Veterinary mechanical ventilator

Compos X

Instructions for use

Metran

[For clinical staff only]

Model name	Compos X
General name	Respiratory aid
Approval No.	Ministry of Agriculture, Forestry and Fisheries Directive 3 Vet. No. 283

For safe use

Introduction

Thank you for using the veterinary ventilator "Compos X" (hereafter referred to as this device).
These instructions for use are intended to explain the precautions in the operation method and specifications of this device.
To ensure correct and safe use, be sure to read this manual before using the product, and make sure you understand its contents before use.

Precautions for use

■About marks symbols

In order to use this device safely, this manual uses the following symbol marks.

■Explanation of symbols/marks

⚠ **Warning**	If the product is mishandled, it may cause damage to your health, injury, product failure, or fire.
🚫	Prohibited acts during handling
❗	Mandatory actions that must be take into consideration during handling
⚠ **Caution**	If there is a risk that the product will not be used correctly or been mishandled, precautions to avoid the danger
🚭	No fires
⚠	High pressure gas caution
⚡	Power supply caution
📝 NOTE	Information that may be useful for use
⊗	Prohibition of disassembly
📖	Follow the instruction manual
🏭	Manufacturer
REF	Manual number
🧍	B type mounting part
🗑	WEEE Directive (2012/19/EU)
🗑	EU Battery directive (2006/66/EC)
IPX0	Not particularly protected against water ingress

⚠️Warning

■Danger of explosion or fire
  ●If oxygen is used to drive this device, never bring it close to fire during operation.
  ●Never use in flammable anesthetic gas and high oxygen concentration environments.
  ●Never use it in a hyperbaric oxygen treatment tank.

■Important notes
  ●Use this device under the supervision of a healthcare professional who can handle abnormal situations correctly.
  ●If an error occurs in this device, take immediate action.
  ●When using this device in combination with an anesthesia machine, carefully read and understand the instruction manual that come with the anesthesia machine. Improper use may cause harm to the patient or cause equipment failure.
  ●Be sure to use the supplied power cord with a 3-pin plug. If other power cords are used, the patient and the operator may be shocked.
  ●To avoid the danger of electric shock, connect this device only to a commercial power source with protective grounding.
  ●Before using this device for patients, be sure to confirm that it operates normally with normal ventilation before using it.

🚫Prohibited

  ●Only use by qualified and trained healthcare professionals who understand the general characteristics of this device.
  ●When defibrillating, do not touch the patient's body or the metal parts of the devices or cords connected to the patient.
  ●Do not use the device in an MRI laboratory (including MRT, NMR, NMI).
  ●Do not use with an electric knife or close to fire. The high frequency energy generated by the electric knife may cause the device to malfunction or malfunction.
  ●Do not use this device in a high temperature environment exceeding 40 ° C. It may cause the device to malfunction or stop ventilation.
  ●Do not place liquids such as infusion bottles near this device. If liquid gets inside the device, it not only causes a malfunction, but also may cause electric shock to the patient.
  ●Do not connect anything other than specified to the terminals of this device. Also, do not insert metal fittings into the terminals or touch them with your hands. Not only may it cause a malfunction of this device, but it may also cause an electric shock.
  ●Only a certified technician is allowed to open or disassemble this device.
  ●Do not install this device near devices or equipment that generate electromagnetic waves, such as personal computers, communication equipment, mobile phones, and elevators. It may cause malfunction of this device.

⚠Caution

■Do not use the equipment unless you are an experienced person.

■Keep the following in mind when installing the equipment:
- ●Please install in a place where it will not be exposed to water.
- ●Install in a location where there is no risk of adverse effects due to air containing atmospheric pressure, temperature, humidity, ventilation, ultraviolet rays, dust, salt, sulfur, etc.
- ●Caution to keep a stable state such as inclination, vibration, impact (including during transportation).
- ●Install the product away from chemical storage and gas generation sites.
- ●Pay attention to the power supply voltage, frequency, and allowable current value (or power consumption) before installation.
- ●Be sure to connect the power supply to the ground correctly before installing.

■Before using the equipment, please note the following:
- ●Check the switches for contact, polarity, dial settings, and displays to make sure that the equipment operates correctly。
- ●Make sure all connections are accurate and secure.
- ●Please note that the combined use of equipment may result in incorrect diagnosis and risk.
- ●Doublecheck the external anesthesia circuit directly connected to the patient.

■Please note the following while using the device:
- ●Please be careful not to exceed the time and amount required for diagnosis and treatment.
- ●Always monitor the equipment and the patient for any abnormalities.
- ●If any abnormality is found in the equipment or the patient, take appropriate measures such as stopping the operation of the equipment in a safe condition for the patient.
- ●Be careful not to let the patient touch the device.

■Please note the following after using the device:
- ●After returning the operation switch, dial, etc. to the state before use according to the specified procedure, turn off the gas source (O_2 gas, Air gas, N_2O gas, drive gas).
- ●Clean used equipment so that it does not interfere with the next use.
- ●Please note the following regarding the storage location.
  - ・Please keep it in a place where it will not be exposed to water.
  - ・Store in a place where there is no risk of adverse effects due to air pressure, temperature, humidity, ventilation, sunlight, dust, salt, sulfur, etc.
  - ・Pay attention to safety conditions such as tilt, vibration, and impact (including during transportation).
  - ・Do not store in a place where chemicals are stored or where gas is generated. After cleaning accessories, tubes, etc., organize them and put them together.
- ●Be sure to keep the equipment clean so that it will not interfere with the next use.

■If it breaks down, do not mess with it and display it appropriately, and leave the repair to a specialist.

■Do not modify the device.

■Maintenance and inspection
- ●Be sure to perform regular inspections of equipment and parts.
- ●When reusing a device that has not been used for a while, be sure to check that the device operates normally and safely before using it.

⚠**Caution**

■Other notes
- ●When using this device, be sure to equip a manual ventilator in case of an emergency.
- ●Be sure to wash your hands before and after touching this device, breathing circuit, and patient.
- ●Make sure that the alarm sounds when the patient connection, including the breathing circuit, is opened to the atmosphere.
- ●Always check that the ventilation mode selection, ventilation conditions and alarm settings are appropriate.
- ●Please use genuine accessories unless otherwise specified.
- ●Periodically inspect the device and its accessories for damage, cracks, wear and tears.
- ●Do not operate the buttons by piercing the panel, display, or terminals with a sharp object such as a nail or pen. It may cause a malfunction such as tearing of the display operation panel or damage to the internal switch.
- ●If abnormal noise occurs when using this device, unplug the power cord before discontinuing use.
- ●Be sure to undergo regular inspections and regular maintenance of equipment and parts.
- ●When reusing a device that you have not used for a while, be sure to check that the device operates normally before using it.
- ●Regarding the disposal of this device, please dispose of it according to the rules of your local government.
- ●Wipe the device with a dry cloth to clean it.
- ●When sterilizing or disinfecting this device, be sure to unplug the power cord from the outlet.
- ●Wire the cord so that it does not get caught in the chair or other equipment or interfere with it.
- ●This device uses a nickel metal hydride battery for the power alarm. If you do not use the product for a long time, turn on the power switch once a month for about 8 hours to charge the nickel-metal hydride battery. If you neglect to charge, the power alarm will not sound.
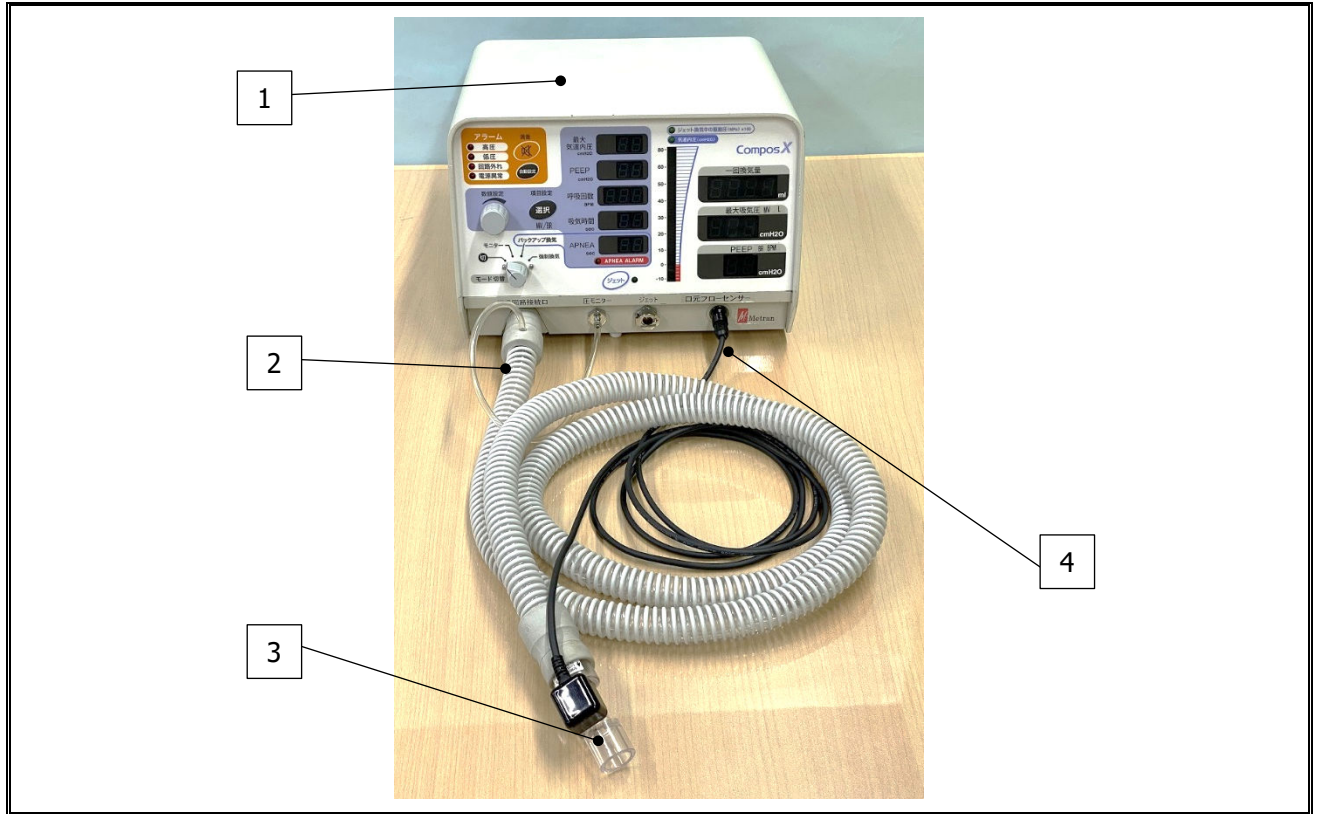
Table of contents

Names and functions of each part

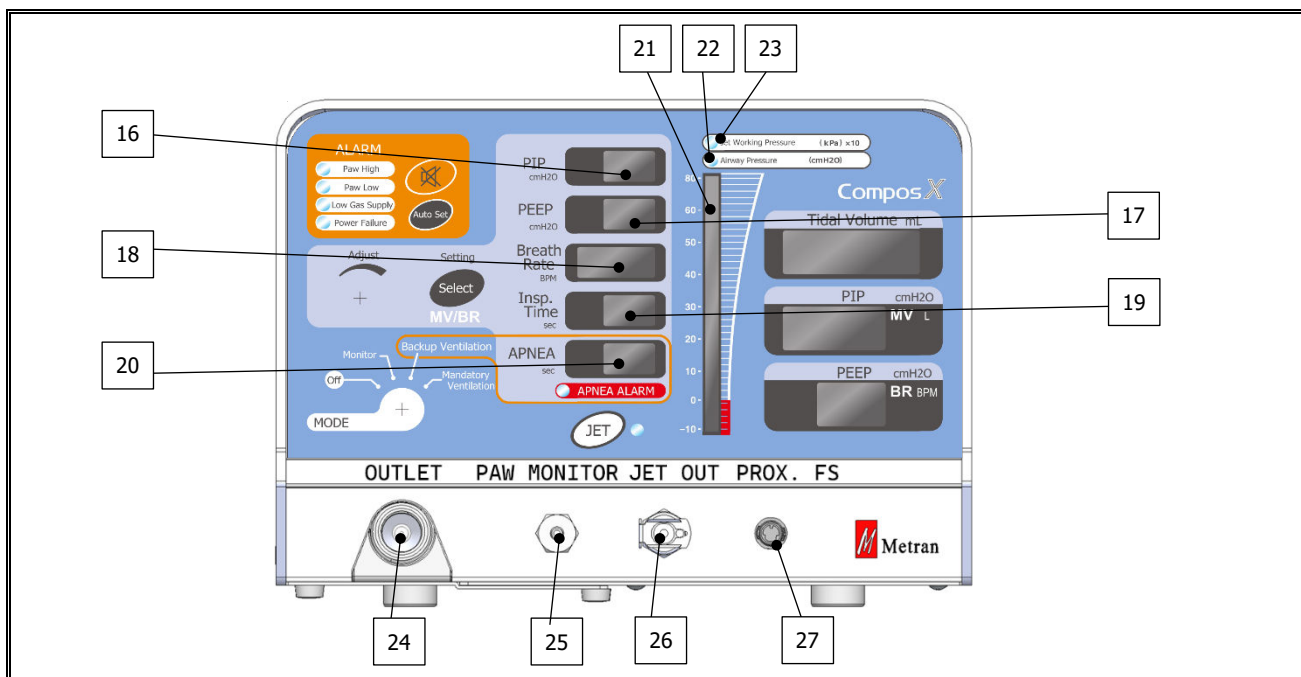## Main unit

No.	Name	Function
1	Main unit	Turn the power on "|" and "〇" OFF.
2	Breathing circuit	To connect the main unit to the patient
3	Proximal flow sensor	To measure the ventilation volume of the patient.
4	Sensor cable	A cable that connects this device to the proximal flow sensor.

