SKX-1000FIII

SPO2 Simulator

Xuzhou Mingsheng Electronic Technology Co., LTD

Version：V 2.49

Chapter 1 SKX-1000FIII instrument features and functions

SKX-1000FIII SPO2 Simulator is a signal simulation tool specially developed by Xuzhou Mingsheng Company for the development and detection of blood oxygen saturation products,Because it can produce optical signals with different curves and pulse amplitudes,It is an essential and preferred tool for the development of products to measure blood oxygen,It has a wide range of signal amplitude,Can simulate a variety of intensity, frequency of blood oxygen signals,It is an important tool to develop the measurement of blood oxygen products.The simulator also has the function of detecting blood oxygen measurement products.Used to test whether the parameters of blood oxygen products can meet the requirements of national standards.The Settings in the detection process will be detailed in the following chapters.

SKX-1000FIII features are as follows:

- Built-in 4 18650 large capacity lithium batteries, external 12V DC power charger.
- 2.8-inch color LCD screen; All Chinese interface, easy to understand the setting content; Menu operation, parameter change is simple and fast, convenient for users to set; Provides shortcut keys to quickly set parameters with one key.
- Equipped with encoder operation, one encoder can complete all functional operations.
- The simulator is a transmissible oximetry optical simulator.
- Can choose to simulate a variety of different skin color, thickness of finger items.
- Can choose a variety of interference waveform mode, jitter, waveform drift, etc.
- Can choose a variety of cases, arrhythmia, tachycardia, bradycardia, hypertension, obesity, special cases, etc.
- Customizable reflex oximeter.

SKX-1000FIII has the following functions:

I . Blood oxygen saturation simulation range:

100%-71%, Step size is 0.1%, error ≤1% , initial value 98%

70%-35%, Step size is 0.1%, error ≤2%

34%-3%, Step size is 0.1%, error ≤2%

II. Pulse rate simulation range:

500bpm-20bpm, Step size is 1bpm, error ≤1bpm, initial value 80bpm

III. Curve selection:

OxiMax, MASIMO, MASIMO1, MASIMO2, BCI, NELLCOR, PM8000, iMEC10, EDAN, Creativ, BLT, Comen, GoldWay, Philips, GE Dash, ZonDon, Kantai initial value: NELLCOR

Note:When using NELLCOR or Mindray curve,Please select a 660nm/905nm oximetry probe.This makes it easier to maintain consistency with clinical data;When you use a BCI curve,Please use 660nm/940nm blood oxygen probe,This makes it easier to maintain consistency with clinical data;When you select the MASIMO curve,Please use the original MASIMO probe.

IV. Transmission intensity adjustment range:

0-1000 Step size is 1

V. Pulse signal amplitude range (PI) :

20%-0.04% initial value: 4%

20%-1%, Step size is 1%; 1%-0.1%, Step size is 0.1%;

Below 0.1%, 0.08%, 0.06%, 0.04% three kinds of strength ;

Weak perfusion is the general term for pulse signal amplitude less than 1%;

Light transmission intensity adjustment can be automatic or manual, light transmission intensity adjustment can be set to different types of finger Settings.

VI. Pulse intensity adjustment range:

At 100% to 81% blood oxygen,Pulse intensity was up to 20%;

At 80.9% to 71% oxygen,Pulse intensity was up to 15%;

At 70.9% to 51% blood oxygen,Pulse intensity was up to 10%;

At 50.9% to 3% blood oxygen,Pulse intensity was up to 8%;

VII. Figle Select:

Black5, yellow5, white5, Black1, yellow1, white1, yellow2, white2;

VIII. Ganro Select:

NO,Drift01,Drift02,Drift03,Drift04,Drift05,Drift06,Drift07,Drift08,Drift09,Drift10,Drift11,Drift12, Jitter1,Jitter2,Jitter3;

IX. Bingli Select:

Normal,No 1,No 2,No 3,No 4,No 5,No 6,No 7;

