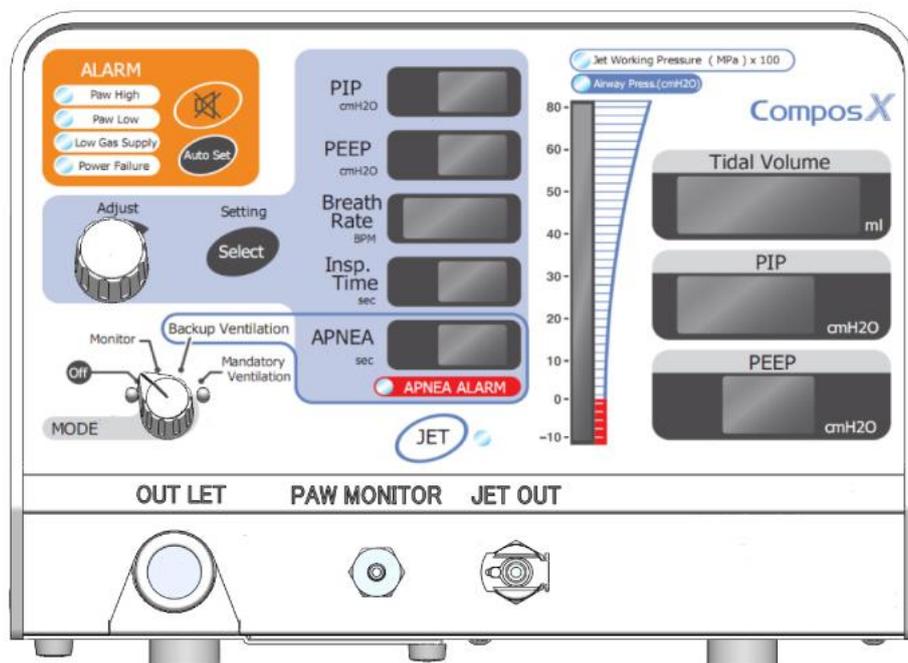


Veterinary Mechanical Ventilator

Compos X

Operation Manual

Rev.2.00 2012/2



Preamble

Thank you for selecting the veterinary artificial respirator (Compos X) from Metran Co., Ltd.

The purpose of this document is to describe the specifications and normal operating procedures of the (Compos X) as well as outline safety guidelines and precautions.

Before using this product, please make sure to fully read and understand this user's guide and follow all safety guidelines and precautions. Also, please store this user's guide in a readily accessible location for future reference.

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Warning

Safety and Accident Prevention during normal use

- | |
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| <ol style="list-style-type: none">1. Allow only trained and skilled people to use this device.2. Be aware of the following points when choosing a location for the device.<ol style="list-style-type: none">① Place the device in an environment where the device is free from being splashed with water.② Place the device where there is no danger of adverse effects originated from air conditioning, abnormal pressures, temperature, humidity, ventilation, direct sunlight, dust, salt content and ion content.③ Place the device in a fixed location without vibrations, slopes or shocks.④ Do not place the device in areas close to chemical storage and pressurized gas generation areas.⑤ Verify the power source voltage and frequency as well as power consumption allowances before plugging in the device.⑥ Use a grounded connection.3. Do not use in the following condition.<ol style="list-style-type: none">① Since malfunction may occur under the environment where an electromagnetic interference wave exists, do not install this device around equipments that may generate electromagnetic waves, such as a computer, communication equipment, and an elevator. Do not use computer, games, or mobile phones around this device, it may cause malfunction4. Be aware of the following items before operating the device.<ol style="list-style-type: none">① Check all switch positions, switch polarities, dial settings and meter settings to make sure the device is in a proper operation |
|--|

- ② Check that the device is properly grounded via the ground connection on the power terminal.
 - ③ Check that all cords and connections are properly connected and secure.
 - ④ Keep in mind that the combined usage of multiple devices may result in a failure of accurate diagnosis and potentially cause a high risk.
 - ⑤ Double check the outer part of the patient circuit that is directly connected to the patient.
- 5.** Make sure to take care of the following items when the device is in operation.
- ① Check that the operating time does not exceed what is required for normal diagnosis and treatment of the patient.
 - ② Continuously monitor the patient and the device for abnormalities.
 - ③ When finding any abnormality in the patient or device, stop the device immediately to ensure the safety of the patient.
 - ④ Check that the device is not in direct contact with the patient at any time.
- 6.** Follow the next steps after operating the device
- ① Turn off the device only after returning all switches and dials to the starting position according to the prescribed operating procedures.
 - ② Do not use excess force when unplugging the cords and peripherals from the device.
- 7.** Follow the next steps concerning storage.
- ① Place the device in an environment where the device is free from being splashed with water.
 - ② Place the device where there is no danger of adverse effects originated from air conditioning, abnormal pressures, temperature, humidity, ventilation, direct sunlight, dust, salt content and ion content.
 - ③ Place the device in a fixed location without vibrations, slopes or shocks.
 - ④ Do not place the device in areas close to chemical storage and pressurized gas generation areas.
 - ⑤ Clean all peripherals and cords and store them in an appropriate way.
 - ⑥ Be sure to clean the device in order to avoid problems during the next operation.
- 8.** Send the device to an authorized maintenance dealer when finding any troubles with the device. Do not attempt to fix the problems by opening the device on your own.
- 9.** Do not try to modify or alter the device in any way.
- 10.** Maintenance and inspection
- ① Be sure to periodically inspect the device and parts, following the recommended maintenance and overhaul cycle.
 - ② Be sure that the device is in proper working condition when using the device for the first time after a long period of inoperation.
- 11.** Backup Battery
- ① This device uses a nickel-hydrogen battery for the power alarm. Since it may discharge automatically when not in use for a long period of time, make sure to turn ON the device for about 8 hours once a month.
 - ② Be sure to have a manual ventilator ready for use in case the ventilator stops its operation for any reason.
 - ③ Be sure that the indicating disconnection of the airway hose is active. Also, be sure to set a correct value to indicate leakage.
 - ④ Always check that the selected ventilation mode, ventilation criteria, and alarm settings are working appropriately.
 - ⑤ Use genuine parts for the device, unless otherwise indicated.
 - ⑥ Keep checking the device for cracks or other damages. When finding any damages, contact an authorized dealer.
 - ⑦ Do not use any sharp or pointy objects to set switches or dials in order to avoid potential damages to the device.
 - ⑧ Properly wash your hands before touching the device, breathing circuit or the patient.



Caution

Failure to comply or ignore the following items may cause serious injury or death of human/animal. It may also cause fire.



※1 Fire Prohibition

This device uses oxygen. Do not bring fire close by any means during operation.



※2 High pressurized gas caution

This device uses high pressure gas. Be cautious of whether there are any loose connection. When a gas leak occurs, stop the use of this device immediately.

※3 Battery

This device uses a nickel-hydrogen battery for the power alarm. Since it may discharge automatically when not in use for a long period of time, make sure to turn ON the device for about 8 hours once a month.

The battery currently used is 4/V80H (VARTA product).



※4 Electrical Power Caution

In this device, there are areas where high voltage is applied, and it may cause electric shock. When performing maintenance check, sterilization, or disinfection, make sure to turn off the power switch and pull out the AC cord.

1. Precautions of use

Explanation of the symbols (DANGER, WARNING and CAUTION) used in this operation manual is as follows.

DANGER, WARNING and CAUTION

Please reconsider all warnings and cautions indicated on this operation manual before operation of the device.

When using the ventilator, thoroughly understand and observe the instructions set forth in all sections of this operation manual. Use the ventilator only for the purpose that is stated under "Purpose of Use." Further, while you use the ventilator, properly observe and monitor the patient. Be sure to observe the DANGER, WARNING and CAUTION that are indicated in this operation manual and on the product labels.

Danger

DANGER is used to indicate the presence of a hazard that will cause severe injury or death to the patient if the danger is ignored.

Warning

WARNING is used to indicate the presence of a hazard that may cause severe personal injury or death if the warning is ignored.

Caution

CAUTION is used to indicate the presence of a hazard that can cause minor personal injury or property damage if the warning is ignored.

Notice

NOTICE is used to notify users about different facts that may help to perform operations easily and effectively.

General Important Notes

Danger

- Do not use the device with flammable anesthetic gas, or in places with high density oxygen, it could cause an explosion and start a fire.
- Do not use the device within a flammable anesthetic gas and high oxygen concentration environment, it would cause explosions and start a fire.
- Do not use with a high pressure oxygen tank indoors, it may cause explosion and fire.

Warning

- The operator must not be in physical contact with the patient or any equipment, cables or metal in contact to the patient.
- When using a defibrillator, be sure that neither the patient body nor any metallic part connected to the patient gets in touch with the defibrillator.
Do not use this device in an MRI (MRT, NMR, NMI) laboratory. Due to strong magnetic fields, damage or malfunctions to the device may be observed.
- Do not let the ventilator be close to fire or an electric scalpel. High frequency energy coming from the electric scalpel can damage the ventilator.
- Do not use this device together with radiotherapy equipment.
- In order to avoid malfunction of the electrical components that may stop the ventilator, do not operate this device in an environment temperature over 40°C.
- This device should be used under the supervision of health workers, who can deal properly with abnormal circumstances.
- Prompt action is necessary when any abnormality is found while using this device.
- Do not use an AC cord different from the 3pin plug AC cord included with this device. The use of a different cord may cause electric shock to the patient or operator.
- Do not leave liquids close to the ventilator. Liquid may damage the device or cause an electric shock.
- Please use "medical grade" outlets which are grounded.
- Do not use any device which is not approved by the manufacture and do not introduce any metallic object into the open terminals of the main unit. They may damage and cause electrical shock.
- Only specialized personnel are allowed to disassemble the main body, flow sensor or any other components of this device.
- All the maintenance service of this device should be genuine replacement parts and be done by trained / qualified personnel.
- Make sure this device is working correctly during conventional ventilation before attaching it to the patient.