Front main unit panel
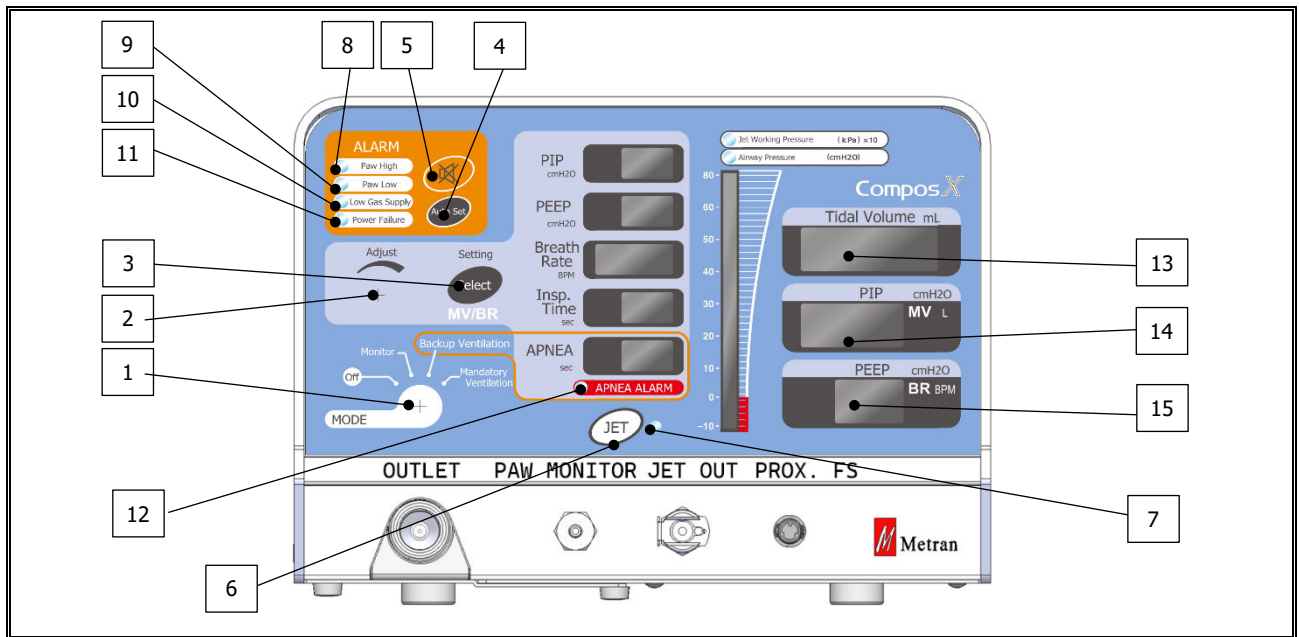
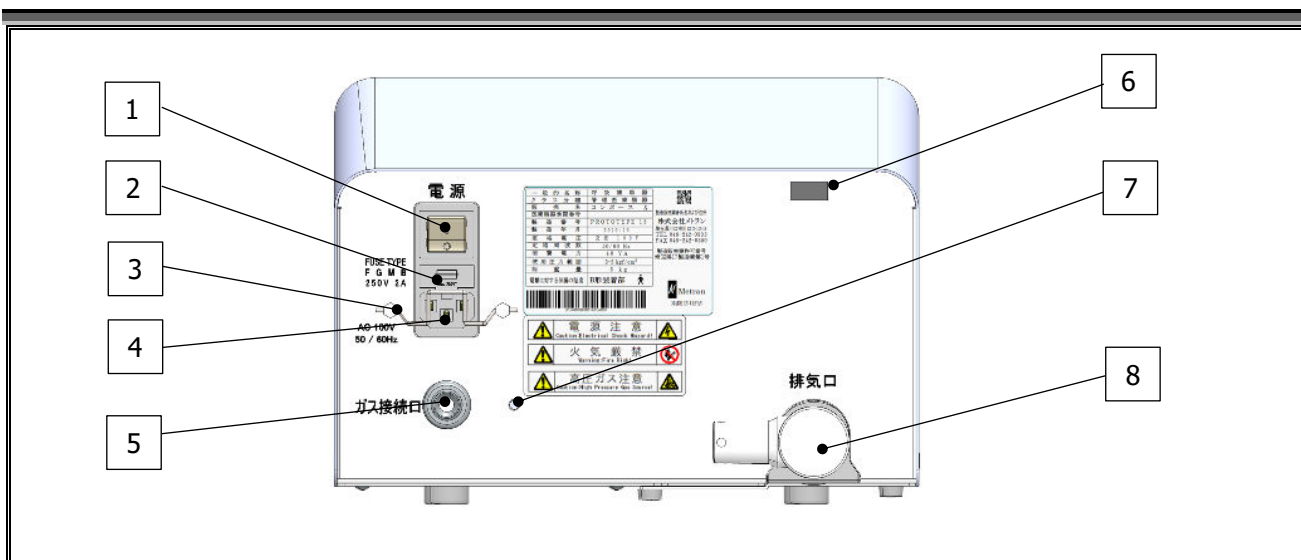| No.	Name	Function
1	Mode switching knob	This is a knob that switches between four modes: "Off", "Monitor", "Backup ventilation", and "Mandatory ventilation".
2	Numerical value setting knob	Used in combination with the select button to adjust the value.
3	Select (MV/BR) button	By pressing the select button, you can change the function to "Maximum inspiratory pressure-> PEEP-> Breathing rate-> APNEA". You can display the minute ventilation and the number of breaths by pressing and holding the button.
4	Auto set button	Press the "Auto set" button after setting the parameters. Then, the high / low pressure / Circuit disconnection alarm thresholds are set automatically according to the set value of the PIP. "Auto set" button must be pressed to confirm and complete the change in numerical settings.
5	Mute button	The alarm will be muted for 30 seconds after pressing this button.
6	Jet button	Press to switch from the breathing circuit connection port to the jet connection port.
7	LED during jet ventilation	While this LED is lit, gas output is from the jet connection port.
8	High pressure alarm	Blinks when the pressure at the pressure monitor connection port exceeds the high-pressure alarm threshold.
9	Low pressure alarm	Blinks when the pressure at the pressure monitor connection port reaches the low-pressure alarm threshold.
10	Breathing circuit disconnected	Blinks when the pressure at the pressure monitor connection port exceeds the circuit disconnection alarm threshold.
11	Power failure alarm	Lights up when the power is not supplied when the mode switching knob is in a position other than "OFF".
12	APNEA alarm	In backup ventilation mode, flashes when the APNEA set time has been exceeded since the last spontaneous breath, and mandatory ventilation begins.

No.	Name	Function
13	Tidal volume display	Displays the ventilation volume during the expiratory time.
14	Maximum inspiratory pressure/Minute ventilation display	Displays the maximum inspiratory pressure / Press and hold the setting button to display the minute ventilation
15	PEEP monitor /Breathing rate	Displays the minimum pressure at the end of exhalation / Press and hold the setting button to display the number of breaths

No.	Name	Function
16	Peak inspiration pressure	Displays the peak inspiration pressure setting
17	PEEP setting display	The set value of the PEEP is displayed
18	Breath rate setting	Displays the set value of the number of breaths per minute. The breathing time is automatically adjusted so that the I: E ratio of this device (Inverted ratio is not allowed)
19	Inspiration time setting	The set value of the inspiratory time of the respiratory cycle is displayed. When changing the breathing rate setting, the device automatically adjusts the I:E ratio so that it does not reach below 1:1.
20	APNEA setting	Displays the apnea time setting. In backup ventilation mode, it lights up when the APNEA set time has been exceeded since the last spontaneous breathing, and mandatory ventilation starts.
21	Pressure indicator LED bar	The pressure is displayed on the analog bar. While the jet ventilation LED is off, the pressure at the pressure monitor connection port is displayed. When the jet ventilation LED is on, the pressure at the jet connection port is displayed.
22	Airway pressure unit LED	When the pressure bar display shows the pressure at the pressure monitor connection, it shows cmH2O, which is the unit of airway pressure.
23	Jet ventilation activated unit LED	When the pressure bar display shows the pressure at the jet connection port, it shows kPa, which is the unit of jet drive pressure.
24	Breathing circuit connection port	This is the terminal to connect the attached breathing circuit. 󰀀 B type applied part.

No.	Name	Function
25	Pressure monitor connection port	This is the terminal connection of the pressure monitor tube from the breathing circuit.
26	Jet connection port	Terminal to connect when using the jet tube.
27	Prox. FS	It is a terminal to connect the proximal flow sensor cable.

Back of this device

No.	Name	Function
1	Power switch	Turns the power supply "|" ON or "〇" OFF.
2	Fuse holder	Contains a fuse to prevent overcurrent. The fuse is a consumable item. Use two fuses with the following specifications. [Rating] 250V 2A Class B characteristics, size φ5.2 x 20mm, Refer to *How to replace the fuse* Section.
3	Lock lever	It is a lever that fixes the attached power cord so that it will not come out of the inlet terminal.
4	AC inlet terminal	Connects the supplied power cord.
5	Gas connection port	Connect the supplied pressure resistant tube (oxygen or air).
6	External port	This port is used to connect a monitor (option) and it is also used for maintenance.
7	Gas exhaust port	This port exhausts the gas used in the valve inside this device. Please do not block it. It can produce fire if the driving gas is oxygen.
8	Exhaust port	Outlet for exhaled gas from the patient breathing circuit. The angle of the outlet can be adjusted using the exhaust port adapter supplied as standard.

⚠**Warning**	Use only medical oxygen and air. Other types of gases not only affect the operation of this equipment, but they can also explode and corrode.
🚫**Prohibited**	If oxygen is used to drive this device, never bring it close to fire during operation.
⚠**Caution**	・This device uses high pressure gas. Make sure that the connections are not loose. If it is loose, there is a risk of explosion or fire due to gas leakage. If there is a gas leak, stop using it immediately. ・If the device is stored and will not be used for a long time, remove the pressure resistant tube (oxygen or air) from the gas supply source. Even if the power switch is "〇" OFF or the mode switching knob is "OFF", if it is connected to a gas supply source, high pressure will always be applied to the pressure control component, which may shorten the component life.

Accessories

Name （PN）	Picture	Function
Breathing circuit (10206602001)		The circuit that connects the breathing circuit connection port of this device and the proximal flow sensor. Connect the cuff side where the pressure monitor tube is located to the breathing circuit connection port of this device. Connect the proximal flow sensor to the cuff on the other side. Please wash it between patients.
Large animals breathing circuit (10206602002)		Used as a gas reservoir when treating large patients. Connect this circuit between the Compos X and the Anesthesia device.
Jet tube (10200802002)		A tube that connects to the jet connection port of this device. Connect the CPC connector side to the jet connection port on the front of the device. The other side is connected to the patient ETT or the ways needed to apply the jet pressure. Be sure to clean the jet tube for each patient.
Exhaust port adapter (10200802003)		It is used to connect to the exhaust port on the back of this device to change the exhaust direction and recover excess gas in the breathing circuit. (Material: Vinyl chloride) Be sure to clean the exhaust port adapter for each patient.
Power cord （10200802004）		It is used to connect between the grounded non-stop power system outlet in the facility and the inlet terminal on the back of the device. The length is about 3m.
Flow sensor (10010902001)		It is used to measure the ventilation volume at the proximal. The attached flow sensor is colorless and single use. Be sure to replace it for each patient.
Sensor cable （10010902002）		To connect the flow sensor and the proximal flow sensor connection port on the front of the device. The length is about 2m.
HME (10206602003)		HME to protect the proximal flow sensor from humidity
Clips （5 pcs） (10206602004)		Clips used to fix the circuit with the sensor cable

⚠Warning	・ Install the breathing circuit, jet tube, power cord, and flow sensor cable so that they do not interfere with the operator while using the device. There is a risk of equipment falling if it gets caught in cords or circuits. ・ The flow sensor (disposal) is for single use. There is a risk of infection if reused.
❗Mandatory	Be sure to use the flow sensor together with a facility-owned HME. Prevents moisture from the patient and disturbance during tidal volume measurement.

⊘**Prohibited**	• When pulling out circuits, tubes, and cords, do not pull them out without holding the roots of each. Forcibly pulling it out may cause disconnection or damage. • Do not sterilize the flow sensor (disposal). It will be damaged. • Do not allow the flow sensor to come into direct contact with condensation from the exhaled breath of the patient. Contact with moisture may cause wrong measurements from the sensor.
⚠**Caution**	· The flow sensor (disposal) cannot be sterilized or washed. Be sure to use a new flow sensor for each patient, or change to a reusable type (option) · The flow sensor has directionality. Pay attention to the orientation when installing. · Because the flow sensor is sensitive to moisture, be careful of the condensation due to exhaled breath of the patient.

Options

Name	Picture	Function
Flow sensor (Reuse)		To measure the tidal volume at the proximal. Color is black unlike the colorless disposable products. It is reusable and can be sterilized by high pressure steam up to 30 times. Be sure to sterilize each patient. See *Maintenance and Inspection* Section.
Sensor extension cable		It is used when the flow sensor does not reach the patient with the attached sensor cable. It is about 2m long and can be connected to the attached sensor cable to make a total length of about 4m.

NOTE

The optional flow sensor (reuse) can be sterilized and used up to 30 times. Please contact the manufacturer for details.

⚠**Warning**	Flow sensors (reuse) must be sterilized before using with a patient. Failure to do so can seriously affect the patient and the operator.
❗**Mandatory**	The flow sensor (reuse) must always be used in conjunction with an HME. It prevents moisture to reach the flow sensor and prevents disturbance of tidal volume measurement.
⊘**Prohibited**	• Do not allow the flow sensor (reuse) to come into direct contact with condensation from the exhaled breath of the patient. Contact with moisture may cause wrong measurements from the sensor. • Do not connect more than two sensor extension cables. The electrical signal from the sensor will be attenuated, making it impossible to detect the patient's respiration.
⚠**Caution**	· The flow sensor (reuse) has directional orientation. Be careful of its orientation when installing it. · The flow sensor (reuse) is sensitive to moisture, so be careful not be reached by sputum from the patient's mucous membranes or exhaled air. · Be careful not to snag the excess portion of the sensor extension cable.

About this device

Intended use

This device is a veterinary ventilation device that connects to the airways of patients using a breathing circuit to assist ventilation of patients under anesthesia or with respiratory diseases.
The ventilation mode is IPPV (Intermittent Positive Pressure Ventilation), it enables to send mandatory breaths in case that no spontaneous breathing effort from the patient is found.
The device is based on pressure control ventilation (PCV), which controls the pressure of the inspiratory gas supplied to the patient.

The device has three modes:
·Mandatory ventilation mode
　The Peak Inspiration Pressure, PEEP, breathing rate, and inspiratory time are set, and the patient
　is mandatory ventilated.
· Backup ventilation mode
　Set the Peak Inspiration Pressure, PEEP, respiratory rate, inspiratory time, and APNEA time, and if
　there is no breathing for more than the APNEA time, the patient is mandatory ventilated.
·Monitor mode
　Mandatory breaths are not activated, but tidal volume is measured and displayed.

If you select the optional exhalation hold function, you can hold the exhalation of the patient from a remote location, such as when taking an X-ray.

Place to be used

This device is intended to be used in veterinary hospitals or operating rooms of facilities that perform treatments related to animals, and the optional exhalation hold function is intended for use when taking X-rays.

Target patients

This device is used in veterinary clinics or facilities that perform treatments related to animals, and under the guidance of a doctor, to treat dogs, cats, or pets handled by the facility.

Authorized users

Authorized users are persons who have knowledge and experience of using a ventilator and is a clinician or a paramedic person who can operate it under the guidance of the medical staff.
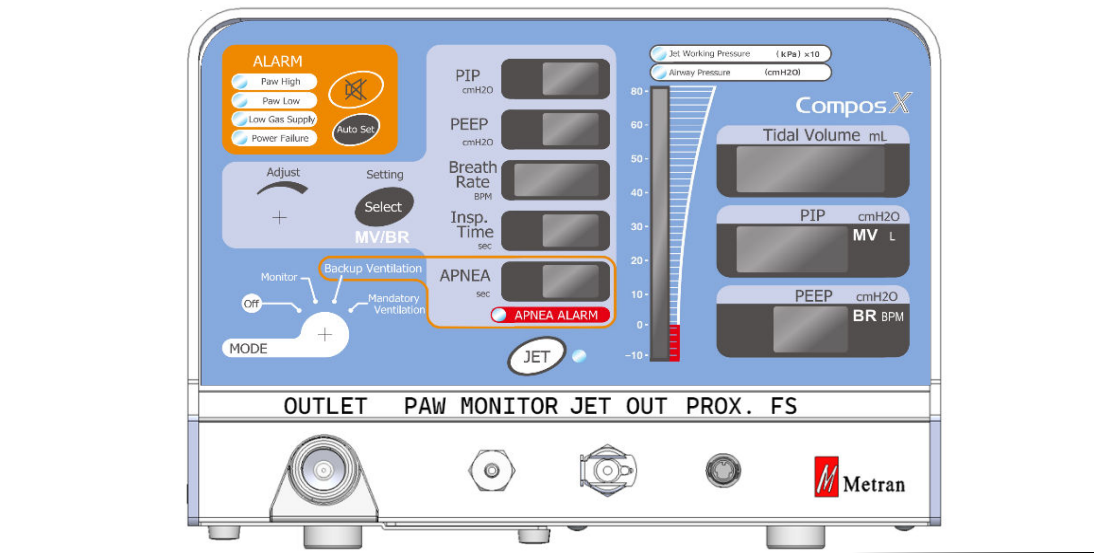
Others

When using this device from the storage state described in this manual, it is necessary to leave it for about 30 minutes at an environmental temperature of around 20 ° C until the device is ready for use.
Dew condensation may occur if the device is taken out from a low temperature storage state to room temperature. Please wait at least 30 minutes at room temperature before starting use as it may cause a malfunction.

Preparations before use

Installation

Install this device on a stable and horizontal surface.

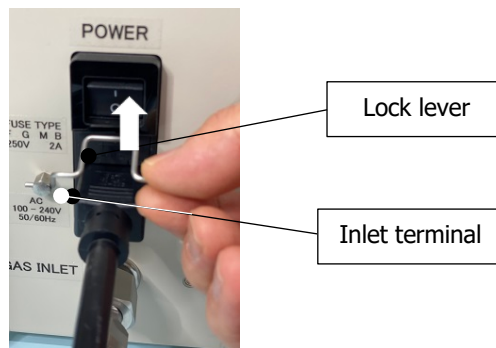|	
🚫 **Prohibited**	・Don't install in a place where chemicals are stored, or gases are generated. ・Make sure that the switch can be operated freely. ・To avoid fire or explosion, don't install this device in an environment with flammable anesthetic gas or high oxygen concentration. ・To avoid explosion or fire, don't install in a hyperbaric oxygen treatment tank.
❗ **Mandatory**	・Install in a place without water exposure. ・Install in a place where there is no risk of adverse effects due to atmospheric pressure, temperature, humidity, ventilation, sunlight, dust, salt, sulfur, etc.
⚠**Caution**	・Be careful of non-stable conditions such as tilt, vibration, and impact (including during transportation).

Power cord connection

※To disconnect, see *Disconnecting power and removing the power cord*.

[1] Check that the power switch on the back of this device is turned off "○".

[2] Lift the lock lever upward and insert the attached power cord into the inlet terminal as far as it will go.

[3] Lower the lock lever and lock it firmly so that the power cord cannot be pulled out.

| ⚠️ **Warning**	Be sure to use the power cord with a 3-pin plug that comes with this device. There is a risk of electric shock to the patient and operator if other power cords are used.
🚫 **Prohibited**	・Do not connect anything other than the supplied power cord to the inlet terminal of this device. ・Do not insert metal fittings into the terminals inside the inlet or touch them directly with your hands. It may cause a device failure or electric shock.
⊗	Do not modify the power cord without permission. There is a risk of electric shock to the patient or operator.

Connection to driving gas

※ To disconnect, refer to *Removal of driving gas*

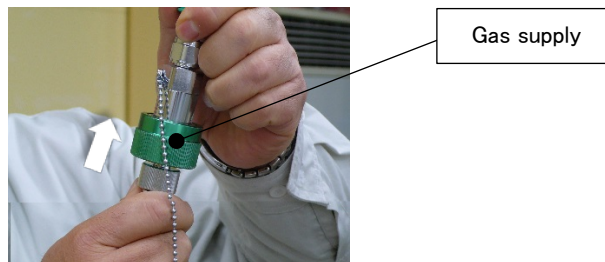Here, the example of the green pressure resistant tube (oxygen) is used.
Connect the yellow pressure resistant tube (air) to the yellow air gas source in the same procedure.

[1] Insert the attached pressure-resistant pipe (oxygen) into the gas connection port on the back of the device and tighten the nut firmly using a tool such as a spanner.

Nut
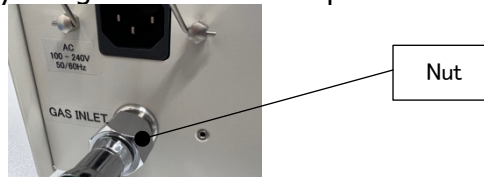
[2] Insert the other side of the pressure resistant tube (oxygen) into the green oxygen gas source until it clicks into place.
Gas source pressure needs 350-500 kPa.

Gas supply

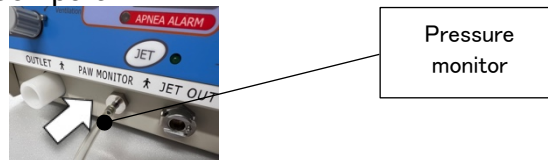| ⚠️ **Warning**	Use only medical oxygen or air. Other types of gas not only affect the operation of this device, but also pose a risk of corrosion and explosion.
🚫 **Prohibited**	・If oxygen is used to drive this device, never bring it close to fire during operation. It may explode or catch fire if it is brought close to fire. ・If the device is not used for a long period of time, do not leave the pressure resistant tube (oxygen or air) connected to the gas supply source. Even if the power switch is turned off, high pressure may be applied to the pressure control parts and the life of the parts may be shortened.
⚠️ **Caution**	This device uses high-pressure gas. Make sure that the connections are not loose. If it is loose, there is a possibility of explosion or fire due to gas leakage.

Breathing circuit connection

※ To disconnect, refer to *Breathing circuit removal*.

[1] Hold the cuff on the side where the pressure monitor tube of the attached breathing circuit (reuse) comes out from the breathing circuit connection port on the front of this device and insert it while twisting firmly to the back of the breathing circuit connection port.
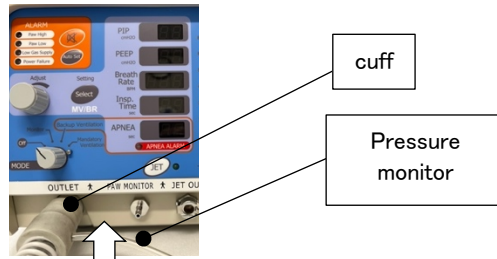
[2] Hold the pressure monitor tube coming out of the cuff of the breathing circuit into the pressure monitor connection port on the front of the device and insert it while twisting it firmly to the back of the pressure monitor connection port.

| ⊘ **Prohibited**	· Do not hold the tube part of the breathing circuit and insert it into the breathing circuit connection port. It may cause the tube to be damaged. · The breathing circuit is reused. It is prohibited to use the breathing circuit without cleaning it.
⚠**Caution**	· Be careful to insert the breathing circuit firmly into the breathing circuit connection port. Incomplete insertion can cause air leaks. · Be careful to insert the pressure monitor tube firmly into the pressure monitor connection port. Incomplete insertion will result in improper operation and monitoring. · If you do not use the attached breathing circuit due to the condition of the patient, please prepare a conversion connector for pressure monitor at the facility as appropriate. Please note that if a conversion connector is used on the breathing circuit connection port side, the maximum inspiratory pressure display of this device will be the breathing circuit connection port pressure, not the patient's proximal pressure.

NOTE

The outlet terminal on the front of the main unit is a　ᛘ-rated attachment part.

# Setting flow sensor and sensor cable

※To remove, refer to *Removing flow sensor and sensor cable from the main unit.*

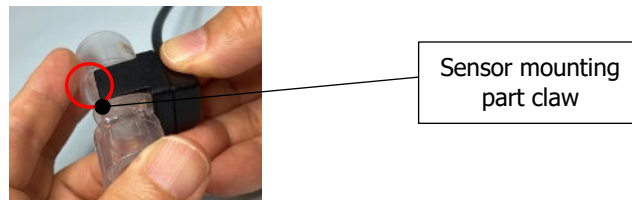[1] Hold the sensor mounting part of the attached sensor cable with one hand.
Hold the notch of the attached flow sensor (disposable) with your other hand in the direction shown in the figure below.

Sensor cable mounting
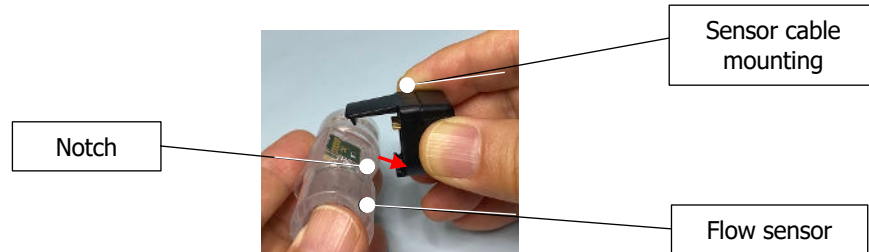
Notch

Flow sensor

[2] Insert the notch of the flow sensor (disposable) into the groove of the sensor mounting part.
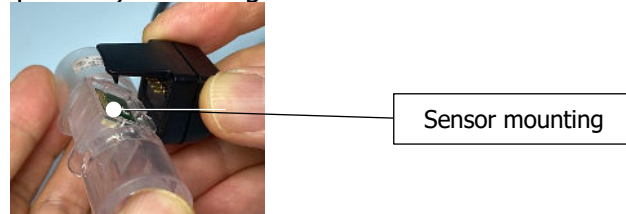
Sensor mounting

[3] Rotate the flow sensor (disposable) until it clicks into place with the claws on the sensor mounting part.

Sensor mounting part claw

|	
🚫 **Prohibited**	・Do not connect by holding the cable base of the sensor mounting part. It may cause the cable to break. ・Do not touch the metal pins on the board pattern of the flow sensor (disposable) and the sensor mounting part with your fingers, or pointing object, may cause contact corrosion, making correct measurement impossible. ・The flow sensor (disposable) is for single use. Reuse is prohibited.
⚠**Caution**	・Be careful not to touch the board pattern of the flow sensor and the metal pins on the sensor mounting part. ・Be careful of the direction of the notch when connecting the flow sensor to the sensor mounting part. It cannot be connected in the opposite direction.

NOTE

The optional flow sensor (reuse) can be installed by the same procedure.

The optional flow sensor (reuse) can be installed by the same procedure.

※See *After Use* section for instructions on how to remove the flow sensor and breathing circuit.

[1] Hold the cuff that does not have the pressure monitor tube in the attached breathing circuit, hold it with the other hand to the attached flow sensor as shown in the figure below, and connect both by paying attention to the "→" mark.

Cuff

Direction mark
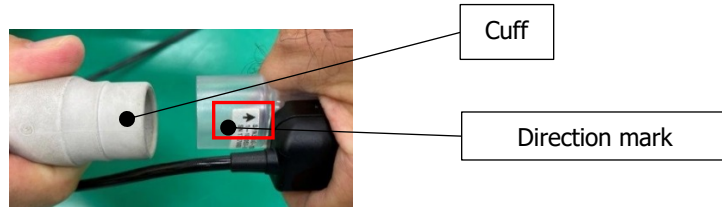
[2] Connect the cuff of the breathing circuit to the flow sensor 22M connector.
(Reuse sensor is an option. In that case, please contact the store.)

Proximal FS
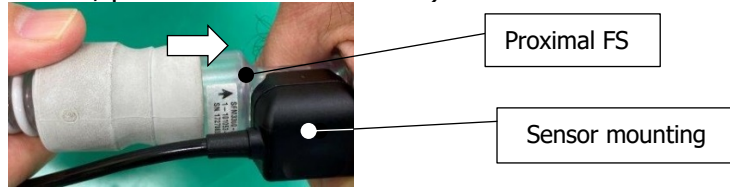
Sensor mounting

[3] Be sure to connect a facility owned HME between the flow sensor and the patient.
After connecting to the patient, be sure to turn the sensor mounting part up.

HME

Flow sensor

Make sure the sensor mounting part is on top
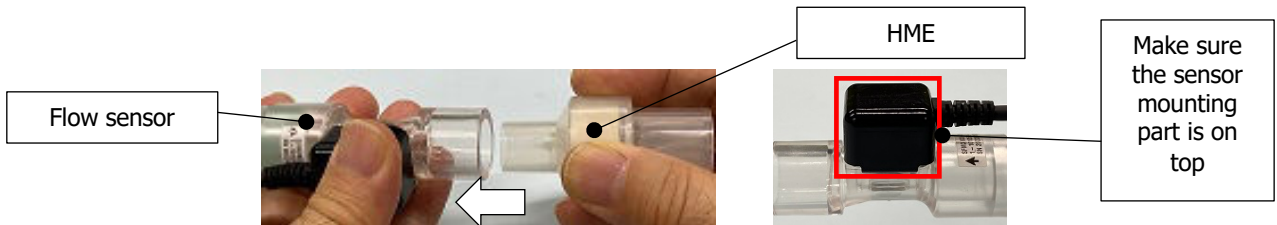
[4] For the CO2 sampling you can add a sampling connector between the tube and the flow sensor or choose an HME with a sampling port included.

| ⚠Warning	· Be sure to use an HME. Tidal volume will not be measured correctly without HME. When using HME, please follow the attached instruction manual and package insert. · When connecting to the patient, be sure to turn the sensor mounting part upward. If it is connected downward, the sensor measurement of tidal volume may be affected by condensation in the circuit.
🚫 **Prohibited**	· Always hold the circuit cuffs, not the tube, when connecting the circuit. Failing to do so may cause damage to the breathing circuit tube. · Make sure to disconnect the sensor cable holding its connector, not pulling the cable. Failing to do so may cause the cable to break.
⚠**Caution**	· When connecting the breathing circuit to the flow sensor, pay attention to the direction of the sensor. If the direction is wrong, the inspiratory phase and expiratory phase of the patient will be reversed and measured, resulting in a misjudgment of ventilation volume. ·In case of using a breathing circuit supplied by another manufacturer, be sure it has a 22M connector ·Be careful to connect securely to avoid air leaks from the connections.

Connecting the sensor cable

※To disconnect refer to *Disconnecting the sensor cable from the main unit.*

[1] Hold the plug body with the "←" mark on the plug part of the attached sensor cable facing up.

「←」mark

Sensor cable plug
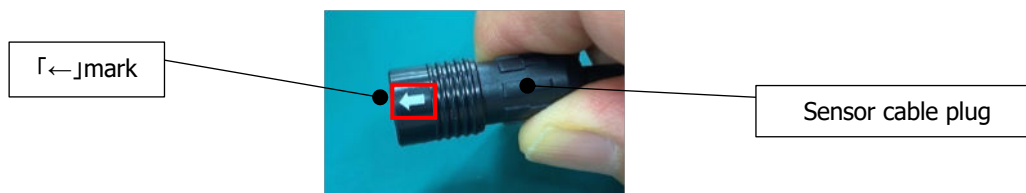
[2] With the "←" mark on the plug facing up, insert it into the proximal flow sensor terminal on the front of the device until you hear a click.

| 🚫 **Prohibited**	Always connect/disconnect the sensor cable while holding its connector not the cable. It may cause the cable to break.
⚠ **Caution**	・The connector can only be plugged in at a specific position. Pay attention to the orientation and make sure that the "←" mark is on top. ・Be sure to make sure you hear a clicking sound when plugging in the connector. Incomplete insertion can cause the patient's breathing to be inadequately monitored.

Sensor extension cable connection

※To remove the extension cable, refer to *how to remove the flow sensor and breathing circuit.*

[1] Hold the plug as shown in the figure below with the "△" mark on the plug of the sensor extension cable facing up.

「△」mark — Sensor extension cable plug
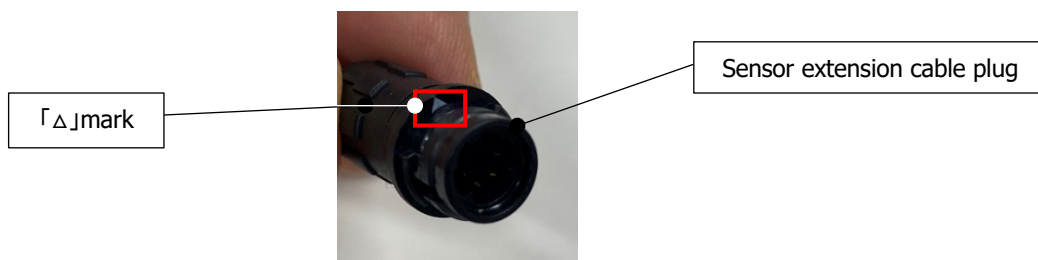
[2] Hold the plug with your other hand with the "←" mark on the plug of the attached sensor cable facing up.

「←」mark

「△」mark — Sensor cable plug
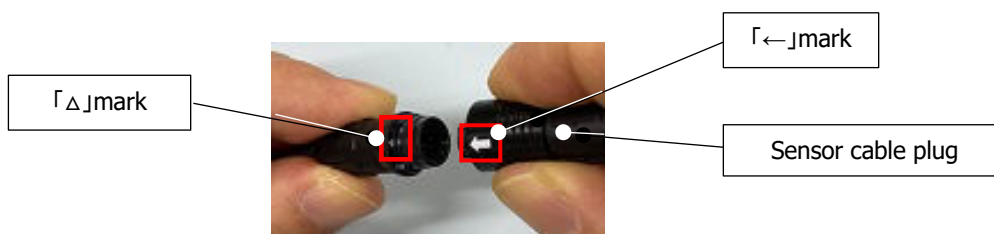
[3] Align the "△" mark on the sensor extension cable with the "←" mark on the sensor cable, and let them fit together until they click to lock.

| 🚫 **Prohibited**	Always connect/disconnect the sensor cable while holding its connector not the cable. It may cause the cable to break.
⚠**Caution**	・The connector can only be plugged in at a specific position. Pay attention to the orientation and make sure that the "←" mark is on top. ・Be sure to make sure you hear a clicking sound when plugging in the connector. Incomplete insertion can cause the patient's breathing to be inadequately monitored.

Handling of sensor cable

It is recommended that the tube and the sensor cable to be bundled avoiding unintended disconnections or entangled breathing circuit and cable.
Since the size of the tie will depend on the thickness and length of the breathing circuit used, secure with a commercially available tie like the one show in the figure below.

Bundling sample

[1] Bundle the breathing circuit and sensor cable and fix them in several places using a binding tool. The figure below is an example of fixing the attached breathing circuit and the attached sensor cable at 6 locations.
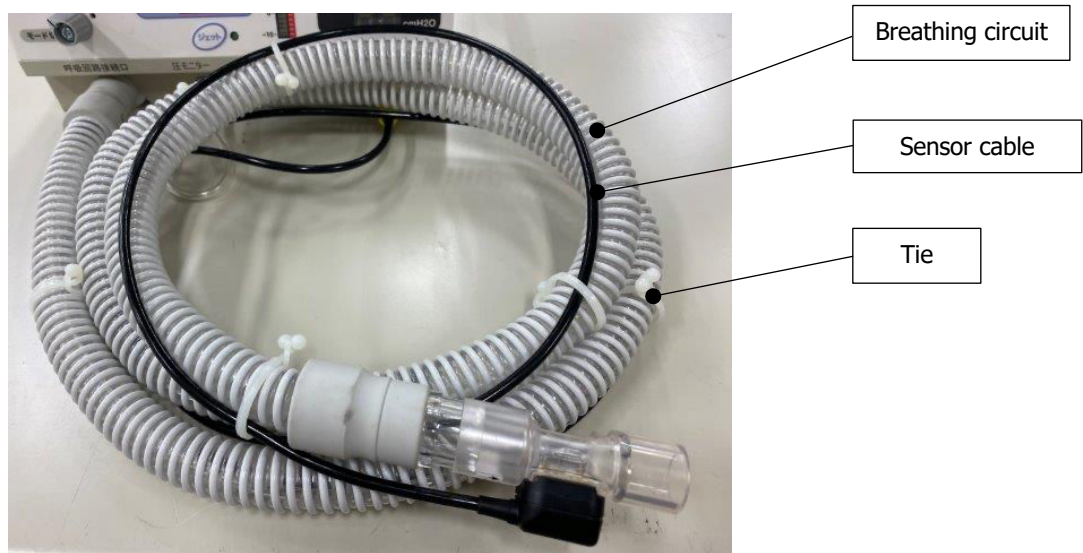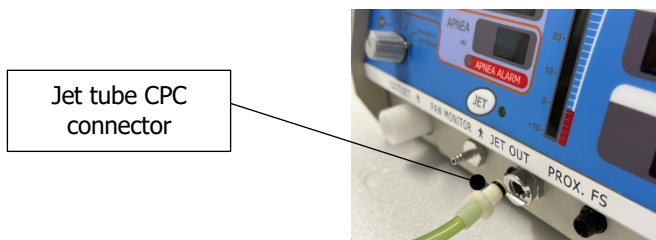

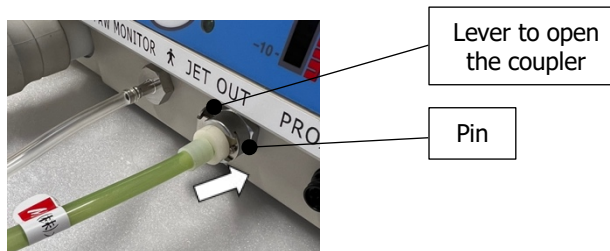| 🚫 **Prohibited**	Take care not to get caught with the breathing circuit or sensor cable while using this device.
⚠️ **Caution**	Please note that the binding tool is not included with this device.

Jet tube connection

※Refer to the section of *removal the jet tube.*

[1] Hold the base of the CPC connector of the jet tube.

Jet tube CPC connector

[2] Make sure that the coupler on the jet connection port on the front of the device is open (the pin is out), and then insert the CPC connector of the jet straight until you hear a click. When inserted all the way, the coupler automatically locks the CPC connector.

Lever to open the coupler

Pin

⃠ **Prohibited**	• Do not hold the tube part of the jet when inserting it into the jet connection port. It may cause the tube to break. • It is prohibited to use the jet tube without cleaning it.
❗	• Make sure the coupler on the jet connection is open. Jet tube cannot be inserted when closed. • Be sure to clean the jet tube for each patient.
⚠ **Caution**	Be careful to insert the jet tube firmly into the jet connection port. Incomplete insertion will cause air leaks.

NOTE

If the coupler on the jet connection is closed, push the lever on the side to open the coupler.
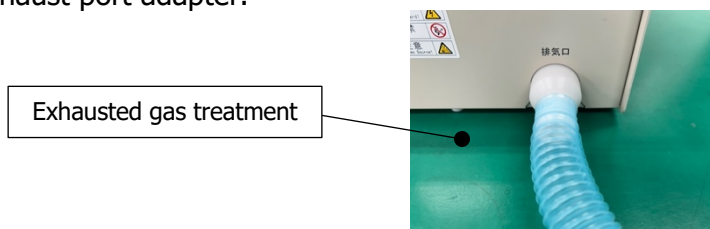The coupler opens by pushing the lever.

Exhaust port adapter connection

※Refer to the Section *Removing the exhaust adapter*

[1] Insert the supplied exhaust port adapter into the exhaust port on the back of the device while twisting it.
The direction of the exhaust port adapter can be freely rotated and changed.

[2] Connect the facility-owned exhaust gas treatment circuit to the thin cylinder of the attached exhaust port adapter.

Exhausted gas treatment

🚫**Prohibited**	• Do not use this device without connecting the exhaust port adapter and the exhausted gas treatment circuit. Exhalation gas leaks may hinder the operation • It is prohibited to use the exhaust port adapter without cleaning it.
❗	Be sure to clean the exhaust port adapter for each patient.
⚠**Caution**	• After deciding the direction of the exhaust adapter, be careful to insert it firmly into the exhaust port. If the plug is loose, there is a risk of excess gas leaking. • Be careful to insert the exhausted gas circuit firmly into the exhaust port adapter. If the plug is loose, there is a risk of excess gas leaking.

Connection to power supply

Insert the plug of the power cord of this device firmly into the grounded outlet of the non-stop power system.

⚠️ **Warning**	• Supply power from "hospital grade" outlets installed at equipotential. • Plug it directly into a grounded outlet in a non-stop power system. If it is connected to a general commercial power supply, the operation of this device will stop in the event of a power outage, which will have a serious impact on the patient.
🚫 **Prohibited**	・Do not supply power from a power strip or the like. Leakage current increases and the patient may be shocked. ・Do not use extension cords. It may cause the power cord to come off and the operation of this device will stop.
❗	Connect the ground correctly. There is a risk of electric shock to the patient or the operator.
⚠️**Caution**	Pay attention to the frequency and voltage of the power supply and the allowable current value (or power consumption).

Connection with anesthesia machine (e.g. Composβ-EA)

The connection when using this device in combination with an anesthesia machine is explained using Compos β-EA as an example. Please connect referring to the picture below.
For details, please read the instruction manual and package insert of the anesthesia machine you are using carefully before connecting.

Compos β-EA main unit	Compos X

Non-rebreathing bracket (Composβ-EA)

F circuit (Composβ-EA)

Switching valve

Breathing circuit (Compos X)

Jet tube (Compos X)
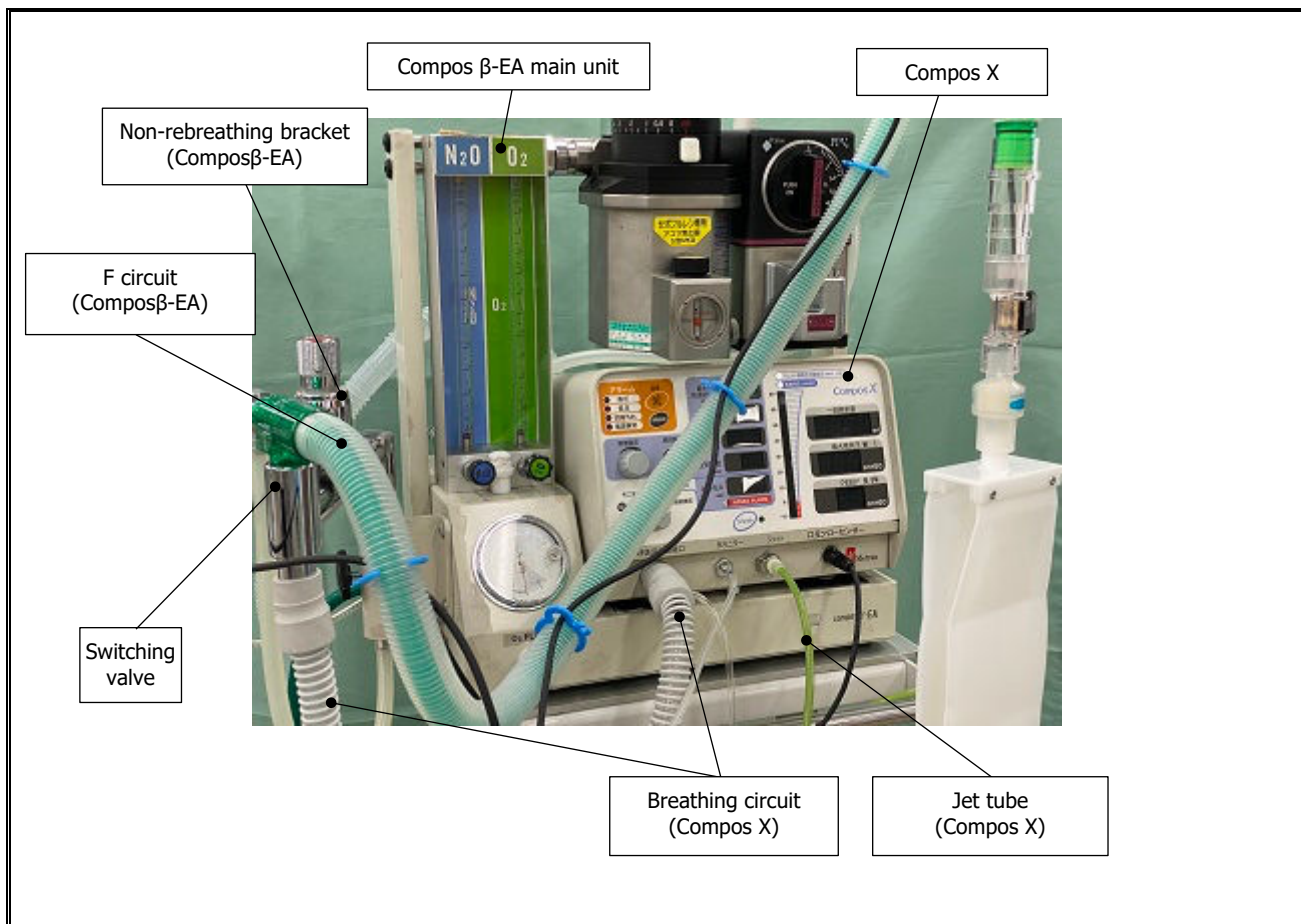
⚠️**Warning**	Please read the instruction manual and package insert of the anesthesia machine to be used before connecting.
🚫**Prohibited**	Do not connect without carefully reading the instruction manual and package insert of the anesthesia machine you are using. Incorrect connection can have a significant impact on the patient.

Gas hose (Oxygen) connecting
ventilator to anesthesia

Pressure monitor tube

Power cord

Exhaled gas treatment

Gas hose (oxygen) connecting ventilator
and anesthesia device

GAS INLET

N₂O   O₂

Gas hose (oxygen)

Slip joint

Breathing circuit
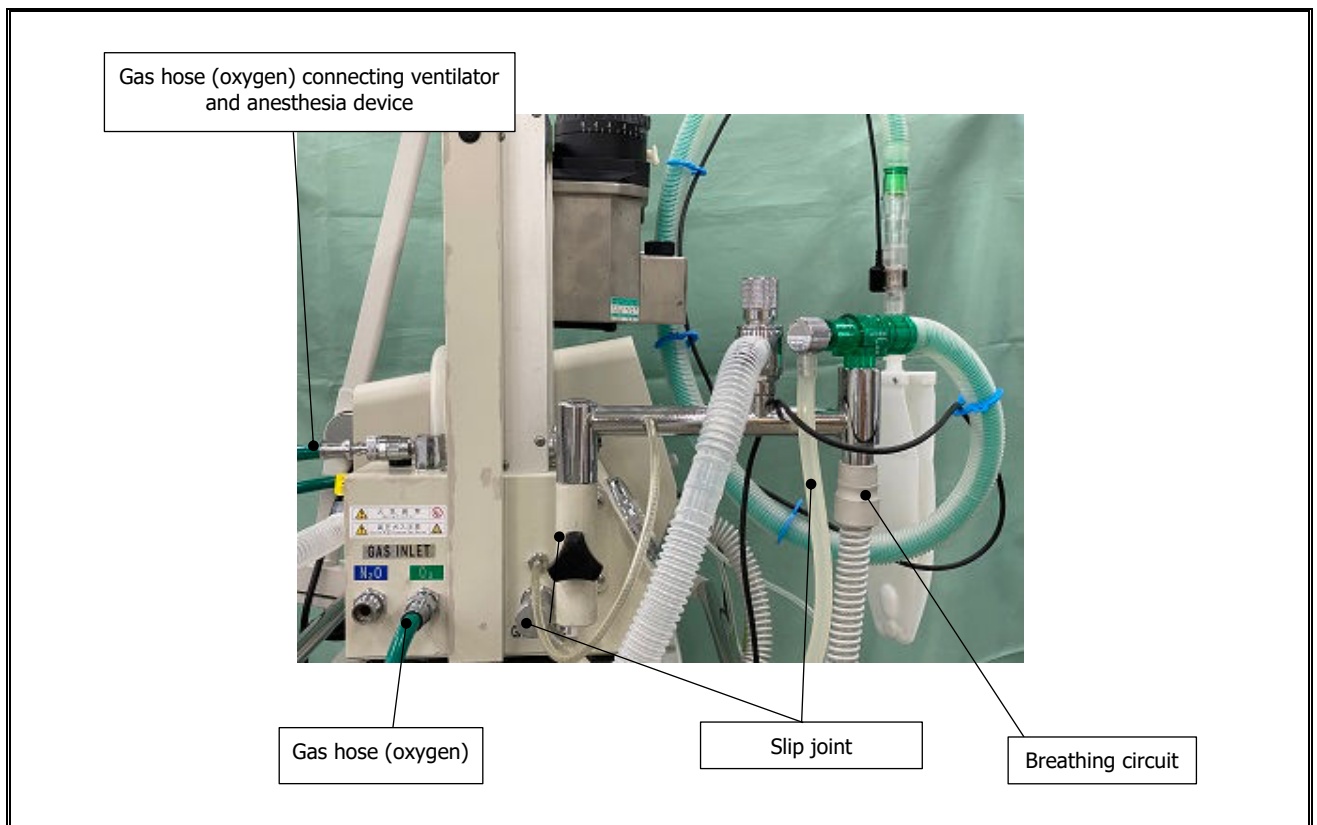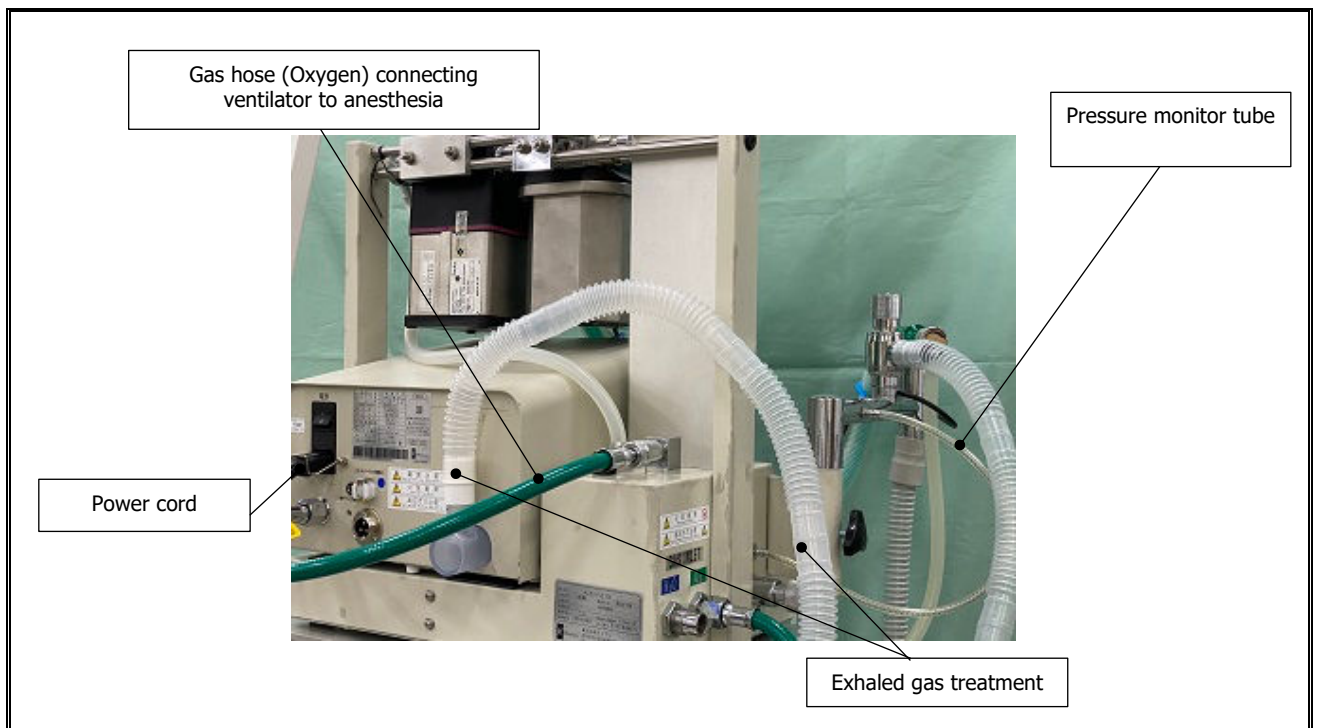
Tidal volume correction

[1] When you are ready to use P17-34, connect a glass syringe to the HME.

[2] Turn on the power switch on the back of the main unit.

[3] Turn the mode switch on the front panel of the main unit to "monitor" mode.

[4] Set the syringe plunger in the 100 mL position and hold it vertically.
   Note: At this moment the inspiration tidal is 100 mL.

[5] Let the syringe plunger to come down due to its weight.
   Note: At this time, tidal volume of 100 mL will be displayed.

[6] Record the value displayed on the tidal volume display on the front of the main unit.

[7] Repeat steps 4-6 10 times.

[8] Calculate the mean value of tidal volume for 10 breaths.

[9] Correction will be acceptable when the average value of tidal volume is within ± 10%.

[10]   If the average value of tidal volume does not fall within ± 10%, enter the correction value in "Tidal volume correction".
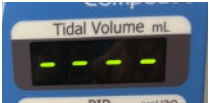

NOTE

Use accurate glass syringe

Be sure to perform volume correction each time the flow sensor is exchanged.

Alarm operation check

Types of alarms

This device has the following alarms.
Be sure to check that the alarm works properly before using this device.

Alarm type	Explanation and check of alarms
High pressure alarm Paw High	This alarm is activated when the pressure inside the breathing circuit ___ ___ high. When the pressure in the breathing cir___ range, the alarm buzzer sounds inter___ LED blinks. Check the alarm buzzer, Paw High a___ when ___ high-pressure alarm occurs.
Low ___ ssure alarm	It is ___ ___arm that occurs when the ___
Low G___ Low Gas Supply	___ breathing circuit. If the pressure in the breathing ___ disconnection alarm setting range, the ___ the circuit disconnection alarm LED bl___ Check the alarm buzzer and the circuit ___ the circuit disconnection alarm occurs ___
Power Failure alarm Power Failure	This is an alarm that occurs when th___ device. When the power cord is unplugg___ fr___ the back of the device turned on ___ar___ of the device is not in the off positi___ sounds continuously and alarm LED li___
APNEA alarm APNEA ALARM	This is an alarm that occurs when th___ APNEA condition. When the set APNEA time is exceeded ___ and the APNEA alarm LED blinks. Check that the alarm buzzer and APN___ occurs.
Flow s___ ___	This is an alarm that occurs when ___m___ cable. (Incomplete plug insertion, inc___ sensor cable, etc.) If an abnormality occurs in the flow se___ the alarm buzzer sounds intermitten___ display. When a flow sensor alarm occurs, ch___ display "----" indicating the flow sens___

31

Alarm mute

You can mute the alarm sound for 30 seconds by pressing the mute button while the alarm buzzer is sounding.

NOTE

・It is not possible to mute the alarm buzzer sound of the power failure alarm.

⚠️ **Warning**	・Be sure to check the alarms before using the device. ・If an alarm occurs, be sure to eliminate the cause before canceling the a 　have an alternative manual respirator. ・Never block the alarm sound output sound so that the operator can hear t 　any time.

80

60

50

40

30

20

10

APNEA ALARM

0

JET

−10

Device settings

Types of modes

This device has four modes: monitor, backup ventilation, mandatory ventilation, and jet modes.
The breath-hold option is also available.

Monitor mode

It is a mode that measures and displays the tidal volume of the patient without performing
ventilation operation.

Backup Ventilation mode

This mode will be monitoring patient's spontaneous breathing and showing the tidal volume, while
mandatory breaths according to the PIP, PEEP, Breath rate, and Insp. time settings will be
performed when APNEA time is exceeded.

Mandatory Ventilation mode

The device will send mandatory breaths according to the PIP, PEEP, breathing rate, and
inspiratory time settings.

Jet mode

In the mandatory ventilation mode, the ventilation destination can be changed from the breathing
circuit connection port to the jet connection port.
For small patients who cannot be intubated the jet tube can be used to ventilate them.

Exhalation hold function

When the exhalation hold function is selected, operator can make the patient to hold the breath
from a remote location during X-ray procedures.
Good quality X-ray images can be taken by using exhalation hold function at any time.

How to use

Monitor mode

This device does not ventilate in monitor mode.

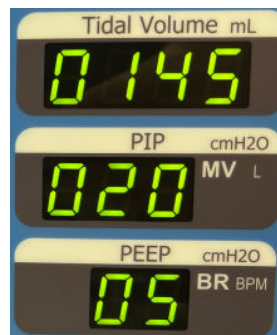> **NOTE**
>
> It is not possible to switch to jet mode during monitor mode.

[1] Turn on「I」the power switch on the back of this device.

[2] Turn the mode switching knob on the front of the device to the "monitor" position.

[3] Tidal volume, peak inspiratory pressure, and PEEP are displayed from the top on the right side of the front of the device.

⚠️**Warning**	There is possibility of electric shock if the user touches the pin of the mounting part of the proximal flow sensor and the patient at the same time.
🚫 **Prohibited**	Do not use for any purpose other than monitoring the tidal volume of the patient, the maximum inspiratory pressure supplied to the patient, and PEEP.
❗	Use when monitoring the tidal volume of the patient, the maximum inspiratory pressure supplied to the patient, and PEEP.
⚠️**Caution**	・You can change the setting value using the select button, but please note that ventilation operation is not performed. ・Please note that the automatic setting button and alarm mute button do not work.

Backup Ventilation mode

Mechanical ventilation starts if the patient does not breathe for more than the set APNEA time.

> **NOTE**
>
> It is not possible to switch to jet mode during backup ventilation mode.

[1] Turn on the power switch on the back of this device.

[2] Turn the mode switching knob on the front of the device to the "backup ventilation" position.

[3] Press the select button and select the item to be set. The LED displa[y] item.
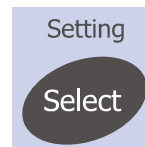
Setting

Select

> **NOTE**
>
> ・You can advance to the desired item by pressing the select button.
> ・Each time you press the select button, it switches from "PIP" → "PEEP" → "Breath rate" → "Insp. time" → "APNEA" → "PIP" (restarts).

[4] While the value is blinking, turn the value setting knob to change th[e] to the desired value.

Adjust

> **NOTE**
>
> During the numerical value change operation, a confirmation 3-time sound is emitted to prompt the operator that the value is being changed.

[5] After completing all the settings, press the automatic setting button.

Auto Set

NOTE

By pressing the Auto Set button, the alarm range will be set automatically.

[6] Start backup ventilation operation.
During this mode, Compos X does not ventilate, but monitors the patient's spon[...]
breathing and displays the tidal volume.
If the patient does not breathe spontaneously within the set APNEA time, the A[...]
sounds, and mandatory ventilation begins.
When the device recognizes the patient's spontaneous breathing, it stops mand[...]
returns to monitor the patient's spontaneous breathing, and displays the tidal v[...]

APNEA ALARM

⚠️ **Warning**	・While using the backup ventilation mode, always monitor the resp[...] pr patient with a vital signs monitor. ・In case of an emergency when using this device, prepare another resp[...] Ambu bag that can add PEEP or oxygen gas) in case the device stops [...] reason. ・Use this device under the supervision of a healthcare professional who can handle abnormal situations correctly. ・When using the backup ventilation mode, the operator should remove the sensor from the mounting part and do not touch the pin of the mounting part and the patient at the same time. The [...] nd the patient will get an electric shock.
🚫 **Prohibited**	・Do not ex[...] me and amount required for diagnosis and treatment. It has a serious impact on the patient. ・Set the PI[...] reath Rate, Insp Time, etc. so that they do not become incompatible with the r[...] physiology of the patient. • When operating each button, do not duplicate it with other operations. If you continue the duplicate operation, the previous operation may continue.
❗	• Before using this device, make sure that it operates normally with normal ventilation before using it. • Continuously monitor the device and the patient for any abnormalities. • If any abnormality is found in this device or the patient, take appropriate measures such as stopping the operation of the device in a safe condition for the patient.
⚠️ **Caution**	・When used with backup ventilation, care should be taken to monitor the respiratory status of the patient using an exhaled gas monitor, etc. ・Please be careful about the time and amount required for diagnosis and treatment according to the condition of the patient. ・Be careful not to let the patient touch this device.

Mandatory Ventilation mode

Used when mandatorily ventilating the patient。

NOTE

Jet mode ventilation can be activated only during Mandatory Ventilation mode. Refer to page 38 for how to use the jet mode.

---

[1] Turn on the power switch on 「I」 the back of this device.
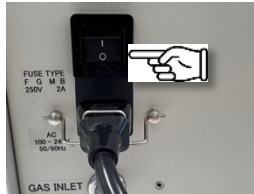
[2] Turn the mode switching knob on the front of the device to the "Mandatory Ventilation" position.

NOTE

For the first 1 second, all LEDs except power failure will light up and an alarm buzzer will sound. Check for missing LEDs or broken buzzer.

---

[3] Press the select button and select the item to be set. The LED displa[...]
item.

Setting

Select

NOTE

・You can advance to the desired item by pressing the select button.
・Each time you press the select button, it switches from "PIP" → "PEEP" → "Breath rate" → "Insp. time" → "APNEA" → "PIP" (restarts).

---

[4] While the value is blinking, turn the value setting knob to change the [...] to the desired value.

Adjust

[5] After completing all the settings, press the Auto Set button.

Auto Set

|	
⚠️ **Warning**	・In case of an emergency when using this device, prepare another resp̶ Ambu bag that can add PEEP or oxygen gas) in case the device stops reason. ・Use this device under the supervision of a healthcare professional who ca̶ situations correctly. ・When using the forced ventilation mode, the operator should remove th̶ mounting part and do not touch the pin of the mounting part and the p̶ time. The operator and the patient will get an electric shock.
🚫 **Prohibited**	・Do not exceed the time and amount required for diagnosis and trea̶ er̶ impact on the patient. ・Set the PIP, PEEP, Breath Rate, Insp Time, etc. so that they do not bec̶ with the respiratory physiology of the patient. ・When operating each button, do not duplicate it with other operations. I̶ ,J̶ c̶ duplicate operation, the previous operation may continue.
❗	・Before using this device, make sure that it operates normally with normal ventilation before using it. ・Continuously monitor the device and the patient for any abnormalities. ・If any abnormality is found in this device or the patient, take appropriate measures such as stopping t̶ ̶on of the device in a safe condition for the patient.
⚠️ **Caution**	・Please be careful about the time and amount required for diagnosis and treatment according to the condition of the patient. ・Be careful ̶ ̶he patient touch this device.

Jet mode

It is used when ventilating a very small patient which is difficult to intubate. Refer to how to connect the jet tube.
In jet mode, "----" is displayed for the tidal volume, PIP, and PEEP display area on the front of the device, and the measured values are not displayed. Pressure can be monitored from the pressure display bar in the center.

[1] Turn on the power switch on「I」the back of this device.

[2] Turn the mode switching knob on the front of the device to the "Mandatory Ventilation" position.

[3] Press the select button and select the item to be set. The LED displa[...]
   item.

Setting

Select

___NOTE___
・You can advance to the desired item by pressing the select button.
・Each time you press the select button, it switches from "PIP" → "PEEP" → "Breath rate" → "Insp. time"
  → "APNEA" → "PIP" (restarts).

[4] While the value is blinking, turn the value setting knob to change the[...]
   to the desired value.

Adjust

___NOTE___
During the numerical value change operation, a confirmation 3-time sound is emitted to prompt the
operator that the value is being changed

[5] After completing all the settings, press the Auto Set button.

Auto Set

___NOTE___
By pressing the Auto Set button, the alarm range will be set automatically

[6] Press the jet button during Mandatory Ventilation.
　The air supply to the patient switches from the breathing circuit connection port to the jet connection port, the LED during jet ventilation beside the jet button lights up, and the pressure display bar LED switches to the drive pressure unit LED during jet ventilation.

📑NOTE

Check if the air is being sent from the jet tube.

[7] To return from Jet mode to Mandatory Ventilation mode, press the jet button again.
　The air supply to the patient switches from the jet connection port to the breathing circuit connection port, the jet ventilation LED beside the jet button turns off, and the pressure display bar LED switches to the airway pressure unit LED.

⚠️ **Warning**	・While using the jet mode, monitor the respiratory condition of the patient with a vital signs monitor. ・In case of an emergency when using this device, prepare another respirator (such as an Ambu bag that can add PEEP or oxygen gas) in case the device stops working for some reason. ・Use this device under the supervision of a healthcare professional who can handle abnormal situations correctly.
🚫 **Prohibited**	・Do not exceed the time and amount required for diagnosis and treatment. It has a serious impact on the patient. ・Set the PIP, PEEP, Breath rate, Insp. time, etc. so that they do not become incompatible with the respiratory physiology of the patient. ・When operating each button, do not duplicate it with other operations. If you continue the duplicate operation, the previous operation may continue. ・Do not reuse the jet tube without cleaning it.
❗	・Before using this device, make sure that it operates normally with normal ventilation before using it. ・Continuously monitor the device and the patient for any abnormalities. ・If any abnormality is found in this device or the patient, take appropriate measures such as stopping the operation of the device in a safe condition for the patient. ・Check if the air is being sent from the jet tube. ・Use jet tubes that are clean for each patient.
⚠️**Caution**	・Please be careful about the time and amount required for diagnosis and treatment according to the condition of the patient. ・Be careful not to let the patient touch this device. ・Please note that tidal volume, PIP, and PEEP are not displayed during jet mode.

Flow trigger adjustment during ventilation

This device can adjust the flow trigger in ventilation mode except jet mode.

[1] Set the mode switching knob on the front of the device to either "monitor", "backup ventilation" or "mandatory ventilation".
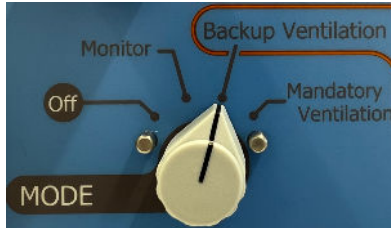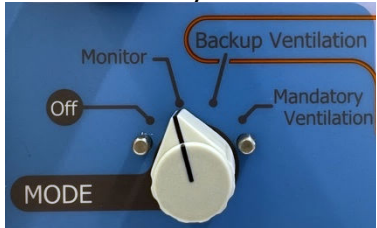
[2] Press the auto set button and the mute button at the same time.
"Last set value" is displayed in the tidal volume display area.
Default is 「10」 units are 「x 100 mL」
In case it shows 10, it means it is 1,000 mL.

Auto Set   +   ⊠   ➡   Tidal Volume mL   **10**
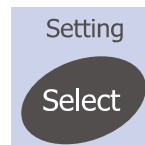
[3] Turn the value setting knob to change the value in the setting value.
The value can be changed in 1 step from 01 to 100 (100 mL).

Adjust

[4] After setting the value, press the select button to confirm.

Setting
Select

📄 **NOTE**

If you want to change the setting value again, press the automatic setting button and the mute button at the same time again.

Display of minute ventilation and breathing rate

You can display the minute ventilation and breathing rate of the patient while using this device. However, this display does not operate in jet mode. Can only be displayed in monitor mode, backup ventilation mode, mandatory ventilation mode.

[1] Turn on the power switch on「I」the back of this device.

[2] Turn the mode switching knob on the front of the device to a position other than "OFF". Here is an example of the position of "Mandatory ventilation".

[3] Select Press and hold the MV / BR button for 2 seconds or longer.

[4] While MV / BR button is pressed, the tidal volume (mL), minute ve
(BPM) are displayed in the right of the front panel of the device.
When releasing MV/BR button, the monitors return to their original
PIP (cmH2O) and PEEP (cmH2O).
The figure shows an example of monitoring the minute ventilation
of 20 BPM.
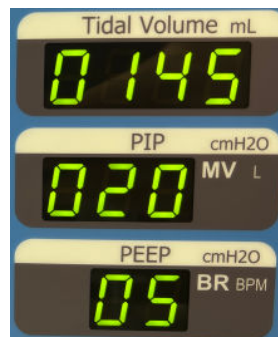
After use

How to turn off the mode

Turn the mode switching knob to the [Off] position.

How to turn off the power

If you do not use the device for a long time or want to store, turn off the power switch on the back of the device.

NOTE

To charge the built-in battery of this device, turn on the power switch "I" once a month for about 8 hours.

Disconnecting the power supply and removing the power cord

[1] Make sure that the power switch on the back of the device is turned off「○」.
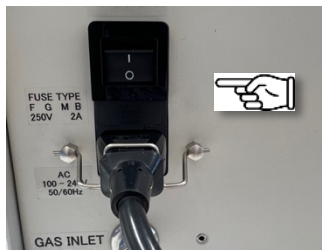

[2] Hold the power plug of the power cord and pull it out from the power outlet.

[3] Lift the inlet terminal lock lever on the back of the device to unlock the power cord.

[4] Hold the plug of the power cord with the lock lever lift and unplug the power cord from the inlet terminal on the back of the device.

🚫 **Prohibited**	Do not pull out the power cord by holding the cord part.
❗	Be sure to hold the plug when pulling out the power cord. Holding the cord and pulling it out may cause the power cord to break.

Removal of drive gas

Here, an example of a pressure resistant tube (oxygen) is used. For pressure resistant tubes (air), unlock the yellow lock.

1. Turn the green lock of the gas supply source to unlock it, and pull out the pressure resistant tube (oxygen) straight.

Gas source

2. Use a tool such as a spanner to loosen and pull out the nut of the pressure resistant pipe (oxygen) connected to the gas connection port on the back of the device.


nut

🚫 **Prohibited**	Do not leave the device connected to the gas source.
❗	If the device will not be used for a long period of time, disconnect the pressure resistant tube (oxygen or air) from the gas supply source.

Removing the sensor cable

※To connect the sensor cable, refer to how to connect the sensor cable.

1. Hold the body of the "←" mark on the plug of the attached sensor cable and pull it toward you. The plug will be unlocked and can be pulled out.。

"←" mark
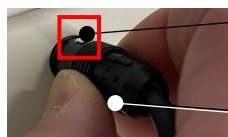
Sensor cable plug

2. While pulling the plug part, pull it out from the mouth flow sensor connection port toward you.

🚫 **Prohibited**	Do not pull out the sensor cable by holding the cable.
❗	Be sure to hold the plug when pulling out the sensor cable. Holding the cable and pulling it out may cause the sensor cable to break.

Removing the sensor extension cable (optional)

1. Hold the optional extension cable and the attached sensor cable respectively and pull the sensor cable plug back to unlock.
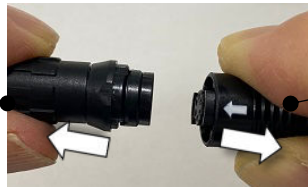
Sensor extension cable plug

Sensor cable plug

2. Pull out the sensor extension cable plug while pulling the plug part of the attached sensor cable.

Sensor extension cable plug

Sensor cable plug

🚫 **Prohibited**	Do not pull out while holding the cable part of the sensor cable. It may cause the cable to break.

Removal of flow sensor and breathing circuit

1. Firmly grasp the flow sensor body and the cuff of the breathing circuit with each hand, and pull it out while twisting.
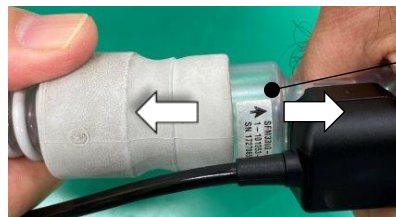
Mouth flow sensor

🚫 **Prohibited**	・Do not pull out by holding the tube part of the attached breathing circuit. It may cause damage to the breathing circuit tube.。 ・Hold the cable part of the attached sensor cable and do not pull it out. It may cause the cable to break.

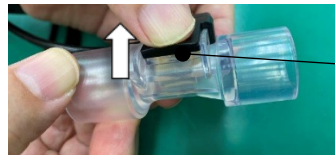# Removing the flow sensor and sensor cable

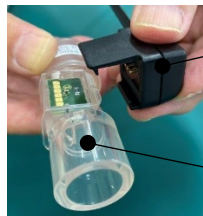1 | Hold the flow sensor and lift the claw on the sensor mounting part to unlock it.

Sensor mounting part

2 | With the claws on the sensor mounting part removed, rotate the flow sensor in the direction of the arrow.

3 | The flow sensor can be removed from the sensor mounting part.

Sensor mounting

Flow sensor

🚫 **Prohibited**	-The flow sensor (disposal) is for single use. Reuse is prohibited. -Do not remove by holding the cable base of the sensor mounting part. It may cause the cable to break. -Do not touch the metal pins on the board pattern of the flow sensor (reuse) and the sensor mounting part with your fingers. It causes contact corrosion due to sebum, etc. and causes poor contact.
⚠️ **Caution**	・Be careful not to touch the board pattern of the flow sensor (reuse). ・Be careful not to touch the metal pin on the sensor mounting part.

NOTE

The optional flow sensor (reuse) can be removed by the same procedure.

Removal of breathing circuit

1 Hold the pressure monitor tube near the pressure monitor connection port and pull it out while twisting it from the pressure monitor connection port on the front of the device.

Pressure monitor tube
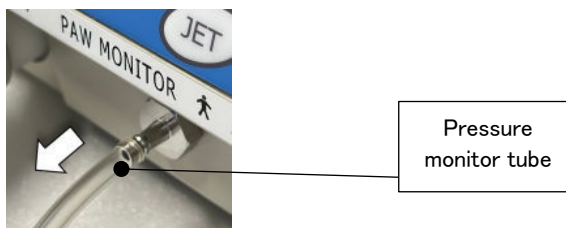
2 Hold the breathing circuit (reuse) cuff and pull it out while twisting it from the breathing circuit connection port.

Cuff

🚫 **Prohibited**	· Do not reuse the breathing circuit (reuse) without cleaning it. Causes infections in patients. · Do not pull out the breathing circuit by holding the tube part.
❗	When pulling out the breathing circuit, be sure to hold the cuff and pull it out. Holding the tube part and pulling it out may cause damage to the tube.

Removing the jet tube

1   Unlock the coupler by pressing the lever beside the jet connection on the front of the device.
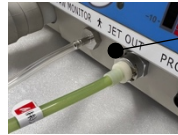
Lever to open
the coupler

2   Hold the base of the CPC connector of the jet tube (reuse) and pull it straight out from the jet connection port.

⊘ **Prohibited**	· Do not reuse the jet tube (reuse) without cleaning it. Reuse causes infections in patients. · Do not pull out by holding the tube part of the jet. It may cause the tube to be damaged.
❗	Be sure to unlock the coupler at the jet connection port. If the jet tube is pulled out as it is, there is a risk of the tube tearing or the device falling.

Removing the exhaust adapter

[1] Remove the excess gas recovery circuit from the thin cylinder of the attached exhaust port adapter.

Exhausted gas treatment
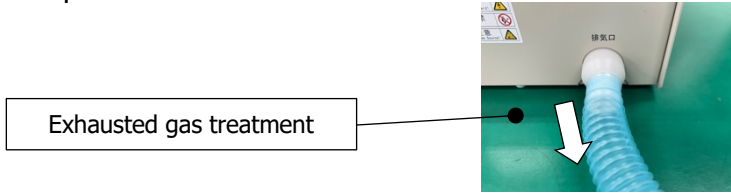
[2] Grasp the attached exhaust port adapter (reuse) and twist it out from the exhaust port on the back of the device.

🚫 **Prohibited**	Do not reuse the exhaust adapter (reuse) without cleaning it. Causes infections in patients.

Maintenance and inspection

Cleaning of this device

The instrument and the optional control box cannot be cleaned, disinfected or sterilized.
Wipe the outside of the device with a soft cloth dampened with a neutral detergent.
Wipe the display with a mild detergent or alcohol (76.9-81.4 vol%) with a soft cloth.

Sterilization of jet assembly

Be sure to sterilize the Jet Assy for each patient before using it.

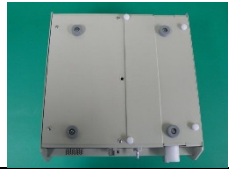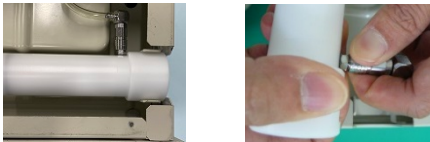First, take out the built-in jet assembly from this device. Follow the procedure below to take it out.
Divide the removed jet assembly into three parts, Jet Body, breathing circuit connection port, and relay tube, and sterilize each separately.
After sterility is complete, reassemble the device in its original location in the reverse order of removal.

How to take out the jet assembly	
Make sure the power cord is unplugged from the power outlet.	
Make sure the pressure tube (oxygen or air) is disconnected from the gas connection.	
Make sure the breathing circuit and jet tube are disconnected from their respective connections.	
Remove the four white resin screws on the bottom of the device.	
Pull up the bottom plate of this device straight and remove it.	
Place your fingers on both ends of the jet assembly and lift the entire jet assembly straight up to remove it from the fixing claws.	
Set the Jet Assy aside and remove it by pulling the outer ring at the base of the micro coupler connected to the Jet Body towards you.	
Disassemble the jet assembly into three parts: Jet Body, breathing circuit connection port, and relay tube.	

Item	specification
Sterilization method	High pressure steam sterilization
Sterilization temperature and sterilization time	121℃ 20min
Guaranteed sterility	Up to 300 times

⚠️ **Warning**	· Do not reuse the Jet Assy without sterilizing it. · Be sure to divide the jet assembly into three parts: Jet Body, breathing circuit connection port, and relay tube before sterilizing. If sterilized while it is assembled, the fitting part will not be properly sterilized nor disinfected, which will have a serious impact on the patient.
🚫 **Prohibited**	Do not reuse the Jet Assy without sterilizing it. It infects the following patients.
⚠️ **Caution**	Be sure to divide the jet assembly into three parts and sterilize them.

Cleaning the exhaust port adapter

If you use the included exhaust port adapter, be sure to wash and dry each patient before using.

Item	specification
Cleaning method	· Use the cleaning solution used in the facility for cleaning. · After cleaning, wash the cleaning liquid thoroughly with running water.
Drying method	After removing excess water, dry in the shade in a well-ventilated place.
Guaranteed number of cleanings	Unless otherwise specified, replace it with a new one if it deteriorates.

⚠️ **Warning**	Do not reuse the exhaust adapter without cleaning it. It infects the patient and has a serious effect.
🚫 **Prohibited**	Do not reuse the exhaust adapter without cleaning it. It infects the following patients.
⚠️ **Caution**	Be sure to clean the exhaust adapter when using it.

Sterilization of the reusable flow sensor

Be sure to sterilize the reusable flow sensor for each patient before use.

Please sterilize the flow sensor alone. Refer to P.58 for how to remove it from the sensor mounting part.

Item	Specification
Sterilization method	High pressure steam sterilization
Sterilization temperature and sterilization time	121℃ 20min
Guaranteed sterility	Up to 30 times

⚠️ **Warning**	-Be sure to sterilize the optional reusable flow sensor before use. -Do not reuse the disposable flow sensors. It infects the patient and has a serious effect. -The disposable flow sensor cannot be sterilized. When sterilized, it breaks down and affects the treatment of patients.
🚫 **Prohibited**	-Do not reuse the optional reusable flow sensor without sterilizing it. It infects the following patients. -Do not sterilize the optional reusable flow sensor more than 30 times. -Do not clean the optional reusable flow sensor. It will break down if washed. -Do not reuse the disposable flow sensor. It may cause infections to the next patients. -Do not sterilize the disposable flow sensor. It will break if sterilized.
⚠️ **Caution**	-Be careful not to clean the reusable flow sensor. -The attached disposable flow sensor cannot be sterilized. Be sure to use a new flow sensor for each patient. -Do not sterilize the attached disposable flow sensor.

Cleaning the breathing circuit

Be sure to wash and dry the breathing circuit (reuse) for each patient before use.

Item	Specification
Cleaning method	・Clean the inside of the circuit using the cleaning solution used in the facility. ・After cleaning, thoroughly wash the cleaning liquid in the circuit with running water.
Drying method	Drying method After removing excess water, dry in the shade in a well-ventilated place.
Guaranteed number of cleanings	Guaranteed number of cleanings Unless otherwise specified, replace with a new one if cracks or damage occur.

⚠️ **Warning**	Do not reuse the breathing circuit (reuse) without cleaning it. It infects the patient and has a serious effect.
🚫 **Prohibited**	Do not reuse the breathing circuit (reuse) without cleaning it. It infects the following patients.
⚠️ **Caution**	Be careful to clean the breathing circuit (reuse) whenever it is used.

Cleaning the jet tube

When using the attached jet tube (reuse), be sure to wash and dry each patient before using.

Item	Specification
Cleaning method	・Clean the inside of the tube with the cleaning solution used in the facility. ・After cleaning, thoroughly wash the cleaning liquid in the tube with running water.
Drying method	After removing excess water, dry in the shade in a well-ventilated place.
Guaranteed number of cleanings	Unless otherwise specified, replace it with a new one if it is cracked or damaged.

⚠️ **Warning**	Do not reuse the jet tube (reusable) without cleaning it. It infects the patient and has a serious effect.
🚫 **Prohibited**	Do not reuse the jet tube (reusable) without cleaning it. It infects the following patients.
⚠️ **Caution**	Be sure to wash the jet tube (reusable) when it is used.

Periodic maintenance and inspection

■Inspection time
To use this device safely, perform regular maintenance and inspection (for a fee) either after 2,000 hours of use or 2 years after the start of use, whichever comes first.

Perform regular maintenance and inspection of the optional control box two years after the start of use.

If the usage time of this device exceeds 2,000 hours, when the mode switching knob is changed from "OFF", the actual operation time will blink for about 5 seconds in the tidal volume display area and the alarm will sound intermittently.

■Inspection contents
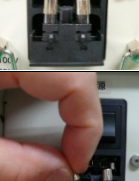
No.	Inspection items
Main Unit	
1	Replacing the EP valve
2	Disassembly and cleaning of this device, replacement of designated parts, adjustment, general inspection
3	Confirmation of electrical safety and performance
4	Calibration
Optional control box	
1	Main body disassembly and cleaning, replacement of designated parts, adjustment, general inspection
2	Confirmation of electrical safety and performance

For technical inquiries, inspections or maintenance, please contact your local Distributor or to the below our contacts below:

Metran Co., Ltd.
2-12-18 Kawaguchi, Kawaguchi City,
Saitama Prefecture, 332-0015, Japan.
TEL: +81-48-242-0333 FAX: +81-48-242-0550
URL：http://www.metran.co.jp/

How to replace the fuse

If the fuse of this device is blown, replace it according to the following procedure.

How to remove the fuse		How to insert a fuse	
With the power cord unplugged, hook your finger on the claw on the bottom of the fuse box and pull out the fuse holder.		Prepare two (2) new fuses (250V 2A class B size: φ5.2x20mm).。	
When you can pinch it with your fingers, pick up the holder.		Insert the new fuse diagonally into the fuse holder.	
Pull out until you can see all the fuses in the fuse box (29). Caution The fuse box cannot be removed from the device, so do not try to pull it out.		Stand the fuse vertically.	
Tilt the fuse box toward you.		Lift the bottom of the fuse box so that the fuse box is level.	
Secure the fuse box by hand and use your other hand to pick up the fuse.		The fuse box will be horizontal.	
Remove the other fuse in the same procedure.		Push the fuse box all the way in.	

⚠️ **Warning**	Use as per the specified fuse.
🚫 **Prohibited**	Do not use fuses other than those specified. It may cause malfunction, smoke or fire.
⚠️**Caution**	Replace two fuses with new ones at the same time.

Built-in battery

This device is equipped with two types of batteries, one for power failure alarm and the other for internal clock (the device does not have a clock display).

■Battery for power failure alarm

This device has a built-in battery separate from the commercial power supply to activate the power supply error alarm.

項目	説明
Battery specifications	Nickel metal hydride battery
Manufacture name	VARTA
Battery model number	3/V150H
Battery life	6 years
Purpose of battery use	For issuing an alarm when the power supply is unintentionally cut off while using this device

■Clock battery

This device does not have a clock display function, but it does have a clock function for maintenance and log management purposes.

項目	説明
Battery specifications	Lithium ion button battery
Manufacture name	Panasonic
Battery model number	CR2032
Battery life	2 years, but when new is installed
Purpose of battery use	For real-time clock of the processor built into this device
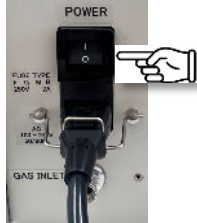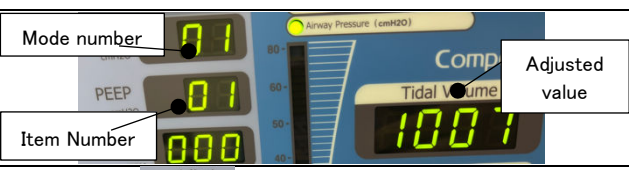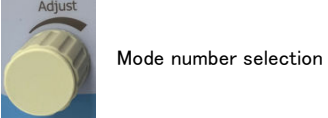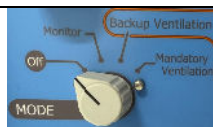
⚠ Warning	Only the designated contractor can replace the built-in battery. If the user opens the case, he / she will get an electric shock.
🚫 Prohibited 🚫	· Do not turn off the power of this device for a long time. The battery for the power error alarm will spontaneously discharge and the buzzer will not sound. ·Do not open the case and replace the built-in battery. There is a risk of electric shock. · Do not use batteries other than those specified. It may cause a malfunction or shorten the usable time.
❗	· Even if you do not use this device for a long time, turn on the power switch "l" once a month for about 8 hours to charge the built-in nickel-metal hydride battery. · Please use the specified battery.
⚠Caution	· Battery life for internal clocks is 2 years from the time of new installation.

Maintenance mode

The maintenance mode of this device has four functions: ⑬ flow trigger adjustment, ⑭ tidal volume correction, ⑮ intake trigger buzzer valid selection, and ⑯ alarm volume adjustment.
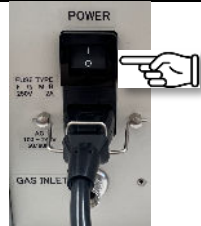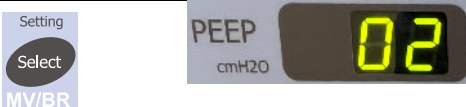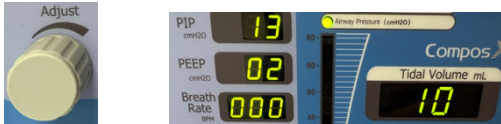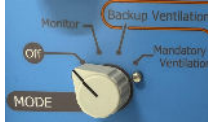
NOTE
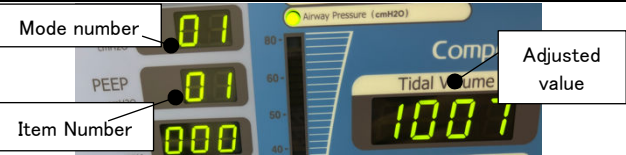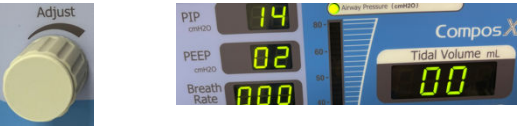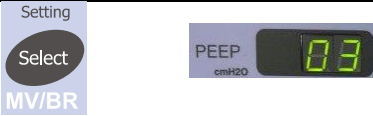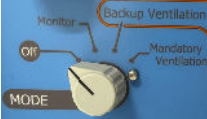
The mode numbers from ① to ⑫ are displayed in the PIP display area, but operations other than ⑬ to ⑯ can be performed.

How to start maintenance mode	
Operation explanation	Procedure photo
Turn on the power switch on the back of the device.	
While pressing the mute button and the automatic setting button on the front of the device at the same time, turn the mode switching knob to the "monitor" position.	Auto Set ➕ 🔇 ➕
It will be in maintenance mode and the display will look like the one on the right.	Mode number / Item Number
You can switch the maintenance mode number from ① to ⑯ by turning the numerical setting knob. (Other than ⑬ to ⑯ can be operated)	Adjust
You can advance to the next item in the mode by pressing the select button. You can return to the previous item by pressing the mute button.	Setting / Select Go one step forward / MV/BR
To end the maintenance mode, turn the mode switching knob on the front of the device to the "OFF" position.	

NOTE
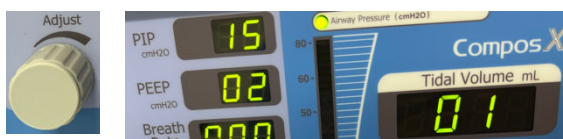
While starting maintenance mode, it does not work even if you switch the mode switching knob to forced ventilation or backup mode.
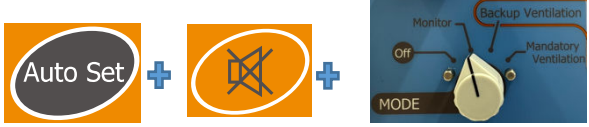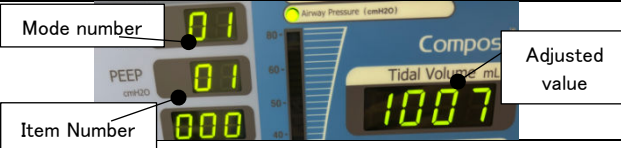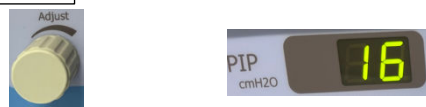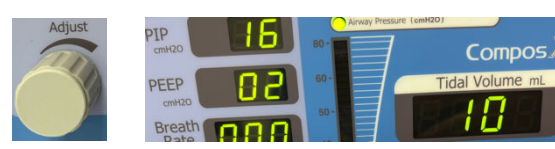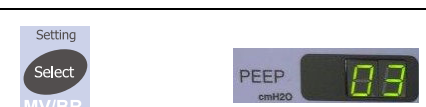
⑬Flow trigger adjustment	
Operation explanation	Procedure photo
Turn on the power switch on the back of the device.	
While pressing the mute button and the automatic setting button on the front of the device at the same time, turn the mode switching knob to the "monitor" position.	Auto Set ✚ 🔇 ✚
It will be in maintenance mode and the display will look like the one on the right.	Mode number — Adjusted value — Item Number
Turn the value setting knob until ⑬ is displayed on the mode number display (PIP display area).	Adjust
Press the select button and change the item number (PEEP display area) from ① to ②.	Setting / Select / MV/BR
Turn the value setting knob to the desired trigger level. The adjustment range is from 01 to 100 and can be adjusted in 1 step steps. (01 display indicates 100 mL) The adjustment value is displayed in blinking in the tidal volume display area. The default is displayed as 10. After setting, the last set value is displayed.	Adjust
Once you have decided on the adjustment value, press the select button to confirm it. Confirmation is completed when the item number (PEEP display area) changes from ② to ③.	Setting / Select / MV/BR
You can return to the previous item by pressing the mute button.	Setting / Select / MV/BR / Go one step forward
To end the maintenance mode, turn the mode switching knob on the front of the device to the "OFF" position.	

⑭Tidal volume correction	
Operation explanation	**Procedure photo**
Turn on the power switch on the back of the device.	
While pressing the mute button and the automatic setting button on the front of the device at the same time, turn the mode switching knob to the "monitor" position.	Auto Set + [mute] + MODE
It will be in maintenance mode and the display will look like the one on the right.	Mode number / Adjusted value / Item Number
Turn the value setting knob until ⑭ is displayed in the mode number display (PIP display area).	Adjust / PIP cmH2O 14
Press the select button and change the item number (PEEP display area) from ① to ②.	Setting / Select / MV/BR
Turn the value setting knob to the desired tidal volume correction value. The adjustment range can be adjusted in 1 step steps from -50% to + 50%. The adjustment value is displayed in blinking in the tidal volume display area. By default, 0 in the center is displayed as "00". After setting, the last adjustment value is displayed.	Adjust
Once you have decided on the adjustment value, press the select button to confirm it. Confirmation is completed when the item number (PEEP display area) changes from ② to ③.	Select
You can return to the previous item by pressing the mute button.	Setting / Select / Go one step forward / MV/BR
To end the maintenance mode, turn the mode switching knob on the front of the device to the "OFF" position.	

⚠ **Caution**	Prepare an accurate glass syringe for tidal volume correction.

60

⑮Inspiration trigger buzzer valid selection	
Operation explanation	Procedure photo
Turn on the power switch on the back of the device.	
While pressing the mute button and the automatic setting button on the front of the device at the same time, turn the mode switching knob to the "monitor" position.	Auto Set ✚ 🔇 ✚ MODE
It will be in maintenance mode and the display will look like the one on the right.	Mode number / Adjusted value / PEEP / Item Number
Turn the value setting knob until ⑮ is displayed on the mode number display (PIP display area).	PIP cmH2O 15
Press the select button and change the item number (PEEP display area) from ① to ②.	Setting Select MV/BR
Turn the value setting knob to the desired intake trigger buzzer valid selection. The choice is either 00 with the intake trigger buzzer disabled or 01 with the intake trigger buzzer enabled. The selected value will flash in the tidal volume display area. The default is displayed as 01. After setting, the last set value is displayed.	PIP 15 / PEEP 02 / Tidal Volume mL 01
Once you have decided on the adjustment value, press the select button to confirm it. Confirmation is completed when the item number (PEEP display area) changes from ② to ③.	Setting Select BR
You can return to the previous item by using the mute button.	Setting Select Go one step forward MV/BR
To end the maintenance mode, turn the mode switching knob on the front of the device to the "OFF" position.	

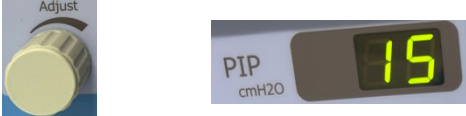| ⑯Intake trigger buzzer valid selection	
Operation explanation	Procedure photo
Turn on the power switch on the back of the device.	
While pressing the mute button and the automatic setting button on the front of the device at the same time, turn the mode switching knob to the "monitor" position.	Auto Set ✚ 🔇 ✚
It will be in maintenance mode and the display will look like the one on the right.	Mode number / Item Number / Adjusted value
Turn the value setting knob until ⑯ is displayed on the mode number display (PIP display area).	
Press the select button and change the item number (PEEP display area) from ① to ②.	
Turn the value setting knob to the desired alarm volume level. The volume adjustment range can be adjusted in 1 to 10 steps for each step, and the volume increases in proportion to the number. The adjustment value is displayed in blinking in the tidal volume display area. The maximum volume of 10 is set at the time of shipment. It cannot be silenced. After setting, the last set value is displayed.	
Once you have decided on the adjustment value, press the select button to confirm it. Confirmation is completed when the item number (PEEP display area) changes from ② to ③.	
You can return to the previous item by pressing the mute button.	Go one step forward
To end the maintenance mode, turn the mode switching knob on the front of the device to the "OFF" position.	

NOTE

By turning the value setting knob, 01 to 12 are displayed on the PIP setting display, but they cannot be operated.

⚠ Caution	Please note that items 01 to 12 cannot be operated.

Troubleshooting

■Alarm display list

If you do not know how to deal with the alarm, or if you think there is another cause, be sure to take appropriate measures to the patient first, and then refer to the measures shown in the table below.
The table below describes troubleshooting primarily for alarms caused by the device. Trouble caused by the condition of the patient are not taken into consideration.
The frequency and importance of troubles are not related to the order shown in the table.

Display	Cause	Corrective action
High pressure	The exhaust port is blocked	Check that the exhaust port on the back of the device is not blocked or that foreign matter is not clogged.
	The breathing circuit is obstructed	Check the breathing circuit and pressure monitor tube for blockages or kinks
low pressure	The cuff of the breathing circuit is not firmly stuck in the breathing circuit connection port	Insert the breathing circuit cuff firmly into the breathing circuit connection port.
	The pressure monitor tube of the breathing circuit is not firmly stuck in the monitor connection port.	Insert the pressure monitor tube of the breathing circuit firmly into the monitor connection port.
	The gas pressure of the supply gas source is low	Check the gas pressure of the supply gas source (350 to 500 kPa) and check for leaks from the connector.
Circuit Disconnected	Leaking from the breathing circuit	・Check that the breathing circuit is not damaged such as tears or cracks. ・Make sure that the connection points of the breathing circuit are firmly connected.
	The gas pressure of the supply gas source is low	Check the gas pressure of the supply gas source (350 to 500 kPa) and check for leaks from the connector.
Power supply error	The power plug of the power cord is not properly connected to the outlet or is about to come off.	Insert the power plug of the power cord firmly into a non-stop power outlet.
	The power cord is about to come off because the inlet terminal lock lever on the back of this device is not used.	Insert the power cord all the way into the inlet terminal and lower the lock lever to fix the power cord.
	Turn the mode switching knob while the power switch on the back of this device is "○" OFF.	Turn on the power switch on the back of the device "I", and then operate the mode switching knob.
	The fuse in the inlet is blown	Eliminate the cause of the blown fuse and replace it with a new fuse.
	A power cord was connected to a general commercial power supply and a power failure occurred.	Refer to page 67 for how to replace the fuse.
	Non-stop power system battery dead	Follow the instruction manual of the non-stop power supply system

Alarm display	Possible cause	Workaround
APNEA	Spontaneous breathing of the patient exceeds the APNEA alarm set time	Not abnormal. In backup ventilation mode, forced ventilation starts at the same time as the alarm. If forced ventilation does not start, turn the mode switching knob to switch to forced ventilation.
Flow sensor flashes in the tidal volume display area	The sensor cable plug is not inserted until it locks into the mouth flow sensor connection port.	Insert it deeply until the plug clicks into the mouth flow sensor connection port.
	The flow sensor is not correctly mounted on the sensor mounting part.	Please install it correctly referring to P.21 of the flow sensor connection method.
	The sensor cable is broken	The cable may be broken due to catching, etc.
	Two or more sensor extension cables are connected	Please consult your dealer and replace with a new sensor cable.

___ 📝NOTE _____

·If the problem is not solved by the corrective action, please contact the seller.
·You can mute the alarm sound for 30 seconds by pressing the mute button on the front of the device

| ⚠️ **Warning**	Eliminate the cause of the alarm as soon as it occurs. It will have a tremendous effect on the patient.
🚫 **Prohibited**	Do not block the hole in the alarm buzzer. The outbreak cannot be recognized and it will have a great impact on the patient.
⚠️**Caution**	Be careful not to leave the alarm unattended.

■Troubleshooting

If you do not know how to deal with the problem, or if you think there is another cause, be sure to take appropriate measures for the patient first, and then refer to the measures shown in the table below.

The table below describes troubleshooting primarily due to the device. Trouble caused by the condition of the patient is not taken into consideration. Refer to P.74 for the corrective action for displaying the alarm.

The frequency and importance of troubles are not related to the order shown in the table.

Trouble	Possible cause	Workaround
Does not rise to the set PIP	Forgot to press the automatic setting button	Press the select button on the front of the device and reset the PIP and PEEP with the numerical setting knobs. Finally press the auto setting button
Does not reach the set PEEP		
I can't change the value of the desired item	Forgot to press the select (item setting) button	Press the select button until the blinking display moves to the desired item.
The value whose setting has been changed remains blinking and cannot be determined.	Forgot to press the automatic setting button	When the display flashes for the desired item, turn the value setting knob to change it to the desired value.
Ventilation does not work	The mode switching knob is in the monitor position.	Turn the mode switching knob to the position of backup ventilation or forced ventilation.
APNEA alarm does not work	Mode switching knob is not in the backup ventilation position	Turn the mode switching knob to the backup ventilation position.
Tidal volume cannot be measured correctly	The direction of the flow sensor is connected in reverse	The flow sensor is directional Tidal volume will not be measured correctly unless connected in the correct orientation Refer to P.21 for how to connect the flow sensor.
	The sensor part of the flow sensor is wet	If the sensor part gets wet, it cannot be measured correctly. Turn the sensor part upward and use HME (heat artificial nose) to prevent the sensor part from getting wet.
	Two or more sensor extension cables are connected	Only one sensor extension cable can be connected If you connect more than that, the sensor signal will not be read and will not be displayed correctly.
It doesn't work when I press the jet button	Ventilation mode is monitor or backup ventilation	Turn the mode switching knob to make forced ventilation, and then press the jet button.
	Jet tube is not connected properly	Insert the jet tube until it locks firmly to the back of the coupler.
	Jet button broke down	Please contact the seller
	The switching valve inside the device has failed.	
Hold valve does not work (When the option exhalation hold function is selected)	Hold valve control tube is blocked or kinked	Straighten the tube so that the control air can flow smoothly into the tube.
	Incomplete control cable connection	Reinsert the control cable plug all the way into the connector.
	The hold valve control tube is not properly connected to the hold valve connection port on the back of the device.	Insert firmly until the CPC connector is locked to prevent air leakage at the hold valve connection port.
	The sealing O-ring has deteriorated	Replace with a new hold valve as it has reached the end of its life.

Others

Storage

Storage conditions	
Temperature	-20 ～ 60 ℃
Relative humidity	0-95% RH (no condensation)
elevation	-264 to 3,165 m above sea level (within equivalent atmospheric pressure)

	・Store in a place where it will not be exposed to liquids. ・Store in a place where there is no risk of adverse effects due to air containing atmospheric pressure, temperature, humidity, ventilation, sunlight, dust, salt, sulfur, etc. ・A place where chemicals are stored or where gas is not generated. ・Store in a place that takes safety into consideration, such as tilting, vibration, and impact (including during transportation).

Transportation

Transport conditions	
Temperature	-20 ～ 60 ℃
Relative humidity	0-95% RH (no condensation)
elevation	-264 to 3,165 m above sea level (within equivalent atmospheric pressure)

	・Store in a place where it will not be exposed to liquids. ・Store in a place where there is no risk of adverse effects due to air containing atmospheric pressure, temperature, humidity, ventilation, sunlight, dust, salt, sulfur, etc. ・Store in a place that takes safety into consideration, such as tilting, vibration, and impact (including during transportation).

Disposal

■Disposal of this device and accessories

	Please dispose of it according to the rules of your local government.

■Battery disposal

	Please dispose of it according to the rules of your local government.

Technical data

Basic data

Conditions of use		
Ventilation modes	Mandatory ventilation	
	Backup ventilation	
	Monitoring	
Ventilation parameters	Supply pressure	350 ～ 500 kPa
	Ventilation method	Time pressure limit method
	Peak Inspiration Pressure	0-80 cmH2O / 1 cmH2O
	PEEP	0 to 20 cmH2O / 1 cmH2O
	Breathing rate	1 to 255 BPM / 1 BPM
	Inspiratory time	0.1 to 3.0 sec / 0.1 sec (However, the IE ratio is not an inverse ratio)
	Apnea time	1 to 60 seconds
Alarm function	High pressure	Alarm function High pressure alarm LED blinking alarm display, alarm sound by buzzer, automatic setting
	Low pressure	Low pressure alarm LED blinking alarm display, buzzer alarm sound, automatic setting
	Circuit disconnection	Circuit disconnection alarm LED blinking alarm display, alarm sound by buzzer, automatic setting
	Power failure	Power abnormality alarm LED lighting alarm display, alarm sound by buzzer
	APNEA	APNEA alarm LED blinking alarm display, alarm sound by buzzer
	Proximal flow sensor	Flow sensor alarm Flashing display of tidal volume LED, alarm sound by buzzer
	Alarm mute	30 seconds
Monitor function	Tidal volume *	20 ～ 99 mL ±5% 100 ～ 2,000 mL ±10%
	Maximum airway pressure	0 ～ 80 cmH$_2$O ±10%
	PEEP	0 ～ 20 cmH$_2$O ±10%
	Minute ventilation	0.0 ～ 99.9 L ±10%
	Breathing rate	1 ～ 99 BPM ±1 BPM
	Analog press. monitor	-10 ～ 80 cmH$_2$O ±2 cmH$_2$O
	Jet working pressure	0 ～ 200 kPa ±10%
Others	Power-supply voltage	AC 100V 50/60Hz
	power consumption	40VA
	External dimensions of this device	(W) 260mm × (H) 190 mm × (D) 283mm
	Equipment weight	Approx. 5.9 kg
	Drip-proof and dust-proof	IPX0
	Accessories	Breathing circuit
		Jet tube (reuse)
		Exhaust port adapter (reuse)
		Power cord

		Flow sensor (disposal)	
		Sensor cable	
	Option	Flow sensor (reuse)	
		Sensor extension cable	

* May vary depending on the type and concentration of anesthetic gas.

Terms of use			
	Control box	Power-supply voltage	AC 100V 50/60Hz
		power consumption	12VA
		External dimensions	(W) 180mm × (H) 150mm × (D) 150mm (Excludes maximum protrusions)
		weight	Around 2.0 kg
		Drip-proof and dust-proof	IPX0
		Component	Control box
			Hold valve (reuse) · Hold valve control tube (blue) · Monitor tube (colorless)
			Control cable / monitor tube (colorless)
			Operation lamp
	Compos X Monitor Application	Operation system	Windows 10 Professional, Home
		Processor	Intel Core i5, Celeron N4500
		Clock speed	2.0 GHz or faster
		Memory capacity	6 GB or more
		Hard disk capacity	20 MB or more
		Maximum resolution	Up to 1980x1080
		USB port	required

Environmental conditions for use and useful life

Usage conditions	
Working pressure range	350 ～ 500 kPa
Rated supply flow rate	50 L/min
Control PIP range	0 ～ 80 cmH$_2$O
Control PEEP range	0 ～ 20 cmH$_2$O
Airway pressure monitor range	-10 ～ 80 cmH$_2$O ± 2 cmH$_2$O
Drive pressure range during jet ventilation	0 ～ 200 kPa ±10%
APNEA monitor range	1 ～ 60 secs
Classification by type of protection against electric shock	Class I equipment
Classification by degree of protection against electric shock	B type mounting part
Degree of protection against harmful ingress of water or particulate matter	IPX0
size	(W) 260mm × (H) 190mm × (D) 283mm
weight	Around 5.9 kg
Power supply voltage / power consumption	AC100V, 50/60 Hz, 40VA

Service life	6 years after installation and delivery However, when the specified maintenance / inspection is carried out, excluding accessories
Operating environment temperature range	5 ~ 40 ℃
Operating environment Humidity range	0~ 95 %RH (No condensation)
Usage environment altitude	Above sea level -264 ~ 3,165m

Conformity standard

Standard	Description
IEC 60601-1	Medical Electrical Equipment-Part 1: General Requirements for Basic Safety and Performance
ISO 13485	Medical device quality management system