

USER'S MANUAL

Vetcorder AirMate Veterinary Monitor



Product Information

- Product Model: Vetcorder AirMate
- Product Name: Veterinary monitor
- Manufactured for: Sentier HC LLC
- Address: 161 W. Sunset Dr. – Suite 102 Waukesha, WI
53189
1-844-VETCORDER (1-844-838-2673)

Revision History

This manual has a revision number. This revision number changes whenever the manual is updated due to software or technical specification change. Contents of this manual are subject to change without prior notice.

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CE mark



Statement

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The contents contained in this manual are subject to amendments without notification.

Manufacturer's Responsibility

Only under the following circumstances will manufacturer be responsible for the safety, reliability and performance of the instrument:

- All the installation, expansion, adjustment, renovation or repairs are conducted by the personnel certified by manufacturer.
- The storage conditions, operation conditions and electrical operation of the instrument conform to the product specifications.

- The instrument is used in accordance with the user's manual.

About this manual

This manual contains the instructions necessary to operate the product safely and in accordance with its function and intended use. Observance of this manual is a prerequisite for proper product performance and correct operation to ensure animal and operator safety.

This manual is an integral part of the product. It should remain accessible so that it can be referred to as needed.

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

Conventions:

- ***Bold Italic*** text is used in this manual to quote the referenced chapter or sections.
- **【 】** is used to enclose screen texts.
- → is used to indicate operational procedures.

Signs in this manual:



Warning: Indicates a potential hazard or unsafe practice that, if not avoided, will result in death or serious injury.



Caution: Indicates a potential hazard or unsafe practice that, if not avoided, could result in minor personal and animal injury or product/property damage.



Note: Provides application tips or other useful information to ensure that you get the most from your product.

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Chapter 1 General Introduction

1.1 Intended Use

The monitor is intended to be used for monitoring, displaying, reviewing, storing and alarming of multiple physiological parameters of an animal, including CO₂ and RR.



Warning: The monitor is intended for use only by clinical professionals or under their guidance. It must only be used by persons who have received adequate training in its use. Anyone unauthorized or untrained shall not perform any operations on it.

1.2 Main Unit

1.2.1 Front View

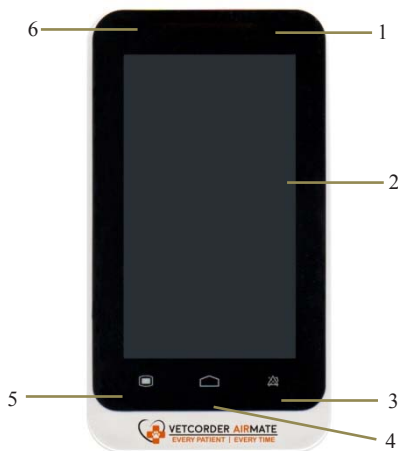


Fig 1-1 Front View of the Monitor

1. Alarm indicating lamp

When an alarm occurs, this lamp will light up as defined below:

- High level alarm: the lamp quickly flashes red.
- Medium level alarm: the lamp slowly flashes yellow.

- Low level alarm: the lamp lights yellow without flashing.
2. Display screen

The device uses resistive-style touch screen. You can improve the sensitivity by using a stylus.
 3. Alarm pause button
 - It can be used to pause the alarm when the alarm is active.
 4. Main interface button
 - Press this button to return to main interface when it is on menu setting.
 - Press this button to shift between different displaying modes when it is in main interface.
 5. Menu
 - Press this button to enter into menu interface when it is on main interface.
 - Press this button to return to main interface when it is on menu setting interface.
 6. Battery charging indicating lamp
 - It is red when the device is being charged.
 - It turns off when the device is plugged in but fully charged.

1.2.2 Rear View



Fig 1-2 Rear View of the Monitor

1.2.3 Side View

Topside:



Downside:



Rightside:



Fig 1-3 Side View of the Monitor

1. CO₂ connector
2. Not available.
3. Micro USB connector
- Connect with power adapter.



Caution: Use only power adapters specified in this manual. Using other power adapters may cause damage. The power adapter is a considered part of the product. The device is not designed to be used while charging.

- Export data to computer (possible future expansion).
-



Warning:

- The equipment connected to the monitor must meet the requirements of the system standard IEC 60601-1. If you are unsure, consult the technical service department or your local representative.
 - Operator shall be responsible for the safety of the system while the monitor is connected to a computer.
 - Don't touch the animal when using the USB connector, if not, it will generate risk of electric shock.
-

4. Shortcut key

Press this button to start or pause the CO₂ measurement.

5. Power button

- Press for about two seconds to turn on when the monitor is off.

- Press for about two seconds to turn off when the monitor is on.
- Calibration of touch screen

NOTE: Regular calibration of the touch screen is NOT required. It is not recommended that you perform calibration unless you are having issues with its operation. Press shortcut key first then press the power button and immediately release the power button. Click the center of the crosshair on screen (requires 5 calibration points). If the calibration passes, it will enter the normal interface. If not, a red “X” will appear on screen and continue to calibrate. Calibration requires very precise contact at the center of each crosshair. We recommend you use a stylus and press each point very carefully.

1.3 Display Views

This device includes automatic display rotation (Gravity Activated) which provides for vertical and horizontal positioning to maximizing space utilization and visibility.

1.3.1 CO2 Waveform Display Mode

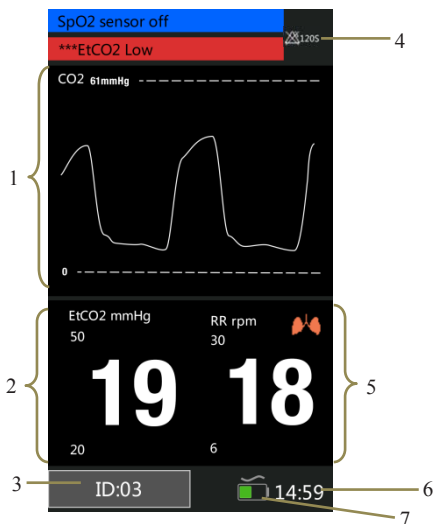


Fig 1-6 CO2 Display Mode

1. CO2 waveform display area: Waveform shown in the area is current CO2 waveform .
2. CO2 parameter area: The values shown in the area are current CO2 value and its higher and lower alarm limits.
3. Animal ID No.: Click and set animal information, its range from 1 to 96.

