Product Information

- Product Model: M860Vet
- Product Name: Veterinary monitor
- Manufacturer: Guangdong Biolight Meditech Co., Ltd.
- After Service Contact Information:

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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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Statement

Manufacturer holds the copyright of this manual, and we are also entitled to deal with this manual as confidential files. This manual is only used for operation, maintenance and service of product, someone else can not publish the manual.

This manual contains exclusive information protected by copyright laws and we reserve its copyright. Without written approval of manufacturer no parts of this manual shall be photocopied, xeroxed or translated into other languages.

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, readjustment, renovation or repairs are conducted by the personnel certified by manufacturer.
- The storage condition, operation condition and electrical status of the instrument conform to the product specification.

- 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 and ensures animal and operator safety.

This manual is based on the maximum configuration and therefore some contents may not apply to your product. If you have any question, please contact us.

This manual is an integral part of the product. It should always be kept close to the equipment so that it can be obtained conveniently when 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.

Contents

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 animal, including SpO2, PR, NIBP.

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 must 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 touchscreen, using stylus or fingernail will improve sensitivity

3. Alarm pause button
   - It can pause the alarm for 120s when alarm volume is on.
   - Pressing it can change the alarm message to prompt message when "Cuff off" or "Sensor off" alarm happens.
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 orange when the device is being 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. NIBP connector
2. SpO2 probe connector

3. Micro USB connector

- Connect with power adapter.

Caution：Use only power adapters specified in this manual. Using other power adapters may cause damage, and the power adapter is a part of the product.

- Export data to computer.

Warning:

- **The equipment connected to monitor shall meets requirements of the system standard IEC 60601-1. If in doubt, consult the technical service department or your local representative.**
- **Operator shall be responsible for safe of system after monitor connected to computer.**
- **Don't connect to animal when the equipment is being charged with USB cable, if not, it will generate risk of electric shock。**

4. Shortcut key

Press this button to start or pause the measuring of NIBP

5. Power buttom

- Press it about two seconds to turn on when the monitor is on the condition of shutdown.
- Press it about two seconds to turn off when the monitor is on the condition of working.
- Calibration of touch screen

Press shortcut key firstly and press power button and immediately loose shortcut key, click the center of appearing point on screen. If the calibration passes, it will enter the normall interface, if not, a red fork will appear on screen and continue to calibrate.

1.3 Display Views

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

1.3.1 Multi-Parameter Display Mode

Fig 1-4 Multi-Parameter Display Mode

1. Animal ID No.: Click into, and set animal information, its range from 1 to 96.
2. NIBP parameter area: The current NIBP parameter and its high and low alarm limits are shown in the area.
3. SpO2 parameter area: The current SpO2 parameter and its high and low alarm limits are shown in the area.
4. SpO2 waveform area: The waveform shown in the area is

current SpO_2 volume curve.

5. Physiological alarm area: Current physiological alarm information is shown in the area.
6. Technical alarm and prompt information area: Current technical alarm and prompt information are 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.
8. System time: Current time is shown in the area.
9. Alarm status area: Alarm status symbols are time are shown in the area.

1.3.2 SpO2 Display mode

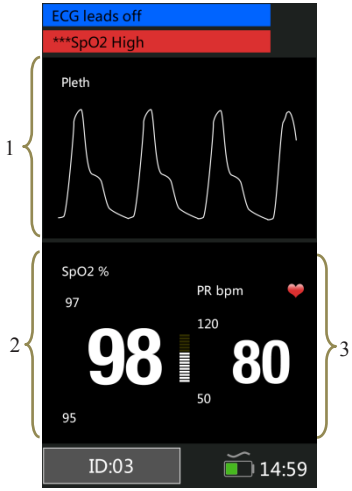


Fig 1-5 SpO2 Display Mode

1. SpO2 waveform area: The waveform shown in the area is current SpO_2 volume curve.
2. SpO_2 parameter area: The values shown in the area are current SpO_2 value and its upper and lower alarm limits.
3. PR parameter area: The values shown in the area are current PR value and its upper and lower alarm limits.

1.3.3 ECG Waveform Display Mode

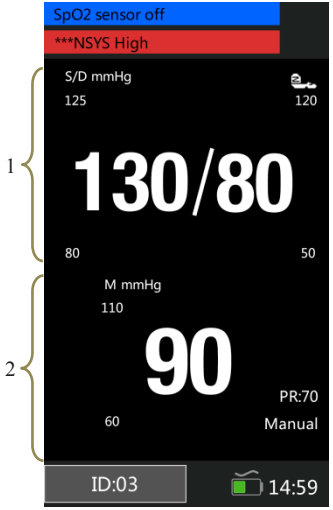


Fig 1-6 NIBP Display Mode

1. Systolic pressure and diastolic pressure area: The values shown in the area are current systolic pressure and diastolic pressure values and its upper and lower alarm limits.
2. Mean pressure parameter area: The values shown in the area are current mean pressure value and its upper and lower alarm limits..

Chapter 2 Safety

2.1 Safety Information

Warning:

- **Explosion hazard: Do not use the monitor in the presence of flammable anesthetics mixture with air, oxygen, or hydrogen.**
- **When the monitor is in use, there should not be any great power appliances as high voltage cables, X-ray machine, ultrasound equipment and electrizer 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.**
- **Keep the monitor away from dust, vibration, corrosive substances, explosive materials, high temperature and moisture.**
- **Do not come into contact with the animal during defibrillation. Otherwise serious injury or death could result.**
- **When the monitor is connecting with high-frequency**

devices, sensors and cables should avoid touching high-frequency devices, in order to leakage current burns animal.

- **The monitor is not designed for the sterilized room.**
- **The monitor should be handled with care so as to avoid shocks and falls.**
- **When the monitor is in use, it must be ensured the batteries have sufficient capacity; otherwise there might be such phenomena as starting-up abnormalities or inaccurate measurement data, etc.**
- **Measurements and pulse signals can be affected by certain environmental conditions, sensor application errors, and certain animal conditions. See the appropriate sections of this manual for specific safety information.**
- **The use of accessories, sensors, and cables other than those specified may result in increased emission, low anti-disturbance and/or create invalid readings of the monitor. It is advised to check it at least once a month.**
- **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.**
- **The service life of this monitor is five years. At the end of its service life, the product described in this manual, as well as its accessories, must 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 by animal or personnel.**
- **The adapter plug is intended to be used as isolation device from the supply mains. Please always make it easily to operate.**

Caution:

- **The monitor does not contain any parts for self-repair by users. The repair of the instrument must be**

conducted by the technical personnel authorized by manufacturer.

- **To ensure animal safety, use only parts and accessories specified in this manual.**
- **When the monitor is connected to AC power, the battery is in a state of being recharged. When it is unable to be connected to the AC power, the battery can be used to supply power, and at this time it is unnecessary to use the electrical wires, and the instrument can be switched on directly.**
- **The monitor can only monitor one animal at a time.**
- **In order to have more accurate measurements results, the monitor should be used in quiet and comfortable environment.**
- **To guarantee the normal and safe operation of the monitor, a preventive check and maintenance should be conducted for the monitor and its parts every 6 to 12 months (including performance check and safety check) to verify the instrument can work in a safe and proper condition and it is safe to the medical personnel and the animal and has met the accuracy required by clinical use.**

■ **This manual describes all features and options. Your monitor may not have all of them.**

2.2 Explanation of Symbols

Symbol	Symbol Note
	Type CF applied part, defibrillation protected The unit displaying this symbol contains an F-Type 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
	Power button
NIBP	Short for "No-invasive Blood Pressure"
SpO_2	Short for "Pulse Oxygen Saturation"
	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. Parts are as follows in the package .Take out the monitor and its accessories.

Parts	Standard	Optional	Quantity
Non-blood pressure cuff	√		1
SpO_2 tongue clip		√	1
SpO_2 Ear clip (9 pin)		√	1
User's manual	√		this manual
QC certificate	√		1
Packing list	√		1
Power adapter	√		1
USB data cable	√		1
Carrying case		√	1
Suction mount		√	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】** to set its values, you can select from 1to 5. Selecting the minimum

brightness can 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】** 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**】→【**Patient Info.**】. Setting shown as follow:

1. Click the right of 【**ID**】to set it values.
2. Set【**Type**】to【**Horse**】,【**Dog**】or【**Cat**】.

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 Demo Mode Setting

To enter the demo mode:

Select 【**Menu**】→【**System**】→【**Maintenance**】→enter the required password. Click the right of 【**Demo**】to turn on.

To exit the demo mode:

Select 【**Menu**】→【**System**】→【**Maintenance**】→enter the required password. Click the right of 【**Demo**】to turn off.

Caution: The Demo mode is for demonstration purpose only. To avoid that the simulated data are mistaken for the monitored animal's data, you should not enter the Demo mode during a animal is being monitored. Otherwise, improper animal monitoring and delayed treatment could result.

3.9 Language Setting

Select 【**Menu**】→【**System**】→【**Maintenance**】, enter the required password. On 【**Factory Mainten.**】interface, you can select 【**Language**】and choose a desired language.

3.10 Checking the Version

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

3.11 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.

3.12 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 form the monitor.
3. Press the power button and hold it for 2s to turn off the monitor If the monitor can't be switched off normally, forced close the monitor by pressing and holding the power switch more than 5s. This may cause some damages to the device.

The device will turn off automatically if any operation or measurement is going on. Auto power-off setting: 【**Menu**】→

【System】→【Maintenance】, enter the required password, click the right of **【Auto power-off setting】**, you can select "**off**", "**10min**", "**30min**".

Chapter 4 Alarm

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

Warning:

- **Setting alarm limits to extreme values that can render the alarm system useless.**
- **Alarm settings are restored automatically after power is interrupted for ≤30s, the alarm setting will lose if the power is interrupted for＞30s.**

Note: The monitor generates all the audible and visual alarms through 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 voice, which indicates the alarm system of the monitor is working normally.

4.1 Alarm Categories

By nature, 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 message are displayed in the physiological alarm area.

2. Technical alarms

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

3. Prompt messages

As a matter of fact, prompt messages are not alarm messages. Apart from the physiological and technical alarm messages, the monitor will show some messages telling the system status. 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 patent'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.**
- **The level of technical alarm can't be changed by the user.**

4.3 Alarm Indicators

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

- Alarm tone: According to alarm level, speaker in the monitor gives alarm sound in different tone.
- Alarm lamp: According to alarm level, alarm lamp on monitor flashes in different color speed.
- Alarm message: Alarm message are displayed on the screen.
- Flashing numeric: The numeric of parameter in alarm 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 on 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 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 of 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 alarm system is in the alarm paused state.

 To identify the control for alarm reset.

 indicates the alarm sound is reset

4.5 Alarm Tone Configuration

1. The minimum alarm volume setting.

Select 【**Menu**】→【**System**】→【**Maintenance**】→enter the required password, select 【**Machine Mainten.**】→【**Alarm Setup**】→【**Min.Alm.Vol.**】, you can select "**0**, **High**, **Mid**, **Low**".

2. Alarm volume setting

Select 【**Menu**】→【**System**】→【**Alarm Volume**】, you can select from X to high. Attention: "X" means: the value of the minimum alarm volume.

 **Warning: Auditory alarm signal sound pressure levels, which are less than ambient levels, can impede operator recognition of alarm conditions.**

4.6 Pausing Alarms

Press the button on the front panel of monitor, you can suspend all alarm indicators of the monitor about 60s:

- 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.

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

4.7 Adjust the Alarm Volume to Zero

Set the **【Min.Alm.Vol.】**and**【Alarm Volume】**to **【0】** to adjust the alarm volume to 0. Then there will be a symbol shown in the alarm status area. The alarm lamp and alarm

messages are still active after the alarm volume is off. The audible alarm is reactivated automatically when:

- The factory configuration is finished;
- Set the alarm volume to a non-off value.

When a factory configuration is selected, the alarm volume of the monitor may be lower than the minimum alarm volume. In this case the alarm volume is automatically adjusted according to the minimum alarm volume.

Warning:

- **Potential hazard can exist if different alarm pre-sets are used for the same of similar equipment in any single area.**
- **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.**
- **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.**

4.8 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 is going on 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.

4.9 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 NIBP

5.1 Introduction

The monitor uses the oscillometric method for measuring NIBP. The method of oscillometric indirectly estimates the systolic and diastolic pressures within the blood vessels by measuring the change of the pressure within blood pressure cuff along with the volume of the arteries and calculates the average pressure.

The measurement time of BP on a calm animal is less than 40s, and when each measurement ends, the cuff automatically deflates to zero.

The monitor applies to any standards of the cuffs for cat, dog and horse (including the cuffs used for arms and legs).

The monitor measures the blood pressure during the time of deflation. Monitor automatically conducts the second and third inflation measurements in case during the first inflation it is unable to measure the value of BP, and gives out the information for measurement failures.

The longest cuff pressure maintaining duration is 120s (90s in neonate mode), and when the time is exceeded, the air will be deflated automatically. The monitor has been designed with

hardware protection circuit regarding overpressure, errors of microprocessors, and the occurrence of power failure.

The NIBP measurement is suitable for use in the presence of electrosurgery and during the discharge of a cardiac defibrillator according to IEC 80601-2-30:2009.

A physician must determine the clinical significance of the NIBP measurement.

5.2 Safety Information

Warning:

- **Check the animal category before monitoring. Incorrect settings may result in some risk for animal safety. Higher horse setting is not suitable for dog and cat animals.**
- **Do not measure NIBP on animals with sickle-cell disease or any condition where skin damage has occurred or is expected.**
- **Use clinical judgment to decide whether to perform frequent Auto BP measurements on animals with severe blood clotting disorders because of the risk of hematoma in the limb fitted with the cuff.**

- **Use clinical judgment to decide whether to perform Auto BP measurement on the animals of thrombasthemia.**
- **Do not use the NIBP cuff on a limb with an intravenous infusion or arterial catheter in place. This could cause tissue damage around the catheter when the infusion is slowed or blocked during cuff inflation.**
- **If you doubt the NIBP measurements, check the animal's vital signs by other device, and then check the monitor.**

5.3 Measurenment Limitations

NIBP measurements are impossible with heart rate extremes of less than 40 bpm or greater than 240 bpm, or if the animal is on a heart-lung machine.

The measurement may be inaccurate or impossible:

——with excessive and continuous animal movement such as shivering or convulsions;

——if a regular arterial pressure pulse is hard to detect;

——with cardiac arrhythmias;

——with rapid blood pressure changes;

——with severe shock or hypothermia that reduces blood flow to the peripheries;

——on an edematous extremity

5.4 Monitoring Produre

1. Check the animal type, if you want to change the animal type, click【ID】to select the animal type required.
2. Select the appropriate cuff according to animal type.
3. Confirm the cuff has been entirely deflated.
4. Plug the air pipe plug of cuff into the connector (NIBP) of monitor until the plug and socket contact well.
5. Place the cuff on the veterinary anima.

Place the animal on a padded surface or chair to provide comfort. Shivering will inhibit the monitor from making a determination.

- Cuff placement for a cat

A cat may be left in its owner's lap to keep it calm. Measurements are best done in an area of the hospital away from noise and bright lights. The animal may be held so that the front limbs are free for cuff placement. In conscious animals, the tail may be the most appropriate location for placement of the cuff. Cats may be most comfortable in sternal recumbency making the

tail a more preferable site.

For the median artery on the foreleg, place the cuff around the forelimb, between the elbow and carpus. It is not necessary to center the cuff over the artery which is on the medial side of the leg because of the fully encircling bladder design. Hair need not be clipped except when heavily matted. In cats less than five pounds when measurements are difficult to obtain, place the cuff around the leg above the elbow to obtain measurements from the brachial artery. Measurements from the coccygeal artery may be used by placing the cuff around the base of the tail but not in anesthetized animals. As shown in Fig.5-1.

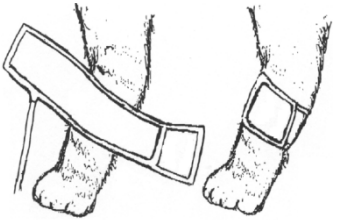


Fig. 5-1 Cat cuff placement

- Cuff placement for a dog

For measurements in dogs, it is preferable to use the right lateral, sternal or dorsal recumbent positions. That is not a

problem in anesthetized animals, but it may be difficult to get large dogs to cooperate for proper positioning. If the dog is in a sitting position, place the front paw on the operator's knee and take measurements from the metacarpus.

Sites for cuff placement are the metacarpus, metatarsus and anterior tibial. In anesthetized animals, most surgeries are done on the posterior part of the body so the metacarpal area of the forelimb is most convenient. In situations where this is not possible, the cuff should be wrapped around the metatarsus just proximal to the tarsal pad or around the hind leg just distal to the hock. The tail site should not be used for cuff placement during anesthesia.

It is not necessary to center the cuff over the artery because of the fully encircling bladder design. If the hair over the artery site is too thick or matted for good contact, it should be clipped. As shown in Fig. 5-2

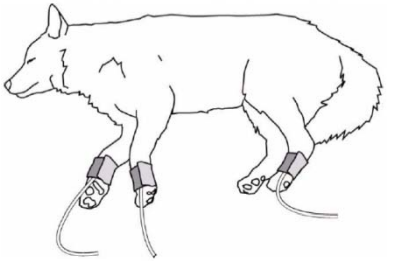


Fig. 5-2 Dog cuff placement

Note:

- **Make sure that the air conduit connecting the blood pressure cuff and the monitor is neither blocked nor tangled, and avoid compression or restriction of air conduit.**
- **While measuring blood pressure, the animal must keep calm without any talk.**
- **The cuff tied on the limb shall be on the same level as the animal's heart so as to avoid the reading error resulting from the hydrostatics effect of the blood flow between the heart and cuff. If the cuff position is higher than heart level, the BP reading will be lower, the measured result shall be added 0.75mmHg (0.1kPa)**

for each centimeter higher; in case the cuff position is lower than heart level, the BP reading will be higher, the measured result shall be deducted 0.75mmHg (0.1kPa) for each centimeter lower.

5.5 NIBP Display

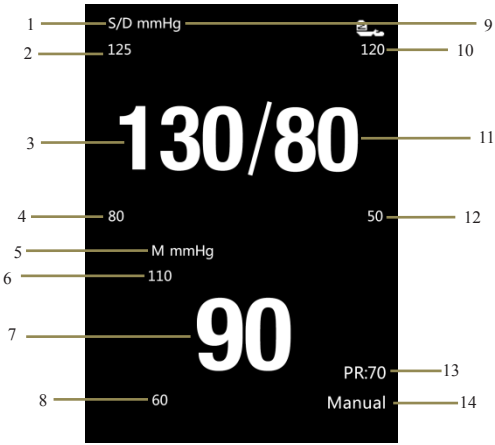


Fig 5-3 NIBP Display

1. Systolic pressure and diastolic label
2. Systolic pressure high alarm limit

3. The current systolic pressure value
4. Systolic pressure low alarm limit
5. Mean pressure unit
6. Mean pressure high alarm limit
7. The current mean pressure value
8. Mean pressure low alarm limit
9. The measuring unit
10. Diastolic pressure high alarm limit
11. The current diastolic pressure value
12. Diastolic pressure low alarm limit
13. The PR value
14. The current measuring mode.

5.6 NIBP Setting

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

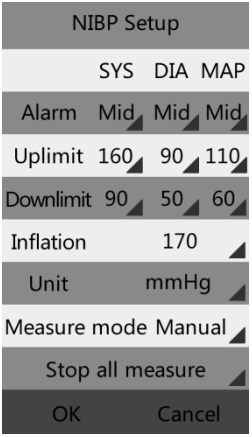


Fig 5-4 NIBP Setup Interface

5.6.1 Setting NIBP Alarm

Click the right of 【**Alarm**】, you can set up the alarm level of systolic pressure(SYS), diastolic pressure (DIA) and mean pressure(MAP) , and select "**Mid**, **High**".

5.6.2 Setting Alarm Limits

Click the right of【**Uplimit**】or【**Downlimit**】, you can set the uplimit and downlimit of systolic pressure(SYS), diastolic pressure (DIA) and mean pressure(MAP) . Attention: The high

alarm limit should greater than the low one.

5.6.3 Setting Inflation

Click the right of 【**Inflation**】, you can upturn or downturn the value of inflation, the up limit of inflation is 170 mmHg (22.7 kPa).

5.6.4 Setting Unit

Click the right of 【**Unit**】, you can select "**mmHg, kPa**".

5.6.5 Setting Measure Mode

Click the right of【**Measure mode**】, you can select "**STAT, Manual, Auto-1min, Auto-2min, Auto-3min, Auto-4min, Auto-5min, Auto-10min, Auto-15min, Auto-50min**".

Manual: measurement on demand.

Auto: continually repeated measurements in the set interval.

STAT: rapid series of measurements over a five minutes period, then the monitor returns to the previous mode. Use only on supervised animals.

5.6.6 Stop all Measure

Click 【**Stop all measure**】 to stop current NIBP

measurement.

5.7 NIBP Reset

Select 【**Menu**】→【**System**】→【**Maintenance**】→enter the required password, select 【**Machine Mainten.**】→【**NIBP Setup**】, select【**NIBP Reset**】, then the inflation value of blood pressure pump restores to the initial value. In case the blood pressure pump doesn't work as normal but without any prompt, the blood pressure pump can be checked by reset, thus the blood pressure pump in abnormal condition due to unexpected reason will automatically restore.

5.8 Menometer Test

Warning: The calibration of the NIBP measurement is necessary for every two years (of as frequently as dictated by your Hospital Procedures Policy). The performance should be checked according to the following details.

1) Replace the cuff of the device with a rigid metal vessel with a capacity of 500 ml ±5%.
2) Connect a calibrated reference manometer with an error less than 0.8 mmHg and a ball pump by means of a T-piece connector and hoses to the pneumatic system.
3) Access the NIBP menu.
4) Select **【Menu】→【System】→【Maintenance】**→enter the required password, select **【Machine Mainten.】→【NIBP Setup】→【Manometer Test】**, click it. Then the NIBP module has started performing calibration.
5) Inflate the pneumatic system to 0mmHg, 50mmHg and 200mmHg by ball pump separately. The difference between the indicated pressure of the reference manometer and the indicated pressure of the monitor will not exceed 3 mmHg. Otherwise, please contact our customer service.
6) Press the  button on the right of monitor can stop the calibration.

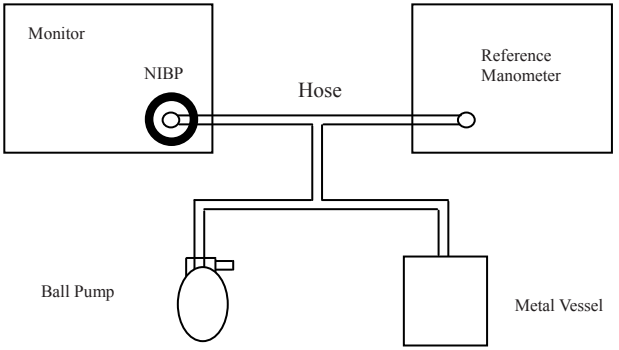


Fig 5-3 Diagram of NIBP calibration

Chapter 6 Measuring SpO2

6.1 Introduction

The measurement of oxygen saturation of arterial blood (also known as pulse oxygen saturation, usually shortened as SpO_2) adopts the principles of light spectra and volume tracing. The LED emits lights with two specific wavelengths, which are selectively absorbed by oxygenated hemoglobin and deoxyhemoglobin. The optical receptor measures the changes in the light intensity after the light passes the capillary network and estimates the ratio of oxygenated hemoglobin and the total hemoglobin.

$$SpO_2\ \% = \frac{\text{oxygenated hemoglobin}}{\text{oxyhemoglobin + deoxyhemoglobin}} \times 100\%$$

Wavelengths of the light emitted by the pulse oximeter probe are nominally 660nm for red LED and 940nm for infrared LED.

6.2 Safety Information

Warning :

- **Use only SpO2 sensors specified in this manual. Follow the SpO2 sensor's instructions for use and adhere to all warnings and cautions.**
- **When a trend toward animal deoxygenation is indicated, blood samples should be analyzed by a laboratory co-oximeter to completely understand the animal's conditions.**
- **Do not use the monitor and the SpO2 sensor during magnetic resonance imaging (MRI). Induced current could cause burns.**
- **Prolonged continuous monitoring may increase the risk of unexpected changes in skin characteristics, such as irritation, reddening, blistering or burns. Inspect the sensor site every two hours and move the sensor if the skin quality changes. For neonates, or animals with poor peripheral blood circulation or sensitive skin, inspect the sensor site more frequently.**
- **Check the SpO2 sensor and its package for any sign of damage before use. Do not use the sensor if any**

damage is detected.

- **When disposing the disposable SpO2 probe or useless SpO2 probe, please observe all local, state, and federal regulations that relate to the disposal of this products or similar products.**

Note:

- **The pleth wave is not equal to the intensity of PR signal.**
- **The monitor does not provide automatic self-examination alarm signal and the operator has to use SpO_2 simulator for self-examination.**

6.3 Monitoring Procedure

1. **Selecting SpO_2 Sensor**

   Select a sensor and clip that is appropriate for the animal.

2. **Connecting SpO2 Sensor**

   Plug the SpO_2 sensor cable into the SpO_2 connector on the measurement module.

3. **Applying SpO2 Sensor**

Put the sensor on the tongue or ear of animal. The preferred sensor application site for canine, feline and equine animals is on the tongue, with the sensor's optical components positioned on the center of the tongue. Alternatively, the sensor and clip may be applied to the animal's lip, toe, ear, prepuce, or vulva.

6.4 SpO2 Display

- **Parameter Display**

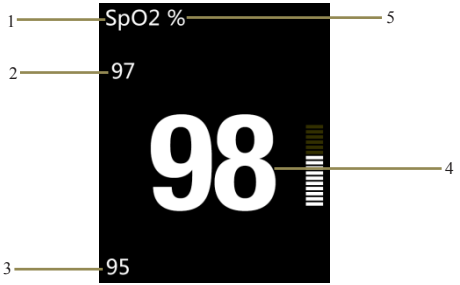


Fig 6-1 SpO_2 Parameter

1. SpO_2 label
2. High alarm limit of SpO_2
3. Low alarm limit of SpO_2
4. SpO_2 value
5. SpO_2 unit

- **Waveform Display**

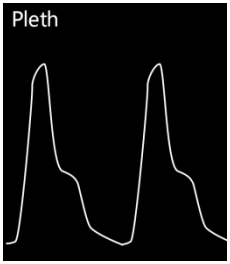


Fig 6-2 SpO_2 Volume Curve

6.5 PR Display

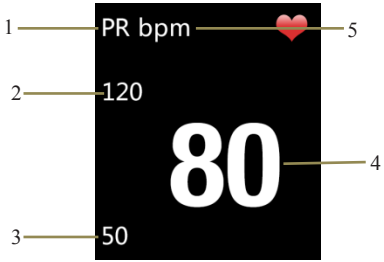


Fig 6-3 PR Display

1. PR label 2. High alarm limit of PR
3. Low alarm limit of PR 4. PR value 5. PR unit

6.6 SpO2 Setup

Select 【**Menu**】→【**SpO2 Setup**】, enter into SpO2 Setup interface.

Fig 6-4 SpO2 Setup

6.6.1 SpO2 Alarm Setup

Click the right of 【**Alarm**】, you can set alarm level of SpO_2 and PR, you can select "**Mid, High**"

6.6.2 SpO2 Alarm Limits Setup

Click the right of 【**Uplimit**】or 【**Downlimit**】, you can set

the SpO2 and PR uplimit and downlimit. Attention: The high alarm limit should greater than the low one. The downlimit for SpO2 should be higher than Desat limit.

6.6.3 Scan Speed Setup

Click the right of 【**Speed**】, you can select "**6.25 mm/s、12.5mm/s, 25 mm/s**".

6.6.4 Average Time Setup

Click the right of【**Avg Time**】, you can select "**4s, 8s, 16s**".

6.6.5 QRS Volume Setup

Click the right of【**QRS Vol.**】, you can select "**Off, High, Mid, Low**".

6.7 Desat limit Setup

SpO_2 desat means when SpO_2 measuring value is lower than the desat limit, a high physiological alarm will be trigged. Its setting is as follows.

1、 Select【**Menu**】→【**System**】→【**Maintenance**】, enter the required password.

2、 Select【**Machine Mainten**】→【**SpO2 Setup**】→【**Desat limit**】, click the right of 【**Desat limit**】to set its value.

Chapter 7 Trend Review

7.1 Introduction

7.1.1 SpO2 Trend

Select【**Menu**】→【**SpO2 Trend**】to enter trend reviewing window. In the window, you can review SpO_2 and PR data stored before.

7.1.2 NIBP Review

Select【**Menu**】→【**NIBP Review**】to enter trend reviewing window. In the window, you can review systolic pressure, diastolic pressure and mean pressure data stored before.

7.2 Review Interface

7.2.1 SpO2 Review Interface

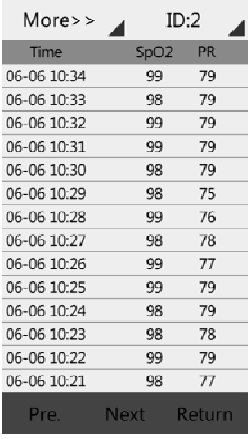


Fig 7-1 SpO2 Review Interface

If the trend date is not only one page, you can turn pages by clicking the【**next**】or【**Pre.**】.

7.2.2 NIBP Review Interface

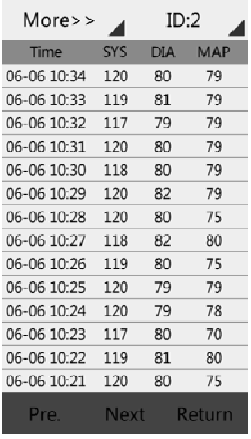


Fig 7-2 NIBP Review Interface

If the trend date is not only one page, you can turn pages by clicking the【**next**】or【**Pre.**】.

7.3 Review Setup

Click the right of 【**ID**】to select animal's ID, you can review animal's trend review by selecting different ID.

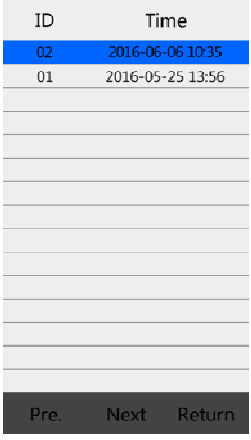
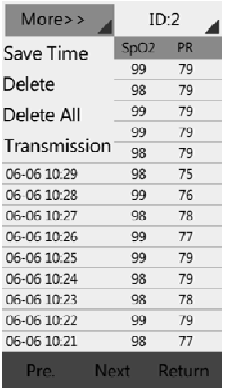


Fig 7-3 ID Review Interface

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

SpO2：



NIBP:

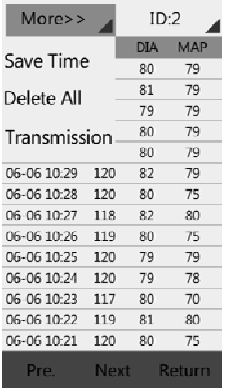


Fig 7-4 The drop-down Window of "More"

SpO2 trend interface: You can set【**Save time**】,【**Delete**】,【**Delete all**】, 【**Transmission**】.

NIBP review interface: You can set【**Delete**】,【**Delete all**】,【**Transmission**】.

- **Save time**: To adjust recording time, you can select"1**0s, 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**: To send trend. Before the operation, review system of monitoring data provided by

manufacturer must be opened, and connect computer and monitor with the USB connector. After sending all the trend data, you can check them in the computer.

Chapter 8 Battery

8.1 Introduction

A rechargeable and maintenance-free battery is designed for veterinary monitor, which enables continuous working when AC power off.

Warning：The replacement and maintenance of battery shall only be conducted by the manufacturer. 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 supply 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 insert the monitor to battery charger to charge the battery. The monitor will be switched off automatically 10 minutes after the first "Battery Low" alarm is given.

8.2 Charging the Battery

To charge the battery:

1. Connect the Micro USB in power adapter,
2. Connect the other connector of Micro USB in 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 in charge,
4. When the battery charging indicating lamp on the monitor turns off, the battery is fully charged.

8.3 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. Place the monitor in the charger stand and connect the AC mains. Allow the battery to be charged uninterruptedly for above 4 hours.
3. Remove the AC mains and allow the monitor to run from the battery until it shuts off.
4. Replace the monitor in the charger stand and connect the AC mains. Allow the battery to be charged uninterruptedly for above 4 hours.
5. The optimizing of the battery is over.

8.4 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. Place the monitor in the charger stand and connect the AC

mains. Allow the battery to be charged uninterruptedly for above 4 hours.

3. Disconnect AC mains and allow the monitor to run on the battery until it shuts off.
4. The operating time of a battery reflects its performance directly.

8.5 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 9 Maintenance and Cleaning

9.1 Introduction

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

1. Always dilute according the manufacturer's instructions or use lowest possible concentration.
2. Do not immerse part of the equipment in the 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 us.

9.2 Seasonal Safety Checking

Note: To ensure the performance and safety of equipment, it must be checked after using 1 year. When check the equipment, please contact professional technology engineers.

Please clean the plug of power cord at least once a year. Too much dust on plug may cause the 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 has to 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 500μA, SFC: 1000μA.

⑤ Test the enclosure leakage current according to IEC 60601-1: Limit: NC 100μA, SFC: 500μA.

⑥ Test the patient leakage current (normal operation) according IEC 60601-1

Limit: type CF: for a.c.: 10μA, for d.c.: 10μA.

⑦ Test the patient leakage current under single fault condition according IEC 60601-1

Limit: type CF: for a.c.: 50μA, for d.c.: 50μA.

⑧ Test the patient leakage current Mains voltage on applied part: According IEC 60601-1:

Limit: type CF: for a.c.: 50uA.

Warning: No use-serviceable parts inside, before servicing to authorized representative or manufacturer.

9.3 Cleaning the Monitor

1. Common detergent and non-corrosive disinfectant used in hospital can be applied to clean monitor, however you must be aware that many kinds of detergents must be diluted prior to utilization, and please use it according to the instruction of detergent manufacturer.
2. Avoid the use of alcohols, amino or acetonyl detergent.
3. The enclosure and screen of monitor shall be free of dust, and they can be wiped with lint-free soft cloth or sponge soaked in detergent. While cleaning, be careful and do 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 kinds of cable and outlet on the panel.
4. Do not use abrasive material including 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. While cable or plug of attachment accidentally gets wet, please rinse it with distilled water or deionized water and dry it in the environment of temperature 40℃ to 80℃ for at least one hour.

9.4 Cleaning NIBP Cuff

1. Please regularly clean the product;
2. Remove cuff from connector and pull out airbag from sheath;
3. Submerge clean and soft medical gauze pad or other soft cleaning tools into fresh water or neutral soapy water, and wring out surplus water from the submerged gauze then wipe airbag and pipe;
4. Wash the cuff sheath in the clean neutral soapy water;
5. After the sheath and airbag intensive drying, enclose airbag with cuff sheath and put into operation.

Caution:

- **Excessive or frequent cleaning may damage airbag, so don't clean airbag unless necessary.**
- **Do not dry airbag and sheath in high temperature.**
- **If higher sterilization level is required, please choose disposal cuff.**
- **One disposal cuff can only be used for one animal.**
- **Carefully keep water and cleaning solution out of the connecting parts of cuff and monitor.**

9.5 Cleaning SpO2 Sensor

1. The casing of the sensor and light tube can be cleaned with swab or non-velvet soft cloth dipped with medical alcohol.
2. The sensor cable can be cleaned or sterilized with Hydrogen Peroxide 3% or isopropyl alcohol 70%.
3. It is forbidden to put the monitor in high-pressure containers and put the sensor directly in liquid.

Warning: Do not reuse or disinfect the disposable SpO2 sensor.

9.6 Disposal

Dispose of the monitor in accordance with local environment and waste disposal laws and regulations. For the disposal of SpO2 sensor and NIBP cuff, follow local regulations regarding disposal of hospital waste.

Chapter 10 Accessories

Warning:

- **Use only accessories specified in this manual. Using other accessories may cause damage to the monitor.**
- **Disposable accessories are designed for single-animal use only. Reuse of 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
NIBP cuff	3-5.5 cm	15-100-0164
	4-8 cm	15-100-0165
	6-11 cm	15-100-0166
	7-13 cm	15-100-0167
	9-14.5 cm	15-100-0168
SpO_2 sensor	Tongue clip	15-100-0079
	Ear clip (9 Pin)	15-100-0062
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 （NIBP, SpO2）
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	Portable
Mode of operation	Continuous
EMC	Group 1, class A

A.2 Physical Specifications

Mainframe weight	<400g (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 Power Adapter

Micro USB	Charge, Data export.
Power adapter	Input: AC 100～240Ⅴ. 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	>20h

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 NIBP 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, you can select optionally PC software, to upload trend review to computer by USB.

Animal ID	1～96
Display way	Trend tabular
SpO2 trend	10s 、 30s 、 1min 、 2min 、 5min 、

interval	10min
Storage	Save when power down
Capacity	500 groups/animal can be stored (only data, no waveform).

A.7 Measurement Specifications

A.7.1 NIBP Specifications

NIBP			
Method	Automatic oscillometry		
Display	Sys, Dia, Map,PR		
Measurement/ Alarm range （mmHg）	Horse	Sys	30~270 mmHg
		Dia	10~220 mmHg
		Map	20~235 mmHg
	Dog	Sys	30~235 mmHg
		Dia	10~220 mmHg
		Map	20~225 mmHg
	Cat	Sys	30~135 mmHg
		Dia	10~100 mmHg
		Map	20~125 mmHg
Cuff pressure range	0~300 mmHg		

<table>
<tr><td>Resolution</td><td colspan="2">1 mmHg</td></tr>
<tr><td>Pressure accuracy</td><td colspan="2">Static：±3 mmHg
Clinic ： Average error: ±5 mmHg, standard deviation: ≤8 mmHg</td></tr>
<tr><td>Unit</td><td colspan="2">mmHg, kPa</td></tr>
<tr><td rowspan="2">overpressure protection</td><td colspan="2">Double hardware, software overpressure protection.</td></tr>
<tr><td>Hardware overpressure protection:
Horse：
315±10 mmHg
Dog：
155±10 mmHg
Cat：
265±10 mmHg</td><td>Software overpressure protection:
Horse：
297±3 mmHg
Dog：
147±3 mmHg
Cat：
252±3 mmHg</td></tr>
<tr><td>Intervals for periodic measurement time</td><td colspan="2">1,2,3,4,5,10,15,20,30,60,120,240,480, 720min</td></tr>
<tr><td>Alarm Indication</td><td colspan="2">Blinking display of the data and parameters, text prompts, Three levels of alarming: sound-light alarming,</td></tr>
</table>

	alarming with blinked data and parameters, and that with text prompts.	
Work mode	Horse	Single, Cycle, STAT
	Dog	Single, Cycle, STAT
	Cat	Single, Cycle.
Recovery time of equipment after defibrillation	5s	
PR		
PR range	40 ~ 240 bpm	
Resolution	1 bpm	
Accuracy	±3 bpm	

A.7.2 BLT-SpO2

SpO_2	
Measurement range	0~100%
Resolution	1%
Accuracy	70~100%：± 2% 0~69%:unspecified
Alarm	Select the high and low alarm limit of SpO_2

Sensor	Pulse oximetry sensors contain LEDs that emit red light at a wavelength of approximately 660 nm and infrared light at a wavelength of approximately 905 nm. The total optical output power of the sensor LEDs is less than 15 mW. This information may be useful to clinicians, such as those performing photodynamic therapy.
Data update period	13s
Anti-interference	Anti-motion interference Anti-electrotome interference
Recovery time of equipment after defibrillation	5s
Resisting low perfusion ability	With powerful ability of resisting low perfusion, PR amplitude can reach to 0.2% with value of SpO2 displaying.
Pitch Tone	with

PR	
Measurement range	25 bpm ~250 bpm
resolution	1 bpm
accuracy	±1% or ± 1 bpm, whichever is greater
Alarm	Select the high and low alarm limit of PR

Appendix B Factory Defaults

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

B.1 Alarm Setup

Alarm Setup	Factory Default
Alarm volume	Medium
Minimum alarm volume	Low
SpO_2 Alarm Level	Medium
Sys Alarm Level	Medium
Dia Alarm Level	Medium
Map Alarm Level	Medium

B.2 System Setup

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

B.3 NIBP Setup

NIBP Setup (mmHg)	Horse	Dog	Cat
Sys High Limit	130 mmHg	180 mmHg	200 mmHg
Sys Low Limit	80 mmHg	70 mmHg	90 mmHg
Dia High Limit	70 mmHg	90 mmHg	105 mmHg
Dia Low Limit	20 mmHg	35 mmHg	40 mmHg
Map High Limit	90 mmHg	125 mmHg	110 mmHg
Map Low Limit	60 mmHg	60 mmHg	60 mmHg
Inflation	140 mmHg	160 mmHg	160 mmHg

B.4 SpO2 Setup

SpO_2 Setup	Horse	Dog	Cat
SpO2 High Limit	100%	100%	100%
SpO2 Low Limit	90%	90%	90%
PR Setup	Horse	Dog	Cat
PR High Limit	50 bpm	160 bpm	200 bpm
PR Low Limit	30 bpm	70 bpm	90 bpm

B.5 Trend Setup

Trend Setup	Factory Default
Interval	30s

Appendix C Alarm Message

This section lists some important alarm message. In the tables below, "*" means the alarm level is user-adjustable.

C.1 Physiological Alarm

NIBP Alarm Message	Cause	Level
NSYS too high*	Measuring value is above the high alarm limit or low alarm limit.	High, Medium
NSYS too low*		High, Medium
NDIA too high*		High, Medium
NDIA too low*		High, Medium
NMEAN too high*		High, Medium
NMEAN too low*		High, Medium
SpO_2 Alarm Message	**Cause**	**level**
SpO_2 too high*	Measuring value is above the high alarm limit or low alarm limit.	High, Medium
SpO_2 too low*		

SpO_2 Desat	SpO_2 measurement has fallen below the SpO_2 desat limit.	High
PR too high *	Measuring value is above the high alarm limit or low alarm limit.	High, Medium
PR too low *		
RR too low *		
RR too high *		
No Pulse	The pulse signal was too weak to be analyzed.	High

C.2 Technical Alarm

Message	Cause	Level
SpO_2 Sensor Off	The SpO_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
SpO_2 Low Perf	The signal detected is weak	Medium
NIBP Communication Error	NIBP measurement failure or communication failure.	Low

Self-text Failed	Transducer or other hardware failure.	Low
Loose Cuff	Cuff is completely unwrapped, The cuff is not connected.	Low
Air leak	Air leak in pneumatics, hose, or cuff.	Low
Air Pressure Error	Unable to maintain stable cuff pressure, e.g. kinked hose.	Low
Weak Signal	Very weak animal signal due to a loosely wrapped cuff. The pulse of animal is too weak.	Low
Rang Exceeded	Measurement range exceeds module specification	Low
Excessive Motion	1. Too many retries due to interference of motion artifact. 2. Signal is too noisy during measurement, e.g. animal has severe tremor. 3. Irregular pulse rate, e.g. arrhythmia.	Low

Overpressure Protection	Cuff pressure exceeds the specified high safety limit. Could be due to rapid squeezing or bumping of cuff.	Low
Signal Saturated	Large motion artifact that saturates the BP amplifier's amplitude handing capability.	Low
Pneumatic Leak	Module reports Air Leakage failure while in the Pneumatic Test mode	Low
System Failure	Module occurs abnormal processor event.	Low
Time Out	Measurement took more than 120 seconds in Horse, 90 seconds in cat mode	Low
Cuff Type Error	The current cuff of measurement is wrong. As Cat cuff used in Horse.	Low

C.3 Prompt Message

Message	Cause	Level
Searching	Searching pulse	Prompt Message
SpO_2 sensor off	SpO2 sensor disconnected from the animal or the monitor after starting monitor, pausing alarm or alarm reset.	
NIBP Resetting	NIBP measurement module is resetting	
Overpress Testing	NIBP is testing Over-Pressure	
Manometer Testing	NIBP is testing Manometer	
Air Leakage Testing	NIBP is testing Air Leakage	

Appendix D Guidance and Manufacturer's Declaration of EMC

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

<table>
<tr><th colspan="3">Guidance and manufacture's declaration – electromagnetic emission</th></tr>
<tr><td colspan="3">The monitor 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 and environment.</td></tr>
<tr><th>Emission test</th><th>Compliance</th><th>Electromagnetic environment – guidance</th></tr>
<tr><td>RF emissions
CISPR 11</td><td>Group 1</td><td>The monitor 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.</td></tr>
<tr><td>RF emission
CISPR 11</td><td>Class A</td><td rowspan="3">The monitor 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.</td></tr>
<tr><td>Harmonic emissions
IEC 61000-3-2</td><td>Class A</td></tr>
<tr><td>Voltage fluctuations/ flicker emissions
IEC 61000-3-3</td><td>Complies</td></tr>
</table>

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

Guidance and manufacture's declaration – electromagnetic immunity			
The *monitor* is intended for use in the electromagnetic environment specified below. The customer or the user of *monitor* should assure that it is used in such an environment.			
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 lines	±2kV for power supply lines ±1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital 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 *monitor* requires continued operation during power mains interruptions, it is recommended that the *monitor* be powered from an uninterruptible power supply or a battery.
Power frequency	3A/m	3A/m	If image distortion occurs, it may be

(50Hz) magnetic field IEC 61000-4-8			necessary to position the *monitor* 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 *monitor* is intended for use in the electromagnetic environment specified below. The customer or the user of *monitor* should assure that it is used in such an environment.			
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 *monitor* 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 *monitor* is used exceeds the applicable RF compliance level above, the *monitor* should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the *monitor*

[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 *monitor*			
The *monitor* is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the *monitor* can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the *monitor* 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 purchasing products of BLT!

Please complete this card and mail back to BLT Service Center in ZHUHAI within one week. If you need any support or the defects occur, please feel free to contact us by telephone or fax. Warranty will apply with no charge in the warranty period (exclude accident, misuse, abuse or misapplication). You are also and always welcome to our service center, when you need any special service after warranty. Do not repair the product by any person who is not authorized or trained by BLT.

Product		Model	
Serial No.		Contract	
Date Installed		Warranty	
Name			
Address			
Contact Person		Tele/fax	

Product name: Veterinary Monitor

Product type: M860Vet

Manufacturer: Guangdong Biolight Meditech Co., Ltd.

Address: No.2 Innovation First Road, Technical Innovation Coast, Hi-tech Zone, Zhuhai, P.R.China

Postcode: 519085

PN: 22-067-0011