Caution

- To prevent malfunction caused by electromagnetic waves, keep cell phones and other communication equipment more than 15cm from the device.
- In order to prevent damage to this device, do not close the exhaust port or the oxygen exhaust port.

Cautions about gas supply

Warning

- Only use clean and dry pressurized air and medical grade oxygen gas. Other types of gas can cause not only malfunction, but also corrosion and even explosion of the device.

Caution

- Disconnect the O₂ and Air pressure hoses during storage or when not using the ventilator for a long period. Even in the power OFF mode, gas will be consumed by the breathing circuit monitor line and other pressure accessories and there is a possibility for this pressure to reduce the components life time.
- This device uses high pressured gas. Make sure there are no loose connection. Gas leakage from loose connections may cause fire or explosion. Stop the device operation in case of leakage.

Cautions about the internal battery

Caution

- Keep internal battery recharged.
- This device uses a nickel-hydrogen battery for power failure alarm.
- The internal battery takes 8 hours for full charge. To recharge the battery, turn ON the SW switch in the back of the ventilator. It is not necessary to operate the ventilator.
- The internal battery is provided for power failure alarm only. It cannot be used as the main source of power.
- The internal battery will become empty due to internal monitoring, if the ventilator has been stored for a long time. Please recharge it for about 8 hours when using the ventilator again.
- The internal battery is fully charged before shipment but it may become discharged during the transportation. We recommend checking and recharging the internal battery before using the ventilator.

Notice

- This device uses a 4/V80H (VARTA type) battery.

Caution about the breathing circuit and jet tube

Caution

- Only use a clean and sterilized breathing circuit and jet tub. Use of an unclean breathing circuit or jet tube may cause infection.
- Do not use a damaged breathing circuit or jet tube (crack, pinholes) even if they are reusable parts. Use only undamaged breathing circuits and jet tubes.

Warning about inspection before use

Warning

- Inspect the device before use. Using this device without inspection can cause an irregular pressure setting which could cause injury to the patient.
- In order to use this device safely, inspect the device before use.

Warning during operation



- When using a mechanical ventilator, be aware of the patient conditions for swift action.
- Use an alternate monitor in case of abnormality in this device monitor. The operator is responsible to ensure the safe working of the ventilator.
- In case of abnormality in this device, remove it from the patient and apply an alternative respirator (such as ambu bag or any other device that can offer PEEP and oxygen to the patient).
- In case of abnormality, remove the device from operation and repair it.
- Do not set PIP, PEEP, breathing rate, or inspiratory time against the patient's respiratory physiology.
- When pressing a button, do not conflict it with others operations. If a duplicated operation occurs, the prior operation may continue.

Warning about the alarm



- Solve the cause of problems prior to muting the alarm. Be ready to provide manual breath at any moment.
- The operator should always be available to hear the audio alarm. Set alarm parameters appropriately. Alarms are very important to show any risk for the patient.

Warning about cleaning, disinfection, and sterilization

Warning

- Do not use an auto-clave, EOG, or other sterilization types to clean the ventilator.
- When using ethylene oxide gas (EOG) for component sterilization, make sure to ventilate with room air until the concentration becomes safe.
- Disassemble the flow meter for cleaning. Do not sterilize.

Caution

- Use of an improperly cleaned jet ASSY or breathing circuit may cause secondary contamination.
- Use of an improperly cleaned exhaust adapter may cause secondary contamination.

Warning about maintenance

Warning

- Be sure to conduct periodical inspections. Without proper maintenance, problems may occur during the operation, causing risk to the patient.

Caution

- For safe use of this device, perform periodical maintenance after every 2000 operation hours or every 2 years.
- For safe use of the jet ASSY, perform periodical maintenance after being sterilized by autoclave over 40 times or every 2 years.

Caution about storage



- Store the ventilator in a place where there is no risk of exposure to any liquid. It may damage this device.



- Do not store the ventilator in places where the air contains inadequate pressure, humidity, temperature, ventilation, sunlight, dust, salt and ion. It may cause malfunction of the equipment.
- Keep this device in a safe place, away from inclination, oscillation, or shock (even during the transportation).

Caution during operation

- Read the instructions on this manual thoroughly.
- Only use this ventilator after understanding the operation manual and the attached documents.
- Ask the manufacturer or the authorized dealer for information related to maintenance.
- For equipment used with this ventilator, but from a different manufacturer, follow the instructions of each manufacturer.
- This device's specifications may vary from different versions. Ask the manufacturer for details.

Responsibility for the patient safety

Read the instructions in this operation manual for safe and correct use of this ventilator.

The design, manuals, and labels of this device were designed to be understood by people with general knowledge and training in artificial ventilators. The manual indications, notes and warnings are based on the device structure. In this manual we are not discussing the dangers of improper use of the device resulting in troubles, or bad effects to the patient which are fully understood by the medical worker. The manufacturer will not be responsible for risk well known by the medical professional, trouble caused by misuse or side effects in the patient. The manufacturer will not be responsible for the results of combination with others devices that are not recommended by the manufacturer.

Operating conditions and selection of the patient monitoring type must be the operator's responsibility. The operator will be responsible for selection of devices needed in patient monitoring. Electronic devices cannot replace visual check and observation of the patient conditions by the medical worker.

Warranty

A written warranty is supplied with the ventilator. The ventilator is warranted under this written warranty. However, the warranty does not cover the following defects:

- Damages caused by wrong use or wrong operation of the device.
- Damages caused by any modification that is not authorized by the manufacturer.
- Damages caused by unauthorized maintenance and repair.
- Damages caused when the device is used in a different form from its purpose of use.

If the ventilator is found to be defective in material or workmanship, it will be repaired or replaced. The manufacturer cannot be responsible for deterioration, wear, and abuse of the ventilator. In no event shall the manufacturer's liability exceed the sale price of the ventilator.

The warranty procedure will be applicable based on the following conditions:

- Contact us immediately when damages are found to the material or equipment.
- Return the damaged material and equipment back to the manufacturer.
- The manufacturer must investigate the device to determine if the damages will be covered by the warranty.

This is the only warranty provided by the manufacturer. There is no other warranty offered by the manufacturer.

The distributor cannot modify the conditions of this warranty. Please always read the warranty certificate.

2. Glossary

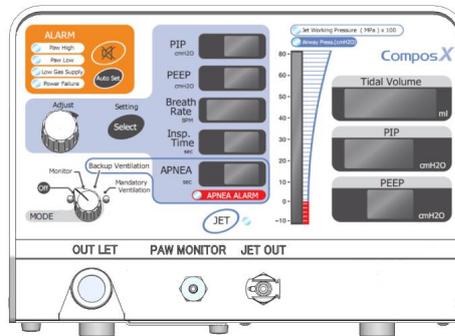
The following describes some items of this manual.

Symbol	Explanation
AC	Alternating current
DC	Direct current
V	Voltage
A	Ampere
Hz	Hertz
kg	Kilogram
sec	Second
cmH ₂ O	Centimeter per water (unit of pressure)
mL	Milliliter
ASSY	Assembly
kPa	kilo Pascal
APNEA	Absence of breath
LED	Light Emitting Diode
BPM	Breath per minute
LPM	Liter per minute (unit of flow)
I : E ratio	Inspiratory and expiratory phases time ratio
IPPV	Intermittent positive pressure ventilation
PCV	Pressure-controlled ventilation
PEEP	Positive end –expiratory pressure

3. Main Unit and Accessories

The following items are enclosed with this product. Please confirm the enclosed items upon receipt.