4. Alarm status area: Alarm status symbols are shown in the area.
5. RR parameter area: The values shown in the area are current RR value and its higher and lower alarm limits.
6. System time: Current time is shown in the area.
7. Battery symbol: The symbol indicates the current quantity of electricity of batteries and whether the device is connecting power source, the alternating-current symbol is above battery symbol when the device is connecting power source.

Chapter 2 Safety

2.1 Safety Information



Warning:

- **Explosion hazard:** Do not use the monitor in the presence of flammable anesthetics, oxygen, or hydrogen.
- When the monitor is in use, there should not be any high power appliances such as high voltage cables, X-ray machine, ultrasound equipment or electro-cautery in use nearby.
- Do not open the monitor housings; electric shock hazard may exist. All servicing and future upgrades must be carried out by the personnel trained and authorized by manufacturer only.
- When the monitor is in the presence of high-frequency devices, sensors and cables should avoid touching high-frequency devices to prevent leakage current burns to animal.
- Keep the monitor away from dust, vibration, corrosive substances, explosive materials, high temperature and moisture.

- **Do not contact or touch the animal during defibrillation as serious injury or death could result.**
- **The monitor should be handled with care and avoid shocks and falls.**
- **Before the monitor is used, ensure that the batteries have a sufficient charge to prevent phenomena such as start-up abnormalities, inaccurate measurement data, etc.**
- **The physiological data and alarm messages displayed on the monitor are for reference only and cannot be directly used for diagnostic interpretation.**
- **Disposable devices are intended for single use only. They should not be reused as performance could degrade or contamination could occur.**
- **At the end of the products service life, the product should be disposed of in compliance with the guidelines regulating the disposal of such products. If you have questions concerning disposal of products, please contact manufacturer or its representatives.**
- **To avoid inadvertent disconnection, route all cables in a way to prevent a stumbling hazard. Wrap and secure excess cabling to avoid risk of entanglement or strangulation of animal or personnel.**



Caution:

- **The monitor does not contain any user replaceable parts. The repair of the device must be conducted by technical personnel authorized by manufacturer.**
- **To ensure animal safety, use only parts and accessories specified in this manual.**
- **The monitor can only monitor one animal at a time.**
- **In order to have more accurate measurements results, the monitor should be used in a quiet and comfortable environment.**
- **To guarantee the normal, safe, and accurate operation of the monitor, a preventive safety check and maintenance should be conducted for the monitor and its parts every 6 to 12 months.**

2.2 Explanation of Symbols

Symbol	Symbol Note
	Type CF applied part; defibrillation protected The unit displaying this symbol contains an F-Type

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	isolated (floating) applied part providing a high degree of protection against shock and is defibrillator-proof.
	Refer to user's manual.
	Alternating current
IPX1	Degree of protection against ingress of liquid
	Alarm volume off
	Alarm paused
	Alarm reset
	QRS volume off
	Date of manufacture
	Manufacturer

	Serial number
	CE mark
	Power button
CO₂	Short for “Carbon dioxide”
RR	Short for “Respiratory Rate”
	Contents of the distribution packages are fragile therefore it shall be handled with care.
	This is the correct upright position of the distribution packages for the transport and/or storage.
	Distribution packages shall be kept away from rain and be kept in dry conditions.
	Maximum number of identical transport packages/items which may be stacked on the bottom package, where “6” is the limiting number.
	Symbol for the marking of electrical and electronics devices according to Directive 2002/96/EC.

Chapter 3 Basic Operations

3.1 Unpacking and Checking

Open the package and verify the contents.. Take out the monitor and its accessories.

Parts	Standard	Quantity
CO2 sampling tube	√	1
CO2 filter	√	6
User's manual	√	this manual
QC certificate	√	1
Packing list	√	1
Power adapter	√	1
USB data cable	√	1

3.2 Getting Started

Before you start to make measurements, carry out the following checks on the monitor including all connected modules.

- Check for any mechanical damage;
 - Check for any incorrect connection of all the external cables and accessories
-



Warning:

- **If the monitor is mechanically damaged, or if it is not working properly, do not use it for any monitoring procedure on animal. Contact your service personnel.**
 - **To avoid explosion hazard, do not use the monitor in the presence of flammable anesthetics, vapors or liquids.**
-

3.3 Starting the Monitor

Press the button  about two seconds to turn on the monitor. The alarm indicating lamp flashes, and then goes out. The system gives a beep and enters the main screen.

3.4 Screen Brightness Setting

【Menu】 → **【System】**, click the right of **【Brightness】**, you can set the screen brightness to a value between 1 and 5. Choose a lower level of brightness to save power.



Caution: If the monitor is used outdoors or the ambient light is strong, set the screen brightness to a higher level.

3.5 Auto-Rotate Setting

【Menu】 → **【System】**, click the right of **【Auto-rotate】** to select **【On】** or **【Off】**. If you select **【On】**, the screen can react to the gravity. When the monitor rotates, the screen will rotate the display direction automatically.

3.6 Date & Time Setting

After starting up, you need to set date and time of this monitor. Operations are as follows:

1. Select **【Menu】** → **【System】** → **【Date&Time Setup】** to enter the System menu shown as follows:
2. Select **【Use 24-hour format】**, it can be set to **【24h】** or **【12h】**.
3. Select **【Date format】**, it can be set to **【YYYY/MM/DD】**, **【MM/DD/YYYY】** or **【DD/MM/YYYY】**.
4. Set the current date and time and select **【OK】** to confirm it.