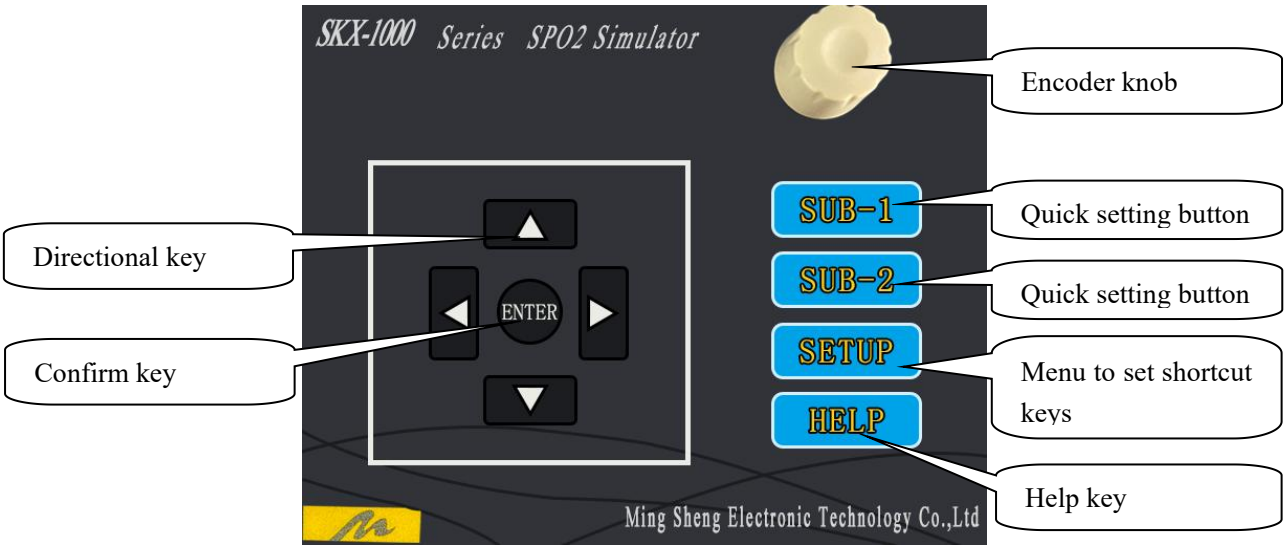
X. The windows editing software provided by our company can be used to edit and synthesize a variety of pulse waveforms, and waveform output can be carried out through the U disk. By changing the sampling rate and amplitude value, a variety of pulse waveforms can be simulated, which can be used to test the compatibility and extensibility of the pulse wave recognition algorithm of blood-oxygen equipment. This function can be applied to quickly improve the shape of new products compared with mature products on the market. In addition, it also provides a waveform file storage format, which can be used to restore the pulse waveform collected clinically to the analog waveform for verification of the algorithm and other functions. In this function, you can change the curve and blood oxygen level. If you have other requirements on this function, you can contact our company for special customization.

The windows editing software provided by our company can be used to edit and synthesize a variety of pulse waveforms, and waveform output can be carried out through the U disk. By changing the sampling rate and amplitude value, a variety of pulse waveforms can be simulated, which can be used to test the compatibility and extensibility of the pulse wave recognition algorithm of blood-oxygen equipment. This function can be applied to quickly improve the shape of new products compared with mature products on the market. In addition, it also provides a waveform file storage format, which can be used to restore the pulse waveform collected clinically to the analog waveform for verification of the algorithm and other functions. In this function, you can change the curve and blood oxygen level. If you have other requirements on this function, you can contact our company for special customization.

Chapter 2 SKX-1000FIII key definition

SKX-1000FIII, use ↑ up, ↓ down, ← Left, → right, and ENTER (Confirm) to perform software operations.And equipped with an encoder,All operations can be operated by the encoder,Encoder has three key states, left turn, right turn, Enter button (represents confirm).