3-1. Main Unit



3-2. Accessories

3-2-1. Pressure hose (oxygen)



3-2-2. Breathing circuit (reusable)



3-2-3. Jet Tube



3-2-4. Exhaust adapter

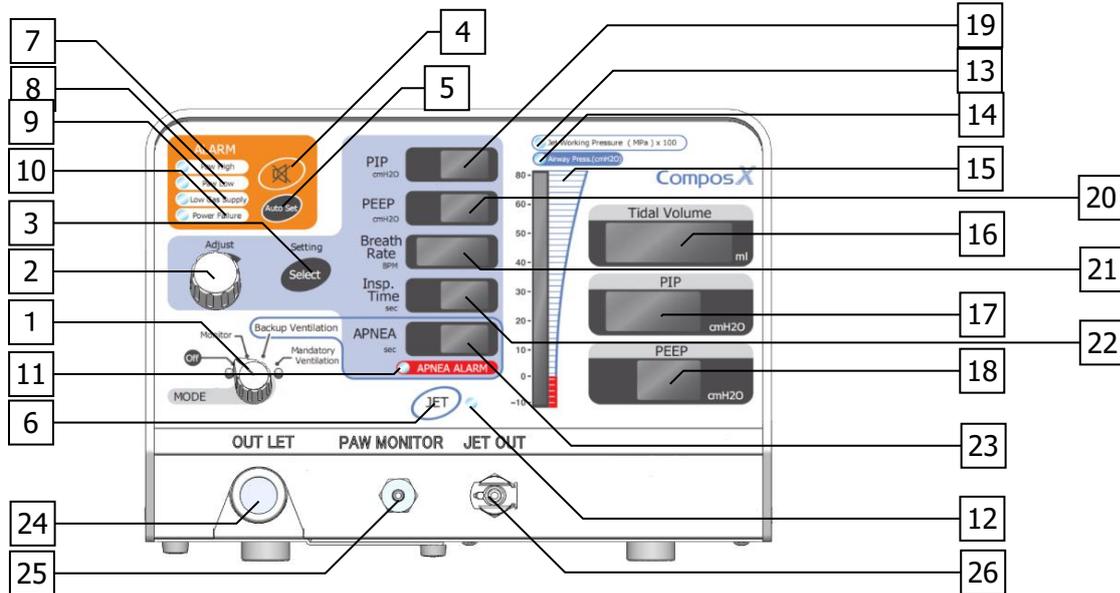


3-2-5. AC cord



4. Part names and functions

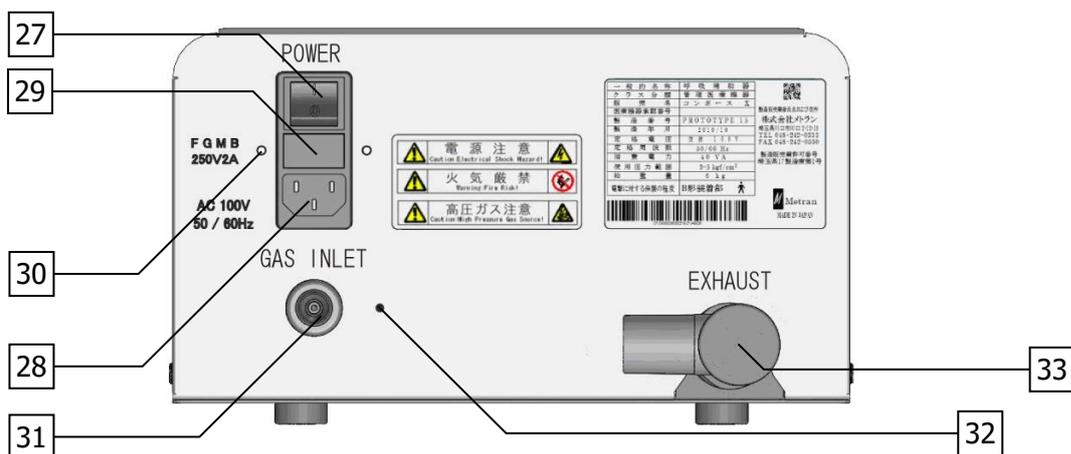
4-1. Front



No.	Name	Function
1	Mode switch	4 modes selectable (OFF, Monitor, Backup and Mandatory Ventilation).
2	Adjust knob	Along with select button to select the item, set the value of the item.
3	Select button	With adjust knob for value settings, select the item. (PIP→PEEP→Breath Rate→Ins. Time→Apnea)
4	Mute button	Mutes the audio alarm of Paw high and low and low gas supply for 30 seconds.
5	Auto set button	When pressing this button, after completing the settings, paw high, paw low, and low gas supply alarms will be set according to PIP value.
6	Jet button	Performs output selection from breathing circuit port or jet port.
7	Paw high alarm LED	Blinks when the pressure measured at the pressure monitor port reaches the paw high alarm threshold $\pm 10\%$ during inspiration.
8	Paw low alarm LED	Blinks when the pressure measured at the pressure monitor port becomes lower than paw low alarm threshold $\pm 10\%$ during inspiration.
9	Low gas supply alarm LED	Blinks when the pressure measured at the pressure monitor port becomes lower than low gas supply alarm, during inspiratory phase.
10	Power failure alarm LED	Illuminates when electric power is not supplied and the mode switch is set to anything other than "OFF".
11	APNEA alarm	Blinks when the time from the last breath reaches and exceeds the pre-set apnea time during backup mode, and then the device automatically initiates mandatory ventilation.

12	Jet ventilation operation LED	Activates while blinking when the ventilation port changes from inspiratory port to jet port by pressing the jet button.
13	Jet working pressure LED	Activates during jet ventilation, by pressing jet button, and bar-graph unit that is being used is MPa (x100).
14	Airway pressure LED	Activates when not applying jet ventilation and bar-graph unit that is being used is cmH ₂ O.
15	Pressure bar-graph	Pressure bar-graph monitor (MPa units during jet ventilation and cmH ₂ O units during the others modes).
16	Tidal volume display	Displays the amount of ventilation per breath during inspiratory phase.
17	PIP display	Displays the peak pressure from inspiratory to expiratory phase.
18	PEEP display	Displays the minimum pressure of end-expiratory phase.
19	PIP set display	Displays the set value of the peak inspiratory pressure.
20	PEEP set display	Displays the set value of the end-expiratory pressure.
21	Breath rate set display	Displays the set value of breath amount per minute. It automatically adjusts the ventilation time in order not to let breathing ratio exceeds 1:1 I:E ratio.
22	Inspiration time set display	Displays the set value of inspiration time. If breath rate is adjusted, it will automatically adjust the ventilation time in order not to let breathing ratio exceeds 1:1 I:E ratio.
23	APNEA set display	Displays the set value of the apnea setting. It initiates mandatory ventilation when the time from the last breath reaches and exceeds the pre-set apnea time during backup mode.
24	Breathing circuit port	Port for the accessory Breathing Circuit (reusable) shown in 3-2-2.
25	Pressure monitor port	Port for pressure monitor tube of the accessory Breathing Circuit (reusable) shown in 3-2-2.
26	Jet port	Port for the accessory Jet Tube shown in 3-2-3.

4-2. Back



No.	Name	Function
27	Power switch	Power ON/OFF
28	AC cord inlet	Port for the accessory AC cord shown in 3-2-5.
29	Fuse box	Fuse for overcurrent protection. The fuse is a disposable product. Use 2 fuses (specifications are as follows). 【Specifications】 250V 2A B Size: $\phi 5.2 \times 20$ mm Go to chapter 11-6 for more information about fuse replacement.
30	Lock lever	Locking accessory for connecting AC cord shown in 3-2-5.
31	Gas inlet port	Port for the accessory Pressure Hose (oxygen) shown in 3-2-1.
32	Oxygen outlet	Exhaust terminal of the surplus oxygen gas from the device's circuit. Do not block it.
33	Exhaust port	Exhaust terminal for surplus gas from the breathing circuit. Exhaust direction is changeable by using the accessory Exhaust adapter shown in 3-2-4.

5. Preparation

5-1. Placement

Make sure to have this device in a safe and horizontal location.

5-2. AC cord and pressure hose setting

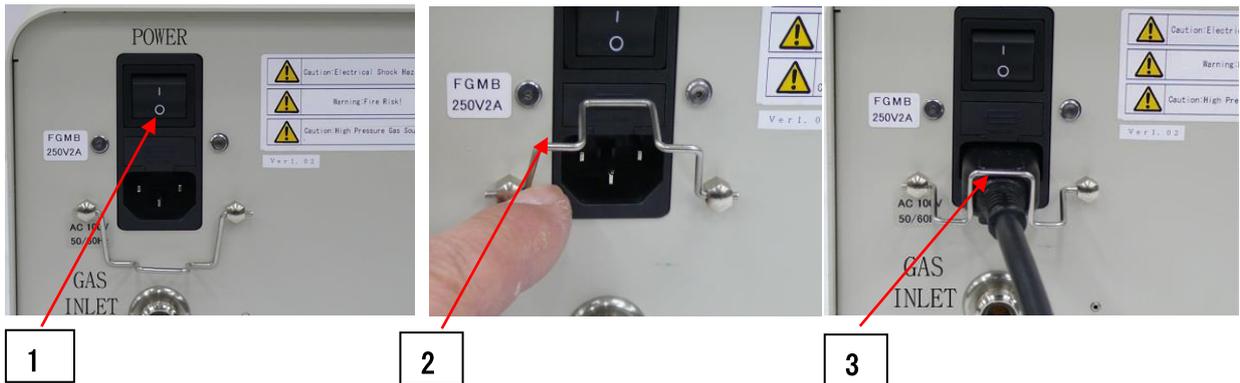
5-2-1 Make sure the power switch is OFF. (fig. 1)

Hold up the lock lever at the device's back. (fig. 2)

Connect the AC cord (3-2-5.) to the device's AC cord inlet.

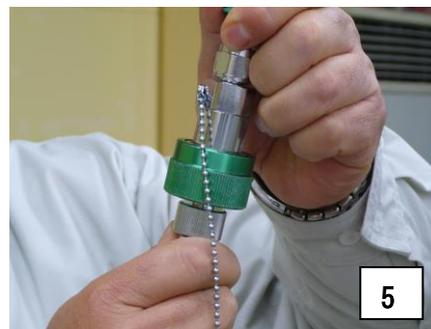
Pull down the lock lever and make sure the AC cord is locked in place. (fig. 3)

Plug the AC cord into a grounded outlet.