3.7 Animal Information Setting

Please select animal information correctly before measuring, Click **【ID】** on the left bottom of main screen to enter into **【Animal Info.】** . You also can select **【Menu】** → **【System】** → **【Animal Info.】** . Setting shown as follow:

1. Click the right of **【ID】** to set it values.
2. Set **【Type】** to **【Large Animal】** or **【Small Animal】** .



Caution: The alarm limits of different parameters depend on the animal type. If you set animal type incorrectly, the monitor will judge animal condition by current setting, which might be wrong for your animal.

3.8 Checking the Version

Select **【Menu】** → **【System】** to check the version of the monitor .

3.9 Restoring the Factory Configuration

If you have changed the system's configuration and want to

restore the factory configuration, follow this procedure:

1. Select **【Menu】** → **【System】** .
2. Select **【Set to Default】** , popping up a confirming window, select **【OK】** to restore the factory configuration.



Caution: The factory configuration only can be set by manual.

3.10 Shutting off the Monitor

Pressing power button about 2s can turn off the monitor.

1. Confirm that the animal monitoring is finished.
2. Disconnect all sensors and cables from the monitor.
3. Press the power button and hold it for 2s to turn off the monitor.

The device will turn off automatically if there is no operation or measurement is going on.

Chapter 4 Alarm

Alarm refers to a prompt that is given by the monitor to medical personnel through visual, audible and other means when a vital sign appears abnormal or the monitor encounters a technical problem.



Warning:

- **Setting alarm limits to extreme values can render the alarm system useless.**
 - **Alarm settings are restored automatically after power is interrupted for less than 30s. The alarm settings may be lost if the power is interrupted for greater than 30s.**
-



Note: The monitor generates all the audible and visual alarms through the speaker, alarm lamp and screen. When the monitor powers on, the alarm lamp will be lighted in red and yellow one time and the speaker will give a beep. This indicates that the alarm system of the monitor is working normally.

4.1 Alarm Categories

The monitor's alarms can be classified into three categories:

1. **Physiological alarms**

Physiological alarms are triggered by a monitored parameter value that violates set alarm limits or an abnormal animal condition. Physiological alarm messages are displayed in the physiological alarm area.

2. **Technical alarms**

Technical alarms are triggered by a device malfunction or the animal data distortion due to improper operation or system problems. Technical alarm messages are displayed in the technical alarm area.

3. **Prompt messages**

Prompt messages are not alarm messages. Prompt messages are displayed in the technical alarm area.

4.2 Alarm Levels

1. By severity, the monitor's physiological alarms can be classified into three categories: high level alarms, medium level alarms and low level alarms.

- **High level alarms**

Indicate that the animal is in a life-threatening situation and an emergency treatment is demanded.

■ Medium level alarms

Indicate that the animal's vital signs appear abnormal and an immediate treatment may be required.

■ Low level alarms

Indicate that the patient's vital signs appear abnormal and an immediate treatment may be required.

2. By severity, the monitor's technical alarms can be classified into three categories: high level, medium level alarms and low level alarms.



Caution:

- **The levels of technical alarms are predefined before the monitor leaves the factory and cannot be changed by users.**
-

4.3 Alarm Indicators

When an alarm occurs, the monitor will raise the user's attention by the following indications:

- Alarm tone: According to alarm level, the speaker in the monitor gives alarm sounds in different tones.

- Alarm lamp: According to alarm level, the alarm lamp on monitor flashes in different colors and speeds.
- Alarm message: Alarm messages are displayed on the screen.
- Flashing numeric: The value of the alarming parameter flashes.



Caution: For different alarm levels, the alarm lamp, alarm tone and alarm messages presented are different.

4.3.1. Alarm Tone

The different level alarms are indicated by the system in following different audio ways:

Alarm level	Audible prompt
High	“DO-DO-DO-----DO-DO,DO-DO-DO-----DO-DO”
Medium	“DO-DO-DO”
Low	“DO-”

4.3.2. Alarm Lamp

When an alarm occurs, the alarm levels are indicated in the following different visual ways:

Alarm level	Visual prompt
High	Alarm lamp flashes in red with 2 Hz.
Medium	Alarm lamp flashes in yellow with 0.5 Hz.
Low	Alarm lamp lights in yellow without flashing.



Caution:

- When multiple alarms of different levels occur at the same time, the monitor will select the alarm of highest level to give visual and alarm indications.
- When multiple alarms occur at the same time, the alarm message will be displayed in the alarm area in turn.

4.3.3. Alarm Message

When an alarm occurs, the alarm message will be displayed in the alarm area:

- ◆ The system uses the following symbols to match the alarm level of physiological alarm messages:
 - High level alarms: ***
 - Medium level alarms: **
 - Low level alarms: *
- ◆ The system uses different background colors for the alarm message to match the alarm level:
 - High level alarms: red
 - Medium level alarms: yellow
 - Low level alarms: yellow
- ◆ Prompt message: blue.

4.3.4. Flashing Numeric

When a physiological alarm occurs, the numeric value of the parameter will flash.

4.4 Alarm Status Symbol



To identify the control for alarm paused or to indicate that the alarm system is in the paused alarm state.



Indicates the alarm sound is turned off.



To identify the control for alarm reset.

4.5 Alarm Tone Configuration

1. The minimum alarm volume setting cannot be changed by the user.
2. Alarm volume setting

Select **【Menu】** → **【System】** → **【Alarm Volume】** , you can select from “**High** or **Mid**”.



Warning:

- Auditory alarm volume levels, which are less than ambient levels, can impede operator recognition of alarm conditions.
 - When the alarm sound is adjusted to 0, the monitor will give no audible alarm tones even if a new alarm occurs. Therefore the user should be very carefully about whether to adjust the alarm volume to 0 or not.
-

4.6 Pausing Alarms

Press the button  on the front panel of monitor to temporarily suspend all alarm indicators of the monitors:

- The visual alarm and audible alarm are all suspended.
- The parameters of physiological alarm stop flashing.