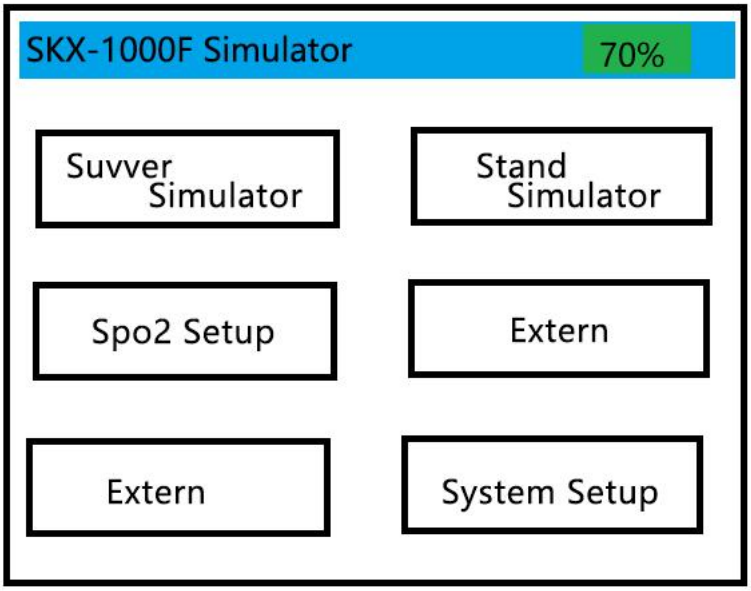
When a menu is selected,You can use the confirm key to confirm the selection,In the select state, you can use left and right to make numeric changes.



NO.	Key name	Description
1	**SUB-1**	Quick set oxygen saturation values (blood oxygen, pulse rate, pulse intensity),the specific value is set in the menu.
2	**SUB-2**	Quick set the blood oxygen saturation value group (blood oxygen, pulse rate, pulse intensity), the specific value is set in the menu.
2	**SETUP**	Menu to set shortcut keys.
4	**HELP**	Help key to open the help description.
5	**Directional key**	Used to adjust the position of the cursor and change parameters.
6	**ENTER**	The Enter key is the confirm key, confirm to change the parameter or enter to return to a window.
7	**Encoder**	It is used for operation in the software interface. It has three functions: left turn, right turn, press (confirm).

Chapter 3 Describes the SKX-1000FIII interface

SKX-1000FIII Main Screen Description:



Suvver Simulator: Some functional test items can be set to test the blood oxygen instrument

Stand Simulator : General parameters such as blood oxygen value were detected

Spo2 Setup **:** Used to change and set blood oxygen parameters

Extern **:** The extension function is used later

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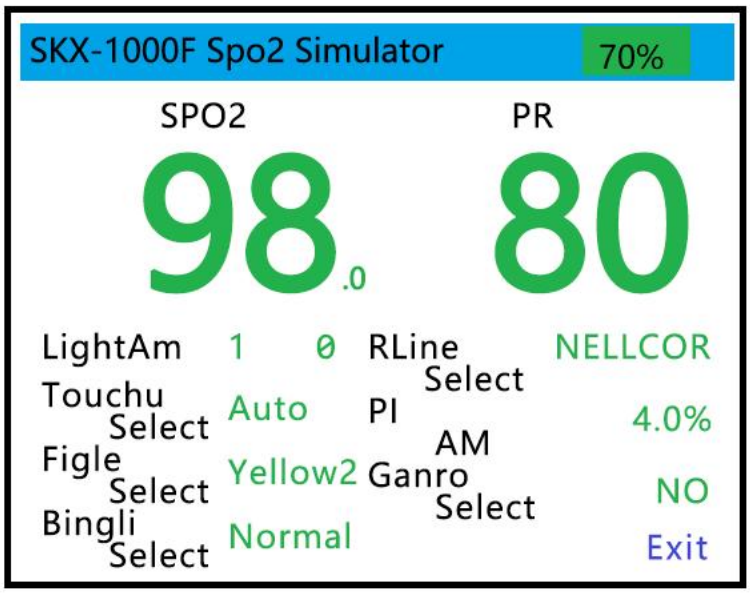
System Setup **:** Some basic Settings about the simulator

SKX-1000FIII Enhanced Blood oxygen Setting interface Description:



SPO2 98: Represents the value of blood oxygen saturation. When changing this value, each bit of this value can be changed separately to achieve the purpose of changing the value quickly. Change range of oxygen saturation: 3%-100%, minimum step size 0.1%.

P.R 80: Represents the pulse rate value, when changing this value, you can respectively change the value of each bit, to achieve the purpose of changing the value quickly;

LightAm: The finger of the analog instrument collects the luminous intensity value of the luminescent tube of the blood oxygen equipment. After connecting the instrument, both values can be displayed for detection;

Touchu Select: The luminescence intensity of the simulated finger can be adjusted automatically or manually to detect the weak perfusion performance of the blood oxygen module and to detect the limit parameters of the DC component of the blood oxygen equipment, which can only be changed in the blood oxygen parameter setting interface.

Figle Select : Different finger types can be selected, each finger has different light transmittance intensity, and different fingers represent different DC component values, which can be set as black thumb, yellow thumb, white thumb, yellow index finger, white index finger, black little finger, yellow little finger, white little finger.Finger type selection is invalid when the light transmission adjustment is set to manual.

Bingli Select : Normal, No 1, No 2, No 3, No 4, No 5, No 6, No 7 are available.

Pulse setting values no longer take effect when a non-normal case selection is selected.

In special cases, the DC component values of red light and infrared light are different, and the changes of blood oxygen value and pulse rate value are invalid. For more numerical measurements of blood oxygen and pulse rate in this case, please select a standard heart-rate curve by OxiMax.

RLine Select : Select R curves corresponding to different clinical data. Please note that the selection of curves should be based on the hardware of the probe, namely, the wavelength data of the blood oxygen luminescent tube. Available curves are OxiMax, MASIMO, MASIMO1, MASIMO2, BCI, NELLCOR, PM8000, iMEC10, EDAN, Creativ, BLT, Comen, GoldWay, Philips, GE Dash, ZonDon, Kantai,

initial value NELLCOR;

PI AM : Pulse signal strength, please note that when changing this parameter, finger selection will automatically change to yellow index finger.

20%, 19%, 18%, 17%, 16%, 15%, 14%, 13%, 12%, 11%,

10%, 9%, 8%, 7%, 6%, 5%, 4%, 3%, 2%, 1%,

0.9%, 0.8%, 0.7%, 0.6%, 0.5%, 0.4%, 0.3%, 0.2%, 0.1%

0.08%, 0.06%, 0.04%;

Ganro Select:NO,Drift01-Drift12,Jitter1,Jitter2,Jitter3,a total of 16 kinds of options;

When PI intensity value is 0.04%-5%, you can change this option;

Drift01~Drift12: When the corresponding pulse waveform is triangle waveform, triangle waveform of different amplitude and frequency is superimposed on the waveform base.

Drift01-Drift03： Are the waveform superimposed on the triangular waveform, and the period of the triangular waveform is 5s, 10s, 20s, respectively.

Drift04-Drift06： Are the waveform superimposed on the triangular waveform, and the period of the triangular

waveform is 5s, 10s, 20s, respectively. The amplitude is 2 times of drift 1;

Drift06-Drift09：Are waveform superimposed on sine waveform, and the period of waveform is 5s, 10s, 20s, respectively.

Drift10-Drift12：Are waveform superimposed on sine waveform, and the period of waveform is 5s, 10s, 20s, respectively. The amplitude is 2 times of drift 6;

Jitter1~Jitter2： When the corresponding pulse waveform is triangular waveform, the waveform is superimposed with sinusoidal waveform of different amplitude and different frequency to simulate the jitter effect. After determining the interference selection each time, the interference waveform of different starting points will be randomly generated.Jitter 3 has the largest amplitude and jitter 1 has the smallest amplitude.

Selection of compound interference: Interference types, finger types, and case selections can be used on top of each other to produce a comprehensive waveform.

When you need to set drift interference + jitter interference + case, please set it in the following order.

A. First, select the type of case;

B. Select drift interference type;

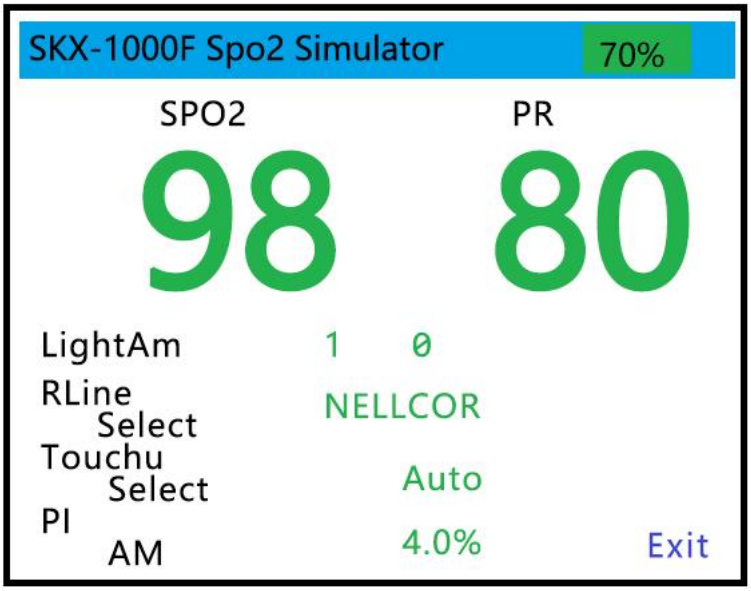
C. Select the jitter interference type

When selected in the order above, the pulse waveform w ill conform to the above three types of Settings.

Note: When the cases of hypotension, hypertension and obesity are selected, please select triangle wave as the waveform type item in the menu setting, otherwise the corresponding waveform will not be generated.

Exit **:** Return to the main window.

SKX-1000FIII Standard Blood oxygen setting interface Description:



SPO2 98: Represents the value of blood oxygen saturation. When changing this value, each bit of this value can be changed separately to achieve the purpose of changing the value quickly. Change range of oxygen saturation: 3%-100%, minimum step size: 1%.

PR 80 : Represents the pulse rate value. When changing this value, each bit of this value can be changed respectively to achieve the purpose of changing the value quickly.

LightAm: The finger of the analog instrument collects the luminous intensity value of the luminescent tube of the blood oxygen equipment. After connecting the instrument, both values can be displayed for detection;

RLine Select : Select R curves corresponding to different clinical data. Please note that the selection of curves should be based on the hardware of the probe, namely, the wavelength data of the blood oxygen luminescent tube. Available curves are OxiMax, MASIMO, MASIMO1, MASIMO2, BCI, NELLCOR, PM8000, iMEC10, EDAN, Creativ, BLT, Comen, GoldWay, Philips, GE Dash, ZonDon, Kantai,

initial value NELLCOR;

Touchu Select: The luminescence intensity of the simulated finger can be adjusted automatically or manually to detect the weak perfusion performance of the blood oxygen module and to detect the limit parameters of the DC component of the blood oxygen

equipment, which can only be changed in the blood oxygen parameter setting interface.

PI AM : Pulse signal strength, please note that when changing this parameter, finger selection will automatically change to yellow index finger.

20%, 19%, 18%, 17%, 16%, 15%, 14%, 13%, 12%, 11%,

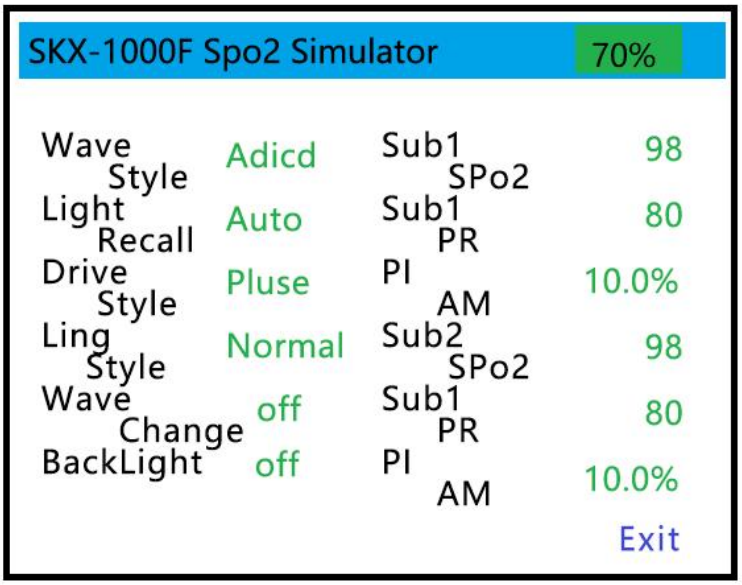
10%, 9%, 8%, 7%, 6%, 5%, 4%, 3%, 2%, 1%,

0.9%, 0.8%, 0.7%, 0.6%, 0.5%, 0.4%, 0.3%, 0.2%, 0.1%

0.08%, 0.06%, 0.04%;

Exit : Return to the main window.

SKX-1000FIII Oxygen parameters setting interface Description:



Wave Style: You can set the waveform shape of the blood oxygen simulation. There are two options, triangle wave and pulse wave, which are two different waveform data. Different waveform does not affect the blood oxygen and pulse rate values.

Light Recall: It can be set to automatic or manual. When set to manual, you can change the light transmission intensity value in the blood oxygen Settings window to simulate different DC components, similar to different fingers, or to test the DC component limits for blood oxygen devices.

Drive Style: Pulse and continuous two options, suitable for different ways of blood oxygen detection methods, can be fast high frequency pulse rate, such as pulse width of dozens to thousands of uS, continuous way for blood oxygen detection, drive pulse width and drive light tube switching frequency is very low, the reaction is no dark period.

Ling Style : Divided into normal, low, medium, high 4 options, this option to improve the compatibility of some blood oxygen equipment.

Wave Change: Used to test the performance of blood oxygen data waveform during data exchange at different wavelengths.

BackLight : The simulator itself emits an ambient light, with two options: on and off. If there is no or little effect on the measured blood oxygen value when it is opened, it indicates that the anti-ambient light interference processing of the machine is very good.

Sub1 SPo2 : The shortcut button setting function corresponding to the key SUB-1 can set the blood oxygen value, which is used to quickly and directly switch the predetermined parameters by pressing the key SUB-1.

Sub1 PR : Corresponding to the shortcut button setting function of the key SUB-1, set the pulse

rate value, used to switch the predetermined parameters quickly and directly by pressing the key SUB-1.

PI AM : Corresponding to the shortcut button setting function of the key SUB-1, the PI intensity value is set for the quick and direct switching of the preset parameters of the key SUB-1.

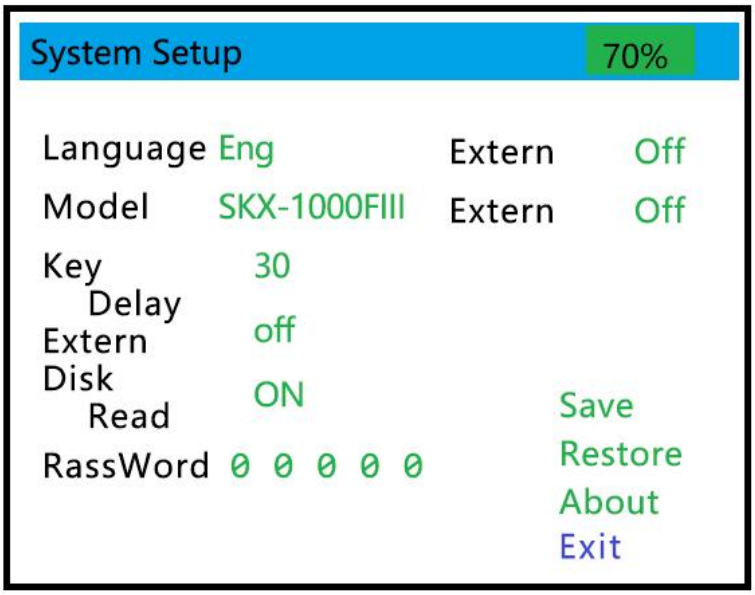
Sub2 SPo2 : Corresponding to the key SUB-2 shortcut button setting function, set the blood oxygen value, pulse rate value, PI intensity value, for the key S-Key quick and direct switch predetermined parameters.

Sub2 PR : Corresponding to the shortcut button setting function of the key SUB-2, set the pulse rate value, used to switch the predetermined parameters quickly and directly by the key SUB-2.