5-2-2 Connect the pressure hose (3-2-1.) to the gas inlet port and lock it by turning its nut in a clockwise direction. (fig. 4) (Make sure the connector is firmly locked.)

Connect the pressure hose (3-2-1.) to the oxygen gas supply terminal. (fig. 5)



Caution

Plug the AC cord to a terminal providing a grounded terminal. This device's operation may stop in case of a power blackout or AC cord disconnection.

Caution

Make sure to have the pressure hose well locked at its outlet terminal. The operation required pressure is from 3.0 to 4.5kgf/cm².

5-3. Breathing Circuit Connection

5-3-1 Make sure to have the breathing circuit (3-2-2.) connected to the device's breathing circuit port completely.

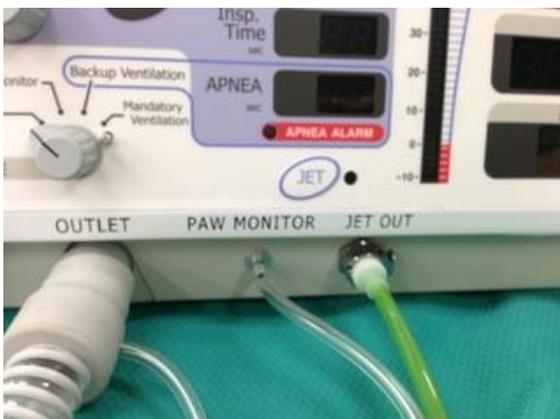


5-3-2 Connect the pressure monitor tube to the pressure monitor port completely.



Disassembling procedure

Release the breathing circuit's pressure monitor tube from the pressure monitor port.
Release the breathing circuit (3-2-2.) from the breathing circuit port.

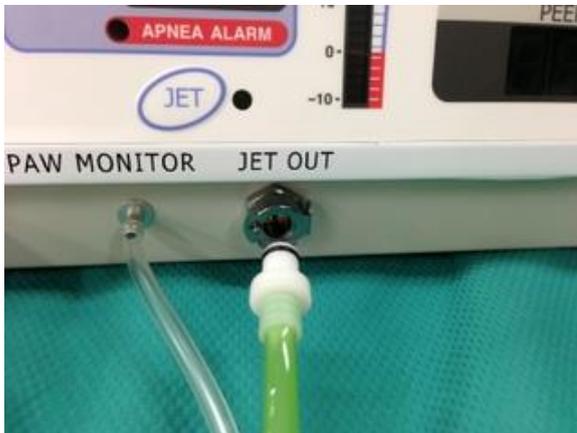


5-3-3 Connect the jet tube (3-2-3.). The coupler will lock by setting the jet tube completely.

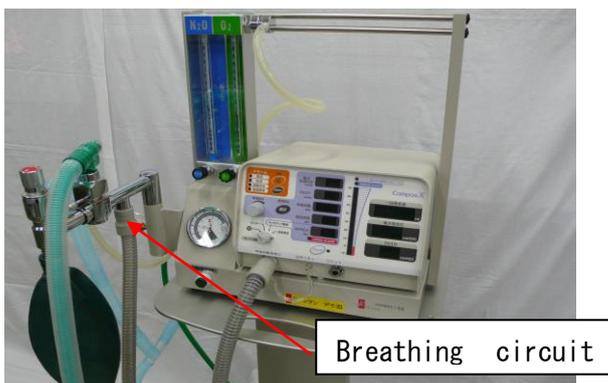


Disconnecting the Jet tube

Press both sides of the coupler until it unlocks the Jet tube.



5-3-4 Connect the breathing circuit to the breathing circuit port at the anesthesia machine.



※ Set it at the bag mount in case there is no breathing circuit port at your anesthesia machine.

(Make sure to have enough breathing circuit tube otherwise it may affect the anesthesia gas concentration)

5-3-7 Exhaust Adapter Connection

Connect the wide side of the exhaust adapter (3-2-4.) to the exhaust port.
Exhaust adapter direction can be easily adjusted.



5-3-8 Exhaust gas circuit connection

Connect the exhaust gas circuit at the exhaust adapter.



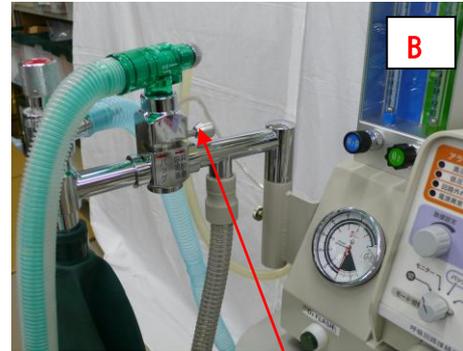
 **Caution**

Only use sterilized and clean breathing circuits.

5-4 Operation Test

5-4-1. Connect the test lung at the anesthesia machine patient port. (fig. A)

Change the select lever from anesthesia to ventilator. (fig. B-1)



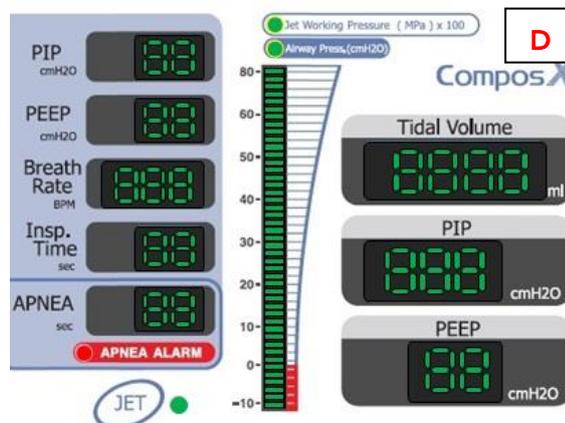
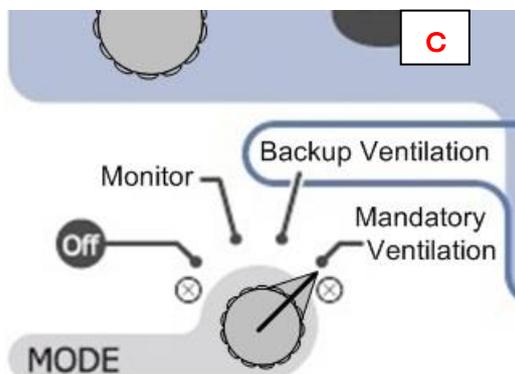
5-4-2. Turn ON the power switch located at the back of Compos X.

B-1



5-4-3. Turn the mode switch to Mandatory ventilation. (fig. C)

All LEDs and audio alarm will activate for the first second. Check if all LED and audio alarm are operating normally. (fig. D)



5-4-4. Ventilation Setting

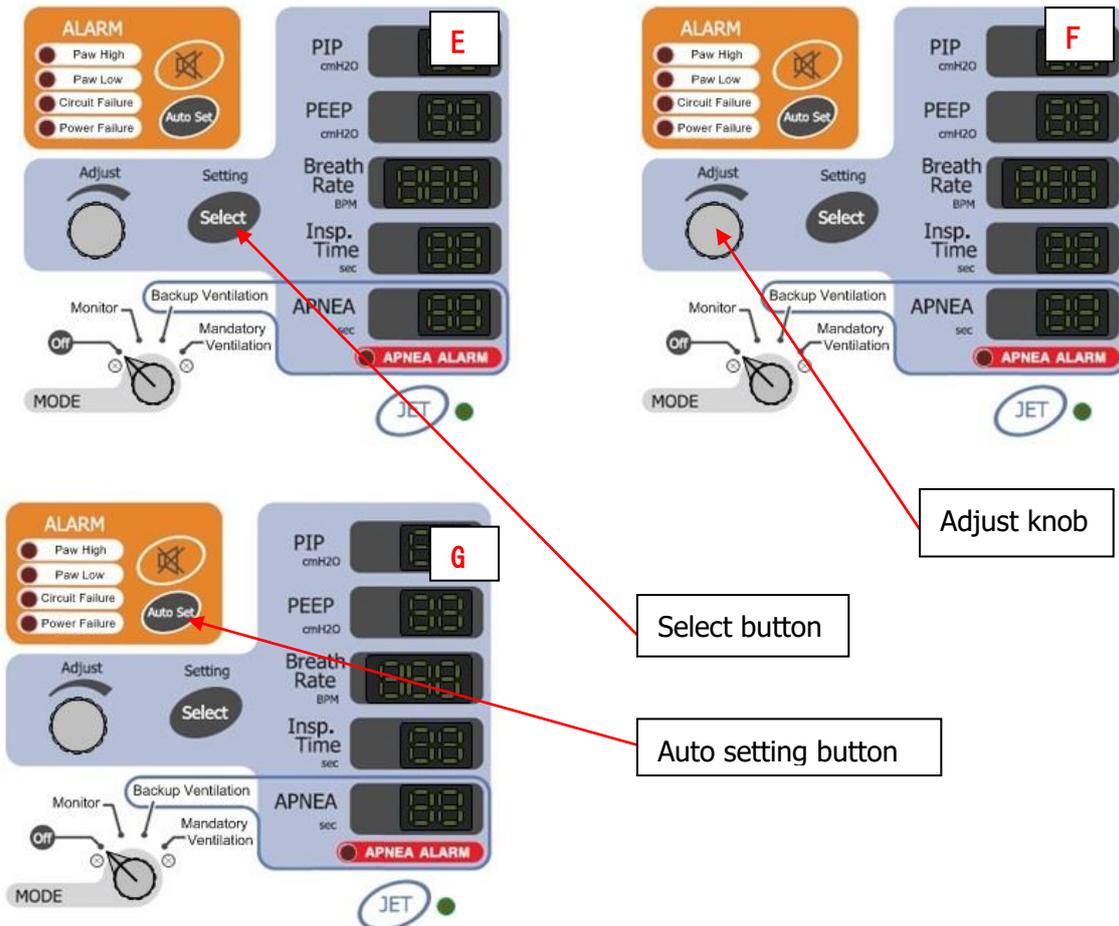
Press select button until PIP LED starts to blink. (fig. E)

Select PEEP, Breath rate, Inspiration time, APNEA and PIP by pushing select button.

