Multi-parameter monitor

Operating Manual

This manual applies to the following models:

Preface

Thank you for using our latest physical health tester (hereinafter referred to as the tester)

In order to make you can skillfully operate the monitor as soon as possible,we provided with the detailed operation manual (this manual).The first time you install and use the instrument,please read carefully.

Based on the need of improving performance and reliability of the components and equipment,sometimes we make some changes to instruments (including hardware and software).In the meanwhile,we will try to change or add information,but the manual may still do not account with physical truth,please understanding.If there is any mistake or omission in the instruction manual,you are welcome to correct it.

Warning

1) There are no components which can be repaired by customers. Please do not disassemble them when failure occurs.

2) This instrument is not a therapeutic device and can not be used in families

3) Do not touch patients, tables and instruments during defibrillation..

4) Before cleaning this instrument, the power supply of the net must be cut off.

5) The instrument shall not be used in places with high temperature , high humidity , inflammable , excessive dust and electromagnetic radiation .

6) Ensure the safety and stability of the power grid and grounding environment of this instrument.

7) （Other details are provided in the manual）

Statement

The content and version number in this instruction may be upgraded at any time as a result of changes in software or technical specifications without prior notice.

The version number of this instruction :1.0

Responsibility of manufacturer

The manufacturer is responsible for safety, reliability and performance of this equipment only in the condition that:

- All installation, expansion, change, modification and repair of this equipment are conducted by qualified personnel;
- Applied electrical appliance is in compliance with relevant National Standards;
- The monitor is operated under strict observance of this manual.

CATALOGUE

Chapter 1 Composition of the main structure

The multi-parameter monitor consists of mainframe, cardiac conductance wire, non-invasive blood pressure cuff, temperature sensor, pulse oxygen saturation sensor and carbon dioxide plug-in module.

Chapter 2 Scope of application

Suitable for monitoring and measurement of heart rate / pulse rate, noninvasive blood pressure (systolic blood pressure, diastolic blood pressure, mean pressure), respiratory rate, ECG, oxygen saturation, body temperature and end-breath carbon dioxide in adults and children.

Chapter 3 Contraindications, Precautios

3.1Contraindications

This instrument is not a therapeutic device.This product has no contraindication.

3.2Precautions

⚠ **Warning：**

- **The multi-parameter monitor is used for clinical patient monitoring and only allows doctors and nurses to use the monitor.**
- **Do not open the casing of the instrument to avoid possible electrical hazard.Any maintenance and upgrading of the monitor must be performed by our trained and authorized service personnel.**
- **Do not use this instrument in place of flammable articles such as narcotics, in case of explosion.**
- **Electrosurgical interference caused by electromagnetic equipment or grid overload will damage or affect the operation of the monitor.**
- **Before using, the user should check that the instrument and its accessories work**

properly and safely.

- **To prevent delay in treatment, each patient should be adequately alerted.**
- **Do not use mobile phones near the detector, which can cause excessive radiation and thus interfere with the function of the detector.**
- **Do not touch patients, tables and instruments during defibrillation.**
- **The interconnecting equipment with the detector should form an isopotential body (the potential equalization wire is effectively connected).**
- **This equipment is not suitable for the use of electrosurgical equipment.**
- **Packaging must be handled in accordance with current waste control codes and placed out of reach of children.**
- **It is suggested that the equipment should be checked every other year, and the verification should be submitted to a qualified third party organization for verification in accordance with the verification regulations prescribed by the state organs.**

This monitor can provide some functions of measuring parameters, recorder and so on. This instruction is for maximum configuration. The model you use may not provide some parameter monitoring or recording functions.

⚠**Warning:**

When the products and accessories described in this manual are about to expire, they must be processed in accordance with the relevant product processing specifications. If you want further information, please contact our company or agency.

- **When there is doubt about the perfection and arrangement of the external grounding of the monitor, the internal battery must be used to operate it.**

Chapter 4 Summary

4.1 Brief introduction of Monitor

Multi-parameter monitor is a novel structure, small size, AC-DC two-purpose equipment, with built-in batteries to facilitate patient transfer.Heart rate / pulse rate, noninvasive blood pressure (systolic blood pressure, diastolic blood pressure, mean pressure, respiratory rate,

electrocardiogram, oxygen saturation, end-breath carbon dioxide and body temperature) can be monitored and measured in adults and children.

Working environment:

Temperature:Work temperature 5 ～ 40 (°C)

Transport and Storage -20 ~ 55 (°C)

Humidity:Working humidity <= 85 %

Transport and Storage <= 93 %

Power supply Voltage: 220 (V) AC, 50 Hz Pmax=110VA FUSE T 1.5 A

Warning:

- **Do not use this monitor outside the temperature and humidity range specified by the manufacturer.**
- **This monitor is limited to one patient at the same time.**

The multi - parameter monitor is rich in function and can be applied to clinical monitoring of adults and children . Users can select different measurement parameter configurations according to different needs .

It can monitor vital signals as ECG, Respiratory Rate, SpO2, NIBP, TEMP and IBP. It integrates parameter measuring modules, display and recorder in one device, featuring in compactness, lightweight and portability. Replaceable built-in battery facilitates transportation of patient. At the same time, 7 waveforms and all monitoring parameters can be clearly displayed on its high resolution display interface.

The POWER switch "⏻"is on the front panel of the monitor.Ac indicator lamp"AC"is on the right side of the power switch,When the instrument is alternating current,the lamp is bright and green.The charging lamp "POWER" is located on the right side of the AC light which is green and flicker when the monitor uses an internal rechargeable battery.When using alternating current, the light is long green.The alarm lamp ALARM is located at the upper right of the whole machine.When alarm occurs, this lamp flashes.The sensor Jack is on the left side of the front panel of the instrument.The recorder is located on the right side of the machine.Other sockets and power sockets are located on the back panel.

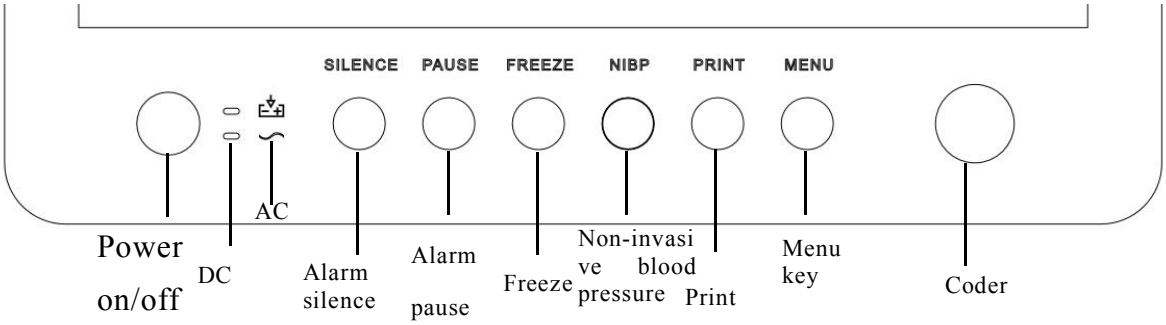
The monitor has a friendly interface, through the front panel keys and encoders can complete all operations, please refer to the **functional keystroke** section.

Definition acronym:

Name	Definition	Name	Definition

ECG	electrocardiogram	HR	Rate of heart
RESP	respiration	RR	Rate of respiration
TEMP	temperature	PR	pulse rate
NIBP	Non-invasive blood press	CO_2	carbon dioxide
S_PO_2	degree of blood oxygen saturation		

4.3 Function keystroke area and encoder



Rotary encoder can move the cursor (choice box)
Select menu options or soft buttons on the screen.
Press the encoder to confirm the current option.

4.4 Function keystroke area identification and operation instructions

Symbol	**Symbol instruction**	**Function keystroke operation instruction**
AC/BAT	Power switch indicator lamp	When the monitor is connected to AC power through power supply, the indicator light is green.When the monitor has no alternating current and is powered by a built-in battery, the indicator lights are orange.
⏻/⊙	Power switch	Press this button once and the monitor is turned on. Press this button again and the monitor shuts down.

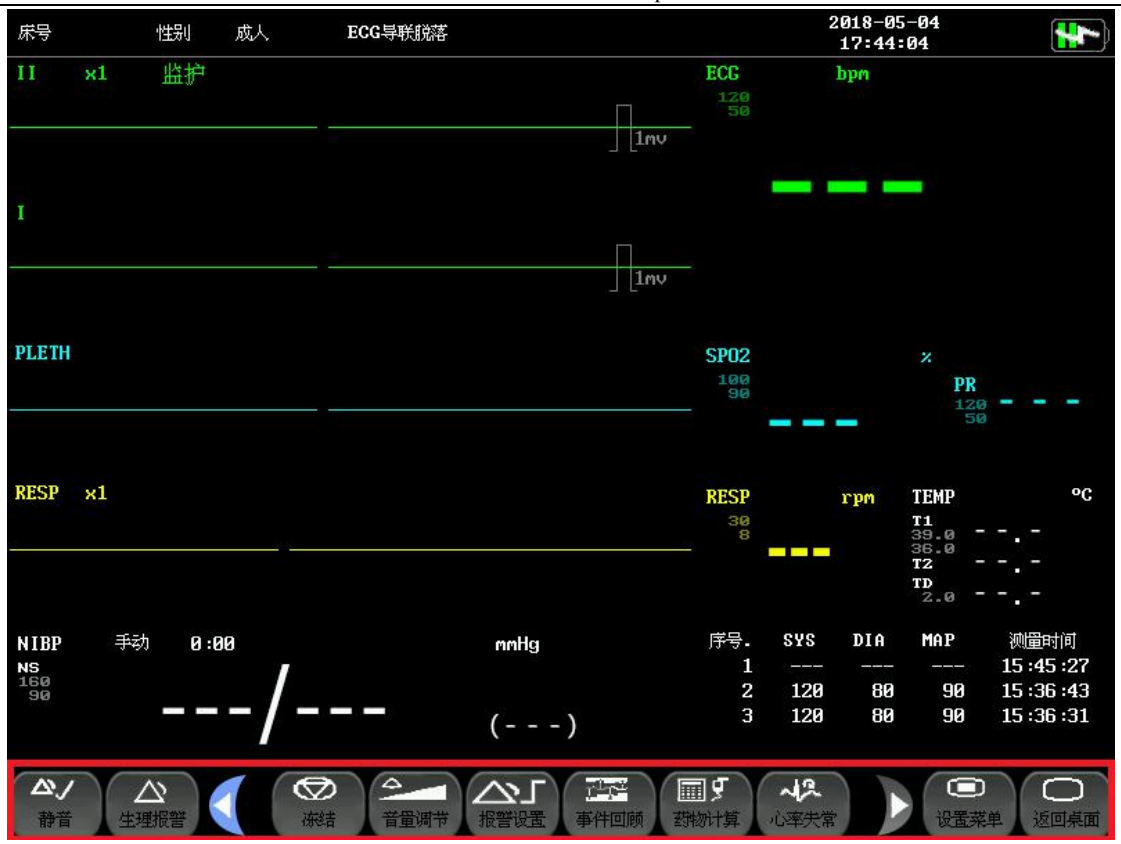
SILENCE	Alarm silence	Can turn off all sounds.
PAUSE	Alarm pause	Stop the alarm and make a 2 minute countdown (you can choose "1 minutes", "2 minutes", "3 minutes").
FREEZE	Freeze(or thaw)/Real-time recording	Press this button: freeze (or thaw) the waveform. Press this button long: start recording the real-time output. If real-time recording is being performed, short or long press of this key will stop real-time recording.
NIBP	Start (stop) measuring blood pressure /quick measurement	Press this button: start (or stop) the air pump, start (or end) non-invasive blood pressure measurement.
MENU	Menu	Press this button to pop up the menu option.

4.5 Display interface introduction

The display screen of the monitor is a color LCD screen, which can display the patient parameters, waveform parameters and alarm information provided by the monitor, bed, monitor status, clock and other prompt information at the same time.

The home screen is divided into five regions

1. State information region
2. Waveform region
3. parameter region
4. Blood pressure review list
5. Bottom menu bar



Display main interface

4.5.1Information area introduction

The information area is at the top of the screen, showing the monitor and the patient's current state.The contents of the information area are as follows:

"bed number": the number of beds under the guardianship of a patient.

"gender": the sex of a patient under guardianship.

“Adult ": means the type of patient under guardianship.

“2018-05-04”： means the current date.

“17：44：04”： means the current time.

Other hints in the information area appear and disappear at the same time as the reported status.Divided according to content：

- Monitor prompts, reports the status of the monitor or sensor, fixed the area behind "adult";
- Monitor alarm information（See the "alarm" section for specific setting methods);

 It is a stop time sign for the police.This flag appears when you press the "PAUSE" key (less than 1 second).It indicates that all alarm sounds have been temporarily shut down.The system does not recover until the PAUSE button is pressed again, or the alarm pause is over.Alarm pause time can choose "1 minute", "2 minutes" and "3 minutes".

 It's a silent alarm sign.This flag appears when the "SILENCE" button is pressed for more

than 1 second, indicating that all alarm sounds have been manually turned off.The voice prompt is not restored until the operator presses the "SILENCE" button again to remove the mute state, or a new alarm event occurs in the system.

⚠**Warning：**

When the alarm volume is set to 0, the system will not be able to give alarm sound prompt, so the operator should use this function very carefully.

- When the screen waveform is frozen, the corresponding "freeze" window appears below the monitor screen.
- Patient parameter alarm information, fixed in the far right area.

4.5.2Description of Waveform / Menu Area:

The waveform area shows 4 waveforms , and the waveform display order can be adjusted .Under the maximum configuration, the system can display two ECG waveforms, SPO 2 volumetric waves and respiratory waveforms in the waveform area.

The name of the waveform is displayed on the upper left of each channel, and ECG leads can be selected as required.The gain of the channel and the filtering method of the cardiac wave are also shown on each channel.The left side of the ECG waveform has a 1 millivolt bar.When a menu pops up in a screen operation, the menu always occupies a fixed position in the middle of the waveform area, making a part of the waveform invisible for the time being.After exiting from the menu, restore the original screen display.

The waveform is refreshed at the set rate, and the adjustment of the refresh rate of each waveform is shown in the setting of each parameter.

4.5.3Introduction of parameter area:

The parameter area is located on the right side of the waveform area and is basically placed in accordance with the waveform.The parameters displayed in the parameter area are:

ECG

—Heart rate or pulse rate（Unit: beats / minutes）

—channe1

SPO2

— degree of blood oxygen saturation SPO2（Unit：%）

— pulse rate（Unit: beats / minutes）（Display when heart rate source selects simultaneous option）

NIBP

— Systolic blood pressure, diastolic blood pressure, mean pressure in order from left to right (in mmHg or KPA units of mmHg)

TEMP

—Temperature (degrees Celsius or Fahrenheit Fahrenheit)

RESP

—Respiratory rate (Unit : time / minute)

End-respiratory carbon dioxide CO2

-Carbon dioxide concentration（Unit：%、kPa、mmHg）

4.5.4 NIBP Measurement Review

The monitor can display the most recent 400 NIBP measurements in a NIBP measurement review.

In the "NIBP Measurement Review" list in the main Interface, 4 rows of NIBP measurements are displayed, and up to 10 NIBP measurements and measurement times are displayed in each page of the window.

Data are arranged in chronological order from near to far.Each page can display 10 measurements,and select the back and forth to view more late or earlier data.Up to 400 measurements can be displayed.When the number of measurements exceeds 400 times, the latest 400 times are displayed.Select record and output all measurements from the review on the recorder.

NIBP Measurement review

Data are arranged in chronological order from near to far.Each screen can display 10 measurements, and select back and forth to view later or earlier data.Up to 400 measurements can be displayed.When the number of measurements exceeds 400 times, the latest 400 times are displayed.

4.5.5Bottom menu bar

See chapter 6 for details.

4.5.6Alarm light and alarm status :

In normal condition, the alarm light is not on.

When alarm occurs, the alarm lamp flashes or lights, the color of the lamp represents a certain alarm level, please refer to the "alarm" section.