- The alarm message in the physiological alarm area will not be displayed.
- The remaining time and the icon  will be shown in the physiological alarm area.
- The technical alarm message will still be shown in the technical alarm area.
- The alarm of lead-off/sensor-off turns into a prompt message.

Press again the button  , the alarm pausing can be cancelled by manual operation. After the alarm paused time, the monitor will automatically cancel the alarm pausing.



Warning:

- **Potential hazard can exist if different alarm pre-sets are used for the same or similar equipment in any single area.**
 - **When the alarms are paused, the monitor will give no audible alarm tones even if a new alarm occurs. Therefore, the user should carefully consider whether to pause the alarm volume or not.**
 - **Don't rely exclusively on the audible alarm system for animal monitoring. Adjusting alarm volume to a low level may result in a hazard to the animal. Always keep the animal under close surveillance.**
-

4.7 Alarm Reset

Select **【Menu】** → **【System】** → **【Alarm reset】** .

Press alarm reset , you can reset alarm system:

- It will exit alarm pause if it is on the condition of alarm pause.
- It only turns off audible alarm, the visual will continue for the existing alarm.
- The audible alarm will be restored when a new alarm occurs.
- The parameters of physiological alarm keep on flashing.
- The alarm of lead-off/sensor-off turns into a prompt message.

4.8 When an Alarm Occurs



Note: When an alarm occurs, you should always check the animal's condition first.

Check the alarm message appeared on screen. It is needed to identify the alarm and action appropriately, according to the cause of the alarm.

1. Check the animal's condition.
2. Identify alarming parameter and alarm category.
3. Identify the cause of the alarm.
4. Silence the alarm, if necessary.
5. When cause of alarm has been over, check that the alarm system is working properly.

You will find the alarm message for the individual parameter in ***Appendix C Alarm message***.

Chapter 5 Measuring CO₂

5.1 Introduction

The monitor uses infrared absorption technology to measure the carbon dioxide (CO₂) concentration in the breathing airway of an animal. Because CO₂ molecules can absorb infrared light of certain wavelengths, the amount of absorbed infrared light directly relates to the concentration of CO₂. Therefore, while the infrared light radiated from the infrared light source is passed through the gas sample containing CO₂, part of energy will be absorbed by CO₂ in the gas. At another side of infrared light source, a photodetector is used to measure the remaining infrared energy and convert it to electric signal. This is compared with the energy of infrared light source and adjusted so as to correctly reflect the CO₂ concentration in the gas sample.

Sidestream: Takes a sample of the respiratory gas with a constant sample flow from the animal's airway and analyzes it with the CO₂ sensor.

5.2 Safety Information



Warning:

- Do not position the sensor cables or tubing in any manner that may cause entanglement or strangulation.
 - Performance is not guaranteed if an item labeled as single animal use is reused.
 - Monitor the CO₂ waveform (Capnogram). If you see changes or abnormal appearance, check the sampling tube. Replace it if needed. This can also be caused by issues with the anesthetic equipment.
 - Monitor the CO₂ waveform (Capnogram) for elevated baseline. Elevated baseline can be caused by sensor issues, patient issues, or anesthetic equipment problems.
 - Do not operate the CO₂ module when it is wet or has exterior condensation.
 - Do not use device on animals that cannot tolerate the withdrawal of 50 ml/min $\pm$ 10 ml/min from the airway or animals that cannot tolerate the added dead space to the airway.
 - Do not connect the exhaust port to the ventilator circuit.
-

5.3 Monitoring Procedure

1. The measurement value will be more accurate if the monitor has at least 2 minutes of warm-up time. Connect the sample line to the sample tube adapter.

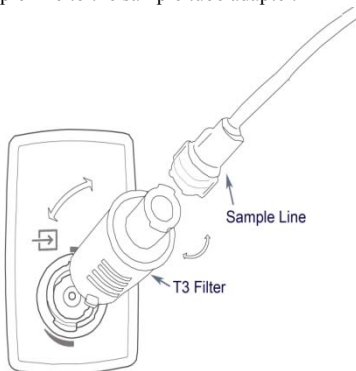


Fig 5-1 Connection of Sampling and Filter



Note:

- Inserting the sampling tube into the receptacle automatically starts the sampling pump. Removal of the sampling tube turns the sample pump off.
 - To remove the CO₂ filter from CO₂ connector, press and rotate the filter counter-clockwise Pull out filter.
-

2. Connect CO₂ filter into CO₂ connector and rotate the filter clockwise.
3. Connect the sampling tube to the CO₂ filter. If the sampling tube is occluded or damaged, the screen will display “Check sampling line”.
4. Ensure that the CO₂ sensor exhaust tube vents gases away from the sensor environment.
5. Using the shortcut key  on the right of monitor to start or pause CO₂ measurement.



Caution:

- **Always disconnect the filter from the CO₂ connector when not in use.**
 - **Do not insert the things other than filter into CO₂ connector.**
 - **The sampling tubes are disposable. Please keep the sampling tube clean and prevent the tube from clogging. It is advised to replace the sampling tube every 12h (up to 120h of use with filter tip), if the sampling tube leaks or has been damaged or becomes contaminated.**
-

5.4 CO₂ Display

- CO₂ parameter display

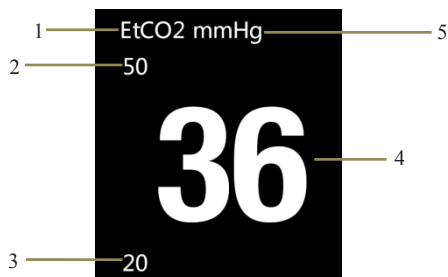


Fig 5-2 CO₂ Display

- 1. CO₂ label
- 2.CO₂ high alarm limit
- 3. CO₂ low alarm limit
- 4. CO₂ value
- 5. CO₂ unit

- CO₂ waveform display

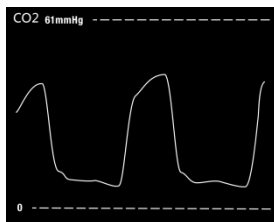


Fig 5-3 CO₂ Waveform Display

5.5 Respiratory Rate

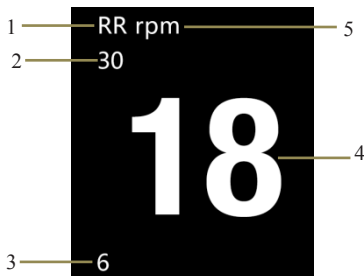


Fig 5-4 RR Display

- | | |
|-----------------------|------------------------|
| 1. RR label | 2. RR high alarm limit |
| 3. RR low alarm limit | 4. RR value |
| 5. RR unit | |

5.6 Setting CO2

Select **【Menu】** → **【CO2 Setup】** , enter into CO2 setup interface.