The setting value pointed by blinking LED can be adjusted by turning the adjust knob. (fig. F)

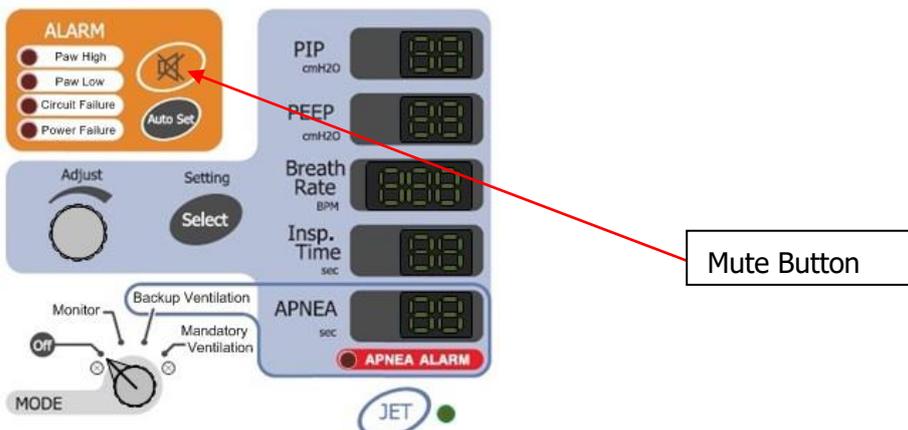
After completing the ventilation setting, paw high, paw low and low gas supply alarms will be set automatically by pressing auto set button. (fig. G)

Make sure to press the auto set button every time you adjust a ventilation setting.



5-4-5 Alarm mute

Audio alarm will stop for 30 seconds by pressing the mute button during the alarm.



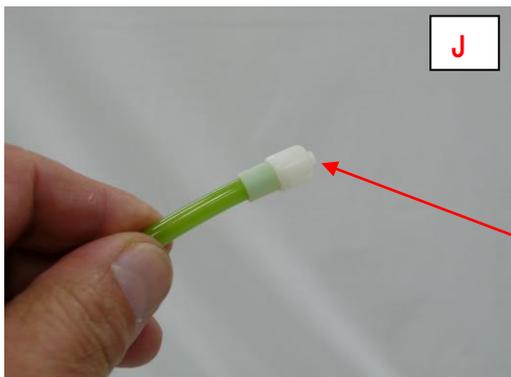
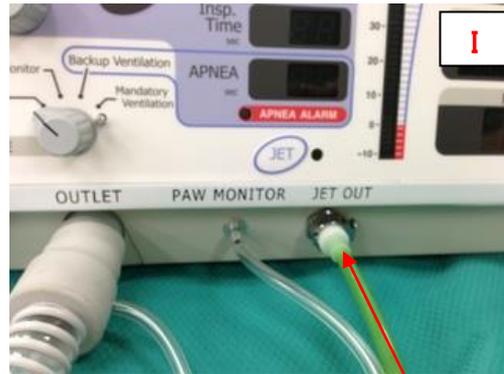
5-4-6. Jet Ventilation

Breathing circuit port and jet port output will switch when pressing the jet button during the ventilation. (fig. H)

When jet port output is selected, jet ventilation operation LED activates, and pressure bar-graph unit will change to MPa and jet working pressure LED activates.

By pressing the jet button again, the output will switch to the breathing circuit port, jet ventilation operation LED deactivates and jet working pressure LED will switch to airway pressure LED.

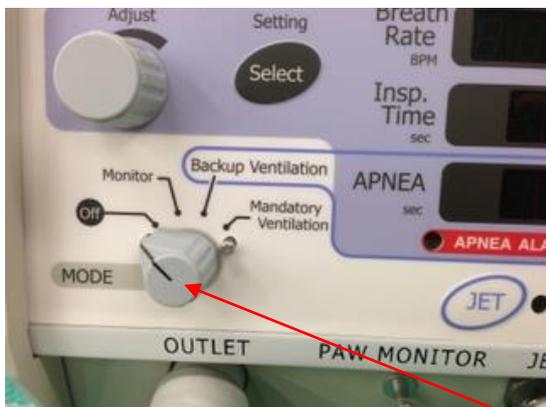
※ Check if the gas is flowing from the jet tube.



Jet Tube

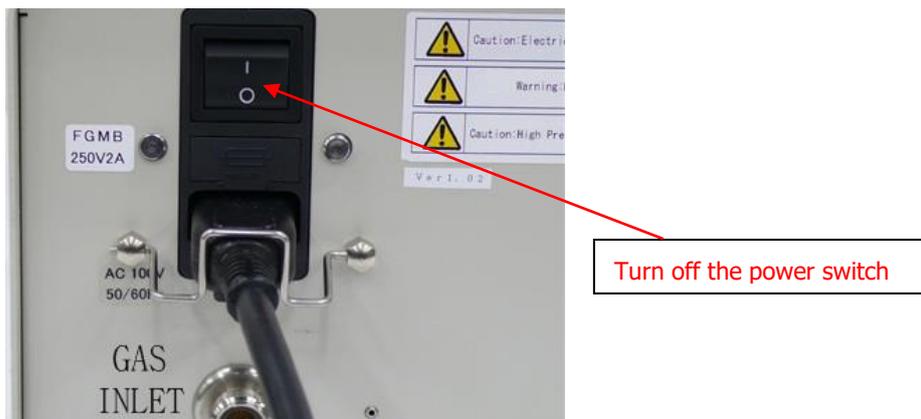
Check if there is gas flowing from the jet tube.

5-4-7. Turn the mode switch to off after finishing the test operation.



Turn the mode switch to off

5-4-8. Turn off the power switch when you are not using the ventilator.



6. Functions

Veterinary mechanical ventilator Compos X has three (3) main functions.

6-1. Mandatory ventilation mode

Mandatory ventilation can be applied by setting the PIP, PEEP, breath rate and inspiration time.

6-2. Backup ventilation mode

Backup ventilation can be applied by setting the PIP, PEEP, breath rate, inspiratory time, and APNEA. Mandatory ventilation will be applied when apnea time exceeds the APNEA set value.

6-3. Monitoring mode

This mode does not apply mandatory ventilation. It measures the tidal volume.

7. Alarm Test

7-1. Paw High Alarm

Check if the paw high alarm LED blinks, audio alarm activates and the ventilation stops when the airway pressure becomes over the paw high alarm range.

7-2. Paw Low Alarm

Check if the paw low alarm LED blinks and audio alarm activates when the airway pressure becomes over the paw low alarm range.

7-3. Low Gas Supply Alarm

Check if the low gas supply alarm LED blinks and audio alarm activates when airway pressure is lower than the low gas supply alarm range.

7-4. Power Failure Alarm

Check if the power failure alarm LED blinks and audio alarm activates when unplugging the AC cord with the mode and power switches ON.

Check if the power failure alarm LED blinks and audio alarm activates when turning off the power switch with the mode switch ON.

8. Mandatory ventilation mode operation

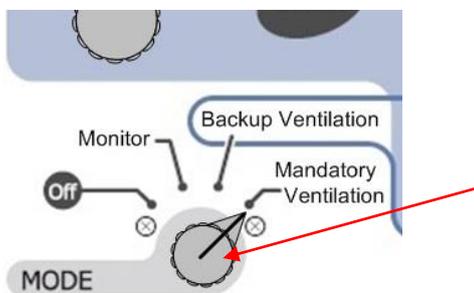
8-1. Turning ON

Turn ON the power switch located at the back of Compos X.



8-2. Selecting the mode

Turn the mode switch to Mandatory ventilation.



8-3. Ventilation Setting

Select and then adjust PEEP, Breath rate, Inspiration time, APNEA and PIP settings by pushing select button.

Press auto set button after finishing the adjustments.

Start the ventilation.

8-4. Auto setting

Always press auto set button after finishing a ventilation adjustment.

8-5. Alarm mute

Press alarm mute button if an alarm starts, it will mute the alarm for 30 seconds.

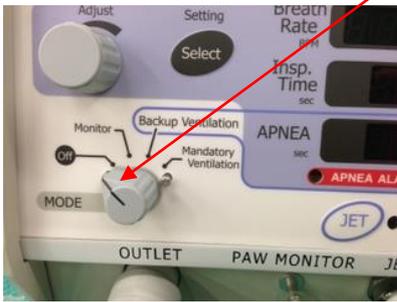
The alarm mute will not activate if the power switch is turned ON and AC cord is unplugged.

8-6. Jet ventilation operation

Breathing circuit port and jet port output will switch when pressing the jet button during the ventilation.