Please refer to each parameter in the relevant section for the specific content of alarm information and prompt information

4.6 Key function and basic operation

The operation on the monitor can be accomplished by means of keystrokes and encoders.

- **SILENCE**

Press this button to block all sounds (such as alarm, heartbeat, pulse, encoder).And in the information area there is a sign "  ”，Press this button again to restore all sounds and cancel the "  " symbol.

Warning：

- **If a new alarm occurs in the alarm pending / mute state, the alarm pending / mute will be automatically released. See the alarm section for details.**
- **Whether the alarm can recover depends on whether the cause of the alarm still exists.But pressing the mute button can permanently turn off the alarm sound of ECG lead shedding and SPO2 sensor shedding.**

- **Alarm pause**(PAUSE)

Press this button to suspend the alarm for 3 minutes (1 minute, 2 min, 3 min optional).

- FREEZE

Press this key to enter the frozen state (temporarily static, at this time you can observe better the screen), and then press this key, the system thawed, the screen back to the monitoring state.

- **Blood pressure(NIBP)**

Press this button and start inflating the cuff to measure blood pressure. During measurement, press this key to stop the measurement and vent air.

- PRINT

Press this key to start a real-time recording.

- MENU

Press this key to pop up the system menu, where users can set system information and perform reviews

- **Rotate control button instead of rotary encoder（abbreviate to encoder)**

The user can rotate the encoder, select the menu item, and modify the settings.The encoder can rotate clockwise or counterclockwise, or press.Users can use the encoder to complete all operations on the home screen, in the system menu, and in the parameters menu.

4.6.1The method of using encoder to operate the screen：

The rectangular logo on the screen that moves along with the encoder is called the cursor where the cursor can stay can be operated.

When the cursor is in the parameter area, the user can open the menu of the related parameters and set the relevant information of the parameters.

The procedure is as follows:

◆Moves the cursor to the item you want to operate on.

◆Press the encoder.

◆One of the following situations occurs in the system:

◆The menu or measurement window pops up in the screen, or the original menu is replaced by a new menu.

◆The cursor with a background color becomes a box with no background color.The contents of the representation box can vary with the rotation of the encoder.

◆Press the encoder to select a box with a background color to select this item and perform a function immediately.

4.7 External interface of monitor

In order to facilitate operation, different interfaces are located on different parts of the monitor.

On the left of the monitor is the jack of the sensor.

Electrocardiogram（ECG）： Cardiac conductance socket

Blood oxygen（SPO2）： Oxygen probe socket

Blood pressure （NIBP）： Sleeve pipe socket

Temperature（T1，T2）： Body temperature probe socket, two sockets optional

Carbon dioxide（CO2）： Carbon dioxide socket

		
PM15A/PM12A Side sensor interface	PRO-M12A/PM12B/PM12D/PM12E/PM80D Side sensor interface	PM12C Side sensor interface
		
PM10A Right side sensor interface	PM80C Side sensor interface	

The rear panel has the following Jack

		
PM15A/PM12A	PRO-M12A/PM12B/PM12D/	PM12C

	PM12E/PM80D	
		
PM10A	PM80C	

（1）Power supply: Access network power requirements:AC220V, 50Hz；

（2）VGA：External display (without lifting this function);

（3）NET：Network interface，Connect with the company's central monitoring system via a network line with a standard RJ45 plug;

（4）Equipotential grounding terminal;

（5）Fuse, standard T 1.5A.

Warning:

- **If the fuse breaks, replace the fuse with the same nominal value.**
- **When replacing, just pull out the cover and take out the damaged fuse.Install a nominal fuse and then gently push the cover in place.**

Identification notes on each panel

Symbol	Symbol statement
	CF anti-defibrillation mark Indicates that the F application has special protection against electric shock to a greater extent than BF (especially with allowable leakage current) and is protected against defibrillation effects.
	BF anti-defibrillation mark Indicates that the F application has special protection against electric shock to a greater extent than type B (especially with allowable leakage current) and is protected against defibrillation effects.

	Warning! Please check the file of the Detector (this instruction manual) !
	Nonionizing radiation
	Dangerous voltage
	Equipotential grounding end
	Alternating Current(AC)
	Individual handling mark for abandoned electrical and electronic equipment
	Network port
ECG	Electrocardiogram
RESP	Respiration
SPO2	Pulse Oxygen Saturation
TEMP	Temperature
NIBP	Non-invasive Blood Pressure
CO_2	End tidal carbon dioxide

4.8Built-in rechargeable battery

The multi-parameter monitor is equipped with a built-in rechargeable battery.When connected to AC power, the battery is automatically charged until it is full.When the power supply of the equipment network is disconnected, the monitor will switch seamlessly to the battery power supply to keep the equipment running normally.When fully charged, the monitor can be maintained for about 240 minutes, depending on the size of the model and the temperature of the working environment.

When working with a battery , the monitor will alarm when the amount of electricity is insufficient .When the battery runs out, the monitor triggers an advanced alarm and sends out a continuous beep ,and indicate "too low battery voltage" in the message area.Ac power should be plugged into the battery to charge the battery, about 2-3 hours of charge can reach about 90% of the battery capacity.If the battery is still being used , the battery consumption indicator may indicate a change in battery capacity.The monitor will be cut off automatically before it runs out of

power(About 5 minutes after the warning of running out of power).

Warning：

- **Waste batteries should be treated in accordance with the relevant laws of the local government, or handed over to the environmental protection department for recycling.**
- **Battery charging state will not cause the performance of this equipment degradation.**
- **If you don't use this device for a long time, remove the battery.**

Chapter 5 Installation of monitor

5.1Get out of the box and check

Carefully remove the monitor and accessories from the packing box and store the packaging materials for later shipment or storage.Please count the accessories according to the packing list.

- Check for any mechanical damage.
- Check all exposed conductors and insert partial attachments

At least 2 inches(5 cm) of space should be set aside around the monitor to ensure air circulation.Monitor the environment to avoid vibration, dust, corrosive or explosive gas, extreme temperature and humidity, etc.

If you have any questions, please contact our sales department or agent immediately.

5.2Electrical connection

Connect AC power cord steps:

- Make sure AC power meets the following specifications: AC220V, 50Hz;
- Use the power cord attached to the monitor.Plug the power cord into the monitor's power interface, and put the other end of the cable into a three-core power outlet in the ground.

⚠**Warning：**

Connect the power cord to the hospital socket.

If necessary, connect the equipotential ground wire. See the section on equipotential grounding in the patient safety chapter

⚠**Warning：**

In case of battery configuration, the battery must be recharged after the instrument is transported or stored.Therefore, if the AC power supply is not connected, it may not work properly because the battery power is insufficient.The battery can be recharged whether or not the monitor is turned on.

5.3Power on

About 1 minute after the power switch is turned on, the system enters the main monitor screen successfully and the user can operate.

Do not use this monitor if you find signs of damage to the function of the monitor or an error prompt.Please contact the biomedical engineer in the hospital or the maintenance engineer in our company.

Warning：

- **If a fatal error is found during self-testing, the system will alert.**
- **Check all available monitoring functions to ensure that the monitor functions properly.**
- **If a battery is configured, the battery must be recharged after each use to ensure that there is sufficient power reserve.**
- **Shut down the machine for one minute before it can be turned on again.**

5.4Sensor connection

Connect the required sensors to the monitor and the patient's monitoring area.

Warning：

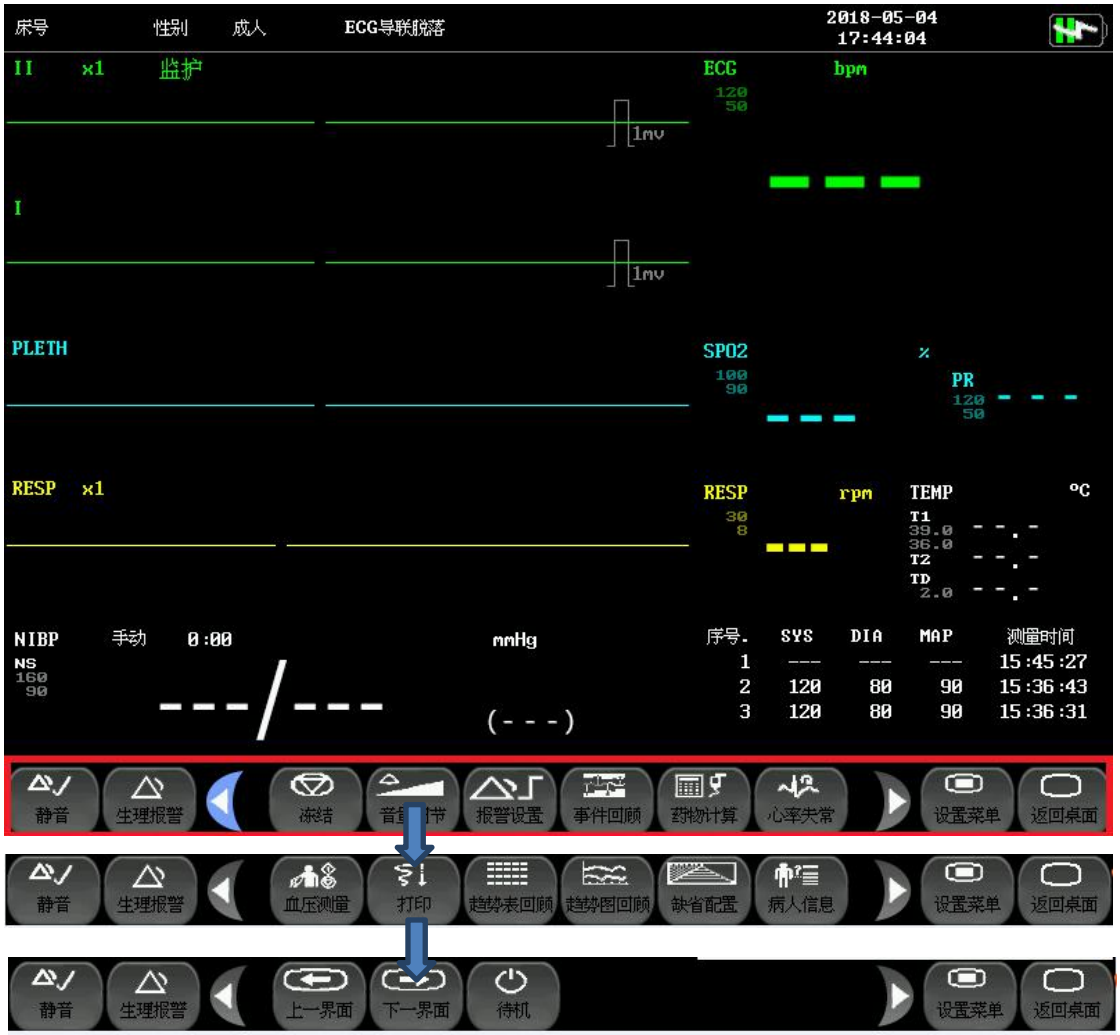
For correct connection methods and requirements of various sensors, please refer to the relevant sections

5.5Inspection of recorders

If the monitor is equipped with a tape recorder, check that the recorder on the right side of the monitor has a paper outlet.

Chapter 6 Menu

The configuration of this monitor is flexible.Monitoring of the content, waveform scan speed and so on can be configured by the user according to needs.Press the menu button on the front panel to pop up the menu below and do the following:



Menu Bar

6.1Mute

The same as Mute function key

The encoder selects "mute", press the encoder to confirm that it is in mute state,  Will appear above the interface,Indicating that all voices have been artificially shut down.

6.2Physiological alarm

With the alarm pause function key.

Encoder select "physiological alarm", press the encoder to make sure to enter alarm pause state,  will appear above the interface,Indicating that all alarm sounds have been temporarily shut down.And pause the 120s countdown with the alarm (default countdown of 2 minutes, choose "1 minute", "2 minutes", "3 minutes"),Until the "physiological alarm" button is selected again, or the alarm pause time is over, the alarm pause state is lifted.

6.3Freeze

Same as Freeze function key.

- Freeze
- In the non-frozen state, press the "free" button on the monitor control panel, the system will enter the frozen state, freezing state, all waveforms are frozen, that is, stop the waveform refresh.
- Thaw

In a frozen state, any of the following operating systems exits the frozen state:

Select the "Freeze" button in the bottom menu bar;

Press the "Freeze" button on the control panel again.

Any action that can cause screen adjustments or require a new menu to pop up.

After the system exits the freezing state, freezes, clears the screen waveform, and redisplays the real-time waveform.Scan from the left side of the waveform area in scan mode, and start displaying and scrolling on the right side of the waveform area in scroll mode.

6.4Volume Regulate

- The setting range of the alarm volume of the monitor is between 0 and 4 , 0 is mute and 4 is the maximum alarm tone.
- The keyboard volume of the monitor is set to turn on High, Medium and Low.
- The pulse volume of the monitor is set to range from 0 to 3. 0 is mute and 3 is the maximum pulse tone.
- The monitor's heartbeat volume is set to range from 0 to 4. 0 is mute and 4 is the maximum heartbeat.

6.5Alarm setting

Select alarm Settings in the bottom menu bar, and the following alarm settings page pops up:

Alarm setting

- Alarm setting step
- Enter the alarm setup interface
- Select the alarm options to set
- Press the encoder to enter the alarm item settings
- Rotary Encoderto setup Values
- Press the encoder to determine the settings
- Select  to exit alarm settings

These settings will remain in effect unless modified again or with default settings.

6.6Event review

This monitor can display the last 60 alarm events in the alarm event review.

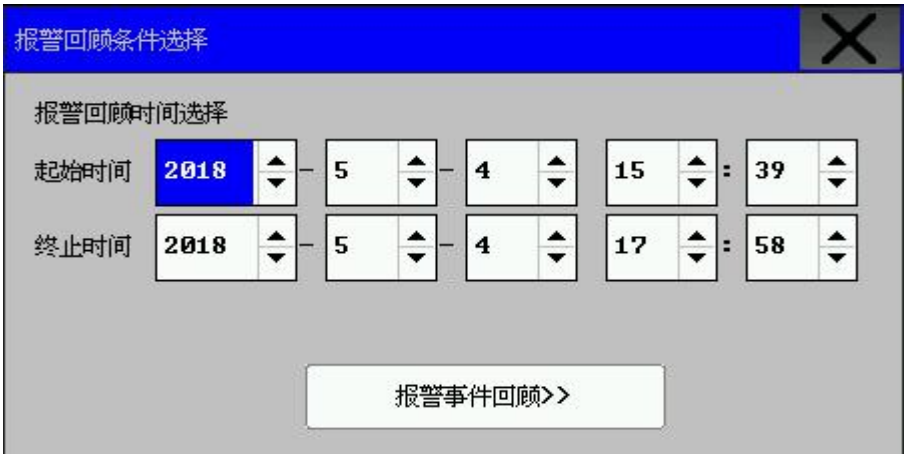
In the bottom menu bar, select event Review and enter the alarm Review condition selection interface, which displays slightly different resolutions depending on the monitor's resolution, but contains exactly the same information:

In this menu, the user can set an alert review condition that contains the following items:

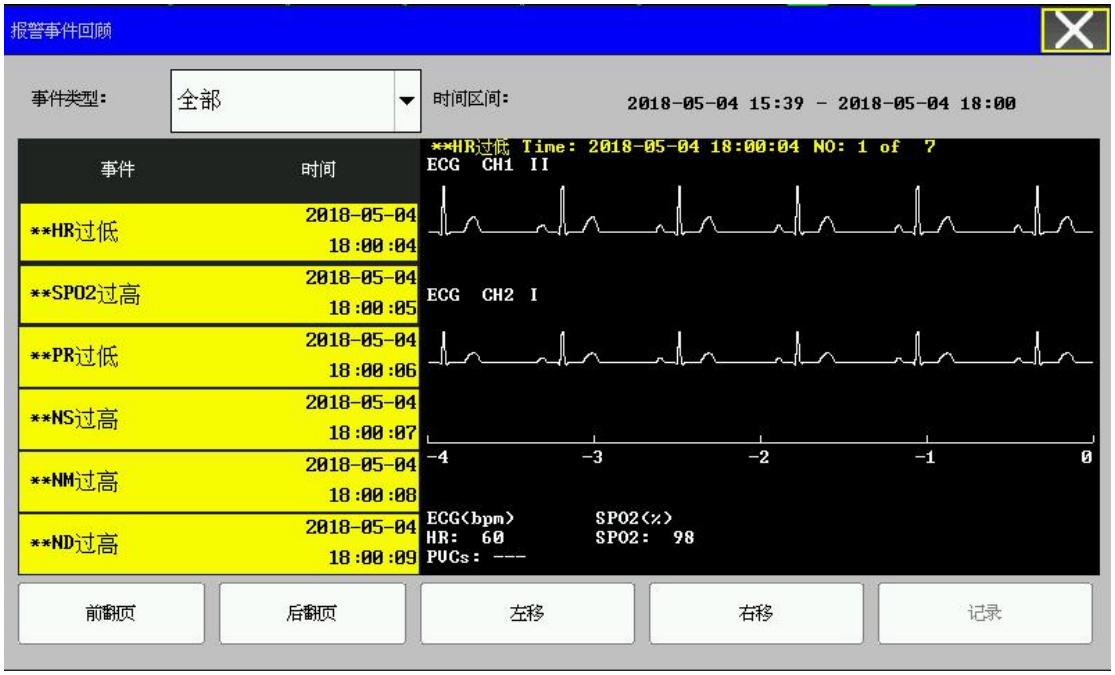
1) Start and end time of alarm Review

Users can set the start time for a review in the start time entry and the end time for a review in

the end time entry. You can set the termination time to either the current time or the user-defined time.



