Multi-parameter monitor
Instruction manual

Thank you for using the latest multi-parameter monitor (the monitor).

As soon as possible in order to make you can skillfully operate the monitor, provided us with the detailed specification (in this instruction manual), the first time you install and use the instrument, please read carefully.

Based on improving the need of parts and equipment performance and reliability, we sometimes for instruments (including hardware and software) to make some changes, at the appointed time, we will try to change or add information, but could still do not agree on some description, please understanding. If there is any error or omission in the instruction manual, you are welcome to correct your correction.

declaration

The contents and version Numbers contained in this manual may be updated without prior notice due to changes in the software or technical specificat

ions.

Modify the translation result of this manual version number: 1.0

Manufacturer's responsibility

Only under the following circumstances shall the manufacturer assume responsibility for the safety, reliability and performance of the instrument:

1、Assembly, expansion, readjustment, improvement or maintenance of personnel recognized by the manufacturer;

2、installation location of electrical safety compliance with national standards;

3、The use of the instrument is performed according to the operation requirements.

Orders to record

Chapter 1 main structure composition

Multi-parameter monitor by the host, ECG leads, noninvasive blood pressure cuffs, body temperature sensors, pulse oximetry sensors and carbon dioxide plug-in modules.

Chapter 2 The scope of application

Suitable for monitoring and measuring vital signs such as heart rate / pulse rate, noninvasive blood pressure (systolic pressure, diastolic pressure, mean pressure), respiratory rate, electrocardiogram, oxygen saturation, body temperature and end-tidal carbon dioxide in medical units for adults and children .

Chapter 3 Contraindications, precautions

3.1 contraindications

The instrument does not belong to the treatment equipment, this product is no contraindication

3.2 Precautions

⚠ **caveat:：**

Multi-parameter monitor is used for clinical patient monitoring, only allow the doctors and nurses to use the monitor.

Do not open the case of the instrument to avoid possible electric shock hazard. Any maintenance and upgrades to the monitor must be performed by trained and authorized service personnel of the company. Do not use this apparatus where flammable substances such as anesthetics are contained in case of explosion.

Electrical surgical equipment causing electromagnetic interference or grid overload will damage or affect the operation of the monitor. Before use, the user should check the instrument and its accessories can work normally and safely.

To prevent delays in treatment, make adequate alarm settings for each patient. At the same time should ensure that the alarm can be issued when the alarm sound.

Interconnection with the monitor Equipotential body should be formed (equipotential bonding wire active connection).

This equipment is not suitable for use in electrosurgical equipment.

Packaging must be handled according to the currently implemented Waste Control

Code and placed in a place out of the reach of children.

It is recommended that the equipment be checked once every other year, and the calibration should be submitted to qualified third-party agencies for verification in accordance with the verification procedures prescribed by the state authorities

The monitor can provide some measurement parameters, recorders and other optional features, this user manual is for the maximum configuration, your model may not provide some parameters such as monitoring functions or records.

⚠ note：

When the products and accessories described in this manual are about to expire, they must be disposed of according to the relevant product handling practices. If you wish to learn more about this information, please contact us or your agency.

When in doubt about the integrity of the external grounding of the monitor and its arrangement, you must use its internal battery for operation.

Chapter 4 Overview

4.1 Introduction to the monitor

Parameter monitor is a novel structure, small size, AC and DC equipment, with a built-in battery to facilitate patient transfer. Adult and pediatric patients can be monitored and measured for vital signs such as heart rate / pulse rate, noninvasive blood pressure (systolic pressure, diastolic pressure, mean pressure), respiratory rate, electrocardiogram, oxygen saturation, end-tidal carbon dioxide and body temperature.

working environment:

Temperature: Operating temperature 5 ~ 40 (C)

Transport and storage temperature -20 ~ 55 (C)

Humidity: Operating humidity ≤ 85%

Transport and storage humidity ≤ 93%

Supply voltage: DC12V @ 2A

⚠ **note：**

Do not use the monitor outside the manufacturer's specified temperature and humidity range or you will not be able to achieve the performance specifications stated in Appendix II.

⚠ **note：**

This monitor is limited to one patient at a time.

Multi-parameter monitor feature-rich, suitable for adults, children's clinical care. Users can also according to different needs, choose different measurement parameters configuration.

The monitor can monitor ECG, RESP, SPO2, NIBP, TEMP and CO2. It integrates the fu nctions of the parameter measurement module with the display to form a compact and li ghtweight monitor. Its built-in battery provides patient movement with ease and clearly displays the waveform and all monitoring parameters on its high-resolution display interf ace.

The monitor's power switch "" is located on the monitor front panel. AC indicator "AC" is located on the right side of the power switch, when the instrument AC power, the l ight green, charging light "POWER" is located above the AC indicator light "AC" light, when the monitor uses the internal rechargeable battery, the light green. Alarm ALARM is located in the upper right of the machine, when an alarm occurs, this light flashes.

The sensor jacks are located on the right side of the instrument front panel while the o ther jacks and outlets are located on the left panel.

The monitor has a friendly user interface, through the front panel keys and encoders to complete all operations, details, see the function button section.

Definitions Abbreviations:：

name	Definition, abbreviation	name	Definition, abbreviation
ECG	Electrocardiogram	HR	Heart rate
RESP	Breathe	RR	Respiratory rate
TEMP	body temperature	PR	Pulse rate
NIBP	Noninvasive blood pres sure	CO2	carbon dioxide
SPO2	Oxygen saturation		

4.2 monitor appearance and structure

Figure 4-1 7 inch monitor appearance

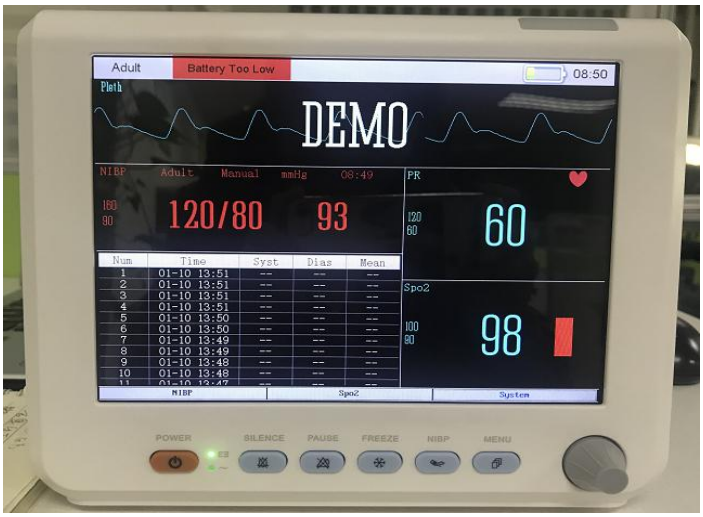

Figure 4-2 8inch monitor appearance

4.3 various types of socket

Figure 4-3 Power connector and network connector on the side panel

Logo	Logo Description
	CF type application part
	Type BF application section
	note! Please check the monitor's random files (this manual)!
	Alternating current (AC)
	network port
ECG	Electrocardiogram Abbreviation, where the ECG parameters
RESP	Respiration Abbreviation, here respiratory parameters
S_PO_2	Pulse Oxygen Saturation abbreviation, where the oxygen parameters
TEMP	Temperature abbreviation, here indicates the body temperature parameters
NIBP	Non-invasive Blood Pressure abbreviation, where non-invasive blood pressure parameters

CO_2	End tidal carbon dioxide abbreviation, where the carbon dioxide parameters

4.4. Keypad area identification and operation instructions

Logo	Logo Description	Function key operation instructions
	Power Indicator	When the monitor is connected to AC power through the power cord, the indicator light is on and green.When the monitor has no AC power, the indicator lights up green when powered by the built-in battery.
	switch	Press this button once, the monitor is turned on. Press the button again, the monitor turns off.
	Freeze (or thaw) /Real-time record	Press this button: Freeze (or unfreeze) the waveform.
	Alarm suspended	Suspend the alarm sound, and a 2-minute countdown.
	Alarm silence	Can turn off all sounds.
	Start(stop)measure blood pressure /rapid measurement	Press this button: start (or stop) the air pump, start (or end) no
	menu	Press this button to pop up the menu options.

4.5 display interface introduction

The screen of the monitor is a color LCD screen, which can simultaneously display th

e collected patient parameters, waveform parameters, and alarm information provided by the monitor, the status of the monitor, the clock, and other prompt information.

The main screen is divided into four areas (as shown in Figure 4-5):

1.Information area

2.the waveform area

3.the parameter area

4.the menu area

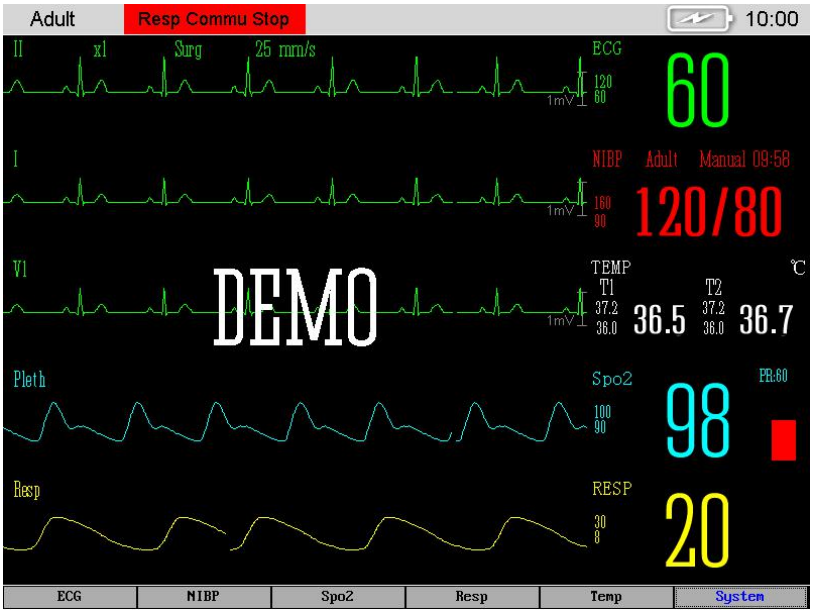

Figure 4-5 shows the main interface (demo interface)

4.5.1 Information Area Introduction

The information area is at the very top of the screen and shows the current status of th e monitor and patient. The meanings of the information area are as follows:

"Adult" refers to the type of patient being monitored.

"10:31" refers to the current time.

Other prompts in the message area appear and disappear correspondingly to the monitore d parameter status, such as:

1, Report the status of the monitor or sensor and pinpoint the area behind "Adult"

2, for example, monitor alarm message:

 Is the alarm pause time mark. When this button is pressed, "  " indicates that all alarm sounds have been temporarily disabled until the "  " button is pressed again o r the alarm pause time is over and the system resumes sound. The alarm is paused for "120 seconds."

 Mute alarm sign. Pressing the "  " button appears when this symbol indicates th at all alarm sounds have been artificially turned off. The voice prompt will not be resto red until the operator presses the "  " key again to release the mute state or a new alarm event occurs in the system.

 note：

- When the alarm volume is set to 0, the system will not be able to give a wa rning sound, so the operator should exercise caution when using this function.
- When the on-screen waveform is frozen, the prompt "" window appears in the message area above the monitor screen.

patient parameter alarm information appears in the corresponding area.

4.5.2 Waveform / Menu Area Description

- The waveform area shows 4 waveforms. Under the maximum configuration, the syst em can display 2 ECG waveforms, SPO2 plethysmogram and respiratory waveform i n the waveform area.
- The name of the waveform is displayed at the upper left of the waveform of each channel. The ECG leads can be selected according to requirements. Each channel E

CG also shows the channel gain and ECG wave filtering. When the menu is popped up during screen operation, the menu always occupies a fixed position in the middle of the waveform area, leaving a portion of the waveform temporarily invisible. Exit from the menu to restore the original screen display.

■ Set the rate of refresh, the adjustment of the waveform refresh rate, see the settings of each parameter.

4.5.3 Parameter Area Introduction

The parameter area display position is related to the selected interface. The parameters displayed in the parameter area are:

ECG

- heart rate or pulse rate (unit: stroke / minute)

Oxygen saturation SPO2

- Oxygen saturation SPO2 (unit:%)

- Pulse rate (unit: stroke / min) (displayed when heart rate source is selected for "Simultaneous" option)

(Heart rate source Spo2 ECG parameter zone display pulse rate, select Auto (priority) is displayed in the heart rate, heart rate is displayed only when the pulse rate)

Non-invasive blood pressure NIBP

In order from left to right are systolic blood pressure, diastolic blood pressure, mean pressure; (unit: mmHg mmHg or kPa)

- Recalls the storage of up to 100 patient blood pressure data, and even if the shutdown, as long as the default configuration is not made, the data will not be lost.

Body temperature TEMP

- Temperature (Celsius ° C or Fahrenheit ° F)

Respiratory RESP

- Respiration rate (unit: times / min)

Breathe end carbon dioxide CO2

- Carbon dioxide concentration (unit:%, kPa, mmHg)

4.5.4 alarm lights and alarm status

- Normal state, the warning light does not shine.
- When an alarm occurs, the alarm light flashes or lights constantly. The color of the light represents a certain alarm level. For details, see the chapter "Alarm".

For the details of alarm information and message, please refer to relevant parameters in relevant chapters.

4.6 key functions and basic operations

The operation on the monitor can be done with the keys and the encoder. As show n in Figure 6-1:

Silence (SILENCE)

Press this button, you can block all sounds (such as alarm sound, heartbeat sound, pulse sound, keyboard sound). And in the information area with "" symbol display, press the button again to restore all sounds and cancel the "" symbol.

note：

If a new alarm occurs while the alarm is pending / mute, the alarm suspend / mut e is automatically canceled. See the alarm section for details.

note：

Whether or not the alarm can be recovered depends on whether the alarm is still p resent. However, press the mute button to permanently turn off the ECG lead off a nd SPO2 sensor off alarm.

- **PAUSE alarm**

Press this button to suspend the alarm for up to 2 minutes.

- **Blood pressure (NIBP)**

Press this button to begin inflating the cuff for blood pressure measurement. During the measurement, press this key to abort the measurement and deflate.

- **FREEZE**

Press this key to enter the frozen state (temporary still, at this time you can better observe the screen), then press this key, the system thaw, the screen back to custody s tatus.

- **Rotary encoder (referred to as encoder)**

The user can turn the encoder, select a menu item and modify the settings.

Encoder can be rotated clockwise or counterclockwise, can also be pressed operat ion. Users can use the encoder to complete the main screen, the system menu, all the p arameters in the menu operation.

4.6.1 Encoder to operate the screen method

The rectangular mark on the screen that moves as the encoder rotates is called the cursor. Where the cursor can stay where you can operate. When the cursor is on a spec ific item, the user can open the relevant menu and set the relevant information.

The operation method is as follows:

- Move the cursor to the item to be operated.

- Press the encoder.
- The system will appear one of the following conditions:
  - ✧ Pop-up menu or measurement window on the screen, or the original menu is replaced by a new menu.
  - ✧ The underlined cursor changes to an uncolored box, indicating that the contents of the box can change as the encoder rotates.
  - ✧ Pressing the encoder to make the selection changes to an underlined box, which means that if this is selected, a certain function will be performed immediately.

4.7 Monitor external interface

In order to facilitate the operation, different interfaces are located in different parts of the monitor.On the left side of the monitor is the sensor's socket, as shown in Figure 4-5:

ECG：ECG lead wire socket

S_PO_2：Blood oxygen probe socket

NIBP：Cuff with tracheal socket

TMP：Body temperature probe socket

Figure 4-5 Sensor Jack

4.8 built-in rechargeable battery

Multiparameter monitors come with a built-in rechargeable battery. When connected to A

C power, the battery will automatically charge until it is full. When the device network power is off, the monitor will seamlessly switch to battery power, to maintain the normal operation of the device. In the case of 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 operating on battery power, the monitor alerts you when the battery is low. When the battery is exhausted, the monitor triggers an advanced alarm, a continuous "beep ..." sound, and a message saying "Battery voltage is too low". At this point should be plugged in AC power, instant battery charging, about 2-3 hours of charge capacity can reach about 90% of battery capacity. If you still use the battery-powered, then the battery consumption indicator can indicate changes in battery capacity, power alarm alarm for the remaining grid to start the alarm, the remaining 5% of the red, empty for one minute off countdown.

note：

Dispose of batteries according to local government departments, the relevant laws and regulations to deal with, or pay with the environmental protection department for recycling.

note：

The state of charge of the battery does not reduce the performance of the device.

note：

If you will not be using the machine for an extended period of time, remove the battery.

caveat：

When defibrillators are used in patients, defibrillator discharges act on the device, t he device should take special precautions.

caveat：

This device is not suitable for patients with cardiac pacemaker and electrical stimul ator.

Chapter 5 Installation of the monitor

5.1 out of the box and check

Carefully remove the monitor and accessories from the box and save the packaging materials for later shipping or storage. Please click on the packing list to count the accessories.

Check for any mechanical damage.

Inspect all exposed wires and insert some accessories.

When installing, leave a minimum of 2 inches (5 cm) around the monitor to allow air circulation. The environment in which the monitor is used should be reasonably safe from vibration, dust, corrosive or explosive gases, extreme temperatures and humidity, and more.

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

5.2 Electrical connection

Connect the output of the monitor's power adapter to the monitor and plug the power plug into a grounded 3-wire power outlet.

⚠ **note：**

Connect the power adapter to the hospital socket.

When there is a battery, the battery must be charged after the instrument has been transported or stored. So do not connect the AC power and boot directly, may be because of lack of battery power, so that the instrument does not work. Turn on the AC power to charge the battery, regardless of whether the monitor is turned on or not.

5.3 Power on

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

Do not use this monitor if you notice signs of damage to the monitor's function or if an error message appears Person, and please contact the hospital's biomedical engineers or the company's maintenance engineers.

⚠ **note：**

In the self-test process if a fatal error, the system will alarm.

⚠ **note：**

Check all the monitoring functions that can be used to ensure that the monitor functions properly.

⚠ **note：**

If equipped with a battery, then the battery must be charged after each use to ensure that there is sufficient power reserve.

7.4 Sensor Connection

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

⚠ **note：**

Various sensors for the correct connection and related requirements, see the rele vant chapter.

Chapter 6 System Menu

Patient type

Demo function

work interface selection

key volume

Pulse volume

Alarm volume

Default setting

System time setting

The monitor's flexible configuration, guardianship content, waveform scanning speed can be configured by the user as needed. Select SYSTEM Press the "Encoder" key, the pop-up menu shown in Figure 6-1, and can do the **following:**

Figure 6-1 System Menu

6.1 Patient Information Management

In the system menu, select "Patient Type", the user can choose to "Adult" or "Child " for custody.

6.2 Demo function

In the "System Menu" select "Demo", through the "ON" or "OFF" to select whether the system into the demo waveform state. Demo waveforms are simulation demo waveforms that manufacturers set up to demonstrate machine performance and to help users train. In actual clinical use, disable the demonstration waveform because it may cause medical st aff mistakenly think it is monitoring the patient waveform and parameters, affecting patie nt monitoring, diagnosis and treatment of delays. So there will be DEMO tips in the mi ddle of the demo screen, as shown in Figure 6-2.

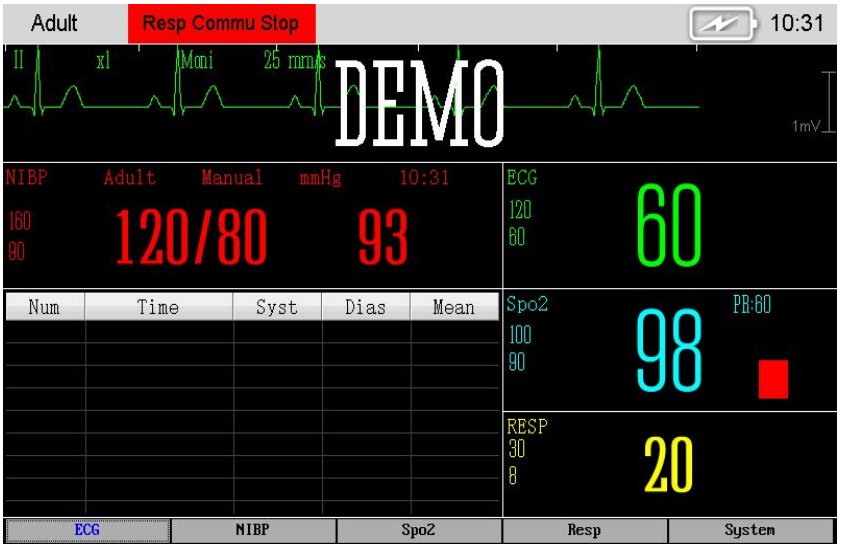

Figure 6-2 Demo

6.3 working interface selection

In the "System Settings", select the "Interface" option, there are a variety of work i nterface options, the user according to their own monitoring needs to choose a different interface.

6.4 button volume

In the "System Settings" menu, select "Key Volume", turn the encoder to set the ke

y volume. The options are "0", "1", "2", "3" and "4" four levels. "0" is the volume off, the greater the number the greater the volume.

6.5 pulse volume

In the "System Settings" menu, select "Pulse Volume", turn the encoder to set the h eartbeat volume. The options are "0", "1", "2", "3" and "4" four levels. "0" is the volu me off, the greater the number the greater the volume.

6.6 alarm volume

In the "System Settings" menu, select "Alarm Volume", turn the encoder to set the alarm volume. The options are "0", "1", "2", "3" and "4" four levels. "0" is the volume off, the greater the number the greater the volume.

caveat：

When the system alarm volume is turned off ("0" is selected), the monitor can not sound an alarm if an alarm occurs. Therefore, the operator should use this func tion with caution.

note：

The "0 to 4" status in "Alarm Volume" is still valid on the next power-on. The ope rator should carefully check this function before use, to avoid the delay of the patient's treatment because the alarm sound is too small. In "System Settings" select "Default Set" "True" to restore the default settings, automatically revert to "2".

6.7 The default setting

In the "System Settings" menu select "Default Set", the user can select "False" or " True" whether to restore the default settings, select "False" means to deny recovery, sele

ct "True" means to restore the default settings.

6.8 system time setting

In the "System Settings", select the system time setting, time setting from year, mo nth, day, hour, minute and second to set. The hour and minute are displayed in the uppe r right corner of the main interface, for example: 18:10.

⚠ **note：**

The setting of the system time should be selected at boot time (if the user needs to set it), otherwise the time information may be provided incorrectly when reviewing the contents with the time information.

Chapter 7 patient safety

The monitor is designed to meet the relevant international safety requirements for m

edical electrical equipment IEC60601-1, EN60601-2-27 and EN60601-2-30. The system ha s floating input defibrillation and surgical knife protection. If the correct electrode (see ECG and Respiratory) is used and placed according to the manufacturer's instructions, th e display shows that the defibrillation is resumed within 10 seconds . This symbol indic ates that this application is part of IEC 60601-1 type CF equipment and is designed for special protection against electric shock (especially with F-type floating isolators for per missible leakage currents).

⚠ **caveat：**

During defibrillation, do not touch patients, beds or equipment.

surroundings：

Follow the instructions below to ensure the absolute safety of the electrical inst allation. The environment used by the monitoring system should be reasonably safe from vibration, dust, corrosive or explosive gases, extreme temperatures, humidity and more. When installed in the cabinet, there should be enough space in front for easy operation. With the cabinet door open, there should be enough space behind for easy maintenance. Should ensure that the cabinet air circulation.

Guardianship system in the ambient temperature of 5 ℃ ~ 40 ℃ below the wo rk to meet the technical indicators. Ambient temperatures outside this range may affect t he accuracy of the instrument and cause damage to components and wiring. Allow at lea st 2 inches (5 cm) of room around the instrument to allow air circulation.

7.1 Power Requirements

Please refer to the product specifications chapter.

7.2 Monitor ground

To protect patients and medical personnel, the monitor's housing must be grounded. If you do not have a three-wire outlet, consult a hospital's electrician.

⚠ caveat:

Do not connect the instrument's three-wire cable to the second plug.

Connect the ground wire to the equipotential ground terminal of the instrument. If it is not clear from the specifications of the instrument whether a particular combination of instruments is dangerous, for example because of the risk of leakage current build-up, the user should consult the relevant manufacturer or other specialist in order to ensure that all of them Necessary security will not be damaged by the proposed combination.

7.3 Interpretation of the symbols used on the monitor

 Note, see random information (this manual).

 Description of the application components are CF type.

 Description of the application components are BF type.

 **Boot, shut down.**

 Equipotential ground.

Chapter 8 Call the police

This chapter describes the general information about the alarm and the action to be taken when the alarm occurs.

You can get the alarm and prompt information of each parameter in the chapter of each parameter setting.

8.1 Overview

The so-called alarm refers to the monitor when the patient is occurring enough to c ause changes in the vital signs of the user or failure of the machine itself so that patien t care can not be carried out smoothly when the monitor made to the user prompts.

8.2 Alarm Properties

8.2.1 Alarm Type

There are two types of alarms: If this alarm is due to a change in the patient's vita l signs, that is, the patient's physiological parameters exceed a specified range or the pat ient experiences a physiological abnormality that can not be measured by a single physio logical parameter, ; If this alarm originates from the machine itself, it is called a techni cal alarm because of an alarm that occurs when the patient care can not be accurately p erformed due to a technical obstacle in the use of the monitor or a malfunction of the machine itself.

8-1 Examples of Physiological and Technical Alarms

Patient or machine condition	**Alarm category**
Patient heart rate was measured as 114BPM, exceeding the user-defined heart rate alarm range.	Physiological alarm
Found in patients with ventricular fibrillation	Physiological alarm
ECG measurement module found ECG lead off	Technical alarm
SPO2 measurement module has failed	Technical alarm

8.2.1.1 Physiological alarm classification

Physiological alarm is the patient's physiological parameters over a specific range, th e occurrence of physiological abnormalities. Including the ECG signal is too weak, the p ulse was not found, RESP heartbeat interference, RESP respiratory asphyxia.

8.2.1.2 Alarm level

Each alarm, whether it is a technical alarm or a physiological alarm, has a level-spe cific characteristic. The higher the level, the more alert the alarm system will be when t he alarm occurs. All technical alarm level users can not change. Some physiological alar m level can be set by the user, while others are not allowed to change after being speci fied by the system.

8.3 Alarm prompt form

When an alarm occurs, acousto-optic and text prompts will be made.

8.3.1 Acousto-optic characteristics

8-2 different levels of alarm sound characteristics and lighting characteristics

Alarm level	Alarm sound characteristics	Alarm light characteristics
high	Mode is "beep - beep - beep ------ beep - beep, beep - beep - beep ------ beep - beep", every 11 seconds a vocal (interval count is from the b	Alarm light flashes red, blinking fast

	eginning of this vocal Until the next vocal start)	
in	The mode is "beep - beep - beep", uttering every 25 seconds (the interval count is from the beginning of this utterance to the beginning of the next utterance)	Alarm light flashes in yellow, blinking slowly
low	The mode is "beep-" and sounds every 25 seconds (the interval count is from the beginning of this utterance to the beginning of the next utterance)	Always bright yellow

8.3.2 Textual characteristics

Background: The high alarm background is red, the medium alarm and low alarm background are yellow.

The color of the string: Except for the NIBP technology alarm indication area, it is always black regardless of the alarm level. The color of the string displayed by NIBP Technology Alarm Tips is related to the alarm level, the high alarm is red, and the medium and low alarms are yellow. When the measurement parameter exceeds the set alarm limit to induce physiological alarm, the alarm triggering parameter value flashes.

8.3.3 Other

A variety of different levels of alarm at the same time, the sound and light prompts according to the highest level of the current alarm tips.

8.4 Alarm status

8.4.1 Overview

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

Trigger Status: Status when the alarm is present.

Clear Status: The alarm does not exist.

All possible alarms at the start of the job are cleared, and when the alarm condition is met in the subsequent time, the alarm goes into the triggered state and any inherent delay of any alarm status is determined to be within 10 s.

- For the entire alarm system (ie for all alarms), the following states exist: Normal state: refers to the alarm in the trigger state can make all prompts (including sound, light and text) state.
- Alarm pause status: the alarm is in the trigger status, but the status of the acousto-optical character is not temporarily displayed.
- Alarm mute status: refers to the alarm in the trigger state, the light, text prompts but no voice prompts.
- Alarm sound off state: refers to the alarm volume is 0 state.

At each moment, the entire alarm system can only be in one state.

8.4.2 Alarm mute status

The silent state of the alarm means that any audible alert on the monitor (including alarms, keys, pulses, etc.) is turned off.

8.4.3 Alarm sound is off

The silent state of the alarm refers to the fact that the other sounds will not be tur ned off except when the alarm indicates that the sound is turned of.

8.4.4 Alarm pause state

When the alarm is paused, the following processing is performed

- Prohibit all alarm sounds, light prompts.
- Prohibit the text prompts of all physiological alarms.
- The physiological alarm description area shows how many seconds the alarm pauses, for a total of 120 seconds.
- Clear the sound and light alarm, the alarm prompts to prompt information.
- For the alarm that can be completely cleared, clear the alarm.

8.4.5 Status Switching

- Press "  " key to enter the alarm and alarm mute state, and then press "  " k ey to resume normal state.
- During the silent state, if there is a new technical alarm, the alarm will be paused and the normal state will be entered.
- During the silent state, if there is a new physiological alarm, the system is still in the alarm suspend state.

Any state:

- In the user settings, set the alarm sound switch is off, enter the alarm sound off.

■ In the user settings, set the alarm sound switch is on, enter the normal state.

8.5 Alarm Settings

Alarm settings for each measurement parameter

The setting of each parameter alarm is in the corresponding menu, for example: When entering the "ECG" menu, the relevant HR alarm settings can be set. As shown i n Figure 8-1

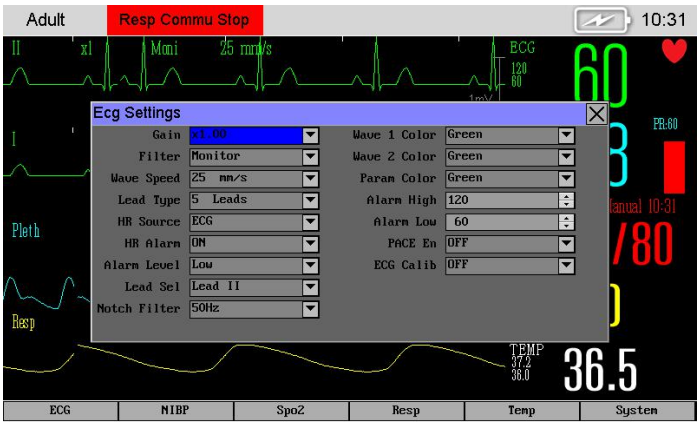

Figure 8-1

HR alarm settings:

Step 1:

Move the cursor to "ECG" in the parameter area on the monitor interface and click to enter "ECG" menu setting.

Step 2:

Users can set Gain, Filter Mode, Waveform Speed, Heart Rate Alarm, Alarm Level, Alarm High Limit, Alarm Low Limit, Heart Rate Source, Lead Type, , "Parameter color ", "waveform color", "heart rate calibration" and so on.

Users can use the spin button to move the cursor to the option to be set, press the spin button to set.

Other measurement parameters of the alarm settings can also be carried out in

accordance with the above method.

8.5.1 Sound switch settings

See Monitor Maintenance in System Setup for a description of the alarm sound swit ch.

8.5.2 Automatic alarm shutdown

Alarm off refers to the failure of the alarm function. At this point, even if the alar m conditions are met, the system does not do any alarm, alarm printing, alarm storage i s not carried out.

When a new measurement module is added or the measurement module just started working, all the alarms related to the module will be automatically shut down within 3 0 seconds after the module starts to work. The other alarms will not be affected.

8.5.3 lead off when switched on

At power on, if the open parameter module is not connected to the lead, it will al ways have a text message in the message area.

8.6 Parameter alarm

⚠ **caveat：Do not set alarm limits that exceed the limit value, which can cause t he alarm system to fail.**

In each parameter menu can set its own alarm parameters, and the user can set the alarm limit and alarm status,When the parameters can be set independently of the alarm switch.

For setting alarm parameters, when the value of one or several parameters exceeds t

he alarm limit, the monitor will automatically alarm and enter Line the following proces sing:

1) a prompt appears on the screen, the form as described in the alarm mode;
2) If the alarm volume is set, the alarm sound will be sent according to the set alarm level and alarm volume;
3) Alarm light flashes.

8.7 Measures to be taken when an alarm occurs

⚠ **note：**

When an alarm occurs, you should first check the patient's condition.

Alarm information displayed in the system information area or system alarm informa tion area, need to identify this alarm and take corresponding measures according to the alarm reason.

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, the alarm mute.

5) When the alarm condition is cleared, check whether the alarm is cleared.

In the parameter monitoring chapter can find the alarm information and tips on the parameters.

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

After the power is interrupted, as long as the power supply is restored, the alar m settings remain unchanged.

The alarm can be closed individually to enter the inactive state.

Termination of alarm signal inactive status: enter the alarm setting interface, ca

ncel the shutdown.

Chapter 9 ECG and Respiration (ECG / RESP)

9.1 ECG monitoring instructions

9.1.1 ECG definition

ECG monitoring produces a continuous waveform of the patient's ECG activity to ac curately assess the patient's current physiological status. For this reason Make sure the E CG cable is properly connected so that you can get the correct measurement. Monitor in

the normal working condition at the same time show 2 ECG waveform.

Guardian display parameters for the heart rate (HR), this parameter can be used as alarm parameters.

9.1.2 Precautions for ECG monitoring

⚠ **caveat：**

When using the monitor for ECG signal monitoring, you must use the ECG cable provided by our company.

⚠ **caveat：**

When you connect electrodes or patient cables, you should make sure that there is absolutely no contact with any other conductive part or ground touch. In particular, be sure that all ECG electrodes, including the neutral electrode, are attached to the patient to prevent them from Conductive components or ground contact.

⚠ **caveat：**

Using an uninsulated ECG cable can not be used on the monitor for defibrillation; on other monitors, the monitor can not be used for defibrillation unless it is defibrillation-free.

⚠ **note：**

Interference from ungrounded instruments near the patient and ESU interference can cause problems with the waveforms.

If operated in accordance with the conditions specified in EN60601-1-2 (resistance to radiation of 3 V / m), field strengths in excess of 1 V / m may cause measurement errors at various frequencies. Therefore, it is not recommended to use radio e

quipment near ECG / respiration measurement.

9.2 ECG monitoring methods of operation

9.2.1 Preparation

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

✧ skin is a poor conductor, so getting a good contact between the electrode and the s kin, the patient's skin preparation is very important.

✧ If necessary, shave the hair at the electrode placement.

✧ Wash the skin thoroughly with soap and water. (Do not use ether and pure alcohol as this will increase the skin's resistance).

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

2) Install the spring clip or button before placing the electrode.

3) Place the electrode on the patient. If using an electrode that does not contain conduct ive paste, apply a conductive paste before placing.

4) Connect the lead and patient cable.

5) Confirm that the monitor is powered on.

⚠ **caveat：**

■ **Check daily if the ECG electrode patch is irritating to the skin. If there is evidence of allergy, change the electrode every 24 hours or change the posit ion.**

■ **Before starting guardianship it is necessary to check that the leads are nor mal. After unplugging the ECG cable, the screen will display "Sensor Off"**

error message and trigger the audible alarm.

note：

To protect the environment from infection, used electrodes must be recovered o r disposed of properly.

9.2.2 Install the ECG lead

Five lead placement ECG monitoring electrode position

The lead of the five-lead unit is placed as shown in Figure 11-1.

■ RA white (right arm) electrode placed under the collarbone, near the right shoulder.

■ LA black (left arm) electrode placed under the collarbone, near the left shoulder. Acc ording to the following picture placed on the chest wall.

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

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

■ V brown (chest) electrode Figure 11-2 placed on the chest wall.

note：

The following table lists the European and American standards in the lead name. (In the European standard with R, L, N, F,

C for each lead, while US standards use RA, LA, RL, LL, V)

United States		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

Figure 9-1 5-lead electrode placement

⚠ **note：**

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

■ For a five-lead configuration, place the chest (V) lead electrode in one of the fo llowing positions, as shown in Figure 11-1:

■ V1 in the fourth right border of the intercostal space.

■ V2 in the left border of the 4th intercostal space.

■ V3 is in the middle of V2 and V4.

■ V4 in the middle of the left clavicle 5 intercostal space.

■ V5 in the left axillary line, the same level with the V4.

■ V6 in the left axillary midline, the same level with the V4.

■ The V3R-V7R is located on the right side of the chest wall and its position corr esponds to the left side.

■ The VE is located at the sarcoplasmic protuberance, and for the back "V" lead, place the "V" electrode in one of the following locations.

■ V7 in the back left axillary line 5th intercostal space.

■ V7R in the back right axillary line 5th intercostal space.

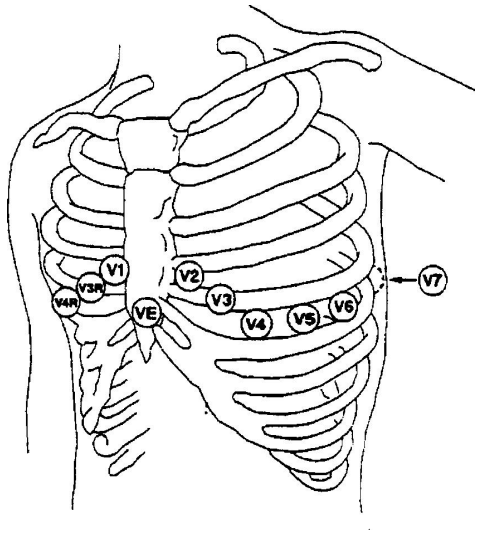

Figure 9-2 5-lead chest electrode placement

⚠ **note：**

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

ECG leads recommended for surgical patients Feature of a good signal:

- Tall, narrow and not cut.
- The R wave is large and lies completely above or below the baseline.
- Pacing signal is not greater than R wave height.
- T wave is less than 1/3 of R wave height.
- P wave should be much smaller than T wave.

In order to obtain a 1 mV calibration ECG wave, an ECG calibration should be per formed and the screen prompts "Can not monitor patient during calibration.

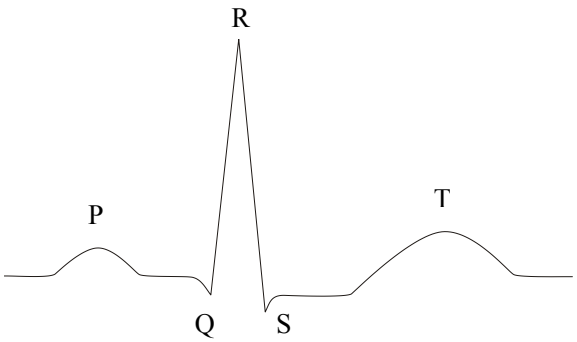

Figure 9-3 Standard ECG Waveform

The heart rate of the ECG wave shown in Figure 11-5 does not deviate by more th an ± 2% from the input heart rate after the device stabilizes for 20 seconds.

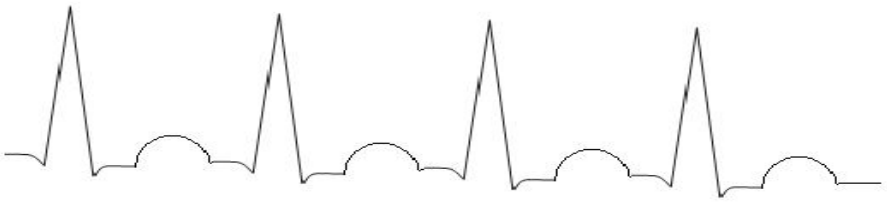

Figure 9-4

note：

If the electrode is glued correctly and the ECG waveform is not accurate, repla ce the lead.

note：

Interference from ungrounded instruments near the patient and ESU interference can cause problems with the waveforms.

9.3 ECG menu

ECG Settings menu

Turn the encoder, move the cursor on the main screen to "ECG" below the interface, and then press the encoder to confirm, the ECG setting menu will pop up, as shown in Figure 9-5:

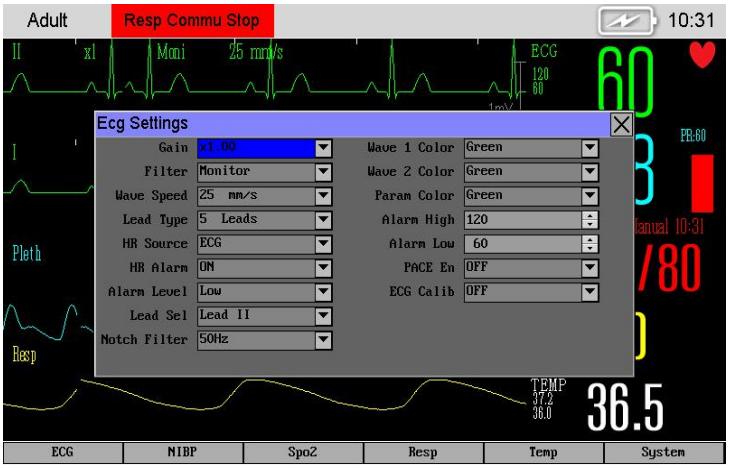

Figure 9-5 ECG Setup Menu

■ ECG gain

Can choose the gain of each calculation channel, the gain is × 0.25 × 0.5, × 1, × 2 fourth gear, when the input signal is too large, the peak may be truncated. In this case, the user can manually change the gain waveform of the ECG waveform by referri ng to the actual waveform to avoid incomplete waveform display.

■ Guardianship method

A "diagnosis", "custody", "surgery" three filtering options can be.

■ Waveform speed

ECG waveform scanning speed 12.5, 25.0 and 50.0mm / s third gear options.

■Lead Type: 3 leads or 5 leads can be selected

■ Heart rate Source: You can choose to detect the heart rate by ECG (ECG), SPO 2 (SpO2); if you select "Auto", the monitor determines the source of heart rat e based on the signal quality, and if provided by SPO2, indicates PULSE And pulse rate sound. When SPO2 is selected as the heart rate source, heart rate alarm judgment is not performed, but pulse rate alarm judgment is performed.

■ Heart Rate Alarm: Select "On" to alert and store the heart rate alarm. When "O ff" is selected, no alarm will be given.

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

■ Channel Settings: Each channel can be set 1, 2, 3, this setting is set when 3 leads are selected.

■ Filter frequency: you can choose "None", 50Hz, 60Hz.

■ Wave Color / Parameter Color Selection: You can choose from Yellow, Sapphire, Purple, Orange, Azure, Magenta, Cyan, Blue, Green, Red, White.

■ Alarm limit: used to set the heart rate alarm limit.

■ Lower limit of alarm: used to set the lower limit of heart rate alarm.

When the heart rate exceeds the high limit or lower than the low limit alarm.

⚠ note：

The upper and lower alarm limits should be set according to the clinical situation of each patient.

Heart rate alarm upper limit set in custody is very important. Should not set the ceiling too high, taking into account the factors of change,

Set the upper limit of heart rate alarm Do not beat heart rate higher than 20 stroke / min.

■ Pacing Analysis: You can choose "ON" or "OFF".

■ ECG calibration: select this ECG waveform will be automatically calibrated.

9.4 ECG alarm information and tips

Alarm information

There are two types of alarms that may occur in ECG measurement: physiological alarm and technical alarm. At the same time, the ECG measurement process may genera

te various kinds of prompt information. When these alarms or prompts appear, the visua l characterization and auditory characterization of the monitor can refer to the descriptio n in the Alarm Function chapter. On the display, physiological alarms and general infor mation (general alarms) are displayed on the monitor's alarm area, while technical alarm s and alarms that do not trigger an alarm are displayed on the monitor's information are a. When the alarm record switch in the relevant menu is turned on, the physiological al arms triggered by the parameters exceeding the alarm limit may trigger the recorder to automatically output alarm parameter values and related measurement waveforms.

The following classification list describes the various alarms that may be genera ted by this measurement section

Physiological alarm:

Prompt information	Cause	Alarm level
ECG is too weak	The patient's ECG signal can not be detected	high
HR is too high	The HR measurement is above the s et alarm high limit	User selectable
HR is too low	The HR measurement is below the s et alarm low limit	User selectable

Technical alarm:

Prompt information	the reason	Alarm	Countermeasures

		level	
ECG lead off	The ECG electrode comes off the patient or the ECG cable comes off the monitor	low	Make sure all the electrodes, leads and cables are connected properly.
ECG module communication stopped	ECG measurement module fault or communication fault	high	Ibid
HR alarm limit error	Functional safety fault	high	Stop using the HR alarm function Notify biomedical engineers or maintenance personnel of the company.
ECG interference is too large	ECG measurement signal is greatly affected by interference	low	Be sure to keep the patient quiet and ensure that the electrodes are connected reliably and that the AC power supply system is well grounded.

Prompt information (including general alarm information):

Prompt information	Cause	Alarm level
HR measurement bey ond the bounds	HR measurement is out of me asurement range	high

9.5 Respiration measurement

How is breath measured?

The monitor measures respiration from the thoracic impedance value of both electrod es, and the impedance change between the two electrodes (due to thorax activity) creates a respiration wave on the screen.

Breathing monitoring settings

Guarding breathing, do not need additional electrodes, but the placement of electrode s is very important. In some patients, due to their clinical condition, lateral expansion of their thorax leads to negative thoracic pressure. In this case, it is best to place the two breathing electrodes in the right midaxillary line and the region that is most active whe n breathing to the left of the thorax to obtain the optimal respiration wave.

⚠ **note：**

Breathing monitoring is not suitable for patients with large activity because it c an lead to false alarms.

RESP monitoring check:

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

2) Attach the spring clip or button to the electrode and secure the electrode to the patient as described below. Place electrodes for respiration measurement.

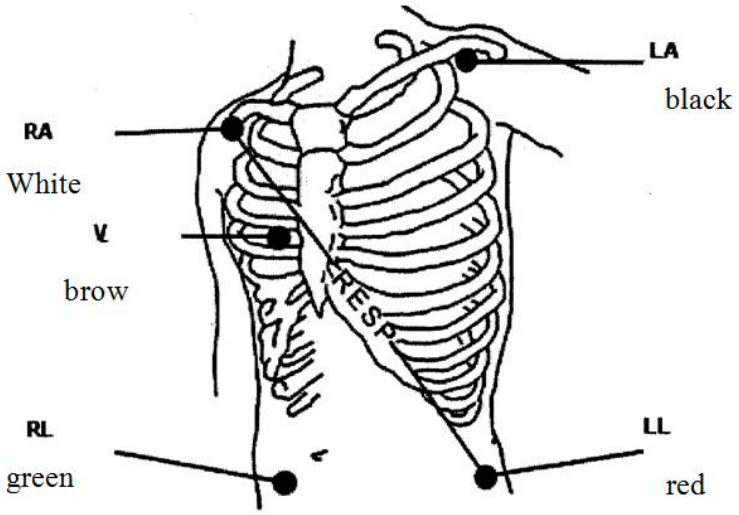

Figure 9-6 Electrode placement (five leads)

note：

Place the white and red electrodes diagonally to get the best respiration wave. Avoi d placing the liver and ventricle on the electrodes of the respiration electrodes so that ar tifacts caused by the heart covering or pulsating blood flow can be avoided.

RESP setting menu

Turn the encoder, move the cursor to "RESP" in the parameter area of the home sc reen, then press the encoder to enter "RESP Settings "menu, as shown in Figure 9-7.

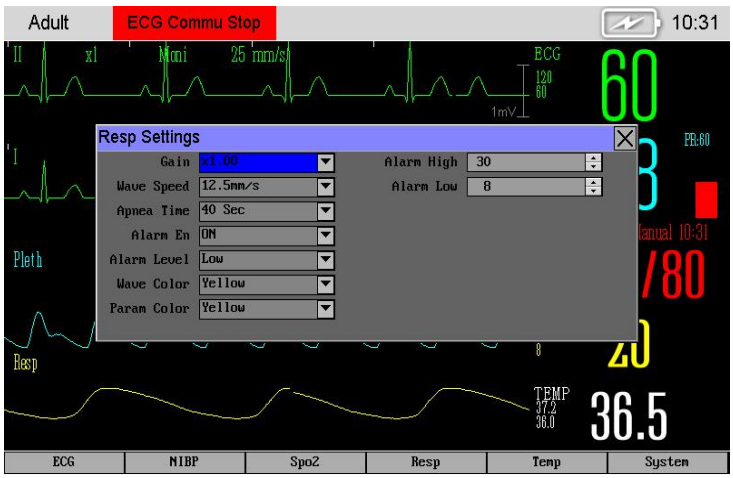

Figure 9-7 RESP Settings Menu

RESP setting

■ Waveform gain：The user can set the RESP waveform enlarged display, the magnification options are 0.25 / 0.5 / 1/2/4.

■ Wave speed: optional respiratory wave speed 6.25mm / s, 12.5mm / s, 25.0mm / s third gear.

■ Apnea alarm: set to determine the time of the patient suffocation, between 10 seconds to 40 seconds, 1 encoder per rotation Subtract 5 seconds, the user can also choose "Never" does not call the police.

■ Alarm switch: Select "On" to alarm when respiration alarm and storage, select "off" is not alarm.

■ Alarm level: Options are "high", "medium", "low". High means the worst alarm.

■ RESP waveform and parameter color options: You can choose from Yellow, Sapphire, Purple, Orange, Azure, Magenta, Cyan, Blue, Green, Red, White.

■ Alarm high limit: used to set the alarm high limit, the setting range 0-150.

■ Alarm low limit: used to set the alarm low limit, the setting range 0-150. Respiratory rate alarm is set high and low as the standard, when the respiratory rate exceeds the high limit or below the low alarm occurs.

RESP alarm upper and lower limits of the adjustment range is as follows:

	The maximum limit	Lowest limit	Single adjustment amount
RR adult	150	0	1
RR children	150	0	1

9.6 RESP alarm information and prompt information

Physiological alarms triggered by parameters exceeding the alarm limit will trigger the recorder to automatically output alarm parameter values and related measurement waveforms when the alarm record switch of the relevant item is on.

Physiological alarms, technical alarms and reminders that may occur during RESP measurements are listed in the following table:

Physiological alarm:

Prompt information	Cause	Alarm level
RR is too high	The RESP measurement is above the set alarm high limit	User selectable
RR is too low	The RESP measurement is below the set alarm low limit	User selectable
Resp Asphyxia	Breathing can not be measured for a specific time interval	high

Technical alarm:

Prompt information	the reason	Alarm level	Countermeasures
RESP alarm limit error	Functional safety fault	high	Stop using the RESP alarm function to notify the biomedical engineer or our service personnel.

Prompt information (including general alarm information):

Prompt information	Cause	Alarm level
RR measurement out of bounds	RR measurement is out of measurement range	high

Chapter 10 Oxygen saturation (SPO2)

10.1 Oxygen saturation monitoring instructions

SPO2 Guardianship definition

The SPO2 plethysmographic parameter measures arterial oxygen saturation, which is the percentage of total oxyhemoglobin. For example, if the total 97% of the hemoglobin molecules in the arterial blood red blood cells are bound to oxygen, the blood has 97%

SPO2 oxygen saturation and the monitor should read 97% of the SPO2 value. The SPO 2 value shows the percentage of oxy-hemoglobin molecules that form oxy-hemoglobin. S PO2 plethysmography parameters also provide pulse rate signals and plethysmographic wa ves.

SPO2 plethysmography parameter measurement principle

- Oxygen saturation was measured by pulse oximetry. This is a continuous, noni nvasive method of determining the saturation of hemoglobin oxygenation. It m easures how much of the light emitted from one side of the sensor's light sou rce passes through a patient's tissue (such as a finger or an ear) and reaches the receiver on the other side. The wavelength that the sensor can measure us ually red LED is 660nm, infrared LED is 940nm. The maximum LED output power is 4mW.
- The amount of light that passes through depends on many factors, most of wh ich are constant. However, one of these factors, arterial blood flow, changes o ver time because it is pulsatile. By measuring the light absorbed during pulsat ions, it is possible to obtain arterial blood oxygen saturation. Detecting the pu lsation itself gives a "plethysmographic" waveform and pulse rate signal.
- The "SPO2" value and the "plethysmography" waveform can be displayed on t he main screen.
- SPO2 in this manual refers to the functional oxygen saturation of the human body as measured by a noninvasive method.

⚠ **caveat：**

If there is carboxyhemoglobin, methemoglobin or dye-diluting chemicals, Sp02 va

lues will be biased.

caveat：

Do not place the sensor on a limb with an artery catheter or IV tube.

note：

Do not put the blood oxygen probe and blood pressure cuff blood pressure measure ment on the same limb, because blood flow occlusion during blood pressure measure ment Will affect the oxygen saturation reading.

note：

■Make sure nails cover the light.

■The probe line should be placed on the back of the hand.

note：

■ **Sp02 value is always displayed in a fixed place.**

■ **Pulse rate is only displayed under the following conditions:**

1) Set "Heart Rate Source" to "SP02" in the ECG menu.

2) Set Heart Rate Source to Auto in the ECG menu, and there is no ECG signal at this time.

note：

The Sp02 waveform is out of proportion with the pulse volume.

caveat：

Before starting guardianship, you should check if the sensor cable is normal. When unplugging the Sp02 sensor cable from the socket When you go, the screen will disp lay the error message "SENSOR OFF" and the alarm will be triggered at the same

time. Re-insert pass Sensor automatically remove the alarm.

caveat：

If the sensor package or sensor has signs of damage, do not use this SpO2 sensor a nd return it to the manufacturer.

caveat：

Continuous, prolonged monitoring may increase the risk of unwanted skin changes, s uch as abnormal sensitivity Sense, redness, blistering or compression necrosis.

10.2 Oxygen saturation monitoring method of operation

Sp02 plethysmography measurement

1) Turn on the monitor;

2) the sensor attached to the patient's finger on the appropriate location;

3) Insert the connector on the end of the sensor cable into the hole Sp02.

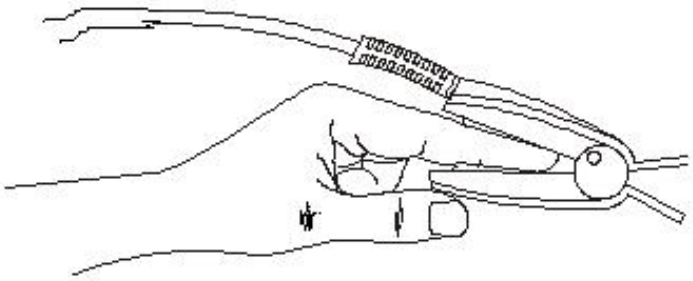

Figure 10-1 Adult SpO2 probe

note：

- If the test site and the probe can not be accurately positioned, may result in in accurate readings of oxygen saturation, or even pulse wave can not be searched

for blood oxygen monitoring, this time should be repositioned.

- Excessive movement of the measurement site may result in inaccurate measurements, in which case the patient should be quiet or change the measurement site to reduce the impact of excessive movement on the measurement.

⚠ **caveat：**

- In a long time continuous monitoring process, check every 2 hours around the measurement of peripheral circulation and skin conditions, if adverse changes, should promptly change the measurement site.
- During long continuous monitoring, the position of the probe should be periodically checked to avoid the influence of the change of the position of the probe due to the movement and other factors on the measurement accuracy.

10.3 Oxygen saturation monitoring measurement limit

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

- High-frequency electrical disturbances, such as interferences generated by the host system itself or interference from, for example, electrosurgical instruments connected to the system.
- Do not use the oximeter and the oximeter sensor during a magnetic resonance imaging scan (MRI). Induced currents can cause burns.
- Intravenous dye.
- Patients move too frequently.
- external light radiation.
- The sensor is improperly installed or in contact with the object.

■ sensor temperature (the best temperature should be 28 ℃ ~ 42 ℃ range).■Place the sensor on a limb with a blood pressure cuff, an arterial catheter, or an endolu minal tube.

■non-functional hemoglobin such as carboxyhemoglobin (COHb) and methemoglobin (MetHb) and other concentrations.

■ Oxygen saturation is too low.

Poor circulation at the site of the test.

■ Shock, anemia, hypothermia and the use of vasoconstrictor drugs may reduce art erial blood flow to unmeasurable levels.

■ Measurement also depends on oxyhemoglobin and hemoglobin hemoglobin on th e absorption of special wavelengths of light. If any It absorbs substances of the sam e wavelength, which can lead to the measurement of false or low SP02 values. Such as:Carbonated hemoglobin, methemoglobin, methylene blue, rouge indigo.

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

10.4 Oxygen saturation menu

Sp02 setup menu

Turn the rotate button to move the cursor in the display interface to SP02 at the bo ttom of the interface, press the rotate button You can enter the "SPO2 Settings" menu, a s shown in Figure 10-2.

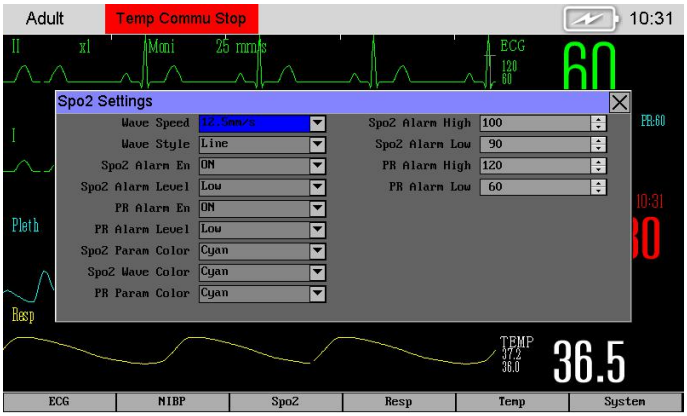

Figure 10-2 SP02 Settings Menu

caveat：

Setting the SPO2 alarm upper limit to 100% equals disconnecting the upper lim it alarm. Hyperoxia levels can cause premature babies to crystallize Fibrous tissue d isease. Therefore, the upper limit of oxygen saturation alarm must be carefully chose n according to accepted clinical practice.

SPO2 setting

- Waveform speed: SPO2 plethysmographic waveform scanning speed 12.5 and 25. 0mm / s second gear selectable.
- Wave Type: Select "Line" or "Fill".
- SPO2 Alarm Switch: Select "On" to alarm when SPO2 (SpO2) alarm is selected, and "Off" is selected to not alarm.
- SPO2 alarm level: used to set the alarm level, the options are "high", "medium " and "low" three. High means the worst alarm event.
- PR Alarm Switch: Select "ON" to prompt alarm when SPO2 (SpO2) alarm is se lected, and "OFF" is not selected to alarm.

- PR alarm level: used to set the alarm level, the options are "high", "medium" and "low" three. High means the worst alarm event.
- SPO2 parameters and waveform color choices: You can choose from Yellow, Sapphire, Purple, Orange, Azure, Magenta, Cyan, Blue, Green, Red, White.
- PR parameter color selection: You can choose from Yellow, Sapphire, Purple, Orange, Azure, Magenta, Cyan, Blue, Green, Red, White.
- SPO2 alarm high and low limit: according to the set high and low limit, when SPO2 exceeds the high limit or below the low alarm.
- PR (pulse rate) alarm high and low limit: According to set the high and low limit, when PR exceeds the high limit or below the low alarm.

SPO2 and PR alarm range:

parameter	The maximum limit	Lowest limit	Single adjustment amount
SPO2	100	0	1
PR	250	0	1

Default alarm range for SPO2 and PR by default:

parameter		The maximum limit	Lowest limit
SPO2	adult	100	90
	child	95	80
PR	adult	120	50

	child	160	75

10.5 oxygen saturation alarm information

10.5.1 SPO2 Alarm Information

Physiological alarms, technical alarms and messages that may occur in the measurement of the SPO2 module are listed in the following table.

Physiological alarm:

Prompt information	the reason	Alarm level
SPO2 is too high	SPO2 measurement above alarm limit.	User selectable
SPO2 is too low	The SPO2 measurement is below the lower alarm limit.	User selectable
PR too high	PR measurement above alarm limit.	User selectable
PR too low	PR measurement below alarm lower li mit	User selectable

Technical alarm:

Prompt information	the reason	Alarm l evel	Remedy
SPO2 sensor comes off	The SPO2 sensor comes off the p atient or monitor	lowest	Make sure the sensor rests on t he patient's finger or other are a, and the monitor and cable ar e properly connected.

SPO2 module communication stopped	SPO2 module error or communication error	high	Stop using the SPO2 module measurement feature and notify the biomedical engineer or our customer service department.
SPO2 Alarm limit error	Functional safety fault	high	Stop using the SPO2 module measurement feature and notify the biomedical engineer or our customer service department.
PR alarm limit error	Functional safety fault	high	Stop using the SPO2 module measurement feature and notify the biomedical engineer or our customer service department.

Tips (including general warnings):

Prompt information	the reason	Alarm level
SPO2 measured beyond the bounds	SpO2 measurement is out of range	high
PR measurement beyond the bounds	PR measurement is out of range	high
Search for pulse	The SpO2 module is searching for a pulse	No alarm
Pulse not found	The SpO2 module can not detect the S	high

	pO2 signal for a long time	

Chapter 11 Body Temperature (TEMP)

11.1 Description of temperature monitoring

The monitor can use a temperature probe to measure body temperature data.

Temperature measurement setting

■ If you are using a disposable temperature probe, insert the temperature cable into th e socket and connect the probe to the cable stand up. For reusable temperature probes, you can plug them directly into the socket.

■ Attach the temperature probe firmly to the patient.

■ Turn on the system power.

⚠ **caveat:**

The probe cable should be checked before starting monitoring. Remove the temp erature probe cable from channel 1 from the jack and screen The screen will displa y the error message "T1 sensor has dropped off" and an alarm sound will sound, si milar to other channels.

⚠ **note：**

Disposable temperature probe can only be used once.

⚠ **caveat：**

Carefully put the temperature probe and cable, when not in use, the probe and cable should be made into a loose ring. If the inside of the wire too tight, it will l ead to mechanical damage.

⚠ **caveat：**

The thermometer calibration must be performed every two years (or as directed by hospital procedures).

⚠ **note：**

During the monitoring process, the temperature meter will automatically self-test every hour. Self-test for 2 seconds, will not affect the temperature monitoring

Protector's normal work....

11.2 temperature menu

Users can move the cursor to parameter area TEMP in the main screen with the encoder and press the encoder to enter the TEMP setting menu, as shown in Figure 11-1.

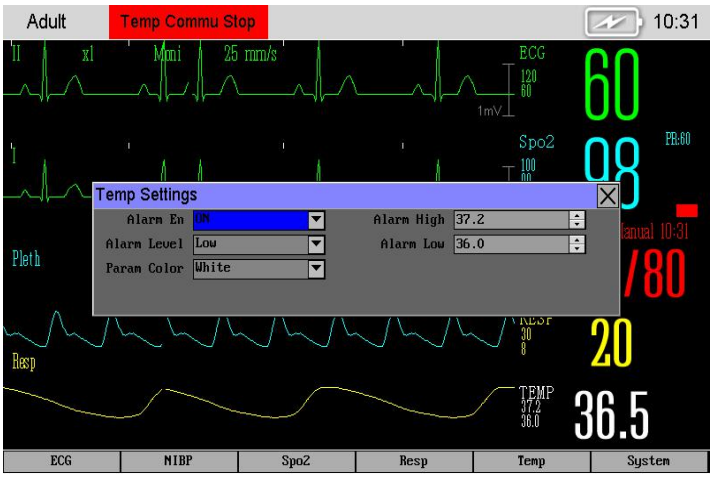

Figure 11-1 TEMP Settings Menu

◆ Alarm switch: Select "On" to alarm and store TEMP (body temperature) alarm, and select "Off" to not alarm.

◆Alarm level: used to set the alarm level, the options are "high", "medium" and "low".

◆ TEMP Parameter Color: You can choose from Yellow, Sapphire, Purple, Orange, Azure, Magenta, Cyan, Blue, Green, Red, White.

T1 alarm is based on the set high and low limit, when the temperature exceeds the high limit or lower than T1 on behalf of the channel 1 temperature.

Alarm upper and lower limits of the adjustment range is as follows (temperature unit: ℃ degrees Celsius.):

parameter	The maximum limit	Lowest limit	Single adjustment amount
T1	50	0	0.1

11.3 temperature alarm information and tips

When the alarm record switch in the relevant menu is turned on, those physiological alarms triggered by the parameter overrun alarm limit will trigger the recorder to automatically output the alarm parameter value and the related measurement waveform.Physiological alarms, technical alarms and prompts that may occur in TEMP measurements are listed in the following table.

Physiological alarm:

Prompt information	Cause	Alarm level
T1 is too high	Temperature measurements above the set alarm high limit	User selectable
T1 is too low	The temperature measurement is below the set alarm low limit	User selectable

Technical alarm:

Prompt information	the reason	Alarm level	Countermeasures
TEMP sensor off	The temperature cable is disconnected from the monitor	low	Make sure the cable is connected securely.

TEMP alarm error limit	Functional safety fault	high	Stop using the TEMP alarm function and notify the biomedical engineer or our maintenance staff.

Prompt information:

Prompt information	Cause	Alarm level
TEMP measurement is out of bounds	Body temperature measurement is out of measurement range	high

Chapter 12 Noninvasive Blood Pressure (NIBP)

12.1 Noninvasive Blood Pressure Monitoring Instruction

- Noninvasive blood pressure (NIBP) measurement using oscillation method;
- Can be used for adults, children;
- Measurement mode: manual, automatic and continuous measurement. Systolic, diastolic, and mean pressures are shown for each mode.
- "Manual" mode, only one measurement.
- "Auto" mode, measurement is repeated. Interval can be set to 1/2/3/4/5/10/15/30/60/90/120/180/240/480 minutes.
- In "continuous" mode, the measurement is taken continuously in five minutes.

⚠ **caveat：**

Noninvasive blood pressure measurements should not be taken in patients with sickle cell disease and any skin lesions that are expected to cause damage.

For patients with severe clotting disorders, determine whether to perform automated blood pressure measurements based on clinical evaluation because of the risk of hematoma at the rubbing of the limbs and cuffs.

When making measurements on child patients, you must ensure that the correct mo

de setting has been selected (see Patient Information Menu Settings). Using the wro ng patient pattern may endanger patient safety, as higher adult blood pressure level s do not apply to children.

The blood pressure measured by this equipment is equivalent to the measured value of the auscultation method, and the error meets the requirements of YY 0667-2008.

This product has been in accordance with the requirements of the YY 0670-2008 sta ndard 4.5 before the listing of the overall effectiveness of the system to do the asse ssment, such as the user needs to obtain the relevant information, please contact th e company's

12.2 Non-invasive blood pressure monitoring methods of operation

12.2.1 Noninvasive blood pressure measurement

The inflation tube connecting the blood pressure cuff and the monitor should be patented and not tangled.

1. The inflation tube into the monitor blood pressure cuff interface, connect the inst rument power.

2. Apply blood pressure cuffs to the patient's upper arm or thigh as shown in Figur e 12-1 as follows.

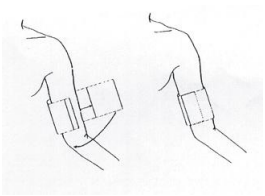

Figure 12-1 Cuff use

◆ Confirm that the cuff has completely deflated.

◆ Use an appropriately dimensioned cuff for the patient to ensure that the mark er tissue is located just above the appropriate artery. Make sure the cuffWrapping limb i s not too tight, or it may cause distal discoloration or even ischemia.

⚠ **note：**

The width of the cuff should be 40% of the limb circumference, or 2/3 of the length of the upper arm. The length of the inflatable cuff should be sufficient to s urround 50 to 80% of the limb. Unsuitable cuffs produce erroneous readings. If ther e is a problem with the cuff size, use a larger cuff to reduce the error.

3. Connect cuff to inflation tube. The limbs used for manometry should be placed at the same level as the patient's heart. If not To do so, we must use the following co rrection method to correct the measurement results:

◆ Check that the edge of the cuff falls within the range marked <->. If not, switc h to a more suitable large orSmaller cuffs.If the cuff is higher than the horizon tal position of the heart, add 0.75mmHg (0.10kPa) to the displayed value per c entimeter of difference.

◆ If the cuff is lower than the horizontal position of the heart, the difference per cm should be reduced by 0.75mmHg (0.10kPa) on the displayed value.

4. Confirm that the monitoring mode is correct (the monitoring mode is displayed in the information area of the monitor interface and the right of the bed number). If y ou need to change the monitoring mode, please go to "System Menu", "Patient Informati on Settings" and change "Patient Type".

5. Select the measurement mode in the NIBP menu. For details, see "Operation Ti

ps" below.

12.3 Operation Tips

1. Make an automatic measurement

◆ Enter the "NIBP Settings" menu, "Measure Type" select "Cycle", "Cycle Time" to select the interval time, the monitor will automatically measure the cycle measurement according to the selected interval time. Automatic measurement interval (unit: minute). One, two, three, four, five, 10, 15, 30, 60, 90, 120, 180, 240, 480 minutes can be selected.

◆ To finish automatic measurement, select "Manual" in "Measure Type" to return to manual mode.

2. Make a manual measurement

◆ Enter the "NIBP Settings" menu, select "Manual" for "Measure Type" and press the "Blood Pressure" button on the front panel to start a manual measurement.

◆ Pressing the "Blood Pressure" key again will stop the manual measurement.

3. Continuous measurement

◆ Enter the "NIBP Settings" menu, "Measure Type" select "Continue" item, will start continuous measurement. In "continuous" mode, the measurement is taken continuously in five minutes.

◆ During the measurement, pressing the "Blood Pressure" key will stop the measurement and return to the "Manual" measurement mode by default.

⚠ caveat：

Continuous measurement mode of non-invasive pressure measurement time pull too long, then the cuff friction with the body may be accompanied by purpura, ischemia

And nerve damage. In custody of patients, we must always check the distal limb co lor, warmth and sensitivity. Once the concept In case of any abnormality, place the cuff in another place or immediately stop the blood pressure measurement.

⚠ caveat：

If you have doubts about the accuracy of the readings, check the patient's vital sign s before you can check the function of the monitor.

⚠ caveat：

If liquid is splashed on equipment or accessories, especially if liquid is likely to en ter the tubing or monitor, contact your hospital's service department.

Limits of measurement

Depending on the patient, there are some limitations with the oscillatometry method. This measurement is looking for regular pulse waves generated by arterial pressure. In the case of patient conditions that make this detection difficult, the measured va lues become unreliable and the time taken for pressure measurement to increase. Th e user should be aware that the following conditions can interfere with the measure ment method, making the pressure measurement unreliable or the pressure measurem ent time lengthened. In this case, the condition of the patient will make the measur ement impossible.

■Patient moving

If the patient is moving, shaking or cramping, the measurement will be unreliabl e or even impossible as these conditions may interfere Arterial pressure pulsation de tected, pressure measurement time will be extended.

■ Arrhythmia

If the patient shows an irregular heartbeat caused by an arrhythmia, the measurement will be unreliable or even impossible and the manometry time will be extended.

■ Heart-lung machine .

If the patient is connected with an artificial heart-lung machine, it will not be able to measure.

■ Pressure changes

If, at some point, the arterial pressure pulsation is being analyzed to obtain a measurement, at which time the patient's blood pressure changes rapidly, the measurement will be unreliable or even impossible.

■ Severe shock

If the patient is in severe shock or hypothermia, manometry will be unreliable. Because the blood flow to the periphery of the reduction will lead Decreased arterial pulsation.

■ Extreme heart rate

Blood pressure measurements were not available at heart rates below 40 bpm (beats / min) and above 240 bpm (beats / min).

12.4 Noninvasive Blood Pressure Menu

Turn the encoder, move the cursor to the NIBP hotkey in the parameter area on the screen, and then press the encoder to enter the "NIBP Settings" menu, as shown in Figure 12-2.

Figure 12-2 NIBP Settings Menu

■NIBP alarm settings

- ◆ Alarm switch: select "open" in the pressure alarm when the alarm prompts and storage, select "off" does not alarm.
- ◆ Alarm level: There are "high", "medium" and "low" three options. High means the worst alarm.
- ◆ Pressure alarm is based on the set high and low limits, when the pressure exceeds the high limit or below the low alarm. Systolic blood pressure, diastolic blood pressure and average pressure can be dealt with separately.

Alarm upper and lower limits of the adjustment range is as follows:

adult

Systolic blood pressure 40 ~ 260 mmHg

Diastolic pressure 10 ~ 215 mmHg

The average pressure of 20 ~ 235 mmHg

child

Systolic blood pressure 40 ~ 200 mmHg

Diastolic pressure 10 ~ 150 mmHg

Average pressure 20 ~ 165 mmHg

■ NIBP parameter area color selection

■ Enter "Nibp Settings" and select "Param Color".

Pre-inflation value

Press this key to select the initial pressure to inflate the cuff next time, with diff erent default settings for different pre-inflation values, as shown in the following table:

Default configuration	The default pre-inflation value (mmHg)	Manually selectable pre-inflation values in the NIBP menu (mmHg)
Default factory adult configuration	160	0--300
Default factory children's configuration	120	0--300

After pressing the "Menu" button on the front case, the user enters the "Default Configuration" menu in the "System Menu". After confirming the default configura tion, the user returns to the main interface. Select the NIBP menu hot key in the NIBP parameter area to enter NIBP Settings. It can be seen that the initial value corresponding to the "pre-inflation value" is the initial inflation pressure value c

orresponding to the selected default configuration, as shown in the above table. M ove the cursor to the Prefill option and press to see the range of prefill values t hat can be manually adjusted as shown in the table above.

⚠ **note：**

The "Prefill Value" option helps the user to select the next cuff inflation pres sure, but the prefill value for subsequent measurements will be based on the same systolic blood pressure measurement of the same patient. System memor y of this value can shorten the measurement time of the same patient, and in crease the measurement accuracy.

⚠ **note：**

When the user sets the "Patient Type" only in the "Patient Information Setti ngs", the system will initially set the relevant module parameters according to "Patient Type".

■Pressure unit

Optional mmHg or kPa.

■ Pressure Calibration: Calibration of NIBP measurements should be performed ev ery two years (or as per the hospital's maintenance chart).

12.5 NIBP Alarm Information and Prompt Information

Alarms triggered by parameters exceeding the alarm limit in the physiological alarm may trigger the recorder to automatically output parameters and associated measurement waveforms at the alarm occurrence, provided the alarm record switch in the relevant me nu is turned on. Physiological alarms, technical alarms and prompts that may occur in N

IBP measurements are listed in the following table: Physiological alarm:

Prompt information	Cause	Alarm level
Nibp Syst Too High	The NIBP systolic blood pressure measurement is above the set alarm high limit	User selectable
Nibp Syst Too Low	NIBP systolic pressure measurement below the set alarm low limit	User selectable
Nibp Dias Too High	NIBP diastolic blood pressure measurement above the set alarm high limit	User selectable
Nibp Dias Too Low	NIBP diastolic blood pressure measurement below the set alarm low limit	User selectable
Nibp Mean Too High	The NIBP average pressure measurement is above the set alarm high limit	User selectable
Nibp Mean Too Low	The NIBP average pressure measurement is below the set alarm low limit	User selectable

Technical alarm 1 (displayed on the monitor's information area):

Prompt information	the reason	Alarm level	Countermeasures
NS alarm limit error	Functional safety fault	high	Stop using the NIBP module alarm function and notify the biomedical engineer or our maintenance staff.

NM alarm limit error	Functional safety fault	high	Stop using the NIBP module alarm function and notify the biomedical engineer or our maintenance staff.
ND alarm limit error	Functional safety fault	high	Stop using the NIBP module alarm function and notify the biomedical engineer or our maintenance staff.

Technical Alarms 2 (display area below NIBP pressure):

Prompt information	the reason	Alarm level	Countermeasures
NIBP self-test error	Sensing of NIBP measurement module or other hardware error	high	Stop using the NIBP measurement function and notify the biomedical engineer or our maintenance staff.
NIBP communication error	Communication with NIBP measurement module failed	high	If the problem persists, stop using the NIBP measurement function and notify the biomedical engineer or our maintenance personnel.
Cuffs are too loose or not co	The cuff is not tied or cuffed	low	Tied up the cuffs.

nnected			
Inflatable cuff inflatable tube	Cuff, hose or fitting damaged	low	Inspect and replace the leaky parts, if necessary, notify the biomedical engineer or our service personnel.
Air pressure is wrong	No stable pressure values, such as hose tangles	low	Check hose is entangled, such as the failure continued, notify the biomedical engineer or the company maintenance staff.
Signal is too weak	The cuff is too loose or the patient's pulse is too weak	low	Use other methods to measure blood pressure.
Pressure over range	The measurement range exceeds the specified upper limit	low	Reset the NIBP measurement module. If the fault persists, stop using the NIBP measurement function and inform the biomedical engineer or our service personnel.
Arm movement	Affected by arm movement, signal noise is too large or irregular pulse rate	low	To ensure the patient was quiet, no exercise.

Overvoltage protection	Pressure exceeds the specified safety limit	low	Measure again and, if the problem persists, stop using the NIBP measurement function and notify the biomedical engineer or our service personnel.
Signal saturation	Great exercise	low	Do not exercise the patient。
NIBP system failed	Blood pressure pump system operation failure	high	Stop using the NIBP measurement function and notify the biomedical engineer or our maintenance staff.
Cuff type wrong	Cuff type does not match patient type	low	Use the right cuff.
Measurement timeout	Measurement time exceeds 120 seconds (adult / child) or 90 seconds	high	Measure or use another manometric method again.
NIBP error reset	Module reset is not normal	high	Use the reset function again.
Measurement error	The system can not perform measurement analysis or calculation	high	Check the cuff to ensure that the patient does not move while in custody and measure again.

	while making measure ments		

Message (displayed in the prompt area below the NIBP pressure value):

Prompt inform ation	Cause	Alarm level
Manual measu rement ...	Manual measurement of the process	No alarm
Continuous m easurement ...	Continuous measurement of the process	
Automatic me asurement ...	Automatic measurement process	
Measurement terminated	Press the start key during measurement to stop th e measurement	
calibration…	During calibration	
Calibration ter minated	The calibration process is over	

Chapter 13 Measurement of carbon dioxide (CO2) (optional)

13.1 Introduction to Measurement

The monitor uses infrared absorption technology to measure the concentration of carbon dioxide (CO2) in the patient's breathing circuit. The principle is based on the fact that CO2 molecules can absorb the energy of infrared light of a particular wavelength, and the amount of energy absorbed is directly related to the concentration of CO2. When the infrared light emitted by the infrared light source penetrates the gas sample containing CO2, part of the energy will be absorbed by the CO2 in the gas. The other side of the infrared light source using a photodetector to measure the remaining infrared light energy and converted into electrical signals that are compared with the energy of the infrared light source and adjusted to accurately reflect the CO2 concentration in the gas sample .

Measurement of CO2: The patient's respiratory gas in the respiratory tract is sampled at a constant sampling rate and analyzed by a CO2 sensor.

13.2 Measurement Preparation

CO2 module with dehydration bottle:

1. Connect the dehydration bottle to the CO2 measurement unit as shown in Figure 13-1.

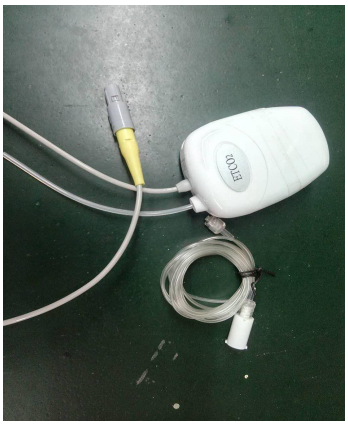

Figure 13-1 CO2 Measurement Module

2. Enter the CO2 menu, select the measurement mode to start measuring.

Note: Observe the water level in the dehydration bottle, do not exceed the maximum water level line, timely replacement of dehydration bottle to prevent water from entering the module. Take care to keep the sampling tube clean to prevent clogging of the tube by dust and the like.

Note: Both the dewatering bottle and the sampling tube are for one-time use. Please use the product provided by the manufacturer or specified type.

13.3 Set CO2 parameters

■ CO_2 Set

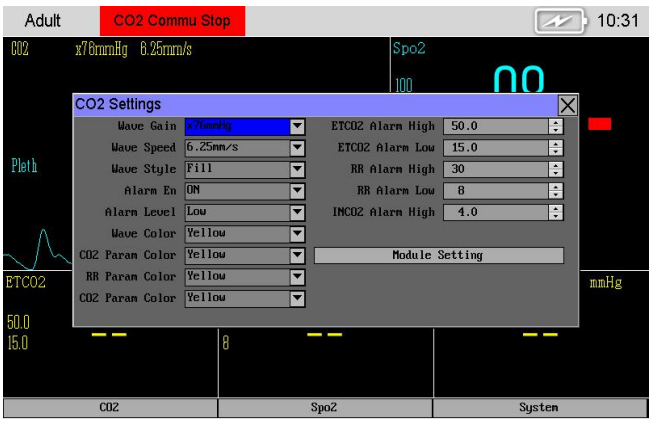

Figure 13-2 CO2 Settings Menu

Waveform gain: select the breathing waveform gain, select "* 50mmhg, * 76mmhg, * 100mmhg".

Wave speed: select the speed of respiratory waveform, you can choose "6.25mm / s, 12.5mm / s".

Wave style: select the style of breathing waveform, you can choose "Fill, Lill".

Alarm switch: CO2 alarm switch settings, you can alarm switch to CO2 whether the ala rm control.

Alarm level: optional low, medium and high.

Waveform / ETCO2 / RR / INCO2 Color: Available in Yellow, Sapphire, Purple, Orange, Azure, Magenta, Cyan, Blue, Green, Red, White.

ETCO2 alarm high limit: Setting range, 0 ~ 150 continuously adjustable.

ETCO2 alarm low limit: Setting range, 0 ~ 50 continuously adjustable.

RR alarm high limit: setting range, 0 ~ 150 continuously adjustable.

RR alarm low limit: setting range, 0 ~ 30 continuously adjustable.

INCO2 alarm high limit: Setting range, 0 ~ 150 continuously adjustable.

Module Setting

Pressure units choose carbon dioxide mmHg.

Operating mode Set the measurement or standby.

Balance the gas Choose the type of balance of gas, choose "indoor air, carbon dioxid e, helium." When the main component of the patient's breathing gas is air, indoor air sh ould be selected; when the main component of the patient's breathing gas is carbon dio xide, carbon dioxide should be selected. And so on.

Calculate the cycle Choose a breath, 10 seconds, 20 seconds.

Calibration type Can choose "indoor air, helium."

CO2 compensation Setting range: 0-20.0, each increase or decrease 1mmHg

Anesthetic gas Setting range: 0-20.0, each time increase or decrease 0.1.

Gas temperature Setting range: 0-50.0, each time increase or decrease 0.1.

Atmospheric pressure Set to measure atmospheric pressure. Turn the dial. Each inc rease or decrease 1mmHg.

Suffocation time Setting range: 10-60, each increase or decrease 1.

13.4 Calibration

The instrument has been calibrated at the factory, under normal circumstances (exce

pt the following three cases) the user can directly measure. When the following three si tuations occur, please bypass module CO2 gain calibration:

1. CO2 module to use six months to one year later;
2. Clinicians suspect the accuracy of the readings;
3. After the last calibration, atmospheric pressure or altitude changes significantly.

⚠ **NOTE: It is recommended that the user perform a calibration procedure unde r the guidance of a manufacturer's authorized service technician, which may result in incorrect readings if an incorrect calibration procedure is performed.**

13.5 Exhaust gas

An exhaust pipe is connected to the vent of the module to discharge the sampled ga s to the exhaust gas treatment system.

15.6 Precautions for use

⚠ **Caveat:**

- **Carefully place the sensor cable to reduce the possibility of the patient being to rn or tightened.**
- **Reuse, disassembly, cleaning, or disinfection of the disposable airway adapter ca n affect functionality and system performance, posing a danger to the user or t he patient. If reusable disposable products, its performance can not be guarante ed.**
- **Before use, please check if the airway adapter is damaged. If you find damage, please do not use.**
- **If too much discharge is found on the airway adapter, replace it immediately.**
- **When monitoring the carbon dioxide waveform, if changes or abnormalities are**

found, check the airway adapter or sampling tube. If necessary, please replace i mmediately.

- **Observe that the baseline of the carbon dioxide waveform is too high, and sens or or patient problems can cause the baseline to be too high.**
- **Periodically check the carbon dioxide sensor and piping for excessive moisture o r accumulation of secretions.**
- **Do not use when the carbon dioxide sensor is wet or outside.**
- **Do not use the carbon dioxide module for patients who can not take 50ml / mi n ± 10ml / min sampling gas from the breathing circuit.**
- **Do not connect the exhaust pipe to the breathing circuit.**

Note:

- **Only use the accessories provided by the manufacturer.**
- **Do not immerse the sensor in liquid or disinfect it.**
- **Please clean according to the requirements of Chapter 16 in this manual.**
- **Do not pull the sensor cable.When aerosol medicine is present, keep the airway adapter away from the breathing circuit. The aerosol drug's viscous material c an contaminate the airway adapter's window and require early cleaning or repl acement of the adapter.**

Description:

- **Sensor and its accessories do not contain latex.**
- **When the sensor reaches the service life, it should be dealt with according to l ocal requirements.**
- **Noxiousness, helium, and excessive oxygen concentrations all affect the measure**

ment of carbon dioxide. According to the actual situation to set a variety of co mpensation.

- **To meet the requirements of the accuracy of the sensor, please set the atmosphe ric pressure compensation according to the actual situation.**
- **Do not place the airway adapter in the ET and elbow breathing circuits, which can cause the patient's secretions to build up in the airway adapter. Place the airway adapter window in a vertical position instead of a horizontal position. This prevents the patient's secretions from collecting on the window.**

Chapter 14 System Care and Cleaning

⚠ **Caveat：Before cleaning the monitor or sensor, always turn the power off and disconnect the AC power.**

14.1 Monitor Cleaning

✧ Cleaning The monitor can be used with the most commonly used hospital cleaning f luids and non-aggressive detergents, but note that many of these cleaners must be d iluted before use. Follow the instructions of the detergent manufacturer.

✧ Avoid using ethanol, amino or acetone based cleaners.

✧ The monitor's case and screen should be kept free of dust and contaminated. Use a soft, lint-free cloth or a sponge soaked in detergent. When cleaning, be careful not to pour the liquid on the instrument, make sure the instrument can not enter any l iquid inside. There are various types of cable sockets on the side panel of the mon itor and special precautions should be taken when wiping to ensure that no water c an enter.

✧ It is forbidden to use abrasives such as wire brushes or metal polishes, which will damage the monitor panel and screen.

✧ Do not immerse the monitor in liquid. 40°C

✧ **When the connector of the cable or accessory gets wet occasionally, rinse it wit h distilled water or deionized water and then dry it for at least 1 hour at 40℃ to 80℃**

14.2 Battery Maintenance and Care

✧ Built-in rechargeable battery maintenance-free monitor to ensure that the AC power off the monitor is still working, under normal circumstances without special maintenance and care.

Lithium-ion battery

✧ When using the battery for the first time, at least two complete optimization cycles should be guaranteed. A complete optimization cycle: uninterrupted

✧ Charge, then discharge until the monitor is turned off. Battery use should be regularly optimized to maintain its useful life. It is recommended to optimize the battery once every two months of use or storage, or when the battery run time is significantly reduced.

Optimization, please refer to the following steps:

- Disconnect the monitor from the patient and stop all monitoring and measurement.
- The battery needs to be optimized into the monitor battery slot;
- The monitor connected to AC power, the battery charge continuously for 6 hours or more;
- Disconnect the AC power and use the battery to power the monitor until the monitor is turned off.
- Re-connect the monitor to the AC power supply, charging the battery for more than 6 hours without interruption.
- Battery optimization is completed.

⚠

Caveat：Do not disassemble the battery, put it into the fire or short circuit it. B

attery burns, explosions or leaks may cause personal injury.

14.3 Accessories cleaning and disinfection

ECG cable

Recommended disinfectants include: glutaraldehyde solution, 10% bleach solution.

- Before disinfection, please clean the cable.
- Use a soft cloth stained with water or neutral soapy water to clean the cable s urface;
- Scrub the cable with a soft cloth with an appropriate amount of disinfectant
- Wipe the disinfectant remaining on the cable with a soft cloth dampened with water;
- Dry the cable in a cool environment.

note:

✧ Do not use high voltage, radiation or steam to sterilize the cable leads.

✧ Do not immerse the cable leads directly in the liquid.

✧ To avoid long-term damage to the cable, it is recommended that you disinfect the p roduct only if the hospital rules you have followed deem it necessary.

✧ Do not clean and reuse disposable electrodes.

1. Blood oxygen sensor

Recommended disinfectant: 70% isopropanol solution. For a lower standard of disinfectio n, use a 10% bleach solution. Do not use undiluted bleach (5% to 5.25% sodium hypoc hlorite) or other non-recommended disinfection solutions to avoid damage to the sensor. Methods of cleaning and disinfection can refer to ECG cable cleaning and disinfection methods.

note:

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

✧ Do not immerse the sensor directly in the liquid.

1. To avoid long-term damage to the sensor, it is recommended that you sterilize the p roduct only if the hospital rules you have followed deem it necessary.

Body temperature sensor

Recommended disinfectants: 70% isopropanol solution, glutaraldehyde solution, 10% blea ch solution.

Methods of cleaning and disinfection can refer to ECG cable cleaning and disinfection methods.

note:

✧ For single-use temperature sensors, do not allow repeated disinfection and re-use.

✧ To avoid long-term damage to the sensor, it is recommended that you disinfect the product only if the hospital rules you have followed deem it necessary.

2. body temperature sensor can only withstand a short period of time 80 ~ 100 ℃ tem perature, the heating shall not exceed 100 ℃.

Noninvasive blood pressure cuffs

✧ Please clean the product regularly.

✧ remove the cuff from the connector, remove the airbag from the skin;

✧ clean the medical soft gauze pad or other soft cleaning tools soaked in water or ne utral soapy water, the gauze after soaking squeezed excess water, wipe the balloon and catheter;

✧ Wash the cuff skin in a clean neutral soapy water;

✧ Wash the outer skin and air bags fully dry, the air bag into the cuff skin before re-put into use.

note:

- Excessive cleaning of the airbag several times may damage the airbag. Do not clean the airbag unless necessary.
- The airbag and the skin should not be high temperature drying....
- For higher disinfection level, please use the disposable cuff.
- Single-use cuffs can only be used for one patient.
- **Water and cleaning fluid must not enter the cuff and monitor couplings.**

3. Carbon dioxide sensor

- Recommended disinfectants: 70% isopropanol solution, 70% alcohol solution.
- Methods of cleaning and disinfection can refer to ECG cable cleaning and disinfection methods.

note:

- Do not sterilize the sensor in a high-pressure container. Do not immerse the sensor directly in the liquid.
- Do not pull or squeeze the sensor extension cable when using it.
- The sensor can not work at the temperature lower than 10 ℃ or higher than 35 ℃.