8-7. Ending the ventilation

Turn the mode switch to OFF.



Turn off the power switch when you are not using the ventilator.



9. Backup ventilation mode operation

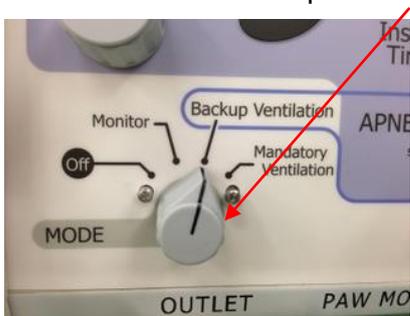
9-1. Turning ON

Turn ON the power switch located at the back of Compos X.



9-2. Selecting the mode

Turn the mode switch to Backup



9-3. Ventilation Setting

Select APNEA display by pressing select button then adjust it. **(Also check PIP, PEEP, breathing rate and insp. Time)**

Press auto set button after finishing the adjustments. Start APNEA ventilation.

This mode monitors the spontaneous breaths and displays the tidal volume, without ventilating.

If the patient does not breathe during the set apnea period, alarm will activate and mandatory ventilation will start.

To reactivate the backup mode, turn the mode switch to monitor then back to backup mode. Do not forget to push auto set button.

※ During backup ventilation be aware of the ventilation conditions by checking the expiratory gas.

9-4. Auto setting

Always press auto set button after finishing a ventilation adjustment.

9-5. Alarm mute

Press alarm mute button if an alarm starts, it will mute the alarm for 30 seconds.

The alarm mute will not activate if the power switch is turned ON and AC cord is unplugged.

9-6. Ending the ventilation

Turn the mode switch to OFF.

10. Monitor mode

It does not ventilate during monitor mode, it just monitors patient spontaneous Vt.

10-1. Turning ON

Turn ON the power switch located at the back of Compos X.

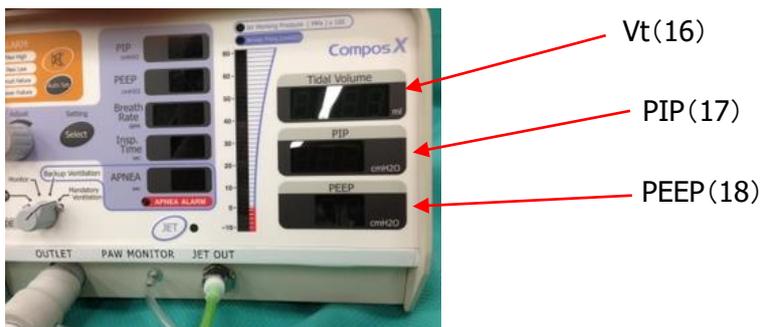


10-2. Selecting the mode

Turn the mode switch to monitor.



During monitor mode the ventilator displays PIP, PEEP and Vt data.



10-3. Ventilation Setting

It is possible to adjust the ventilation settings, but it will not ventilate during monitor mode.

10-4. Auto setting

There is no need to push the auto set button.

10-5. Alarm mute

Alarm mute does not work during monitor mode.

10-6. Ending the ventilation

Turn the mode switch to OFF.

11. Maintenance

In order to ensure continuous safe usage of this device, regular maintenance (prior to use and periodical maintenance checks) is required.

Make sure to follow the instructions on chapter 5 (Preparation).

11-1. Inspection before using this device

Follow the instructions on chapter 13 (Trouble shooting) in case of alarm or any other abnormality during operation.

Breathing circuit and jet tube may degrade after several usages and sterilizations. Make sure to have spare parts of those accessories ready for use at any and all the time.

11-2. Sterilization of jet ASSY

12-2-1. Removing jet ASSY

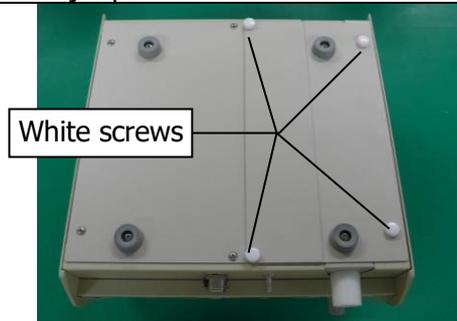
Check if the AC cord (3-2-5.) is unplugged.

Check if the breathing circuit (3-2-2.) is disconnected from the breathing circuit port.

Check if the pressure hose (3-2-1.) is disconnected from the gas inlet port.

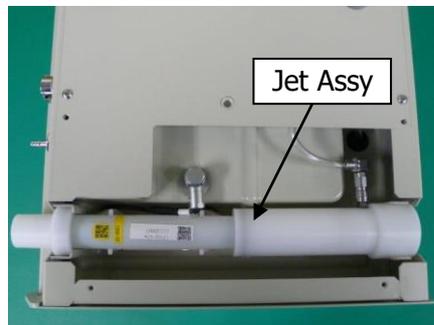
Check if the jet tube (3-2-3.) is disconnected from the jet port.

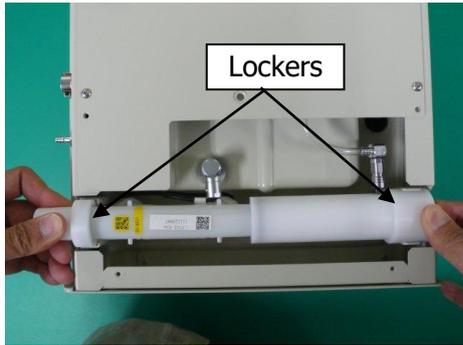
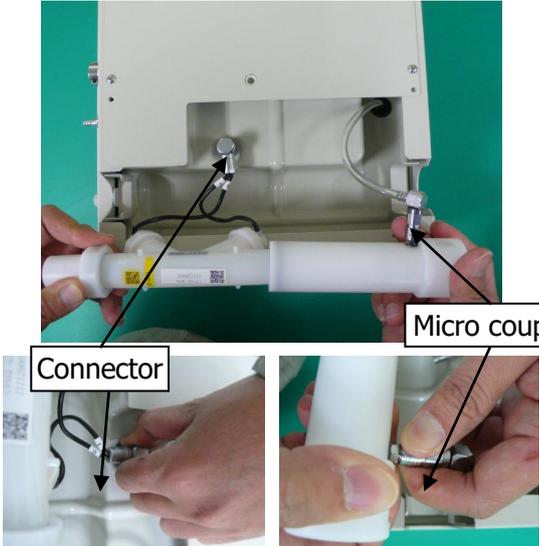
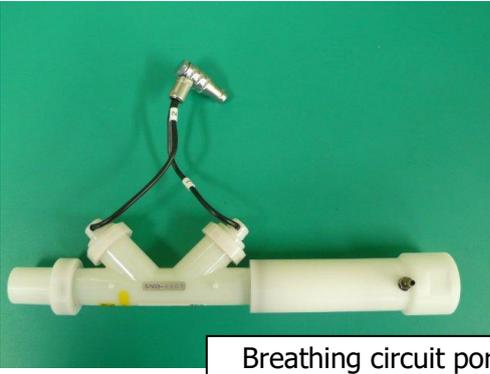
Release these four (4) white screws from the bottom plate of the unit.

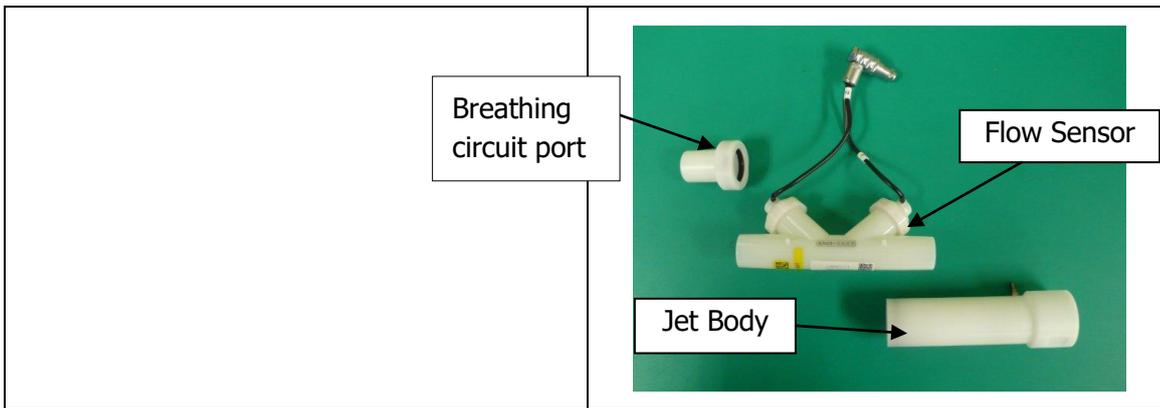


Remove the plate.

Jet ASSY will appear under the plate.



<p>Use both hands to pull up and remove the jet ASSY from its locker.</p>	
<p>Put the jet ASSY at the side and release the connector and micro coupler. Both can be released by pulling them.</p>	
<p>Jet ASSY removed.</p>	
<p>Jet ASSY can be divided in 3 parts as :</p> <ol style="list-style-type: none"> 1. Jet Body 2. Breathing circuit Port 3. Flow Sensor 	



Warning

Disassemble the jet ASSY in 3 individual parts in order to apply proper disinfection and sterilization. Without disassemble, jointed parts cannot be disinfected or sterilized.