CO2 Setup		
	CO2	RR
Alarm	Mid ▲	High ▲
Uplimit	42 ▲	30 ▲
Downlimit	32 ▲	8 ▲
Speed	6.25mm/s ▲	
Unit	mmHg ▲	
Scale	61mmHg ▲	
Apnea Alm	Off ▲	
OK	Cancel	

Fig 5-5 CO2 Setup Interface

5.6.1 Setting CO2 and RR Alarm

Click the right of **【Alarm】**, you can set CO2 and RR Alarm, you can select “**Mid, High**”.

5.6.2 Setting CO2 and RR Alarm Limits

Click the right of **【Uplimit】** or **【Downlimit】**, you can set up limit and down limit of CO2 and RR. Attention: The high alarm limit should be greater than the lower one.

5.6.3 Setting CO2 Scan Speed

Select scan speed of CO2 waveform. Click the right of **【Speed】**, you can select “**6.25 mm/s, 12.5mm/s, 25 mm/s**”.

5.6.4 Setting CO2 Unit

Click the right of **【CO2 Unit】**, you can select “**mmHg, %, kPa**”.

5.6.5 Setting Scale

You can adjust the position of wave scale manually, and the waveform amplitude will vary along with it. Click the right of **【Scale】**, you can select “**61mmHg, 76mmHg, 91 mmHg, 106 mmHg**”.

5.6.6 Setting Apnea Alarm

You can select the apnea alarm time as necessary.. The monitor indicates an alarm when a pre-adjusted time has elapsed since the last detected breath. Click the right **【Apnea Alm】**, you can select “**Off, 5s, 10s, 20s, 40s, 60s, 80s, 100s, 120s**”.

5.7 Removing Exhaust Gases from the System



Warning: When using the sidestream CO₂ measurement on animal who is receiving or have recently received anesthetics, connect the outlet to a scavenging system, or to the anesthesia machine/ventilator, to avoid exposing medical staff to anesthetics.

This monitor removes exhaust gas directly to the exhaust port.

Chapter 6 Trend Review

6.1 Introduction

Select **【Menu】** → **【Trend】** to enter trend reviewing window. In the window, you can review CO₂, RR, SpO₂ and PR data stored before.

6.2 Review Interface

More>>		ID:2			
Time	CO ₂	RR	SpO ₂	PR	
06-06 10:34	31	22	98	79	
06-06 10:33	31	22	98	79	
06-06 10:32	30	23	98	78	
06-06 10:31	31	23	98	78	
06-06 10:30	32	21	98	79	
06-06 10:29	30	20	98	79	
06-06 10:28	32	21	98	75	
06-06 10:27	33	23	98	76	
06-06 10:26	31	23	98	77	
06-06 10:25	30	22	98	78	
06-06 10:24	32	22	98	79	
06-06 10:23	30	23	98	78	
06-06 10:22	31	23	98	78	
06-06 10:21	31	22	98	79	
Pre.		Next		Return	

Fig 6-1 Review Interface

6.3 Review Setup

[illegible]

Click the right of **【More】** on the top of review interface, the drop-down window shown as following:

More>>	ID:2			
Save Time	RR	SpO2	PR	
	22	98	79	
Delete	22	98	79	
Delete All	23	98	78	
	23	98	78	
Transmission	21	98	79	
06-06 10:29	30	20	98	79
06-06 10:28	32	21	98	75
06-06 10:27	33	23	98	76
06-06 10:26	31	23	98	77
06-06 10:25	30	22	98	78
06-06 10:24	32	22	98	79
06-06 10:23	30	23	98	78
06-06 10:22	31	23	98	78
06-06 10:21	31	22	98	79
Pre.	Next	Return		

Fig 6-3 The drop-down Window of “More”

You can set **【Save time】** , **【Delete】** , **【Delete all】** , **【Transmission】** in this interface.

- **Save time:** To adjust recording time, you can select “10s, 30s, 1min, 2 min, 5min, 10min”.
- **Delete:** To delete trend data of the selected ID No.
- **Delete all:** To delete trend data of all animals.
- **Transmission:** (For potential future expansion. Not used at this time.)

Chapter 7 Battery

7.1 Introduction

A rechargeable and maintenance-free battery is designed for the monitor which enables continuous operation without a connection to AC power.



Warning: The replacement and maintenance of battery shall only be conducted by the manufacture. Please contact to the manufacturer or its representatives.

When a lithium ion battery is used, the battery icon indicates the battery status as follows:

1.  Indicates that the power of the battery is full;
2.  Indicates that the power of the battery is 3 grids left;
3.  Indicates that the power of the battery is 2 grids left;
4.  Indicates that the power of the battery is 1 grid left;
5.  Indicates that the battery is almost depleted.

Battery power can only last for a period of time. If the

voltage of batteries is too low, an alarm of “Battery Low” will be triggered. Please connect the monitor to the battery charger to charge the battery. The monitor will be switched off automatically 10 minutes after the first “Battery Low” alarm is given. The monitor should not be used while charging.