When the alarm review time is set, press the alarm event Review button to enter the alarm event Review page, which displays slightly different resolutions depending on the monitor, but contains exactly the same information:



The following information appears in the alarm event Review menu:

- Event type ;

In the event type selection lower box, the user can select the parameters to view.Optional is "All" (alarm event for all parameters),ECG 、 SPO2 、 NIBP 、 RESP 、 TEMP 、 CO2 、 HR_H>180(This value is higher than the alarm limit)、HR_L<60(This value is below the lower alarm limit)、 SPO2<90%、IBP_H>200mmHg、IBP_L<40mmHg、RR_H>40、RR_L<10、TEMP_H>40℃、TEMP_L<34℃。

- Time interval: start and end times displayed as set
- Event time: information about alarm item time and time of occurrence.

Events are arranged in chronological order from near to far.Select the back-to-back button and turn the rotate button to see later or earlier events.

- Front page:Page forward operation
- Backward page：Back page operation
- left shift：To move the appearance to the left
- Right shift：To move the appearance to the right

6.7Drug Calculation

Not applicable.

6.8Heart rate disorder

6.9Blood pressure measurement

Same blood pressure measurement function key.

Start (or stop) the air pump and start (or end) non-invasive blood pressure measurements.

6.10Print

Same as print function key.

6.11Trend table review

- The trend chart shows 1 minute, 5 minutes, 10 minutes, 30 minutes, 60 minutes, according to the following resolution.
- Select trend Table Review in the bottom menu bar and pop up the following trend Table:

Trend table menu

The time for each group of trend data is shown in the leftmost column, with dates in parentheses.The events listed below are the events that have been marked and correspond to the time of the marked events.The events listed below are the events that have been marked and correspond to the time of the marked events.

HR 、 ST、 SPO2 、 PR 、NIBP(S/M/D) 、RR

The display of NIBP trend data has its particularity. In addition to the measurement value, the time when the NIBP measurement was performed is also shown under the "measurement point".If there are multiple measurements within the same time period, only one set of measurements can be displayed,At the same time, a "*" is displayed at "ore" (more),Indicates that there are two or more measurements.

Select a trend table with different resolutions: Use the cursor to select the resolution, use the rotation button to change its options, and change the trend data interval.

Observed trend data of different parameters

Select left and right to select one of the six sets of parameters.On the right side of the right-most parameter is marked ">" to indicate that the page can be turned to the right,On the left side of the leftmost parameter is marked "<" to indicate that the page can be turned to the left.

Operation example

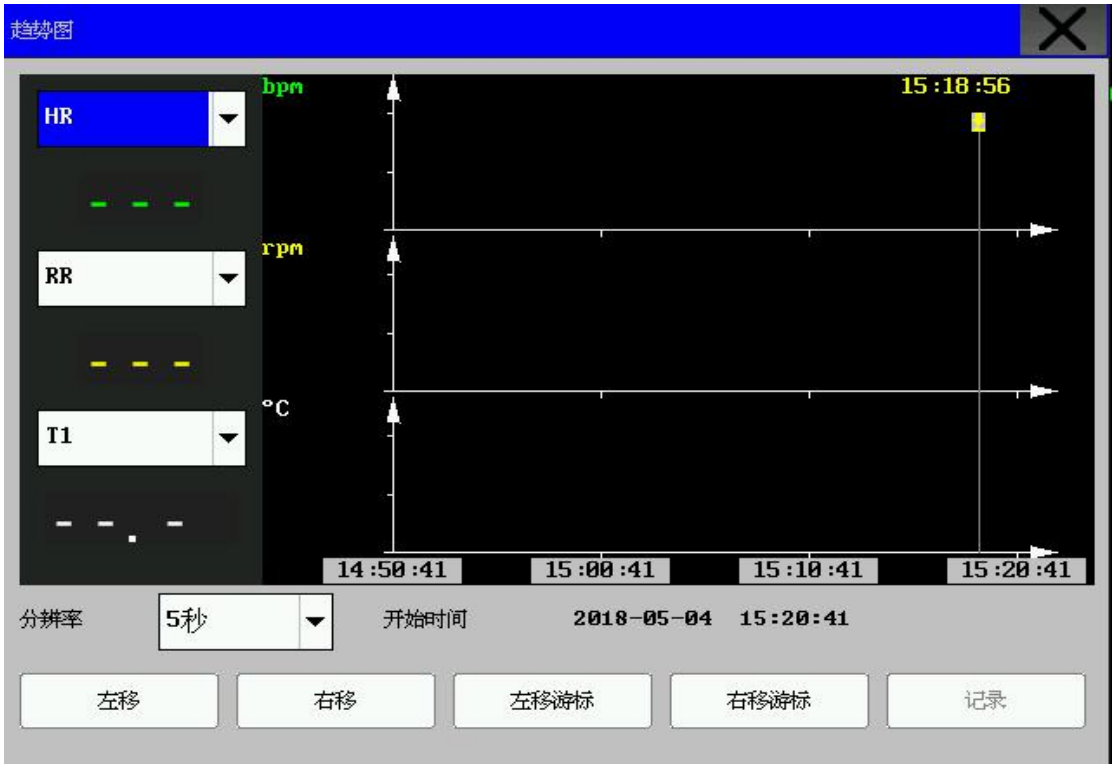
- Observe NIBP trend table:
- Press the menu button on the control panel and pop up the system menu;
- Select the trend Table Review item in the menu;
- Select parameters: select "left and right" and turn the encoder until NIBP data appears in the

window;

- Select the resolution: select the first item on the left and select the desired data interval;
- Select turn back and forth, turn the encoder, and observe the NIBP trend data at different times;
- Press exit to observe the exit trend table.

6.12Trend chart review

The most recent 1 hour trend chart can be displayed at a resolution of one second, one every five seconds and one minute;Select the trend Chart Review item in the bottom menu bar and the following window pops up:



Trend chart menu

The Vertical Coordinates represent the measured values, and the Transverse Coordinates represent the measuring time,On the map "🡻" is the trend map cursor,， The measured values of the position indicated are shown below the trend chart and the corresponding time is displayed above the trend chart.With the exception of NlBP, other trends are shown as continuous curves.On the NIBP trend chart, "NS" stands for systolic pressure, "ND" for diastolic blood pressure and "NM" for mean pressure.

- **The trend chart for the selection of different parameters shows:**
- Select the "parameter selection" option with the cursor, modify its display, press the rotate button when the desired parameter appears, and the trend chart of the parameter appears in the window.
- **Get trend data at a time on the current trend map**

Select "left move cursor" / "right shift cursor", and turn the encoder.The cursor will move with it.The time refers to will change, and the parameter value of this moment will be displayed under the horizontal coordinate.

➢ **Operation example**

Observe the NIBP trend chart for the last 1 hour:

◆ Select "trend Chart Review" in the bottom menu bar;

◆ Select parameters: in the Parameter selection item, turn the encoder until "NIBP" appears in the box.

◆ In the Resolution item, select 1 second or 5 seconds;

◆ Select " left and right shift " , rotate the encoder , observe the change of trend chart time , and change the trend curve ;

◆ To know the measured value at a certain time, select the move cursor, move the cursor there, the time is displayed at the top, and the measurement value is shown below the curve;

◆ Press exit button to observe the exit trend chart.

6.13Default configuration

See Chapter 7. 7. 1 default settings.

6.14Patient information

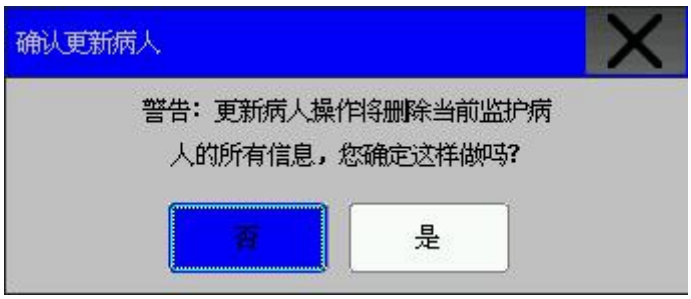
⚠**Warning：Clear current patient data see the section of this chapter, "clear patient record data."**

Select "patient information" in the bottom menu bar and enter the patient information management interface.

Patient information management

- Bed number 1-100 beds optional
- Gender Patient sex (male, female)
- Type of patient Patient type (adult, child, newborn)
- Pacemaker To mark a pacing signal.
- Renewal of patients Purge current monitoring patient information

In this menu, users can also select Update patient to enter the confirm Update patient dialog box to determine whether to clear the data.



Confirm the update of patient data

◆ Select Yes, delete all information about the currently monitored patient, and exit the menu.

Choose "No", Continue to save patient information, and withdraw from the menu.

⚠**Warning：If yes is selected, all information about the currently monitored patient is deleted.**

6.15Previous interface

Interface can be switched. Go to the next interface.

6.16Next interface

Interface can be switched. Enter the previous interface.

6.17Standby

Monitor can be set to standby.At this point, the monitoring of all parameters is suspended until the system exits the standby state,**Press any key or rotary encoder to exit standby mode,**Resumption of its monitoring.

In the bottom bar menu, the user can set the current monitor status to standby, select "standby", and pop up the dialog box shown in the following figure:

Enter standby mode

◆ Select Yes and enter standby status.

◆ Choose No, abandon the current operation, and the system remains the same as the original configuration.

6.18Setup menu

Press the menu button on the front panel, pop up the menu shown below, and do the following:

- Monitor setting
- Monitor maintenance
- Monitor information
- Default configuration
- Drug calculation
- Demonstration function

Setup menu

6.18.1Monitor setting

Select the Monitor Settings option in the system menu, and the following menu appears:

Monitor setting

In the Monitor Settings menu, users can set up the following items:

- **Working interface selection**

The monitor has four working interfaces.They are standard interfaces, trend coexistence interfaces, oxyCRG interfaces, and large font interfaces.According to different needs, users can choose different working interfaces and get different screen information.

- **Alarm recording time**

Select “alarm recording time” on the “monitor setup menu” and turn the encoder to record the output time when setting alarm. The options are 8 seconds, 16 seconds and 32 seconds.

- **Alarm pause time**

On the monitor setup menu, select alarm pause time and turn the encoder to set the short stop time of the alarm.No alarm will be processed during this period.Select alarm to suspend for 1 minute, 2 minutes, 3 minutes.

- **Parameter alarm form**

Select "parameter alarm form" in "Monitor setup" menu, turn encoder to set alarm bolt lock, not bolt lock.

- **Alarm volume**

Select Alarm Volume from the Monitor Settings menu , and turn the encoder to set the size of the alarm volume .There are four levels of optional ' 0 ' , ' 1 ' , ' 2 ' , ' 3 ' , and ' 4 ' .The "0" is turned off for all volume. The higher the number, the higher the volume.

⚠ Warning：

■ When the alarm volume of the system is turned off (selected "0"), the monitor cannot give an alarm if an alarm occurs. Therefore, the operator should use this function carefully.

■ If in mute or alarm pause state, select alarm volume to turn off, then the system will automatically end mute state or alarm pause state.

⚠ **Warning： The "1 to 4" status in "alarm volume" is still valid for the next boot.Operators should carefully check the function before use to avoid delays in patients' treatment due to low alarm sounds.Select the volume in "0" state, and the next time you turn it on, automatically return to "2".**

➢ **Keyboard volume**

From the Monitor Settings menu, select Keyboard Volume to turn the encoder to set the alarm volume.The options are low, medium and high.

➢ **System time setting**

In Monitor Settings, select the system time Settings item and pop up the menu as shown in the figure:

⚠ **Warning：System time settings should be selected at boot time (if the user needs to set up), Otherwise, incorrect time information may be provided when reviewing content with time hints, etc.**

➢ **Record output setting**

If the monitor installed has a recorder function, check that the recorder outlet on the right side of the monitor has paper.

➢ **Event setting**

(This guardianship does not provide this function)

6.18.2Monitor maintenance

In the system menu, select the monitor maintenance item and pop up the enter maintenance password dialog box.Users can enter the user password in the user maintenance menu for user maintenance Users can not perform factory maintenance functions, this is only open to the company's designated maintenance staff.

- Input maintenance password

In the enter maintenance password menu, enter the correct user password (105),and press the "OK" button, pop-up "user maintenance" menu, you can set the picture information.

User maintenance

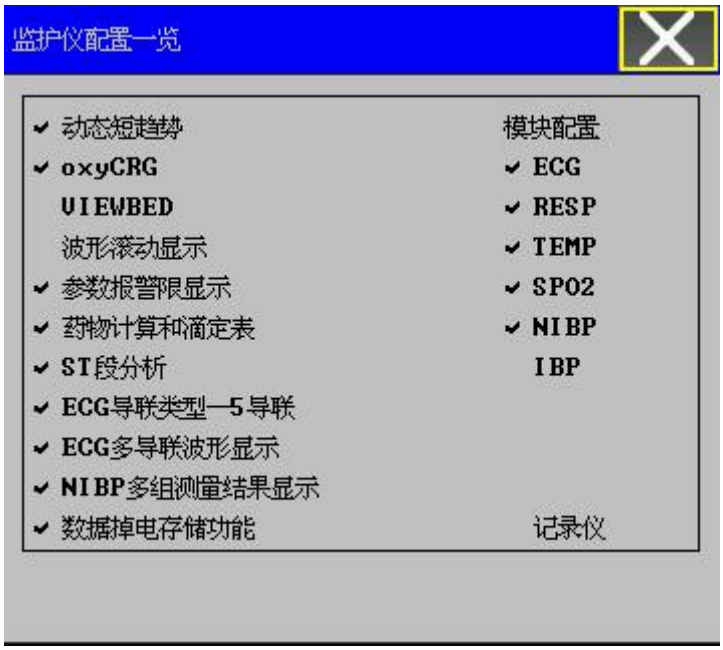
- Language selection:The user can set the text displayed on the screen as “CHINESE”、“ENGLISH”.Specific options are determined by the user's configuration.
- Lead naming style：Choose“AHA”or“EURO”，The differences between the two styles are described in the Relevant content of “ECG / respiratory monitoring”.
- Color customization： Used to define the display colors of waveforms and parameters on the screen, as shown in the figure.

Color customization

6.18.3Monitor information

In the system menu, you can select Monitor Information to view monitor information.

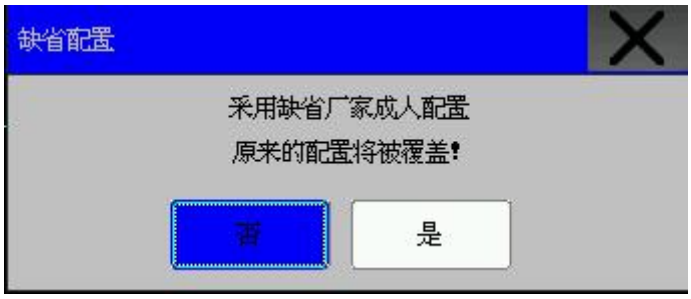
Select Monitor configuration to view the configuration of this machine, as shown in the figure.



Monitor configuration

6.18.4Default configuration

In the menu, the user can set the current system configuration to the user default configuration,At this point, the system automatically saves the settings of the current parameter menu, such as ECG lead, gain and filter, as the default configuration of the corresponding type of user based on the patient type, and pops up the dialog box shown in the following figure:



Default configuration menu

◆ Select Yes to save all configurations for the current patient type as user default.

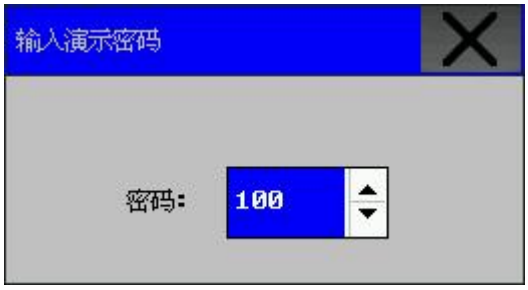
◆ Choose No, discard the current operation, and the system remains the same as the original configuration.

Warning：Exit after either item is selected from the default configuration menu, and the confirm default configuration dialog box pops up，The user can choose Yes to determine the choice, or No to give up the option.

Warning：At this point, all configurations in the system will be replaced by default configuration.

6.18.5Demonstration function

On the system menu, select the “demo features” and pop up the enter demo password dialog box.After entering the correct password（101）. The system enters the demonstration waveform state.The presentation waveform is the simulation presentation waveform set by the manufacturer to show the performance of the machine and assist the user in training.In actual clinical use, the function of demonstrating waveform may be disabled because it may make the medical staff think it is the waveform and parameters of monitored patient, which will affect patient monitoring and delay the diagnosis and treatment of the disease.Therefore, this menu has a password, as shown in the figure.



Demonstration function

6.19Return to the desktop

No support for the time being.

Chapter 7 Patient safety

The system has floating input anti-defibrillation and surgical knife protection. If the correct electrode (see ECG and respiratory section) and according to manufacturer's guidance, the screen display can be restored within 10 seconds after defibrillation.

⚠**Warning：During defibrillation, do not touch patients, beds or instruments.**

- **Environment：**

Follow the following instructions to ensure the absolute safety of electrical installations.The monitoring system should be properly protected from vibration, dust, corrosive or explosive gases, extreme temperatures, humidity, etc.When installed in the cabinet, there should be enough space in front to facilitate operation.In the case of cabinet doors open, there should be enough space in the back to facilitate maintenance. The circulation of air in the cabinet should be guaranteed.

The monitoring system can meet the technical requirements when the ambient temperature is below 5 ℃ and 40 ℃.Ambient temperatures beyond this range may affect the accuracy of the instrument and cause damage to components and circuits.At least 2 inches (5 cm) of space should be set aside around the instrument to ensure air circulation.

7.1Power requirement

Please refer to the section on product specifications.

7.2Grounding of Monitor

In order to protect patients and medical personnel, the casing of the monitor must be grounded.So the monitor is equipped with a detachable three-wire cable.When inserted into a matching three-wire socket, the instrument is grounded through the ground wire in the power line. If there is no three-wire socket, consult the hospital's electrical administrator.

⚠ **Warning： Do not connect the three-wire cable of this instrument to the 2-wire plug.**

Connect the ground wire to the equipotential grounding terminal of the instrument.If it is not clear from that instrument specification a particular instrument combination is dangerous.For example, as a result of the accumulation of leakage current,the user shall consult the relevant manufacturer or other expert in this regard.To ensure that the necessary safety of all of these instruments is not damaged by the recommended combination.

7.3Equipotential grounding

The primary protection of the instrument has been grounded by the power plug method included in the protective earthing system of the house.For the internal examination of the heart or brain, the monitoring system must be separately connected to the equipotential grounding system.One end of the equal-potential grounding wire (potential-balanced wire) is connected to the equipotential grounding terminal on the back panel of the instrument,and the other end is connected to a joint of the equipotential system.If the protective grounding system is damaged, the equipotential grounding system can take on the safety function of the grounding wire protection.Heart (or brain) examination should be performed only in a medical home equipped with a protective grounding system.Check that the instrument is in good working condition before each use.Cables connecting patients and instruments must be free from electrolyte contamination.

⚠ Warning： If the protective grounding system is unstable, the monitor should use an internal power supply.

7.4Condensation

To ensure that the instrument is not condensed during work.Condensation can occur when the instrument moves from room to room.This is because the instrument is exposed to moist air and different temperatures.

⚠ **Warning： If used in places where flammable anesthetics are available, there is a risk of explosion.**

7.5Interpretation of symbols used on monitors

 Be careful, see accessory information.

 It shows that the application part is CF type, F type isolation (floating) application part, and has defibrillation function.

 It shows that the application part belongs to BF type, has F type isolation (floating) application part, and has defibrillation function.

 It shows that the application part belongs to BF type and has F type isolation (floating)

 Turn on the machine and turn off the machine。

 Equipotential grounding end.

Chapter 8 Alarm

➢ This chapter introduces the general information about the alarm and the measures to be taken when the alarm occurs.

➢ You can get alarm and prompt information about each parameter in the section about the setting of each parameter.

8.1Summary

The alarm refers to the indication made by the monitor to the user when the patient being monitored has a change of vital signs sufficient to arouse the attention of the user or when the monitoring of the patient cannot proceed smoothly due to the malfunction of the machine itself.

8.2Alarm attribute

8.2.1Alarm type

The alarm is divided into two categories:If the alarm originates from the change of the patient's vital signs, that is, the physiological parameters of the monitored patient exceed a specific range or the patient has physiological abnormalities which cannot be measured by a single physiological parameter, it is called physiological alarm； If the alarm originates from the machine itself, that is, the alarm that can not be accurately carried out when the patient is monitored because of the technical obstacle in the use of the monitor or the failure of the machine itself, it is called the technical alarm.

Examples of physiological and technical alarms

Patient or machine condition	**Type of alarm generated**
The heart rate of the patient was 94 BPM, which exceeded the alarm range set by the user.。	Physiological alarm
Ventricular fibrillation was found in the patient	Physiological alarm
ECG measurement module finds ECG lead shedding	Technical alarm
Failure of SPO2 Measurement Module	Technical alarm

8. 2. 1. 1Physiological alarm classification

Physiological alarm can be divided into two situations.First,the physiological parameters of the monitored patients exceed a specific range. The other one is physiological abnormalities that

can not be measured by a single physiological parameter.

The latter can temporarily block the former alarm, specifically the following:

ECG signal is too weak;

No pulse was found.

RESP Interference;

RESP Respiratory asphyxia；

Others belongs to the former.

8.2.1.2Alarm level

Every kind of alarm, whether it is a technical alarm or a physiological alarm, has a level characteristic, the higher the level, when the alarm occurs, the system will alert the alarm in a more vigilant way.All technical alert level users cannot change.Some physiological alarm levels can be set by the user, while others are specified by the system and not allowed to change

8.2.1.3Removable acousto-optic

Removable acousto-optic, refers to some technical alarm.If a pause is made, either during the pause or return to the normal alarm state, it is changed to the prompt mode for the prompt message, as follows:

1. The ability to drive acousto-optic alarm is cleared, that is, no acousto-optic alarm is carried out.
2. The ability to drive text is removed, that is, the color of the background will be the same as the background of the title.
3. After returning to normal alarm state, alert the alarm according to normal alarm when it is triggered again.

This kind of technical alarm is mainly caused by errors and normal use of recorders except the lead shedding and the alarm limit of NIBP parameters.

8.2.1.4Completely cleared

Can be completely cleared: refers to the "mute" key when the pause state.The alarm will be cleared, that is, no more alarm warning.This alarm is not performed in a pause state； After the pause is over, the alarm will not be alerted unless it is re-triggered.The main technical alarm module communication errors and module initialization errors.

8.3Alarm prompt form

When alarm occurs, acousto-optic and text prompts will be carried out.

8.3.1Acoustooptic characteristics

Different levels of alarm sound and lighting characteristics

Alarm level	Alarm sound characteristic	Alarm lighting characteristics
High	The mode is "Du-du-du -----du-du, Do-du-du -----du-du", which sounds every 9 seconds (the interval count is from the beginning of this sound to the beginning of the next sound)	The alarm lamp flashes in red and flashes quickly
Medium	The mode is "du-du-du", sounding every 25 seconds (the interval count is from the beginning of this sound to the beginning of the next sound)	The alarm light flashes in yellow and flashes slowly
Low	The mode is "du", sounding every 25 seconds (the interval count is from the beginning of this sound to the beginning of the next sound)	The alarm light is bright yellow

8.3.2Character characteristics

Background: High alarm background is red, intermediate alarm and low alarm background is yellow.

String color: except NIBP technology alarm warning area, regardless of alarm level, has always been black.The string color displayed by the NIBP alarm prompt is related to the alarm levelHigh-level alarm display red, intermediate and low-level alarm display yellow.When the measured parameters exceed the set alarm limit to induce physiological alarm, the trigger alarm parameters flicker.The "***" symbol in the monitor information area on the upper right side of the screen indicates an advanced alarm level.The symbol "**" indicates the occurrence of an intermediate alarm level.The "*" symbol indicates a low-level alert level

8.3.3Else

When different levels of alarm are generated at the same time, sound and light prompt will be prompted according to the highest level in the current alarm.

8.4Alarm state

8.4.1Summary

For each alarm, there are two states: trigger state and clear state. Each moment can only be in one state.

At the start of the operation, all possible alarms are cleared and triggered in the following time: when the alarm exists.

Clear status: A state in which the alarm does not exist.

When the alarm condition is satisfied, the alarm enters the trigger state, and any inherent delay time for determining the alarm state is within 10s.

For the whole alarm system, (For all alarms), there are the following states:

- Normal state: A state in which an alarm is capable of all prompts (including sound, light, and text) in the triggered state.
- Alarm pause: A state in which the alarm is triggered but no acousto-optic text prompts are made for the time being.
- Alarm mute: The state in which the alarm is triggered, illuminated, written but not sound prompted.
- Alarm sound off: A state in which the alarm volume is 0.
- At each moment, the entire alarm system can only be in one state.

8.4.2Alarm silent state

Alarm mute means that any sound prompt (including alarm, keystroke, heartbeat, pulse, etc.) of the monitor is turned off.

If you press the "Silence" button on the control panel, you can turn off all sounds.When the "Silence" button is pressed again, it exits the mute state and switches to the "alarm pause" state,and suspend the alarm for a while at the default pause time;When pressed the third time, it exits the alarm pause state and reactivates the corresponding alarm sound to return to normal alarm state.When the system is in "Silence" state, any newly triggered alarm can be released from the "mute" state, making the system return to the normal acousto-optic alarm state.

8.4.3Alarm sound off state

Alarm silence means that the sound will not be turned off but the alarm sound is turned off.

8.4.4Alarm pause state

Click the "Pause" button on the control panel,you can turn off all alarm sounds and lights and physiological alarm description information， and Put the system into "alarm pause" state.Alarm

pause time countdown is displayed in the physiological alarm area,and in this prompt area, there is a sign "  " display.

There are three options available for alarm pause times for 1 minute , 2 minutes , and 3 minutes , respectively .The user must go to the “Monitor Settings menu” in the Settings menu and select in alarm pause time.

When you press the button "Pause" again, the system can return to normal.In addition, the newly triggered technical alarm can also be released from the "pause" state.Returns the system to its normal state, and the symbol “  ” disappears.

- When the alarm is suspended, do the following:

✧ Prohibit all alarm sound and light warning.

✧ Prohibit all physiological alarm text prompts.

✧ For clear acousto-optic alarm, change the alarm prompt to prompt information

✧ For the alarm that can be completely cleared, clear the alarm prompt.

8.4.5Status Switching

■ Press the "SILENCE" button to enter the alarm mute state, and press the "SILENCE" button again to return to normal state.

■ Pause time, if there is a new technology alarm, will end alarm pause state, into normal state.

■ Pause time, if there is a new physiological alarm, the system is still in alarm pause state.

In any state:

➢ In the monitor setting, set the alarm sound switch to turn off, enter the alarm sound off state.

➢ In the monitor setting, set the alarm sound switch to open, into the normal state.

8.5Alarm mode

8.5.1Summary

There are two kinds of alarm modes: bolt-lock mode and Non-bolt lock mode.

Bolt-lock mode： When the alarm condition does not exist, the characteristic that the system still carries out the alarm is called bolt lock mode.Only after the alarm system has been reset can

no longer be prompted that the alarm does not exist.

Non-bolt lock mode：When the alarm condition does not exist,the alarm stop which is called bolt lock mode.

8.5.2scope of application

All physiological alarms can work in locking mode.

All technical alarms can only work in non-locking mode.

8.5.3Warning after locking

When an alarm is locked (This alarm has occurred but the alarm is not triggered by the alarm), the following changes will occur in the warning mode associated with the alarm：

1. The measurement parameters and the related alarm limits are no longer flickering.
2. The last system time to enter the trigger state after the alarm description prompt entry.

8.5.4Removal of locking mode

Lock clearance is also called alarm reset. Users can use alarm pause function to reset the alarm.When the lock alarm is cleared, the alarm that has occurred before but which is still alerting under the condition that the alarm condition no longer exists will be cleared.

When working in non-lock alarm mode, the alarm pause key on the keyboard module has only the function of pause alarm and no reset function.

8.6Alarm setting

You can set each alarm parameter value in the alarm Settings menu.

In the alarm Settings menu, you can see the alarm settings for each parameter module.

Alarm setting

8.6.1Sound switch setting

See the monitor settings in the setup menu for a description of the alarm sound switch.

8.6.2Automatic alarm shutdown

Alarm shutdown refers to the failure of the whole alarm function.Even if the alarm condition is satisfied, the system does not do any alarm warning, alarm printing, nor alarm storage.When a new measurement module is added or the measurement module is just starting to work, all alerts associated with the module are automatically turned off within 30 seconds after the module starts working.Other alerts are not affected.

8.7Parameter alarm

⚠ Warning：Do not set alarm limits beyond the limit, which can cause alarm system failure.

In each parameter menu, the alarm parameters can be set independently, and the user can set the alarm limit and alarm state.

When a parameter alarm is turned off, display a "  " prompt next to the parameter display area.For setting the alarm parameters, when a certain or a few parameters exceed the alarm limit, the monitor automatically alerts the following processes:

1) A prompt appears on the screen, as described in the alarm mode;

2) If the alarm volume is set , the alarm sound is generated according to the set alarm level and the alarm volume;

3) Alarm lights flashing (If the machine has alarm lights).

8.8Measures to be taken when alarm occurs

⚠ **Warning： When a particular alarm occurs, the patient's condition should be checked first.**

The alarm information is displayed in the system information area or the system alarm information area. It is necessary to identify the alarm and take appropriate measures according to the cause of the alarm.

1) Check the patient's condition.
2) Identify which parameter is alarming or which alarm is occurring.
3) Identify the cause of the alarm.
4) If necessary, Alarm mute.
5) When the alarm status is lifted, check to see if the alarm is eliminated.

Alarm information and prompt information about parameters can be found in each parameter monitoring section.

Sound pressure range of auditory alarm signal: 40dB-85dB (A).

After the interruption of power supply, as long as the power supply is restored, the alarm setting remains unchanged.

Alarm settings need to enter the password to enter the modified interface.

Alarm can be turned off by a single item, into inactive state.

Alarm signal inactive termination: enter alarm setup interface, cancel closure.

Chapter 9 ECG/RESP

9.1Electrocardio monitoring

9.1.1Definition of ECG monitoring

ECG monitoring generates continuous waveforms of patient's ECG activity to accurately assess the patient's physiological state at the time.Therefore, the normal connection of ECG cable should be ensured so that the correct measurement value can be obtained.The monitor displays two cardiac waves at the same time in normal working condition.

■ Monitoring parameters included heart rate (HR) ,St segment measurements and arrhythmia (selection).

■ All the above parameters can be used as alarm parameters.

9.1.2Considerations for ECG monitoring

⚠ Warning:

- **Do not touch patients, tables or instruments during defibrillation.**
- **The ECG cable provided by our company must be used for ECG signal monitoring using the monitor.**
- **When connecting electrodes or patient cables, make sure you are absolutely free of any other conductive parts or contact with the ground.In particular, be sure that all ECG electrodes, including neutral electrodes, are attached to the patient to prevent them from contacting the conductive parts or the ground.**
- **Use of non-resistive ECG cable, not used in the monitor for defibrillation;In other monitors, the monitor cannot be used for defibrillation if it does not have a defibrillation current limiting resistor on its own.**
- **Interference from ungrounded instruments near the patient and ESU interference may cause waveform problems.**
- **It is recommended that electrocardiographic / respiratory equipment not be used near electrocardiogram / respiratory measurements.**

9.2ECG monitoring operation method

9.2.1Prepare

1) Prepare the patient's skin before placing the electrode.

● The skin is a bad conductor, so to get good contact between the electrodes and the skin, the patient's skin is prepared to be important.

● When necessary, shave off body hair at electrode placement.

● Wash skin thoroughly with soap and water.(Do not use ether and pure alcohol because it increases the impedance of skin.

● Dry the skin to increase the capillary blood flow in the tissue and remove skin debris and grease.

2) Install a spring clamp or knob before the electrode is placed.

3) Place conductive paste on patients before placing electrodes that do not contain conductive paste.

4) Connect the electrode lead to the patient's cable.

5) Confirm the power supply of the monitor.

⚠ Warning:

- **The electrode should be carefully attached and the contact is confirmed.**

■ **Check whether the ECG electrode patch stimulate the skin every day . If there are any signs of allergy, change the electrode or change the position every 24 hours.**

■ **It is necessary to check whether the lead is normal before starting the monitoring.When the ECG cable is unplugged, the screen displays an error message of "sensor shedding" and triggers a sound alarm.**

⚠ **Warning： To protect the environment from infection, used electrodes must be recovered or properly treated.**

9.2.2Installation of ECG lead

The position of ECG monitoring electrode in five leads

The electrode of the five-lead device is arranged as shown below.

■ RA white (right arm) electrode is placed under the clavicle near the right shoulder.

■ La black (left arm) electrodes are placed under the clavicle, close to the left shoulder.Place it on the chest wall as shown below.

■ RL green (right leg) electrode is placed in the right lower abdomen.

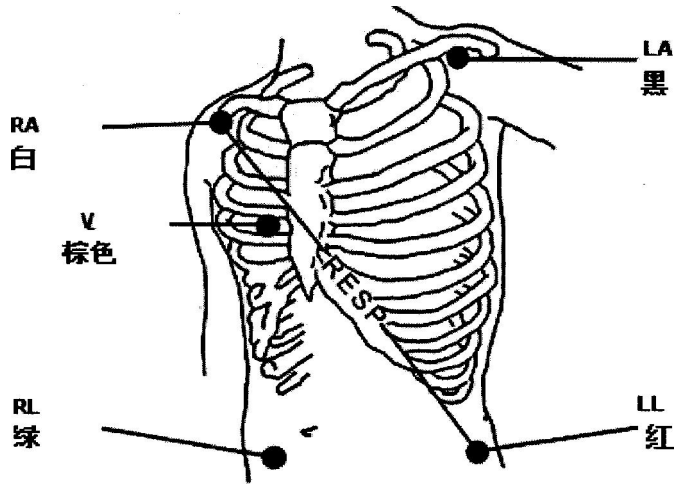
■ LL red (left leg) electrode one placed in the left lower abdomen.

■ V-brown electrodes are placed on the chest wall.

⚠**Warning：**

The lead names in European and American standards are listed in the table below.(In European standards, use of R、L、N、F、C for each lead，in the American standard for RA、LA、RL、LL、V)

America		Europe	
Lead name	Colour	Lead name	Colour
RA	white	R	red
LA	black	L	yellow
LL	red	F	green
RL	green	N	black
V	brown	C	white



5-lead electrode placement

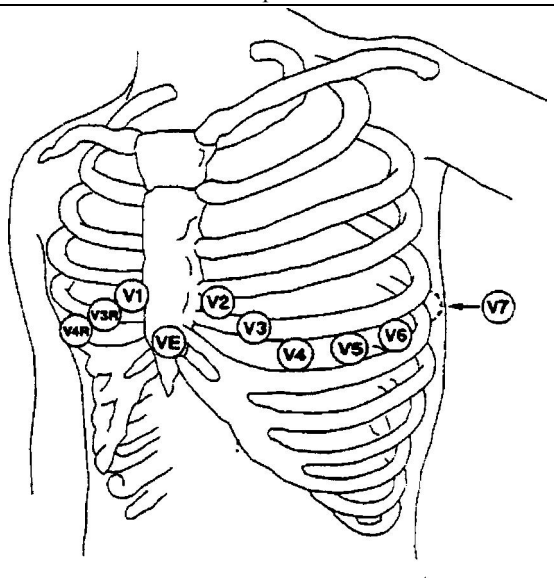
⚠Warning：To ensure patient safety, all leads must be connected to the patient.

■ For the five-lead configuration, place the chest v-lead electrode in one of the following positions, as shown in figure 9-2:

- V1 was located in the fourth intercostal region of the right sternum.
- V2 was located in the fourth intercostal region of the left sternum.
- V3 is in the middle of V2 and V4.
- V4 is in the fifth intercostal area of the left middle line of the clavicle.
- V5 in the front line of left axillary, horizontal position is the same as V4.
- V6 in left axillary midline, horizontal position is the same as V4.
- V3R-V7R is located on the right side of the chest wall, corresponding to the left side.

■ VE is located in the bulge of the xiphoid process, "V" will lead to "V" placed electrodes on one of the following locations.

- V7 is on the fifth rib of the posterior left axillary line .
- V7R was at the 5th intercostal of the right posterior axillary line on the abaxial surface.

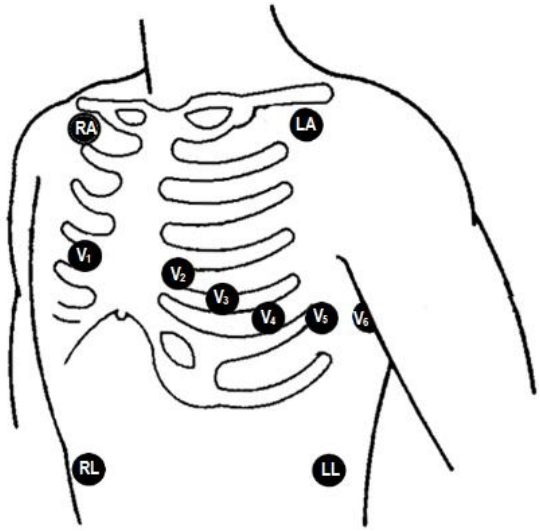


Placement of chest conductive pole in lead 5

Location of ECG monitoring electrode at 12 lead

The electrodes of the 12-lead device are arranged as shown in the diagram.

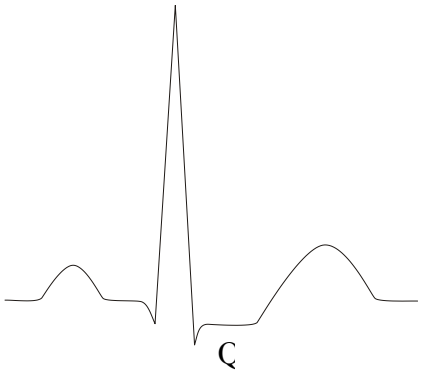
Lead label (IEC)	**Color (IEC)**	**Lead label (AHA)**	**Color (AHA)**	**Position**
R	Red	RA	White	Right shoulder subclavian
L	Yellow	LA	Black	Left shoulder subclavian
N	Black	RL	Green	Right lower quadrant
F	Green	LL	Red	Left lower quadrant
C1	Red	V1	Red	Right sternum fourth intercostal
C2	Yellow	V2	Yellow	Left sternum fourth intercostal
C3	Green	V3	Green	The midpoint of the line between V2 and V4
C4	Brown	V4	Blue	Left middle line of clavicle 5th intercostal
C5	Black	V5	Orange	Left axillary front parallel to V4
C6	Purple	V6	Purple	Left axillary midline parallel to V4



10 lead electrode placement

⚠Warning:

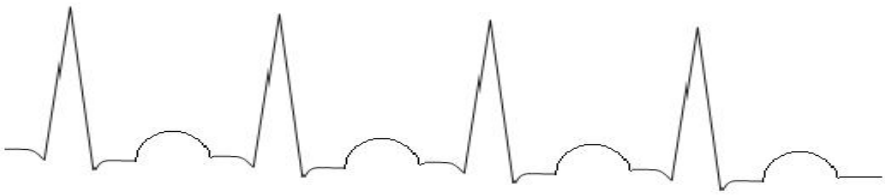
- To ensure patient safety, all leads must be connected to the patient.
- The ECG leads recommended by surgical patients to connect to a good signal:
- Tall and narrow without a notch.
- The R wave is tall and completely above or below the baseline.
- The pacing signal is no greater than the height of the R wave.
- T wave is less than 1/3 height of R wave.
- P wave should be much smaller than T wave.



Standard ECG waveform

In order to obtain 1 millivolt of calibrated ECG waves, ECG calibration should be performed, and the screen indicates that "the patient cannot be monitored during calibration."

After a steady time of 20s, the error between the heart rate and the input heart rate of the ECG wave shown in figure 2 is not more than ±2.



Warning：

If the electrode is stuck correctly and the ECG waveform is inaccurate , replace the lead .

Interference from ungrounded instruments near the patient and ESU interference may cause waveform problems.

9.3ECG menu

- ECG Setup menu

Turn the encoder, move the cursor on the main screen to the parameter area "ECG", then press the encoder to confirm, and pop up the ECG settings menu, as shown in the figure:

ECG setting menu

- ECG set up

● Heart rate alarm：Select "on" to alert and store heart rate alarm, select "off" to not alarm, and prompt “ ” next to ECG in screen parameter area。

● Alarm level: Optional "high", "medium", "low" three values, "high" means the most serious alarm.

● Heart rate source

Heart rate can be detected by ECG or SpO2.To select "automatic", the monitor determines the source of heart rate according to the signal quality..If you select simultaneous, the monitor displays both heart rate and pulse rate.If provided by SPO2, prompt pulse-rate sound.

When the heart rate source is selected SPO2, the alarm judgment of heart rate is not carried

out, but the pulse rate is judged.

- Computing channel

"Channel" 1 represents the heart rate calculated from the waveform data of the first ECG wave.

"Channel 2" represents the heart rate calculated from the waveform data of the second ECG wave.

"Automatic" represents the automatic selection by the monitor of the channel for calculating the heart rate.

- Channel 1: optional lead Ⅰ，Ⅱ，Ⅲ，aVR，aVL，aVF，V。
- Channel 2: optional leadⅠ，Ⅱ，Ⅲ，aVR，aVL，aVF，V。
- Filter mode

When the heart rate increases from 80bpm to 100bpm or decreases from 80bpm to 40bpm, the device indicates that the maximum response time of the new heart rate is not longer than 10s.

Follow two types of ventricular tachycardia waves following 80bpm's normal heart rate and set the alarm upper limit to 100bpm or the nearest value.The lower limit of the alarm is 60bpm or the nearest value.Alarm time is not longer than 10s.When the amplitude of these waveforms is half or twice the indicated amplitude, the device indicates that the maximum response time for the new heart rate is not longer than 10 S.

⚠ **Warning：Only when the diagnosis is done, can the system provide the real signal that has not been processed.In the filtering mode of "monitoring" and "operation", ECG waveforms are distorted to varying degrees.At this time, the system can only provide the basic state of ECG, which will have a great influence on the results of St segment analysis.The results of ARR analysis may also have a partial effect on the operation mode.Therefore, it is suggested that the diagnosis mode should be used as far as possible in patients' monitoring.**

A cleaner or more accurate waveform can be obtained by filtering.

Three filtering methods can be chosen. The unfiltered ECG wave is displayed in the diagnostic mode, and the false difference which may lead to false alarm is filtered out by the monitoring mode.

- Gain

⚠**Warning：When the input signal is too large, the peak may be truncated.At this time, users can manually change the gain file of ECG waveform according to the actual waveform to avoid incomplete waveform display.**

You can choose to calculate the gain of each channel,Gain has ×0.25 ×0.5、×1、×2 、Auto optional.A 1 millivolt scale is given on the left side of each cardiac wave shape.The height of a 1 millivolt scale is proportional to the amplitude of the wave.

- Lead type: The 5 lead or 3 lead can be selected
- Waveform speed: ECG scan speed is available at 12.525. 0 and 50.0mm/s options.
- St segment analysis: St segment can be analyzed and related parameters can be set.
- Analysis of arrhythmias: analysis of arrhythmias and the setting of related parameters
- Other settings

Select to enter the ECG Settings menu, as shown in the figure:

ECG setting menu

There are the following features in this submenu:

✧ ECG monitoring type: select normal display can display 2 ECG waveforms in 5 leads. Select full-screen multi-lead display and 7 ECG waveforms can be displayed in the screen waveform area.

✧ Heartbeat volume: you can choose the volume level:0、1、2、3、4.

✧ Pacing analysis: marking of pacing signals

✧ Power frequency suppression: suppression of network electrical interference.

✧ ECG calibration: select this ECG waveform to automatically calibrate.

✧ Default configuration: select this entry into the default configuration dialog box of ECG. You can choose the default configuration of the system.

9.4ECG alarm information and prompt information

Warning message

The alarm that may occur in ECG measurement can be divided into physiological alarm and technical alarm. At the same time, the process of ECG measurement may also produce various kinds of warning information.When these alerts or cues occur, the visual and auditory representations of the monitor are described in the alarm function section.On the display screen, the physiological alarm and general warning information (general alarm) are displayed in the alarm area of the monitor, while the technical alarm and the warning information that cannot trigger the alarm are displayed in the information area of the monitor.When the alarm record switch in the relative menu is turned on, the physiological alarm caused by the parameter exceeding the alarm limit may trigger the recorder to automatically output the alarm parameter value and the relevant measurement waveform.

The following classification list describes the various alarms that may be generated by the measuring section

Physiological alarm:

Prompt information	Cause	Alarm Level
ECG is too weak.	The patient's ECG signal was not detected	Higt
HR is too high	HR measurement value is higher than the set alarm high limit	User optional
HR is too low	HR measurement value is lower than the set alarm high limit	User optional

Technical alarm:

Prompt message	Cause	Alarm level	Counterplan
ECG lead shedding	Electrocardiogram (ECG) electrode shedding from patient or ECG cable from monitor	low	Make sure the electrodes, leads and cables are all connected properly.
ECG LL Lead shedding or ECG F Lead shedding			
ECG LA lead shedding or ECG L shedding lead			
ECG RA lead shedding or ECG R lead shedding			
ECG module communication stop	ECG failure of measurement module or communication	High	Ditto
ECG module communication error	Accidental communication failure	High	If the fault persists, the processing method is the same above.

HR Alarm error limitation	Functional safety error	High	Stop using HR alarm function and notify biomedical engineer or our maintenance staff.
ECG interference is too large	The measurement signal of ECG is greatly affected by interference.	Low	Be sure to keep the patient quiet, reliable electrode connection and good grounding of AC power supply system.