Notice

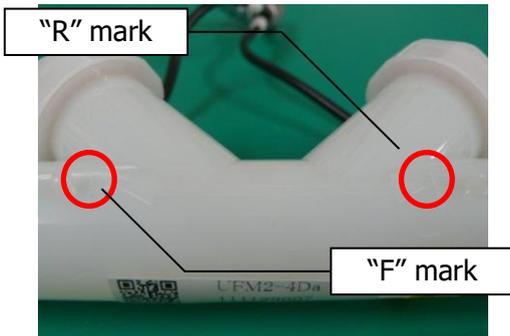
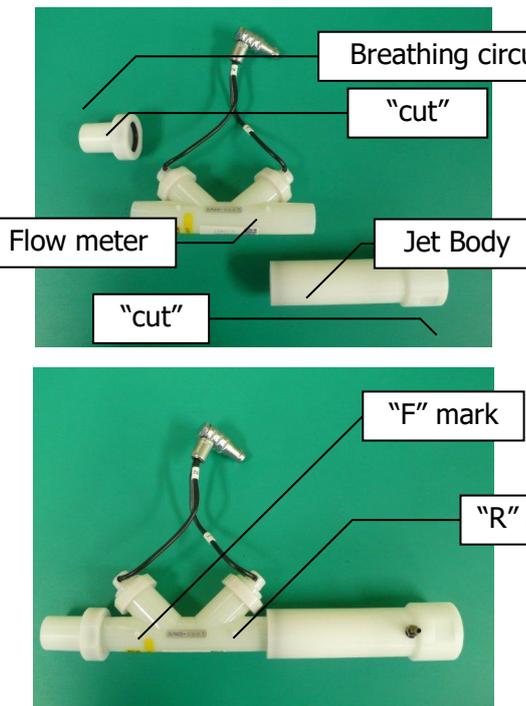
The "exhaust adapter" (fig 3-2-4), should be disinfected and sterilized with the jet ASSY.

11-2-2. Assembling the sensor, jet ASSY

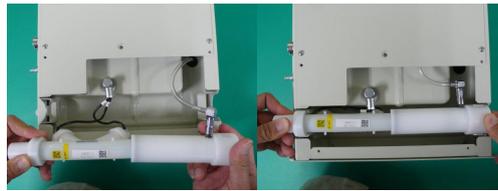
Check if the AC cord (3-2-5.) is unplugged.

Check if the pressure hose (3-2-1.) is disconnected from the gas inlet port.

Check if the jet tube (3-2-3.) is disconnected from the jet port.

<p>There is a print of "F" ⇔ "R" at the low meter body. "F" for the front and "R" for the back side.</p>	 <p>The image shows a close-up of the white plastic flow meter body. Two red circles highlight the 'R' and 'F' marks on the top surface. A label 'UFM2-4D4' is visible on the bottom of the device.</p>
<p>Connect the flow meter's "R" side to the jet body. Connect the flow meter's "F" side to the breathing circuit port connector. There are vertical cuts on each connector that must be on vertical position in order to fit with the locker.</p>	 <p>The image shows the flow meter and jet body being assembled. Labels include: 'Breathing circuit port' pointing to a metal fitting, '"cut"' pointing to the vertical slots on the connectors, 'Flow meter' pointing to the main device, and 'Jet Body' pointing to the white tube. A second image below shows the 'F' and 'R' marks on the flow meter.</p>
<p>Connect the flow meter connector to the red mark position and make sure to have it firmly locked.</p>	 <p>Two side-by-side close-up photos show a hand inserting a metal connector into a port. Red circles highlight the alignment points.</p>
<p>Insert the jet body's micro coupler until it completely locks.</p>	 <p>A close-up photo shows hands pushing a metal micro coupler into the end of the white jet body until it is fully seated and locked.</p>

The flow meter's sensor lead line must be pointing down and the "F" mark (breathing circuit port) on the front part of the device's body. Both cuts must fit with the locker.



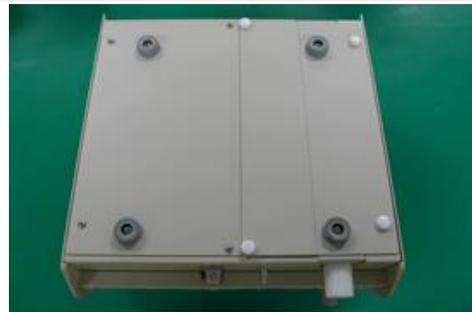
Use both hands to set the jet ASSY completely deep into the compartment.



Set the bottom plate.
There are metal parts on the bottom plate that fits with the jet ASSY. Set the bottom plate carefully.



Complete setting the bottom plate by locking the four (4) white screws.



11-2-3. Jet ASSY sterilization method

Autoclave sterilization (121°C or 135°C for 20 minutes) can be used.
EOG or low temperature plasma sterilization can also be applied.

11-2-4. Life expectancy of the Flow meter in case of sterilization
The life expectancy is approximately 40 times of autoclave sterilization.
We recommend this value of autoclave sterilization.

Warning

After being sterilized by autoclave approximately over 40 times, electrical components of the flow meter could be damaged which might cause incorrect tidal volume and dysfunction of the flow meter.

Caution

The jet ASSY must be exchanged every 2 years during periodical maintenance.
After use of the exhaust adapter, apply disinfection and sterilization together with the jet ASSY.

11-3. Periodical maintenance

When turning the mode switch to OFF, after exceeding 2,000 hours of total usage, the tidal volume LED will blink for 5 seconds. This blink indicates that the device should have periodical maintenance.

We offer paid services of periodic maintenance check and overhaul. Contact us for more detailed information.

11-4. Cleaning

Wipe with soft cloth and rinse water for dust cleaning.
Turn the power switch ON, after cleaning the device, in order to recharge the power failure alarm battery.

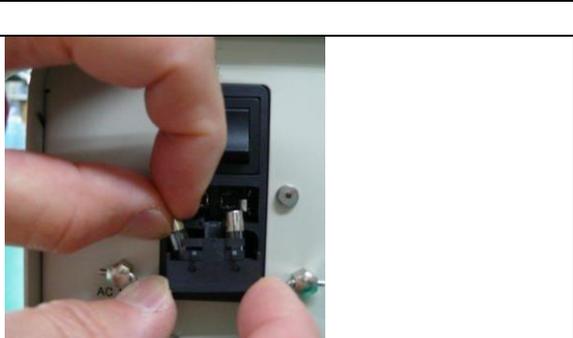
11-5. Cycle

Apply sterilization before each usage.

Notice

Apply cleaning before each usage or once a month when the device is not in use.

11-6. Exchange of the fuses

<p>With the AC cord (3-2-5.) disconnected, pullout the fuse box.</p>	
<p>Pull it out by using your finger.</p>	
<p>Pull the fuse box until you have a complete view of the fuses.</p> <p>Notice</p> <p>Since the fuse box cannot be removed from the main unit, make sure that you do not pull it with too much force.</p>	
<p>This picture shows the fuse box being released.</p>	
<p>Hold the fuse box with one hand and exchange the fuses with the other hand.</p>	

<p>Remove the second fuse in the same way.</p>	
<p>It must be exchanged with two (2) new fuses. (250V 2A Bø5.2x20mm size)</p>	
<p>Set the new fuses into the fuse box.</p>	
<p>Set the fuses vertically.</p>	
<p>Hold the bottom part to keep the fuse box on horizontal position.</p>	
<p>After the fuse box becomes horizontal.</p>	

Push the fuse box to the closed position.



11-7 Maintenance Mode

This device maintenance mode provides the functions below.

- 1- Serial number display
- 2- External time display
- 3- Internal time display
- 4- Supply solenoid valve used time display
- 5- Circuit/Jet used time display
- 11- System compliance calibration
- 12- System compliance validation selection

Notice

Items 6 to 10 are also displayed but can only be use by service personnel.

11-7-1. Maintenance Mode

Maintenance mode can be used when turning on the device by the method bellow.

- Prepare the device by connecting the power and pressure hose.
- Turn ON the power switch on the back of the device.
- Turn the mode switch to monitor with mute and auto set buttons pressed at the same time.
- During maintenance mode the function number, from 1 to 15, are displayed on the PIP set display and the item of each function on the PEEP set display.
- The function number can be selected by turning the adjust knob.
- The mode item can be selected by pressing the select button and the previous item by pressing the mute button.
- Turn the mode switch to OFF in order to end the maintenance mode.

Notice

During maintenance mode the device will not operate, even by turning the switch mode knob to backup or mandatory ventilation modes.

11-7-2. Serial Number display

The serial number is displayed on the device's specification.

When turning ON the maintenance mode, the value 01 appears on the PIP setting display as mentioned in 11-7-1.

The serial number will be displayed on the tidal volume, PIP and PEEP displays as:

- PIP display: Manufactured year
- PEEP display: Manufactured month
- Tidal Volume display: Device's serial number

11-7-3. External time display

External time display shows the operation time in hours from the last maintenance, and it can be reset.

During the maintenance mode, turn the adjust knob until the value 02 appears on the PIP setting display as described in 11-7-1.

External time value will be displayed on the tidal volume and PIP displays as:

- Tidal volume display: Unit value for thousands
- PIP display: Unit for values below one thousand

11-7-4. Internal time display

Internal time display shows the operation time from the manufactured date, and it cannot be reset.