7.2 Charging the Battery

To charge the battery:

1. Connect the USB cable to the power adapter,
2. Connect the other end (micro-USB) to the monitor and plug the adapter into the AC mains.
3. The indicating lamp on the monitor is on to indicate that the battery is charging.
4. When the battery charging indicating lamp on the monitor turns off, the battery is fully charged.

7.3 Optimizing Battery Performance

A battery needs at least two optimizing cycles when it is put into use for the first time. A battery cycle is one complete, uninterrupted charge of the battery, followed by a complete, uninterrupted discharge of the battery. A battery should be conditioned regularly to maintain its useful life. Condition a

battery once when it is used or stored for two months, or when its run time becomes noticeably shorter.

To optimize a battery, follow this procedure:

1. Disconnect the monitor from the animal and stop all monitoring and measuring procedures.
2. Connect the monitor to the charger and connect the AC mains. Allow the battery to be charged uninterrupted for at least 4 hours.
3. Remove the AC mains and allow the monitor to run from the battery until it is completely discharged. Remember that the unit will turn off automatically if not in use.
4. Re-connect the monitor to the charger and connect the AC mains. Allow the battery to be charged uninterrupted for at least 4 hours.
5. The optimizing of the battery is completed.

7.4 Checking the Lithium Battery

The performance of a battery may deteriorate over time. To check the performance of a battery, follow this procedure:

1. Disconnect the monitor from the animal and stop all monitoring and measuring procedures.
2. Plug the monitor into the charger and connect the AC mains. Allow the battery to be charged uninterruptedly for at least 4

hours.

3. Remove the AC mains and allow the monitor to run from the battery until it is completely discharged. Remember that the unit will turn off automatically if not in use.
4. The operating time of a battery reflects its current capacity.

7.5 Disposing of the Batteries

Batteries that are damaged or depleted should be replaced and discarded properly. Dispose of used batteries according to local regulations.



Warning: Do not disassemble batteries, or dispose of them in fire, or cause them to short circuit. They may ignite, explode, or leak, causing personal or animal injury.

Chapter 8 Maintenance and Cleaning

8.1 Introduction

Keep your equipment and accessories free of dust and dirt. To avoid damage to the equipment, follow these rules:

1. Always dilute cleaners according to the manufacturer's instructions or use the lowest possible concentration.
2. Do not immerse any part of the equipment in liquid.
3. Do not pour liquid onto the equipment or accessories.
4. Do not allow liquid to enter the case.
5. Never use abrasive materials (such as steel wool or silver polish), or erosive cleaners (such as acetone or acetone-based cleaners).



Warning:

- **Be sure to shut down the system and disconnect all power cables from the outlets before cleaning the equipment.**
 - **For optimal performance, product service should be performed only by qualified service personnel**
-



Caution: If you spill liquid into the equipment of accessories, connect you service personal or the manufacturer.

8.2 Preventative Maintenance and Safety Checks



Note: To ensure the performance and safety of equipment, it must be checked after using 1 year. When checking the equipment, please contact qualified professionals

Please clean the plug of power cord at least once a year. Too much dust on plug may cause fire.

The following safety checks should be performed at least every 12 months by a qualified person who has adequate training, knowledge, and practical experience to perform these tests.

The data should be recorded in an equipment log. If the device is not functioning properly or fails any of the following tests, the device must be repaired.

- ① Inspect the equipment and accessories for mechanical and functional damage.

- ② Inspect the safety relevant labels for legibility.
- ③ Verify that the device functions properly as described in the instructions for use.
- ④ Test the earth leakage current according IEC 60601-1 Limit: NC 500 μ A, SFC: 1000 μ A.
- ⑤ Test the enclosure leakage current according to IEC 60601-1: Limit: NC 100 μ A, SFC: 500 μ A.
- ⑥ Test the patient leakage current (normal operation) according IEC 60601-1
Limit: type CF: for a.c.: 10 μ A, for d.c.: 10 μ A.
- ⑦ Test the patient leakage current under single fault condition according IEC 60601-1
Limit: type CF: for a.c.: 50 μ A, for d.c.: 50 μ A.
- ⑧ Test the patient leakage current Mains voltage on applied part: According IEC 60601-1:
Limit: type CF: for a.c.: 50 μ A.



Warning: The monitor contains no user-serviceable parts. All service must be performed by an authorized representative or manufacturer.

8.3 Cleaning the Monitor

1. Common detergent and non-corrosive disinfectants used in a hospital can be used to clean the monitor. However you must be aware that many kinds of detergents must be diluted prior to utilization. Please use it according to the instructions of detergent manufacturer.
2. Avoid the use of alcohols, amino or acetonyl detergents.
3. The enclosure and screen of monitor shall be free of dust. They can be wiped clean with a lint-free soft cloth or sponge soaked in detergent. While cleaning, be careful to not spill liquid onto the instrument and keep any liquid out of it. When wiping the side panel of monitor, you must be especially careful to keep water out of all openings and connectors on the panel.
4. Do not use and abrasive materials (including a wire brush or metal brightener during cleaning) because this material will damage the panel and monitor screen.
5. Do not submerge the monitor in liquid.
6. When an accessory accidentally gets wet, please rinse it with distilled or deionized water and dry it in an environment where the temperature is 40°C to 80°C for at least one hour.

8.4 Disposal

Dispose of the monitor in accordance with local environment and waste disposal laws and regulations. For the disposal of CO2 accessories, follow local regulations regarding disposal of hospital waste.

Chapter 9 Accessories



Warning:

- Use only accessories specified in this manual. Using other accessories may causes damage to the monitor.
 - Disposable accessories are designed for single-animal use only. Reusing them may cause a risk of contamination and affect the measurement accuracy.
 - Check the accessories and their packages for any sign of damage. Do not use them if any damage is detected.
-

Type	Mode	PN
CO2	CO2 Filter	15-100-0184
	CO2 sampling Tube	15-100-0035
	CO2 3-Way Stopcock	15-100-0037
Power adapter	LXCP12-005	15-048-0020

Appendix A Product Specifications

A.1 Safety Specifications

Type of protection against electric shock	II, with internal power or external power device
Degree of protection against electric shock	Type CF applied part, defibrillation protected (CO ₂ , SpO ₂)
Degree of protection against hazards of explosion	Ordinary equipment, without protection against hazards of explosion
Degree of protection against ingress of liquid	IPX1
Equipment type	Handheld
Mode of operation	Continuous
EMC	Group 1, class A

A.2 Physical Specifications

Mainframe weight	500g(full configuration, including the batteries)
Mainframe size	142mm(W)×78mm(H)×36mm(D)

A.3 Environmental Specifications

Temperature	Operating: 5℃ to +40℃ ;
	Storage: -20℃ to +55℃ ;
Atmospheric pressure	Operating: 860hPa to 1060hPa;
	Storage: 500hPa to 1060hPa;
Humidity	Operating: 15% to 85%(non condensing)
	Storage: less than 93%(non condensing)

A.4 Charging Specifications

A4.1 Charger

Micro USB	Charge, Data export
Power adapter	Input: AC 100~240 V Output: DC 5V/2A

A4.2 Battery Requirement

Type	Built-in lithium battery
Voltage	3.7V
capacity	4800mAH
Charging time	3 hours to 90% 4 hours to 100%
Run time	>12h

A.5 Hardware Specifications

A.5.1 Display

Size	4.3inch
Resolution	480*272
Touch	Resistive touch
Autorotation Direction	four direction

A.5.2 Indicating Lamp

Alarm indicating	1 (Yellow/Red), on the top of screen
Battery charging indicating lamp	1 (orange) When charged, it lights orange. When fully charged or not charged, it doesn't light

A.5.3 Audio Indicating

Speaker	Gives audible alarm, button tone and QRS tone Supports Pitch Tone and multi-level volume; Alarm tones meet the requirement of IEC 60601-1-8.
---------	--

Alarm pressure	45 dB to 85 dB, Testing place is 1 meter from the tone.
----------------	---

A.5.4 Buttons

Power button	Turn on/off
Shortcut key	Start/Pause CO2 measurement Short press to achieve the above function, long press + power button to achieve calibration of LCD

A.6 Data Storage

The changing trends of physiological parameters will be shown in the monitor.

Animal ID	1~96
Display way	Trend tabular
Trend interval	10s、30s、1min、2min、5min、10min
Storage	Save when power down
Capacity	500 groups/animal can be stored (only data, no waveform).

A.7 Measurement Specifications

A.7.1 CO2 Specifications

CO2 (Sidestream)	
Measurement Way	Infrared spectrum
Measurement Range	0—19.7%(0-150mmHg or 0-20.0kPa)
CO2 Accuracy	0%-5.3%(0mmHg-40mmHg), $\pm 0.3\%$ (± 2 mmHg); 5.4%-9.2%(41mmHg-70mmHg), $\pm 5\%$ of reading; 9.3%-13.2%(71mmHg-100mmHg); $\pm 8\%$ of reading; 13.3%-19.7%(101mmHg-150mmHg), $\pm 10\%$ of reading.
CO2 Resolution	0.1mmHg
Gas Flow Rate	60~80ml/min
Unit	%, mmHg, kPa
Measurement Range of RR	3~150 rpm
Measuring accuracy of RR	$\pm 1\%$ or ± 1 rpm, whichever is greater

Response Time	<3s
CO2 Alarm Range	0—19.7%(0-150mmHg or 0-20.0kPa) high/low limit can be adjusted continuously
Alarm Indication	Blinking display of the data and parameters, text prompts, Three levels of alarming: sound-light alarming, alarming with blinked data and parameters, and that with text prompts.
Recovery time of equipment after defibrillation	5s

Appendix B Factory Defaults

This section lists the most important factory default settings. These settings can be adjusted and you can re-load the factory defaults if necessary.

B.1 Alarm Setup

Alarm Setup	Factory Default
Alarm volume	Medium
Minimum alarm volume	Low
CO2 Alarm Level	Medium

B.2 System Setup

System setup	Factory Default
QRS volume	medium
Brightness	3
Scan speed	12.5mm/s

B.3 CO2 Setup

CO2 setup	Horse	Dog	Cat
EtCO2 High Limit	62 mmHg	62 mmHg	62 mmHg
EtCO2 Low Limit	21 mmHg	21 mmHg	21 mmHg
RR	Horse	Dog	Cat
RR High Limit	35 rpm	40 rpm	40 rpm
RR Low Limit	5 rpm	8 rpm	8 rpm

B.4 Trend Setup

Trend Setup	Factory Default
Interval	30s

Appendix C Alarm Message

This section lists some important alarm messages. In the tables below, “*” means the alarm level is user-adjustable.

C.1 Physiological Alarm

CO2 Alarm Messages	Cause	Level
EtCO2 Too High *	A measurement has risen above the high alarm limit or fallen below the low alarm limit.	High、 Medium
EtCO2 Too Low *		High、 Medium
RR Too High		High、 Medium
RR Too Low		High、 Medium
Apnea	Resp can't be detected on preset-time.	High

C.2 Technical Alarm

Message	Cause	Level
CO ₂ Sensor Off	The CO ₂ sensor detached the animal or the monitor.	Low
Communication Error	Communication error or test model error.	Low
Battery Low	The battery power is low.	Medium
CO ₂ sensor error	CO ₂ sensor error.	Low
CO ₂ sensor Over Temp	Temperature of the sensor is over the normal working temperature.	High
Check CO ₂ Sampling Line	Sampling line is occluded or damaged. Sampling tube is kinked or pinched. Exhaust tube is blocked.	Low
CO ₂ sensor no initialized	CO ₂ sensor no initialized	Low

C.3 Prompt Message

Message	Cause	Level
CO ₂ sensor off	Sensor dose not connect with monitor when the monitor is running. After confirming alarm message of sensor off, the alarm message will become prompt message.	Prompt Message

Appendix D Guidance and Manufacturer's Declaration of EMC

Guidance and manufacturer's declaration – electromagnetic emissions- for all EQUIPMENT and SYSTEMS

Guidance and manufacture's declaration – electromagnetic emission		
The <i>monitor</i> is intended for use in the electromagnetic environment specified below. The customer or the user of the monitor should assure that it is used in such an environment that doesn't exceed these levels.		
Emission test	Compliance	Electromagnetic environment – guidance
RF emissions CISPR 11	Group 1	The <i>monitor</i> uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emission CISPR 11	Class A	The <i>monitor</i> is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies building used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Complies	

Guidance and manufacturer's declaration – electromagnetic immunity – for all EQUIPMENT and SYSTEMS

Guidance and manufacture's declaration – electromagnetic immunity			
The <i>monitor</i> is intended for use in the electromagnetic environment specified below. The customer or the user of <i>monitor</i> should assure that it is used in such an environment that doesn't exceed these levels.			
Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Electrostatic discharge (ESD) IEC 61000-4-2	± 6 kV contact ± 8 kV air	± 6 kV contact ± 8 kV air	Floors should be wood, concrete or ceramic tile. If floor are covered with synthetic material, the relative humidity should be at least 30%. Users must eliminate static in their hands before use it.
Electrical fast transient/burst IEC 61000-4-4	± 2 kV for power supply lines ± 1 kV for input/output	± 2 kV for power supply lines ± 1 kV for input/output	Mains power quality should be that of a typical commercial or hospital

	lines	lines	environment. Make sure there is not impulse interference >1kV in use environment.
Surge IEC 61000-4-5	± 1 kV differential mode ± 2 kV common mode	± 1 kV differential mode ± 2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	$<5\% U_T$ ($>95\%$ dip in U_T) for 0.5 cycle $40\% U_T$ (60% dip in U_T) for 5 cycles $70\% U_T$ (30% dip in U_T) for 25 cycles $<5\% U_T$ ($>95\%$ dip in U_T) for 5 sec	$<5\% U_T$ ($>95\%$ dip in U_T) for 0.5 cycle $40\% U_T$ (60% dip in U_T) for 5 cycles $70\% U_T$ (30% dip in U_T) for 25 cycles $<5\% U_T$ ($>95\%$ dip in U_T) for 5 sec	Mains power quality should be that of a typical commercial or hospital environment. If the user of the <i>monitor</i> requires continued operation during power mains interruptions, it is recommended that the <i>monitor</i> be powered from an uninterruptible power supply or a battery.
Power	3A/m	3A/m	If image distortion

frequency (50Hz) magnetic field IEC 61000-4-8			occurs, it may be necessary to position the <i>monitor</i> further from sources of power frequency magnetic fields or to install magnetic shielding. The power frequency magnetic field should be measured in the intended installation location to assure that it is sufficiently low.
NOTE U_T is the a.c. mains voltage prior to application of the test level.			

**Guidance and manufacturer's declaration –
electromagnetic immunity –
for EQUIPMENT and SYSTEMS that are not
LIFE-SUPPORTING**

Guidance and manufacture's declaration – electromagnetic immunity			
The <i>monitor</i> is intended for use in the electromagnetic environment specified below. The customer or the user of <i>monitor</i> should assure that it is used in such an environment that doesn't exceed these levels.			
Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Conducted RF IEC 61000-4-6	3 V _{rms} 150 kHz to 80 MHz	3 V	Portable and mobile RF communications equipment should be used no closer to any part of the <i>monitor</i> including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance $d = \left[\frac{3.5}{V_1} \right] \sqrt{P}$

Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	$d = \left[\frac{3.5}{E_1} \right] \sqrt{P}$ 80 MHz to 800 MHz $d = \left[\frac{7}{E_1} \right] \sqrt{P}$ 800 MHz to 2.5 GHz Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in metres (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, ^a should be less than the compliance level in each frequency range. ^b Interference may occur in the vicinity of equipment marked with the following symbol:
---------------------------------	-------------------------------	-------	---

			
NOTE 1	At 80 MHz and 800 MHz, the higher frequency range applies.		
NOTE 2	These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.		
^a	Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the <i>monitor</i> is used exceeds the applicable RF compliance level above, the <i>monitor</i> should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the <i>monitor</i>		
^b	Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.		

**Recommended separation distances between
portable and mobile
RF communications equipment and the
EQUIPMENT or SYSTEM –
for EQUIPMENT or SYSTEM that are not
LIFE-SUPPORTING**

Recommended separation distances between portable and mobile RF communications equipment and the <i>monitor</i>			
The <i>monitor</i> is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the <i>monitor</i> can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the <i>monitor</i> as recommended below, according to the maximum output power of the communications equipment.			
Rated maximum output power of transmitter (W)	Separation distance according to frequency of transmitter (m)		
	150 kHz to 80 MHz $d = \left[\frac{3.5}{V_1} \right] \sqrt{P}$	80 MHz to 800 MHz $d = \left[\frac{3.5}{E_1} \right] \sqrt{P}$	800 MHz to 2.5 GHz $d = \left[\frac{7}{E_1} \right] \sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.37	0.37	0.74
1	1.17	1.17	2.33
10	3.69	3.69	7.38
100	11.67	11.67	23.33

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in metres (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Appendix E Warranty Registration Card

Thank you for your purchase!

Please visit our website to register your warranty. If you need any support or issues occur, please feel free to contact us by telephone or via our website. The warranty is limited to manufacturer defects and excludes damage caused by accidents, misuse, abuse, or improper application. Do not repair the product by any person who is not authorized or trained by our company.

Product Name: Veterinary Monitor

Product Model: Vetcorder AirMate

Manufactured for: Sentier HC LLC

Address: 161 W. Sunset Dr. – Suite 102 Waukesha, WI
53189

1-844-VETCORDER (1-844-838-2673)

PN: 22-067-0035