Prompt information(Including general alarm messages)：

Prompt message	Cause	Alarm level
HR measurement superbound	HR measurements exceed the range of measurement	High

9.5Respiratory measurement

How is breathing measured?

The monitor measures the respiration from the chest impedance of the two electrodes, and the impedance changes between the two electrodes(due to chest movement)

A breath wave is generated on the screen .

Setting of respiratory monitoring

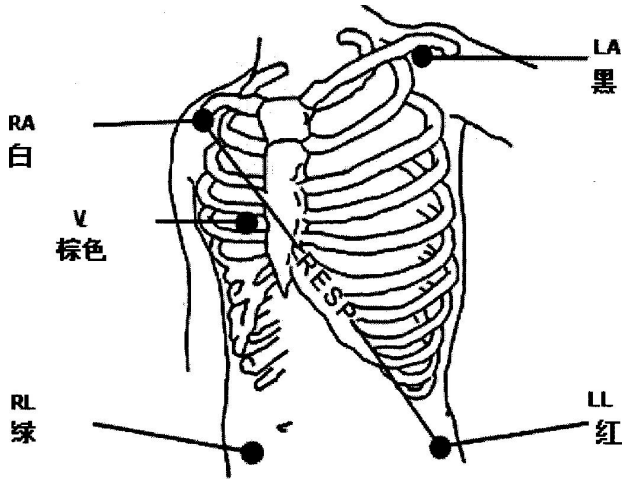
Monitoring breathing does not require additional electrodes, but the placement of electrodes is important.Some patients, due to their clinical conditions, have a lateral expansion of the chest resulting in negative thoracic pressure.In this case, it is better to place the two breathing electrodes in the region with the greatest activity of the right axillary midline and the left chest to obtain the best breathing wave.

⚠**Warning： Respiratory monitoring is not suitable for patients with high levels of activity, as this can lead to false alarms.**

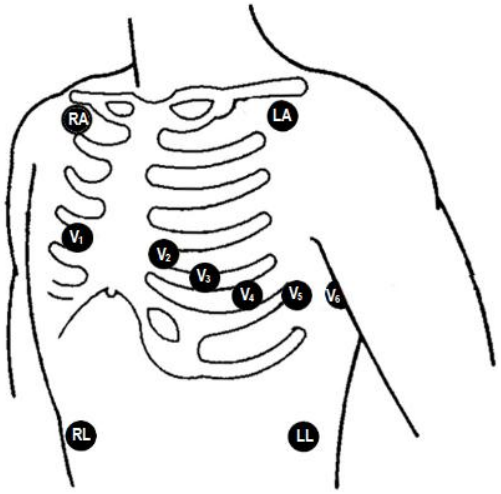
RESP Guardianship inspection：

1）Prepare the patient's skin before placing the electrode.

2）Install the electrode with a spring clip or knob and place the electrode on the patient in the manner described below.



Electronic placement (5 leads)



Electronic placement (12 leads)

⚠ **Warning： White and red electrodes are placed diagonally to obtain optimal breathing waves.Keeping the liver and ventricle on the line of the respiratory electrode should be avoided so as to avoid false variations in cardiac overlay or pulsating blood flow.**

RESP Setup menu

Turn the encoder, move the cursor to the "RESP" in the parameter area of the main screen, then press the encoder to enter the "RESP Settings" menu, as shown in the figure.

RESP setup menu

RESP Alarm setting

■ Select "ON" to alert and store heart rate alarm, select "off" to not alarm, and prompt "  " next to ECG in screen parameter area.

■ Alarm level：Optional "high", "medium", "low" three values, "high" for the most serious alarm.

The range of adjustments to the upper and lower limits of the alert is as follows:

	Max upper limit	Min lower limit	Single regulation quantity
RR Children	130	6	1
RR Adult	100	6	1

■ Suffocation alarm：Setting the time to judge the patient's asphyxia，Between 10 seconds and 40 seconds, each turn of the encoder plus / minus 5 seconds, the user can also choose not to alarm.

■ Waveform velocity：The optional breathing velocity is 6.25 mm / s, 10.5mm / s ,25.0mm / s .

■ Breathing gain: the user can set up the RESP waveform amplification display, the magnification option is 0.25，0.5，2,4.

■ Default configuration: Select this item to enter the RESP default configuration dialog box,Tip: will use the default configuration! The original configuration will be overwritten! Users can choose Yes or No.

9.6 RESP alarm and prompt information

When the alarm record switch of the relevant item is opened, the physiological alarm which is caused by the parameter beyond the alarm limit triggers the recorder's automatic output alarm parameter value and the related measurement waveform.

The physiological alarm, technical alarm and warning information that may occur in the RESP measurement are listed in the following table:

Physiological alarm：

Prompt message	Cause	Alarm level
RR is too high	The RESP measurement value is higher than the set alarm high limit.	User optional
RR is too	The RESP measurement value is	User optional

low	lower than the set alarm limit.	
RESP Respiratory asphyxia	Breathing cannot be measured at specified intervals	High

Technical alarm：

Prompt message	Cause	Alarm level	Counterplan
RESP Alarm error limitation	Functional safety failure	High	Stop using RESP alarm function and notify biomedical engineer or our maintenance staff.

Prompt information (including general alarm information)：

Prompt message	Cause	Alarm level
RR Measurement superbound	RR measurement is beyond the range of measurement	High

Chapter 10 Degree of blood oxygen saturation （SPO2）

10.1Monitoring of blood oxygen saturation

- S_PO_2 **Definition of guardianship**

The SPO2 plethysmogram parameter measures arterial oxygen saturation, which is the percentage of total oxygenated hemoglobin.For example, if hemoglobin molecules, which account for 97% of the total number of red blood cells in arterial blood, bind to oxygen, the blood has 97% SPO2 oxygen saturation。The SPO2 value is read on the monitor is the percentage of oxygenated hemoglobin molecules that form the 97%. SPO2 plethysmography parameters can also provide

pulse rate signals and plethysmography waves.

➢ **Measurement principle of S_PO_2 plethysmography parameters**

✧ Determination of oxygen saturation by pulsating oxygen quantitative method

✧ This is a continuous, non-invasive method for measuring hemoglobin oxygen saturation.It measures how much light emitted from one side of the sensor's light source passes through the patient's tissue, such as fingers or ears, to the other side's receiver.

The measurable wavelength of the sensor is usually 660 nm for the red LED and 940nm for infrared.The maximum optional output power of LED is 4 MW.

■ The amount of light passing through depends on a number of factors, most of which are constant.However, one of these factors, the arterial flow, changes over time because it is pulsating.By measuring the light absorbed during the pulsation, it is possible to obtain the arterial blood oxygen saturation.Detecting pulsation itself gives a plethysmogram waveform and pulse rate signal.

Volumetric parameter measurement

✧ The SPO2 value and the Sketch Waveform can be displayed on the main screen.

✧ The SPO2 in this manual refers to the oxygen saturation of the human body measured by a noninvasive method.

⚠ **Warning：**

- **If carboxyhemoglobin, methemoglobin or dye dilute chemicals exist, Sp02 values can be skewed.**
- **Don't put the sensor on a limb with an arterial catheter or an intravenous tube.**
- **Before starting monitoring, check that the sensor cable is normal.When the SPO_2 sensor cable is unplugged from the socket, the screen displays an error message of "sensor shedding".And trigger sound alarm at the same time. The alarm is automatically released after the sensor is re-inserted.**
- **Do not use this SPO_2 beholder if the sensor is packaged or if the sensor has signs of damage.It should be returned to the manufacturer.**
- **Continuous, prolonged monitoring may increase the risk of unwanted changes in skin characteristics,such as, abnormal sensitivity, redness, foaming or compressive necrosis.**

⚠Warning：

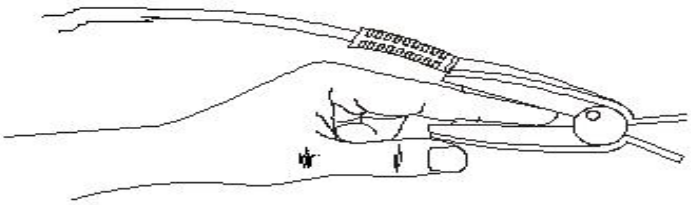
- Do not put the blood oxygen probe on the same limb as the blood pressure cuff, because the blood flow occlusion during the blood pressure measurement can affect the blood oxygen saturation reading.
- Make sure your nails cover the light.
- Probe lines should be placed on the back of the hand.
- SPO2 values are always displayed in fixed places.

- SPO2 waveform is not proportional to pulse volume。

10.2Operational method of oxygen saturation monitoring

➢ SPO2 Volumetric measurement

1) Turn on the monitor；
2) Attach the sensor to the proper position of the patient's finger；
3) Insert the connector at one end of the sensor cable into the Sp02 hole.



Adult blood oxygen probe

⚠Warning：

- If the testing site and probe can not be accurately located, it may lead to inaccurate oxygen saturation readings, or even to search for pulse waves, so that blood oxygen monitoring can not be carried out, and the location should be relocated at this time.
- Excessive movement of the measuring site may result in inaccurate measurement. The patient should be quieted or replaced at this time in order to reduce the impact of excessive movement on the measurement.

⚠ Warning：

- During continuous monitoring for a long time, check the peripheral circulation and skin condition every 2 hours or so. If bad changes are found, the measured position should be changed in time.
- In the process of continuous monitoring for a long time, the location of the probe should be checked periodically so as to avoid the influence of the accuracy of the measurement because of the change of the orientation of the probe caused by the moving of the probe and other factors.

10.3Limit of blood oxygen saturation monitoring

During operation, the following factors can affect the accuracy of oxygen saturation measurement:

■ High frequency electrical interference, such as interference generated by the host system itself or from electrical surgical instruments such as systems connected to the system.

■ Do not use photoelectric oximeter and oxygen sensor during magnetic resonance imaging (MRI) scan. Inductive currents may lead to burns.

■ Intravenously dyestuff.

■ The patient moved too frequently.

■ External radiation.

■ Improper installation of sensor or improper contact position with object.

■ Sensor temperature (the optimum temperature should be in the range of 28 ℃ ～42 ℃).

■ Place the sensor on a limb with a blood pressure cuff, an arterial catheter, or an intracavitary conduit.

■ Concentrations of nonfunctional hemoglobin such as COHb and MetHb).

■ Blood oxygen saturation is too low.

■ The circulatory perfusion was poor.

■ Shock, anemia, hypothermia, and the use of vasoconstrictors can reduce arterial blood flow to unmeasurable levels.

■ Measurements also depend on the absorption of specific wavelengths of light by oxygenated hemoglobin and reduced hemoglobin.If other substances absorb the same wavelength, they can lead to false or low SP02 values,such as : carbonated hemoglobin, iron hemoglobin, methylene blue, rouge indigo.

■ It is recommended to use the SpO2 sensor described in the attachment.

10.4Oxygen saturation menu

➢ **$Sp0_2$ Setup menu**

Turn the rotation button and move the cursor in the display interface to the SP02 hotkey in the parameter area. Press the rotate button to enter the "SPO2 Settings" menu, as shown in the figure.

SP02 setting menu

Warning：

Setting the upper limit of SPO2 alarm to 100% is equivalent to disconnecting the upper limit alarm.High oxygen levels can cause preterm infants to develop post-crystalline fibrous tissue disease.Therefore, the upper limit of blood oxygen saturation must be carefully

selected according to recognized clinical practice.

➢ SPO2 Alarm setting

✧ Alarm switch：Select "Open" to alarm and store when SPO2 (blood oxygen saturation) is alerting.Select "turn" and leave no alarm and prompt“  ”next to the SPO2 in the parameter area of the screen.。

✧ Alarm level：To set alarm levels, the options are high, medium and low. High represents the most serious alarm

✧ Waveform speed: SPO2 volumetric waveform scan speed 12.5 and 25.0mm/s options

✧ Pulse volume: you can select the volume level 0、1、2、3。

✧ Calculating sensitivity: select the average time to calculate the SPO2 value.Selecting "high", "medium" or "low" means taking an average of 4 seconds, 8 seconds, or 14 seconds of SPO2.

✧ Default configuration: select this to enter the SPO 2 default configuration dialog box.Tip: will use the default configuration! The original configuration will be overwritten! Users can choose Yes or No.

✧ PR (pulse rate) alarm high and low limit: according to the set high limit and low limit, when PR beyond the high limit or below the low limit to alarm.

SPO2 and PR Alarm range：

Parameter	High limit	Low limit	Single adjustment
SP02	100	0	1
PR	250	0	1

Default alarm range for SPO2 and PR under default setting:

Parameter		High limit	Low limit
SP02	Adult	100	90
	Children	95	80

PR	Audlt	100	50
	Children	140	75

10.5Oxygen saturation alarm message

10.5.1 SPO2 Alarm information

When the alarm record switch in the correlation menu is turned on, the physiological alarm caused by the parameter exceeding the alarm limit will trigger the recorder to automatically output the alarm parameter value and the related measurement waveform.

The physiological alarm, technical alarm and warning information that may occur in the measurement of the SPO 2 module are listed in the following table.

physiological alarm：

Prompt information	Cause	Alarm level
S_PO_2 too high	The SPO2 measurement value is higher than the alarm upper limit.	User optional
S_PO_2 too low	SPO2 measurements are below the lower alarm limit.	User optional
PR too high	The PR measurement value is higher than the alarm upper limit.	User optional
PR too low	The measurement value of PR is lower than the lower limit of alarm	User optional

Technical alarm：

Prompt information	Cause	Alarm level	Countermeasure
S_PO_2 sensor shedding	The SPO2 sensor shedding from a patient or a monitor	Low	Make sure the sensor is placed on the patient's finger or other area, and that the monitor is properly

			connected to the cable.
S_PO_2 module communication stop	S_PO_2 Module error or communication error	High	Stop using S_PO_2 module measurement function, notify biomedical engineer or customer service department of our company。
S_PO_2 Alarm error limitation	Functional safety failure	High	Stop using S_PO_2 module measurement function and notify biomedical engineer or customer service department.
PR Alarm error limitation	Functional safety failure	High	Stop using S_PO_2 module measurement function and notify biomedical engineer or customer service department.

Prompt alarm (including general alarm)：

Prompt information	Cause	Alarm level
S_PO_2 Measurement superbound	Measurement of SpO_2 out of range.	High
PR Measurement superbound	Measurement of PR out of range.	High
Search pulse	SpO_2 module is searching for pulse	No alarm
Undetected pulse	SpO_2 module can't detect SpO2 signal for a long time	High

Chapter 11 Temperature（TEMP）

11.1Temperature monitoring instructions

The monitor can use the temperature probe to measure the temperature data.

- Temperature measurement setting

■ If a one-time temperature probe is being used, insert the temperature cable into the socket and connect the probe to the cable.For reusable temperature probes, you can insert them directly into the socket.

■ Attach the temperature probe firmly to the patient.

■ Power on the system.

⚠ Warning：

■ Before starting monitoring, check whether the probe cable is normal.Unplug the temperature probe cable of channel 1 from the Jack, and the screen will display the error message "T1 sensor shedding" and make an alarm sound.Other channels are similar.

■ Carefully hold the temperature probe and cable, when not used, the probe and cable should be pulled into a loose ring. If the wire inside is too tight, it will cause mechanical damage.

■ Calibration of the thermometer must be performed every two years (or according to the time indicated in the hospital procedure).

⚠Warning：

- One-time temperature probe can only be used once.
- During the monitoring process, the temperature meter automatically checks itself every hour.Self-test lasts 2 seconds and will not affect the normal operation of the temperature monitor.

11.2Temperature menu

The user can use the encoder to move the cursor to the parameter area TEMP in the main screen and press the encoder to enter the TEMP settings menu, as shown in the figure.

TEMP setting menu

➢ Alarm switch ： Select "OPEN" to alarm and store when TEMP(body temperature) alarm, select "OFF" do not alarm, and the screen parameter area next to the TEMP prompted "" .

➢ Alarm level：For setting alarm levels, options are High, medium, and low.