During the maintenance mode, turn the adjust knob until the value 03 appears on the PIP setting display as described in 11-7-1.

External time value will be displayed on the tidal volume and PIP displays as:

- Tidal volume display: Unit value for thousands
- PIP display: Unit for values bellow one thousand

11-7-5. Supply solenoid valve used time display

It shows the supply solenoid valve operated number time, and it can be reset.

During the maintenance mode, turn the adjust knob until the value 04 appears on the PIP setting display as described in 11-7-1.

External time value will be displayed on the tidal volume and PIP displays as:

- Tidal volume display: Unit value for thousands
- PIP display: Unit for values bellow one thousand

11-7-6. Circuit/Jet used time display

It shows the Circuit/Jet (Solenoid Valve SV2) operated number time, and it can be reset.

During the maintenance mode, turn the adjust knob until the value 05 appears on the PIP setting display as described in 11-7-1.

External time value will be displayed on the tidal volume and PIP displays as:

- Tidal volume display: Unit value for thousands
- PIP display: Unit for values bellow one thousand

Notice

Items 6 to 10 are also displayed at the PIP display but can only be used by service personnel.

11-7-7. System compliance calibration

Notice

This procedure should be performed whenever the breathing circuit size is changed.

- Preparation:

Connect the breathing circuit and pressure monitor port in order to apply the system compliance calibration. You must occlude the circuit at the connection to the endo tracheal tube during this procedure. Using your thumb or the palm of your hand is acceptable.

- Process:

During the maintenance mode, turn the adjust knob until the value 11 appears on the PIP set display as described in 11-7-1.

PEEP set display will show the value 01, and then the tidal volume display shows system compliance value for 60cmH₂O.

Press the select button until the PEEP set display shows the value 02. PIP, tidal volume and PEEP displays will show the value 0.

Press the select button until the PEEP set display shows the value 04. The calibration will start automatically.

During the calibration, tidal volume display will blink for a pressure of 60cmH₂O that will be shown on the PIP display as the peak pressure, and the PEEP display will show the number of times the calibration test has been applied.

The calibration range is 60 ± 2 cmH₂O and will automatically end after being applied 10 times. If the calibration cannot reach the range of 60 ± 2 cmH₂O, it will continue until it reaches the range.

PEEP display will show the value 10 and calibration data will be memorized. The calibration finishes when PEEP set display shows the value 01.

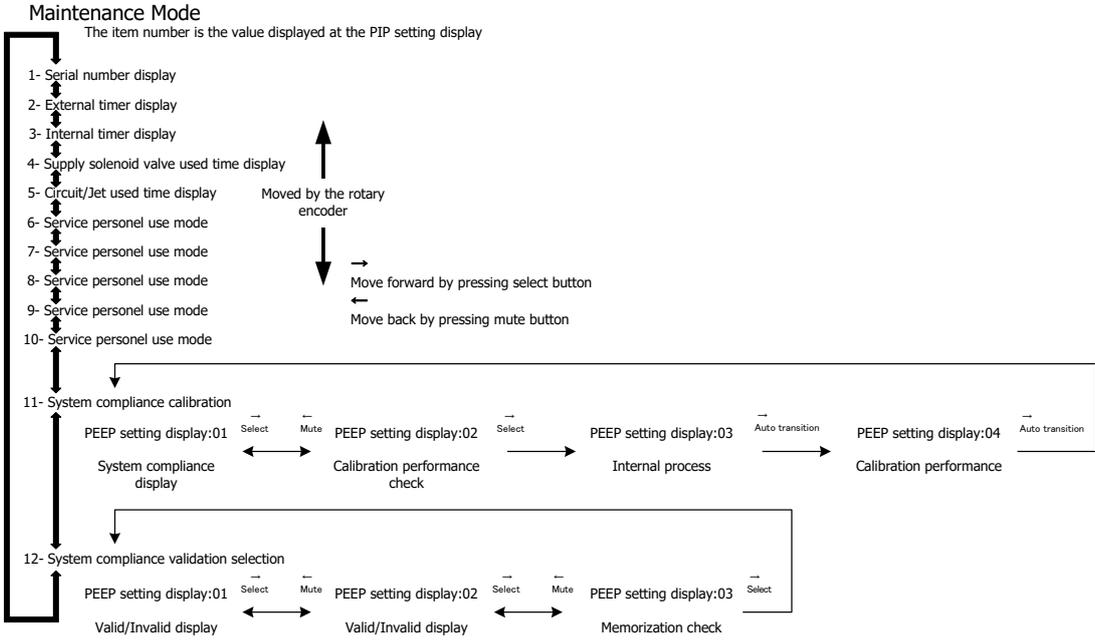
Notice

Press mute button to turn back one item.

When the system compliance setting is invalid, it automatically will become valid after applying the calibration.

Notice

Press mute button to turn back one item.



11-7-9. Disposal of Compos X and accessories.

Contact your local dealer for this device and accessories disposal information.

12. Trouble shooting

When the alarm activates and you do not know how to fix it, first make sure to secure the patient's safety, and then follow the instructions below.

The following instructions are for the purpose of troubleshooting the device and not for any problem concerning the patient. The order of the trouble shooting sections below is unrelated to the frequency of occurrence.

12-1. Trouble shooting when alarm activates

Trouble	Reason	Trouble shooting
Paw high	Paw high alarm setting is too low	Press the auto set button.
	Exhaust port is blocked	Check if there is anything blocking the exhaust port.
	others	Call the emergency contact.
Paw low Low gas supply	Breathing circuit leakage	Check if there is no damage on the breathing circuit. Check if all breathing circuit connectors are firmly connected. Check for leaks in the anesthesia machine.
	Decrease of supply gas	Check if there is no leakage in the gas supply device or connection.
	others	Call the emergency contact.
	If paw low alarm or low gas supply alarm is too frequent	Press the auto setting button.
APNEA	There is no spontaneous breath from the patient	Switch to mandatory ventilation mode.
Power failure	The AC cord is unplugged	Plug the AC cord (3-2-5.).
	There is no electrical power coming to the device	Check if the power switch is not set OFF.
	Disconnection of the AC cord	Call the emergency contact.
	others	Call the emergency contact.
	The device is malfunctioning	Call the emergency contact.
Jet button does not operate	others	Call the emergency contact.

12-2. During operation

Trouble	Reason	Trouble shooting
PIP does not increase	Breathing circuit leakage	Check if there is no damage on the breathing circuit (3-2-2.).
		Check if all breathing circuit (3-2-2.) connectors are firmly connected.
	Decrease of supply gas	Check if there is no leakage in the gas supply device.
	others	Call the emergency contact.

13. Technical characteristic

13-1. Technical characteristic

Transportation and storage condition.

- Place the device in an environment where the device is free from being splashed with water.
- Place the device where there is no danger of adverse effects originated from air conditioning, abnormal pressures, temperature, humidity, ventilation, direct sunlight, dust, salt content and ion content.
- Place the device in a fixed place without vibrations, slopes or shocks.
- Do not place the device in areas close to chemical storage and pressurized gas generation areas.

Transportation and storage environment

Ambient temperature range: -20 to 60°C

Ambient humidity range: 0 to 95% (without condensation)

Relative pressure: 500hPa to 1060 hPa (altitude -264 to 3,165 meter)

Guaranteed terms of operation

Ambient temperature range: 5 to 40°C

Ambient humidity range: 0 to 95% (without condensation)

13-2. Specification

General	
Name	Compos X
Input power	AC100 to 240V (50 to 60Hz)
Power consumption	40VA
Operating pressure	3 to 5kgf/cm ²
Ventilation	
Ventilation type	Pressure limit, time cycle
PIP	0 to 80cmH ₂ O 1cmH ₂ O unit
PEEP	0 to 20cmH ₂ O 1cmH ₂ O unit
Breath rate	1 to 255 BPM 1BPM unit
Inspiration time	0.1 to 3.0sec 0.1sec unit (but with no invert I:E ratio)
Alarm	
Paw high	LED alarm, audio alarm and auto alarm setting
Paw low	LED alarm, audio alarm and auto alarm setting
Low gas supply	LED alarm, audio alarm and auto alarm setting
Power failure	LED alarm, audio alarm
Apnea	LED alarm, audio alarm
Alarm mute	30 seconds
Monitoring	
Tidal volume	20mL to 2,000mL ±10%+10mL
PIIP	0 to 80cmH ₂ O ±10%
PEEP	0 to 20cmH ₂ O ±10%
Airway pressure	-10cmH ₂ O to 80cmH ₂ O ±2cmH ₂ O
Jet ventilation pressure	0 to 0.8MPa ±0.02MPa
Apnea	1 to 60 sec. Depending on flow trigger
Others	
Dimensions	260mm(W)×190mm(H)×283mm(D)
Weight	6kg

Category	
IP protection class	IPX0
Electric shock protection	Class I
	B type
	Caution Read the operation manual. Failure to comply or ignore the following items may cause serious injury or death of human/animal. It may also cause fire.
	Do not expose to fire
	High pressure gas hazard
	Electrical shock hazard
	Equipment of continuous operation



Manufactory contact

METRAN CO., LTD.
12-18, 2 CHOME KAWAGUCHI, KAWAGUCHI-SHI,
SAITAMA-KEN, 332-0015 JAPAN
TEL +81 48(242)0333 FAX +81 48(242)0550



Emergency contact

Dealer: