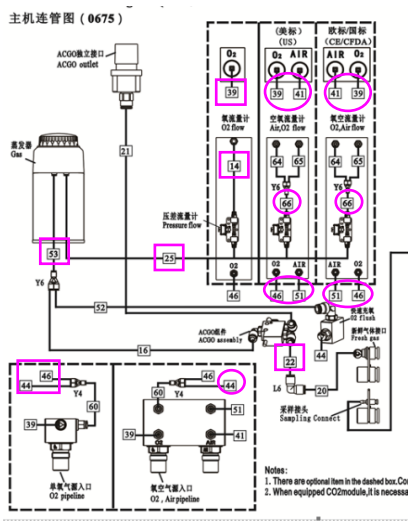


Figure B

Figure C

10.33 Removing the O2 Flush Assembly

10.33.1 Preparations

10.33.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- Phillips screwdriver

10.33.1.2 Preparations

Before removing the O2 flush assembly:

- Shut down the anesthesia machine and disconnect the AC power.
- Lower the air pressure inside the anesthesia machine to avoid personal injury or equipment damage.
- Disconnect all pipelines and cylinder gas supplies.
- Move the anesthesia machine to an appropriate position and brake the machine.

10.33.1.3 Pre-disassembly

Remove the flowmeter panel assembly by referring to *10.32Removing the Flowmeter Panel Assembly.*

10.33.2 Removing the O2 Flush Assembly

Use a Phillips screwdriver to remove the two screws and take down the O2 flush assembly (Veta 5), as shown in Figure A and Figure B.

Figure A Figure B

10.34 Removing the O2/Air Supply Pressure Gauge Assembly

10.34.1 Preparations

10.34.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- Phillips screwdriver

10.34.1.2 Preparations

Before removing the O2/air supply pressure gauge assembly:

- Shut down the anesthesia machine and disconnect the AC power.
- Lower the air pressure inside the anesthesia machine to avoid personal injury or equipment damage.
- Disconnect all pipelines and cylinder gas supplies.
- Move the anesthesia machine to an appropriate position and brake the machine.

10.34.1.3 Pre-disassembly

Remove the rear panel assembly from Veta 3 by referring to *10.1.5 Removing the Rear Panel Assembly from Veta 3*.

10.34.2 Removing the O2/Air Supply Pressure Gauge Assembly

Use a Phillips screwdriver to remove the four screws and take down the gas supply pressure gauge, as shown in Figure A and Figure B.

Figure A

Figure B

10.35 Removing the ACGO Manual Two-Position Three-Way Valve

10.35.1 Preparations

10.35.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- Phillips screwdriver

10.35.1.2 Preparations

Before removing the ACGO manual two-position three-way valve:

- Shut down the anesthesia machine and disconnect the AC power.
- Lower the air pressure inside the anesthesia machine to avoid personal injury or equipment damage.
- Disconnect all pipelines and cylinder gas supplies.
- Move the anesthesia machine to an appropriate position and brake the machine.

10.35.1.3 Pre-disassembly

Remove the flowmeter panel assembly by referring to *10.32Removing the Flowmeter Panel Assembly.*

10.35.2 Removing the ACGO Manual Two-Position Three-Way Valve

Use a Phillips screwdriver to remove the three screws and take down the ACGO manual two-position three-way valve, as shown in Figure A and Figure B.

Figure A Figure B

10.36 Removing the Flowmeter (O2/O2-Air/Air-O2)

10.36.1 Preparations

10.36.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- Phillips screwdriver
- M2 Allen wrench

10.36.1.2 Preparations

Before removing the flowmeter (O2/O2-air/air-O2):

- Shut down the anesthesia machine and disconnect the AC power.
- Lower the air pressure inside the anesthesia machine to avoid personal injury or equipment damage.
- Disconnect all pipelines and cylinder gas supplies.
- Move the anesthesia machine to an appropriate position and brake the machine.

10.36.1.3 Pre-disassembly

Remove the flowmeter panel assembly by referring to *10.32Removing the Flowmeter Panel Assembly*.

10.36.2 Removing the Flowmeter (O2/O2-Air/Air-O2)

1. Use an Allen wrench to remove the four screws and take down the O2-air flowmeter knob, as shown in Figure A.
2. Use a Phillips screwdriver to remove the six screws and take down the fixing plate, as shown in Figure B.
3. Use a Phillips screwdriver to remove the six screws and take down the flowmeter, as shown in Figure C.

Figure A

Figure B

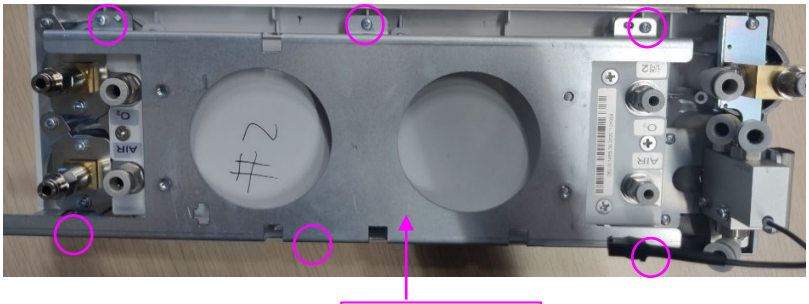


Figure C

10.37 Removing the O2 Supply Inlet Assembly (DISS/NIST)

10.37.1 Preparations

10.37.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- Phillips screwdriver

10.37.1.2 Preparations

Before removing the O2 supply inlet assembly (DISS/NIST):

- Lower the air pressure inside the anesthesia machine to avoid personal injury or equipment damage.

- Disconnect all pipelines and cylinder gas supplies.
- Move the anesthesia machine to an appropriate position and brake the machine.

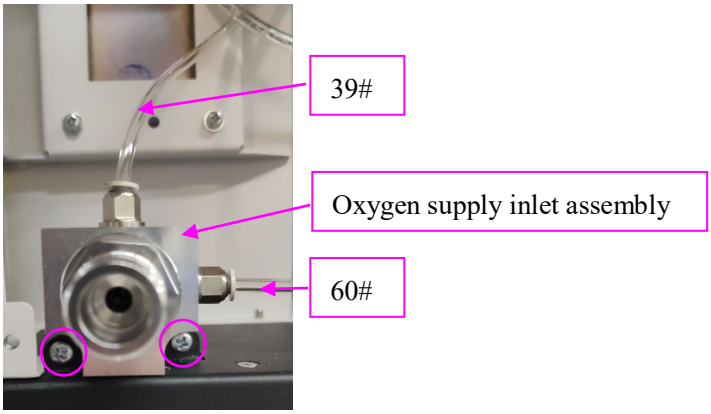
10.37.1.3 Pre-disassembly

1. Remove the rear panel assembly from Veta 3 by referring to *10.1.5Removing the Rear Panel Assembly from Veta 3*.

10.37.2 Removing the O2 Supply Inlet Assembly (DISS/NIST)

1. Pull out the 39# and 60# pipes, as shown in Figure A.
2. Use a Phillips screwdriver to remove the two screws and take down the O2 supply inlet assembly, as shown in Figure A.

Figure A



10.38 Removing the O2/Air Supply Inlet Assembly (DISS/NIST)

10.38.1 Preparations

10.38.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- Phillips screwdriver

10.38.1.2 Preparations

Before removing the O2/air supply inlet assembly (DISS/NIST):

- Lower the air pressure inside the anesthesia machine to avoid personal injury or equipment damage.
- Disconnect all pipelines and cylinder gas supplies.
- Move the anesthesia machine to an appropriate position and brake the machine.

10.38.1.3 Pre-disassembly

1. Remove the rear panel assembly from Veta 3 by referring to *10.1.5Removing the Rear Panel Assembly from Veta 3*.

10.38.2 Removing the O2/Air Supply Inlet Assembly (DISS/NIST)

1. Pull out the 39#, 41#, 60#, and 51# pipes, as shown in Figure A.
2. Use a Phillips screwdriver to remove the three screws and take down the O2/air supply inlet assembly, as shown in Figure A and Figure B.