➢ The T1 alarm is performed according to the set high - limit and low - limit , when the temperature exceeds the upper limit or lower than T1 represents the temperature of the channel

➢ The range of adjustments to the upper and lower limits of the alert is as follows:

Parameter	Upper limit	Lower limit	Single regulation quantity
T1	50	0	0.1

➢ Unit of temperature: choose degrees Celsius or. F degrees Fahrenheit.

➢ Default configuration: select this item to enter the TEMP default configuration dialog box.Tip: will use the default configuration! The original configuration will be overwritten!Users can choose Yes or No.

11.3Body temperature alarm information and warning information

When the alarm record switch in the relative menu is turned on, the physiological alarm caused by the parameter exceeding the alarm limit will trigger the recorder to automatically output the alarm parameter value and the relevant measurement waveform.

The physiological alarm, technical alarm and warning information that may occur in TEMP measurements are listed in the table below.

Physiological alarm：

Prompt information	Cause	Alarm level
T1，too high	The temperature measurement value	User

	is higher than the set alarm limit.	optional
T1，too low	The temperature measurement value is lower than the set alarm limit.	User optional

Technical alarm：

Prompt information	Cause	Alarm level	countermeasure
TEMP sensor shedding	Temperature cable shedding from monitor	Low	Ensure reliable cable connections.
TEMP Alarm error limitation	Functional safety failure	High	Stop using TEMP alarm function and notify biomedical engineer or our maintenance staff.

Prompt information：

Prompt information	Cause	Alarm level
TEMP Measurement superbound	Temperature measurement is beyond the range of measurement	High

Chapter 12 NIBP

12.1Noninvasive blood pressure monitoring instructions

- Noninvasive blood pressure (NIBP) was measured by oscillatory method；
- Can be used for adults, children；
- Measurement mode: manual, automatic and continuous measurement.Each mode shows systolic, diastolic and mean pressure.

  □ Manual mode with only one measurement.

  □ Automatic mode, measurement repeated.The interval can be set as 1 / 2 / 3 / 4 / 5 / 10 / 10 / 15 / 30 / 60 / 90 / 120 / 180 / 240 / 480 minutes.

  □ Continuous mode in which measurements are carried out continuously over a period of five minutes.

⚠ **Warning：**

- Non-invasive blood pressure measurements should not be performed on patients with sickle cell disease and any skin damage or expected damage.
- For patients with severe clotting disorders, automatic blood pressure measurement should be determined based on clinical evaluation, as there is a risk of hematoma at the friction between the limb and the cuff.
- When measuring a child patient, make sure the correct mode settings are selected (see patient information menu settings).The use of the wrong patient pattern may endanger the patient's safety because higher adult blood pressure levels do not apply to children.
- The blood pressure measured by this equipment is equivalent to that measured by auscultation.

12.2Non invasive blood pressure monitoring operation

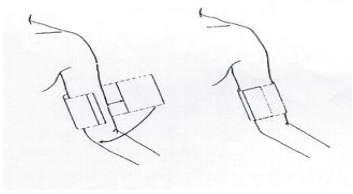
12.2.1Noninvasive blood pressure measurement

The inflatable tube connected to the blood pressure sleeve and monitor should be smooth and untangled.

1． Plug the inflatable tube into the blood pressure cuff interface of the monitor and connect the power supply to the instrument.

2． 2． Tie the blood pressure cuff on the patient's upper arm or thigh, as shown below

figure.



cuff using

◆ Make sure the sleeve band is fully deflated.

Use the appropriate cuff for the patient to ensure that the tissue is just above the right artery.Make sure the cuff is not too tight, or it may cause discoloration or even ischemia of the distal end of the limb.

⚠Warning：

The width of the cuff should be 40 parts of the circumference of the limb, or 2 / 3 of the length of the upper arm. The inflatable part of the cuff should be long enough to encircle the 50 / 80 length of the limb.The wrong size of the sleeve tape will produce the wrong reading.

3.The cuff and the inflatable tube are connected. The limbs used for manometry should be at the same level as the patient's heart.If this is not possible, the following correction methods should be used to correct the measurement results：

◆ Check that the edge of the cuff falls within the range marked <->.如 If not, switch to a larger or smaller sleeve band.

◆ If the cuff is higher than the heart level, the difference per centimeter should be added to the display value of 0.75mm HgG （0.10kPa).

◆ If the cuff band is below the heart level, the difference per centimeter should be reduced by 0.75mm HgG （0.10kPa).

4. Verify that the monitoring method is correct (the monitor is displayed in the information area of the monitor interface, right behind the bed number)， If you need to change care, go to patient Information Settings on the system menu and change patient Type.

5． Select the measurement mode in the NIBP menu, as shown in the Action Tip below.

6． Press the "blood pressure" (start) button on the front panel to start the pressure measurement.

➢ **Operation prompt**

1． Carry out an automatic measurement

Enter the NIBP settings menu, check the interval time, and the user can choose the time interval value to automatically measure.Then press the "blood pressure" button on the front panel and the system automatically inflates according to the interval.

⚠ Warning：

If the automatic noninvasive manometry takes too long, the limb with cuff friction may

be accompanied by purpura, ischemia, and nerve damage.Always check the color, warmth, and sensitivity of the distal extremity when monitoring the patient.Once any abnormalities are observed, place the cuff in another place or immediately stop blood pressure measurements.

2．Stop automatic measurement

Pressing the "blood pressure" button at any time during automatic measurement can stops automatic measurement.

3．Make a manual measurement

◆ Go to the NIBP Settings menu, select interval, set to Manual, and press the Blood pressure ammonium button on the front panel to start a manual measurement.

◆ During the free time of automatic measurement, press the Blood pressure button and a manual measurement will begin. If you press the Blood pressure button again, the manual measurement will stop and continue with the automatic measurement.

4．Carry out a manual measurement in the course of automatic measurement

Press the Blood pressure button on the control panel.

5.Stop a manual measurement midway

Press the Blood pressure button on the control panel again.

6．Continuous measurement

Go to the NIBP Settings menu, select the continuous Measurement tab, and start continuous Measurement. This process will last 5 minutes.

⚠ **Warning：**

If the noninvasive manometry time of continuous measurement is too long, the limb with cuff friction may be accompanied by purpura, ischemia and nerve injury.Always check the color, warmth, and sensitivity of the distal extremity when monitoring the patient.Once any abnormalities are observed, place the cuff in another place or immediately stop blood pressure measurements.

7. Stoppage of continuous measurement

Press the "blood pressure" button on the control panel to stop continuous measurement at any time during continuous measurement.

⚠ Warning：

■ **If there is doubt about reading accuracy, examine the patient's vital signs in a possible way before examining the monitor's function.**

■ **If the liquid splashes on the equipment or accessories, especially if the liquid may enter the pipeline or monitor, contact the hospital maintenance department.**

Limits of measurement

There are certain limits to oscillatory measurements depending on the patient's condition.This measurement looks for regular pulse waves generated by arterial pressure.When the patient's condition makes the detection method difficult, the measurement value becomes unreliable and the pressure measurement time increases.Users should be aware that the following may interfere with the measurement method, making the pressure measurement unreliable or time prolonged.In this case, the condition of the patient will render the measurement impossible.

■ Patient movement

If the patient is moving, shaking or spasmodic, the measurements will be unreliable or even impossible, as these conditions may interfere with the detection of arterial pressure pulsation, and the blood pressure measurement time will be prolonged.

■ Arhythmia

If the patient shows arrhythmia and causes irregular cardiac beats, the measurement will be unreliable or impossible, and the manometry time will be prolonged.

■ Heart-lung machine

If the patient is connected with an artificial Heart-lung machine, it will not be measured.

■ Pressure variation

If, at a certain time, the arterial pressure pulsation is being analyzed to obtain the measured value, and the patient's blood pressure changes rapidly, the measurement will be unreliable or impossible.

■ Severe shock

If the patient is in severe shock or hypothermia, the manometry will not be reliable.Because a decrease in blood flow to the periphery leads to a decrease in arterial pulsation.

■ Limiting heart rate

Blood pressure could not be measured when heart rate was lower than 40 bpm (heart beat /mins) or higher than 240 bpm (heart beat/mins).

12.3Noninvasive blood pressure menu

Turn the encoder, move the cursor to the NIBP hotkey in the parameter area on the screen, and press the encoder to enter the NIBP Settings menu, as shown in the figure.

NIBP Setup menu

➢ NIBP Alarm setting

■ Alarm switch ：Select "open" to alarm and store when pressure alarm, select "off" not alarm, and the screen parameter area NIBP next to the prompt“ ”.

■ Alarm level: High, Medium and Low options. "High" means the most serious alarm.

■ Pressure unit

Optional mmHg or kPa。

■ Interval

Automatic measurement of interval time (in minutes),It can be selected at 1: 1, 2, 2, 3, 5, 5, 10, 10, 30, 30, 60, 90,100, 180, 240, 480 minutes.After the interval is selected, a prompt will appear in the NIBP parameter area, "Please press the blood pressure button (start) key."Then press the "blood pressure" button to start the first automatic measurement of inflation.To end automatic measurement, select Manual to return to manual mode during measurement intervals.

■ Preinflatable value

Press this key to select the initial pressure value for the next time the cuff is inflated, and for different default configurations, there are different ranges of preinflatable values, as shown in the following table:

Default configuration	Default preinflatable value (mmHg/kPa)	Manually selected preinflatable values in the NIBP menu (mmHg/kPa)

Default factory adult configuration	160	80/90/100/90/100/110/120/130/140/170 180/190/200/210/220/230/240
Default factory children configuration	120	80/90/100/90/100/110/120/130/140/170 180/190/200

Once the user presses the Menu key on the front shell , enter the Default Configuration menu in the System MenuAfter confirming the default configuration, return to the NIBP menu hotkey of the main interface to select the NIBP parameter area and go to "NIBP Settings."You can see that the initial value corresponding to the "preinflatable value" is the initial inflatable pressure corresponding to the selected default configuration, as shown in the table above.Move the cursor to the preinflatable value option and press to see the range of preinflatable values that can be manually adjusted as shown in the above table.

⚠Warning：

The "preinflatable value" option is designed to help the user select the next cuff inflatable pressure, but the preinflatable value for subsequent measurements will be based on the same patient's previous systolic blood pressure measurement.Systematic memory can shorten the measurement time and increase the accuracy of measurement in the same patient.

- **When the user only sets the "patient type" in "patient Information Settings" and does not make any choices in the "default configuration", the system will make the initial setting of the relevant module parameters according to the "Patient Type".And changes to default type settings in default configuration will also change patient types in patient Information Settings.**

■ Reset

Blood pressure pump measurement state reset.

Press this button to restore the inflation value of the blood pressure pump to its initial setting.

This key is recommended when the blood pressure pump is not working properly but the monitor cannot indicate the cause of the problem.This allows the blood pressure pump to self-check, thus automatically recovering when the pump is abnormal due to accidental causes.

■ Continuous measurement

Start a continuous measurement .

After the election, the menu will disappear automatically, and continuous measurement will be carried out immediately.

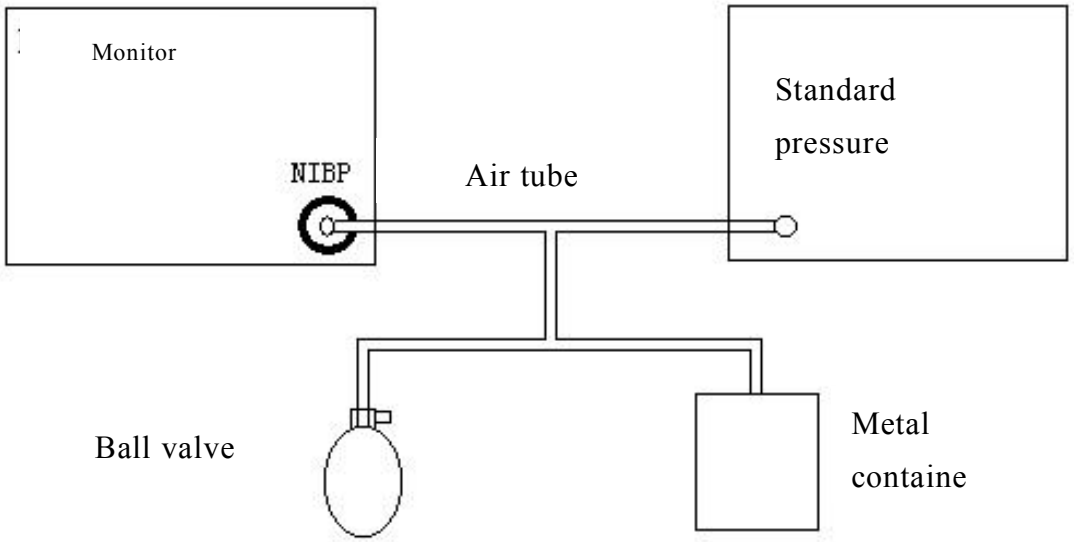
■ Calibration

⚠ **Warning：Calibration of NIBP measurements should be performed every two years**

(or in accordance with hospital maintenance regulations).

Calibration steps for pressure sensors：

Replace cuff with a metal container of 500ml+5%.A calibrated standard pressure gauge with an error less than 0.8mmHg and a spherical gas pump with T-type interface are connected to the NIBP Jack of the module.The monitor is set to "calibrate" mode, and the pressure in the metal container is inflated to 0, 50 and 200 mmHg, respectively, using a spherical air pump.The difference between the standard pressure gauge and the pressure indicated by the monitor should be within 3 mmHg.Otherwise, please contact our maintenance engineer.



NIBP calibration connection diagram

■ Gas leak detection

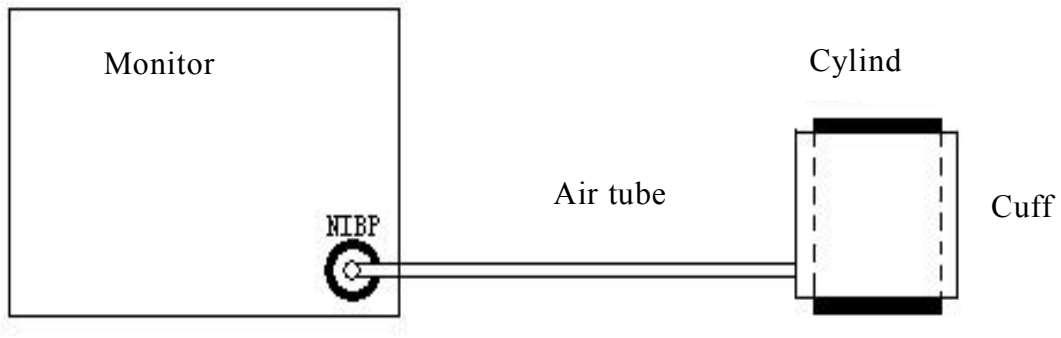
It can be used to detect whether the pump is leaking by NIBP, and the key can be used to start the NIBP inflating process when it is connected to the NIBP cuff band, and the airtight condition of the NIBP gas path is found to be good or not.If the air leak test is passed, the system will not be prompted；If it is not passed , there is a corresponding error prompt in the information area.

Leak detection proces:

1) Connect the sleeve band to the NIBP stomata of the monitor.
2) Wrap the sleeve band around the cylinder of the appropriate size.
3) Go to the NIBP Settings menu.
4) Turn the encoder, move the cursor to "leak detection", and press the encoder.At this point on the screen below the NIBP parameter area will appear "leak detection.", indicating that the system began to perform leak detection.
5) The system automatically inflates to a pressure of 180 mm Hg.
6) After about 20 seconds, the system automatically opens the valve and marks the leak

measurement complete.

7) If there is no hint in the NIBP parameter region, there is no air leakage in the system.If you show "pump leak.", the gas path may have a leak fault.The operator should check if the connection is loose. After confirming that the connection is correct, the operator should do a new air leak test.If there is still a fault prompt, please contact the manufacturer for maintenance.



NIBP gas leak detection connection diagram

■ Default configuration: select this entry into the default configuration dialog box of NIBP, and you can choose the default configuration option of the system.

12.4 NIBP alarm and prompt information

In physiological alarm, if the alarm record switch in the related menu is turned on , the alarm caused by the parameter exceeding the alarm limit may trigger the recorder to automatically output the parameters of the alarm occurrence time and the correlation measurement waveform.The physiological alarm, technical alarm and warning information that may occur in NIBP measurements are listed in the following table:

Physiological alarm:

Prompt message	Cause	Alarm level
NS too high	The NIBP systolic pressure measurement value is higher than the set alarm high limit.	User optional
NS too low	The NIBP systolic pressure measurement value is lower than the set alarm high limit.	User optional
ND too high	The measured value of NIBP diastolic pressure is higher than the set alarm high limit.	User optional

ND too low	The measured value of NIBP diastolic pressure is lower than the set alarm high limit.	User optional
NM too high	The measured value of NIBP diastolic pressure is higher than the set alarm high limit.	User optional
NM too high	The measured value of NIBP diastolic pressure is lower than the set alarm high limit.	User optional

Technical alarm 1 (display in the Information area of the Monitor):

Prompt information	Cause	Alarm level	Counterplan
NS alarm limit error	Functional safety failure	High	Stop using the NIBP module alarm function, notify the biomedical engineer or our maintenance personnel.
NM alarm limit error	Functional safety failure	High	Stop using the NIBP module alarm function, notify the biomedical engineer or our maintenance personnel.
ND alarm limit error	Function safety failure	High	Stop using the NIBP module alarm function, notify the biomedical engineer or the company's maintenance personnel.

Technical Alert 2 (display below the NIBP pressure value in the prompt area):

Prompt information	Cause	Alarm level	Counterplan
NIBP self-checking error	Sensor or other hardware errors in NIBP measurement module	High	Stop using NIBP measurement function and notify biomedical engineer or our maintenance staff.
NIBP communication	Communication failure with NIBP	High	If the failure continues, stop using the NIBP measurement

error	Measurement Module		function and notify the biomedical engineer or our maintenance staff.
Cuff too loose or not connected	The cuff is not tied or has no cuff	Low	Tie up the cuff.
Sleeve air leakage	Sleeve tape, hose or joint damaged	Low	Check and replace air leakage parts.Notify the biomedical engineer or the company's maintenance staff if necessary.
Air pressure error	No stable pressure value, such as tubing entanglement.	Low	Check if the hose is tangled, if the failure continues, notify the biomedical engineer or our maintenance staff.
The signal is too weak	Loose cuff or weak pulse	Low	Use other methods to measure blood pressure.
Pressure exceeding range	The range of measurements exceeds the prescribed upper limit	Low	Reset the NIBP measurement module, if the failure continues, stop using the NIBP measurement function, notify the biomedical engineer or our maintenance personnel.
Arm movement	Signal noise is too loud or pulse rate is irregular due to arm movement	Low	Make sure the patient is quiet and motionless.
Overvoltage crowbar	Pressure exceeding the prescribed safety limit	High	Remeasure, if the failure continues, stop using the NIBP measurement function, notify the biomedical engineer or the company's maintenance staff.
Signal saturation	Gross movement	Low	Don't make the patient exercise.

Pump leakage	Leak found in leak test	Low	Check and replace air leakage parts and notify biomedical engineer or our maintenance staff if necessary.
NIBP System failure	System failure of blood pressure pump	High	Stop using NIBP measurement function and notify biomedical engineer or our maintenance staff.
Sleeve tape type error	The type of cuff does not match the type of patient.	High	Select the right cuff.
Measurement overtime	Measurement time exceeding 100 seconds (adult / child) or 90 seconds	High	Measure or use other methods of pressure measurement again.
NIBP Error reset	Module reset abnormal	High	Use reset again.
Measurement error	When measuring, the system cannot perform measurement analysis or calculation	High	Check the cuff to make sure the patient stays motionless and measures it again.

Tip information (the prompt area below the NIBP pressure value):

Prompt message	Cause	Alarm level
Measure manually…	In the course of manual measurement	Alarm free
Continuous measurement …	Continuous measurement process	
Automatic measurement	Automatic measurement process	

…		
Please press start key	Select the measurement interval from the menu	
Measurement termination	Press start key to stop measurement during measurement	
Calibration …	Calibration process	
Calibration termination	The calibration process has been completed	
Leak detection...	Gas leak detection is in progress	
Leakage detection termination	Gas leak detection terminated	
Module reset...	The reset process after the NIBP module is loaded	
Manual Reset . .	NIBP reset (user-triggered) process	
Reset failure	Reset action failed	

Chapter 13 Measuring carbon dioxide（CO2）

13.1 Brief introduction of measurement

The concentration of CO2 in the respiratory tract of patients was measured by infrared absorption technique.The principle is based on the fact that CO2 molecules can absorb infrared ray energy of specific wavelength, and the amount of absorption energy is directly related to the

concentration of CO2.When the infrared light emitted by the infrared light source penetrates the gas sample containing CO2, some of the energy is absorbed by the CO2 in the gas.On the other side of the infrared light source, a photodetector is used to measure the remaining infrared ray energy and convert it into an electrical signal.Compared with the energy of infrared light source, the signal can accurately reflect the concentration of CO2 in the gas sample.

Measurement method of CO2: the respiratory gas in the respiratory airway of patients was sampled by constant sampling flow rate, and analyzed by CO2 sensor.

13.2 Measurement preparation

■ CO2 Module with desiccant bottle：

1. Connect the dehydration bottle to the CO2 measurement assembly as shown below.

CO2 measurement module

2. Go to the CO2 menu and select the measurement mode to start the measurement.

⚠Warning： Observe the water level in the dehydration bottle, do not exceed the highest water level, replace the dehydration bottle in time, and waterproof enter the module.Please be careful to keep the sampling tube clean to prevent the dust from clogging into the pipe.

Note: the dehydration bottle and the sampling tube are for one-time use, please use the products supplied by the manufacturer or specified model.

13.3Setting CO2 parameters

■ CO2 Setting

Alarm switch　Select "ON" to alert and store CO2 parameters when they are alarm.Select "OFF" do not alarm, and in the screen parameter area next to CO _ 2 prompt.

Alarm level　Optional low, medium, high.High is the most serious alarm, followed by medium and low.The "alarm level" change affects only CO2 parameters.

High limit of CO_2 alarm　Used to adjust the upper limit of EtCO2 alarm.Set the range of: 1 to 99 continuously adjustable, no less than the lower limit.

CO_2 alarm limit　Used to adjust the upper limit of EtCO2 alarm.Set the range of:0 to 98 continuously adjustable, no less than the lower limit.

NS alarm limit　Upper warning limit for adjusting InsCO_2。

AWRR alarm limit　Used to adjust the alarm upper limit of AwRR.

AWRR alarm low limit　Lower alarm limit for adjusting AwRR。

Waveform velocity　Select the speed of the respiratory waveform, optional“**6.25mm/s 、10.5mm/s**”。

Pressure unit　The display unit used to change the parameters of CO2 and InsCO2. Optional "mmHg" or "KPA"。

■ CO_2 Other settings

Waveform gain Select the gain of the respiratory waveform, choose "low, high".

Work pattern Set measurement or standby.

O2 Compensate Setting range 0-100

Equilibrium gas Choose the type of equilibrium gas, can choose "indoor air, carbon dioxide, helium gas." When the main component of the patient's breathing gas is air, choose indoor air; when the main component of the patient's breathing gas is carbon dioxide, carbon dioxide should be selected. and so on

Anesthetic gases Setting range 0.0-20.0

Gas temperature Setting range 0.0-50.0

Atmos Set up to measure atmospheric pressure. Turn the dial. 1 mmHg per increase or decrease。

Computing cycle Can choose a breath、10 seconds、20 seconds。

13.4 Calibration

The instrument has been calibrated before the factory, generally (except the following three cases) users can directly measure.

When the following three situations occur, calibrate the gain of the side-flow CO2 module:

1. CO2 module were used for six months to one year;
2. Clinicians suspected the accuracy of readings;
3. After the last calibration , there was a significant change in atmospheric pressure or altitude .

⚠Warning：Users are advised to perform calibration operations under the guidance of technical service personnel authorized by the manufacturer.f an incorrect calibration procedure is performed, it may lead to incorrect readings .

13.5Discharge of waste gas

A exhaust pipe is connected to the exhaust hole of the module to discharge the sampled gas to the exhaust gas treatment system.

13.6 Matters needing attention in use

⚠Warning：

◆ Place sensor cables carefully to reduce the risk of twining or tightening.

◆ Reuse, removal, cleaning, or disinfection of disposable airway adapters can affect function and system performance, leading to user or patient risk.If the reuse of a one-time product, its performance can not be guaranteed.

◆ Check that the airway adapter is damaged before using it.If damage is found, please do not use it.

◆ If excessive secretion is found on the airway adapter, replace it immediately.

◆ When monitoring a carbon dioxide waveform, check the airway adapter or sampling tube if the change or abnormal phenomenon is found. If necessary, please replace it immediately.

◆ Observe whether the baseline of the CO2 waveform is too high, sensor or patient problems can cause the baseline to be too high.

◆ Regularly check carbon dioxide sensors and pipes for excess moisture or discharge accumulation.

◆ Do not use carbon dioxide sensors when they are wet or externally condensed.

◆ Do not use carbon dioxide modules for patients who cannot afford to extract 50ml/min ±10ml/min samples from respiratory circuits.

■ Do not connect the exhaust pipe to the breathing loop.

⚠Warning：

◆ Only accessories supplied by the manufacturer can be used.

◆ **Sensors cannot be immersed in liquids or disinfected.**

◆ **Please clean in accordance with section 16 of this specification.**

◆ **Never mind pulling the sensor cable.**

◆ **When aerosol drugs are present, keep the airway adapter away from the respiratory loop.The aerosol's stickiness can contaminate the window of the air channel adapter and need to be cleaned or replaced in advance.**

◆ **Explain：**

◆ **Sensors and accessories are free of latex。**

◆ **When the sensor reaches service life, it should be processed in accordance with local requirements.**

◆ **Laughing gas, helium and excessive oxygen concentrations all affect carbon dioxide measurements.Please set up various kinds of compensation according to the actual situation.**

◆ **In order to meet the precision of the sensor, please set up the atmospheric pressure compensation according to the actual situation.**

◆ **Do not place airway adapters in ET tubes and elbow breathing circuits, which can cause the patient's secretions to accumulate in the airway adapters.**

◆ **Place the window of the airway adapter in a vertical position rather than in a horizontal position.This prevents the patient's secretions from gathering in the window.**

Chapter 14 Maintenance and cleaning of systems

⚠ **Warning：Before cleaning monitor or sensor, remember to turn off the power and turn off AC power.**

14.1 Cleaning of monitor

Cleaning of monitor

✧ Most commonly used hospital cleaning fluids and non-corrosive detergents can be used, but note that many of them must be diluted before they are used. Follow instructions from the detergent manufacturer.

✧ Avoid alcohol, amino or acetone based detergents.

✧ Monitor case and screen should be kept free from dust and can be cleaned with soft velvet cloth or sponge soaking with detergent.When cleaning, be careful not to pour liquid onto the instrument and ensure that no liquid is entered inside the instrument.Monitor side panel has all kinds of cable socket, wiper to be careful to ensure that no water enter.

✧ Do not use abrasive materials such as wire brushes or metal polishing agents, which can cause damage to monitor panels and screens.

✧ Do not soak the monitor in the liquid.

✧ When the plug of the cable or accessory is occasionally wet , rinse with distilled water or deionized water and cool it in a 40°C~80°C environment for at least 1 hour .

14.2 Battery maintenance and maintenance

The monitor is equipped with a rechargeable battery to ensure that the the monitor can work continuously when the AC power is broken, and it is not need special maintenance under normal conditions.

■ **Lithium-ion battery**

At least two full optimization cycles should be guaranteed when the battery is first used.A complete optimization cycle: uninterrupted charge, then discharge until the monitor shut down.Battery life should be optimized regularly during battery use.It is recommended that the battery be optimized for every two months of use or storage, or when the operating time of the battery is significantly reduced.

When optimizing, refer to the following steps:

- Disconnect the monitor from the patient and stop all monitoring and measurement;
- Put the battery that needs to be optimized into the battery tank of the monitor;
- Connect the monitor to AC power supply and charge the battery continuously for more than 6 hours.
- Disconnect AC power and use batteries to power the monitor until the monitor is shut down；
- Reconnect the monitor to the AC power supply and charge the battery continuously for more than 6 hours;
- The battery is optimized.

⚠ **Warning：Do not remove the battery, put it in the fire or short-circuit it.Battery burning, explosion or leakage can cause personal injury.**

14.3 Cleaning and disinfection of accessories

■ **ECG cable**

Recommended disinfectants include: glutaraldehyde solution 10% bleach solution.

- ■ Please clean the cable before disinfection.
- ■ Clean the surface of the cable with soft cloth and proper amount of water or neutral soapy water;
- ■ Use a soft cloth with a proper amount of disinfectant to scrub the cable;
- ■ Wipe the remaining disinfectant on the cable with a soft cloth with clear water;
- ■ Dry the cable in a cool environment.

⚠ **Warning：**

- ✧ Do not use high pressure, rays or steam to disinfect cable leads.
- ✧ Do not immerse the cable lead wire directly in liquid.
- ✧ To avoid long-term damage to the cable, it is recommended to disinfect the product

only if the hospital regulations you follow deem necessary.

✧ Do not wash and reuse disposable electrodes.

1. Blood oxygen transducer

Recommended disinfectant: 70% isopropanol solution.10% bleach solution may be used for disinfection only with lower standards.Do not use undiluted bleach 5. 25% sodium hypochlorite) or other unrecommended disinfectant solution to avoid damage to the sensor.

Cleaning and disinfection methods can be referred to ECG cable cleaning and disinfection methods.

⚠**Warning:**

✧ Do not use radiation, steam or ethylene oxide to disinfect the sensor.

✧ Do not immerse the sensor directly in liquid.

✧ To avoid long-term damage to the sensor, it is recommended to disinfect the product only if the hospital regulations you follow deem necessary.

2. Body temperature trans

Recommended disinfectant: 70% isopropyl alcohol solution, glutaraldehyde solution ,10% bleach solution.

Cleaning and disinfection methods can be referred to ECG cable cleaning and disinfection methods.

⚠**Warning:**

✧ Repeated disinfection and reuse are not allowed for one-time temperature sensors.

✧ To avoid long-term damage to the sensor, it is recommended to disinfect the product only if the hospital regulations you follow deem necessary.

✧ The temperature sensor can only tolerate a temperature of 80~100 degrees centigrade for a short time and can not be heated more than 100 degrees centigrade.

3. Noninvasive blood pressure cuff

✧ Please carry on the regular cleaning to this product;

✧ Remove the cuff from the connector and remove the airbag from the outer skin;

✧ The clean medical soft gauze pad or other soft cleaning tools should be soaked in clear water or neutral soapy water. After drying the gauze, dry the excess air and wipe the air bag and catheter;

✧ Wash cuff skin in clean neutral soap water;

✧ After washing the skin and air bag fully dry, Put the air bag into the sleeve band and it can be used again.

⚠**Warning:**

- Excessive, multiple cleaning of the airbag, may cause damage to the airbag, unless necessary, please do not clean the airbag.
- Air bags and skins shall not be dried at high temperature.
- For a higher disinfection grade, use a disposable cuff.
- The disposable cuff can only be used for a patient.
- The water and the cleaning solution must not enter the coupling parts of the cuff and the monitor .

4. Carbon dioxide sensor

- Recommended disinfectant: 70% isopropanol solution , 70% alcohol solution
- Cleaning and disinfection methods can be referred to ECG cable cleaning and disinfection methods.

Warning:

◆ Do not sterilize the sensor in a high pressure container. Do not immerse the sensor directly in a liquid.

◆ Do not pull or squeeze the sensor extension line when in use.

◆ Sensors cannot work below 10 ℃ or above 35 ℃.