Figure A

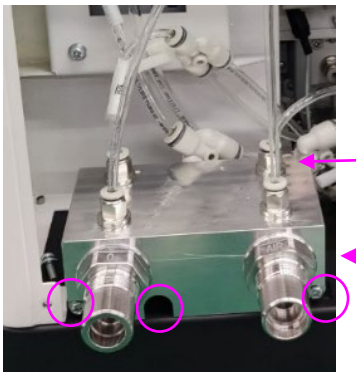


Figure B

10.39 Removing the Vaporizer Assembly

10.39.1 Preparations

10.39.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- Phillips screwdriver

10.39.1.2 Preparations

Before removing the vaporizer assembly:

- Shut down the anesthesia machine and disconnect the AC power.
- Lower the air pressure inside the anesthesia machine to avoid personal injury or equipment damage.
- Disconnect all pipelines and cylinder gas supplies.
- Move the anesthesia machine to an appropriate position and brake the machine.

10.39.1.3 Pre-disassembly

1. Remove the rear panel assembly from Veta 3 by referring to *10.1.5Removing the Rear Panel Assembly from Veta 3*.

10.39.2 Removing the Vaporizer Assembly

1. Pull out the 53# and 25# pipes, as shown in Figure A.
2. Use a Phillips screwdriver to remove the four screws and take down the vaporizer assembly, as shown in Figure A.

Figure A

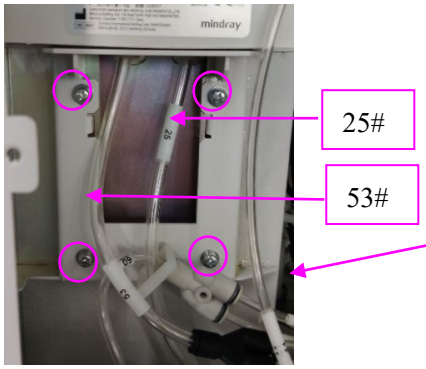


Figure B

10.40 Removing the Basket

10.40.1 Preparations

10.40.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- Phillips screwdriver

10.40.1.2 Preparations

Before removing the basket (Veta 5):

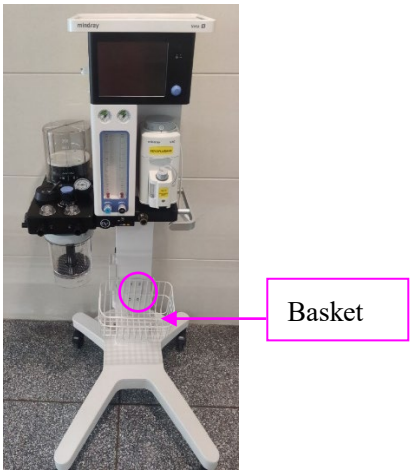
- Move the anesthesia machine to an appropriate position and brake the machine.

10.40.1.3 Pre-disassembly

None

10.40.2 Removing the Basket

1. Use a Phillips screwdriver to remove the four screws.



10.41 Removing the Veta 5 Trolley Assembly

10.41.1 Preparations

10.41.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- M6 hex key

10.41.1.2 Preparations

Before removing the Veta 5 trolley assembly:

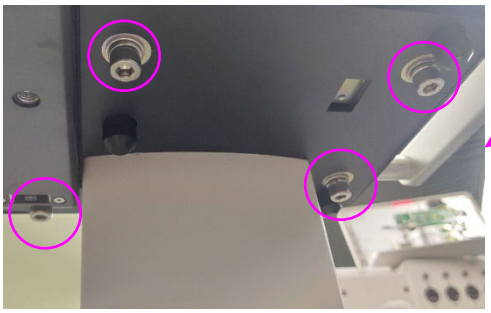
- Shut down the anesthesia machine and disconnect the AC power.
- Move the anesthesia machine to an appropriate position and brake the machine.

10.41.1.3 Pre-disassembly

None

10.41.2 Removing the Veta 5 Trolley Assembly

Use an M6 Allen wrench to remove the four screws and lift the main unit upward to take it down.



10.42 Removing Casters

10.42.1 Preparations

10.42.1.1 Tools

The following tools may be required in the removal and replacement of parts:

- M6 Hexagon screw wrench
- Non-adjustable wrench

10.42.1.2 Preparations

Before removing casters:

- Shut down the anesthesia machine and disconnect the AC power.
- Move the anesthesia machine to an appropriate position and brake the machine.

10.42.1.3 Pre-disassembly

Remove the Veta 5 trolley assembly by referring to *10.41Removing the Veta 5 Trolley Assembly*.

10.42.2 Removing Casters

1. Put down the trolley to keep the long legs in touch with the ground.
2. Use a non-adjustable wrench to turn casters counterclockwise to take them down.