PI AM : Corresponding to the shortcut button setting function of the key SUB-2, the PI intensity value is set for the quick and direct switching of the predetermined parameters of the key SUB-2.

Exit : Return to the main window.

SKX-1000FIII System Parameter setting page Description:



Language : The optional languages are Chinese and English;

Model : The machine type selected by this machine;

Key Delay: When the button is pressed continuously, the delay time required by the automatic continuous selection of the button;

Extern : Extension interface;

Disk read : Optional, you can choose to open the reading U disk function, used to output custom pulse waveform;

PassWord: You can choose to change the password;

Extern : Extension interface;

Extern : Extension interface;

Save : After selecting this project, click "Confirm" and "Saving" will appear. When "Finish" appears, the saving Settings are completed;

Restore : Extension interface;

Exit : Return to the main window.

Chapter4 SKX-1000FIII hardware connection description

SKX-1000F An external analog finger is used to connect the oximetry apparatus, as shown below:

Figure 1

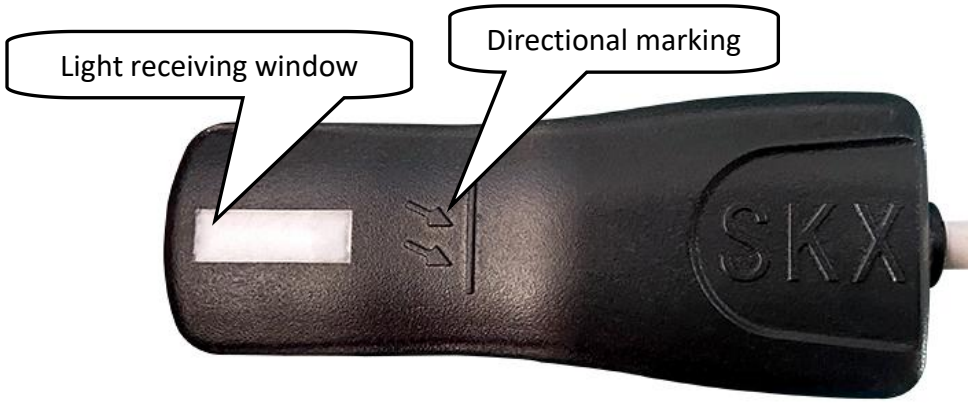


Figure 2

As shown in the figure above, Figure 1 is the luminous end of the simulated finger, and Figure 2 is the receiving end of the simulated finger.

Method of connection with blood oxygen probe:

1. Please align the simulated finger as shown in Figure 2 with the luminescent tube part of the blood oxygen probe;
2. As shown in Figure 1, please point the simulated finger at the receiving tube of the blood oxygen probe. Please note that the light emitting window in the white part of the picture is aligned with the receiving tube;
3. After normal connection, the luminescent tube of the blood oxygen probe will turn into a steady light. If the luminescent tube of the blood oxygen probe is always changing, please continue to adjust the position of the simulated finger.

Chapter 5 SKX-1000FIII After-sales service

* The company will provide you with a two-year warranty from the date of purchase of the instrument (battery, charger warranty for one year), warranty expiration, responsible for lifelong maintenance, and charge maintenance materials according to regulations.

***** Our company will not provide free warranty service for the following reasons:

- Failure caused by unauthorized disassembly and modification of the product.
- Analog finger damaged by external damage, no longer provide warranty.
- Fault caused by careless falls and drops during use and handling.
- Failure due to lack of proper maintenance and failure to meet environmental requirements.
- Failure caused by failure to follow the correct instructions in the operation manual.
- Failure caused by self-repair without our company's permission.
- Failure caused by the irresistible forces of nature caused by acts of god, fire, earthquake, etc.

* If you need warranty service, please contact our technical service center directly by telephone, letter, fax and other forms, such as contact with other personnel or departments, there may be information transmission interruption, resulting in the misunderstanding of time and service, the most important or affect your normal use.

* After-sales service information:

- Full name: Xuzhou Mingsheng Electronic Technology Co., LTD
- Address: 726, Building A, Shimao Diamond International, Yunlong District, Xuzhou City
- ZIP Code: 221004
- Telephone: 0516-83460606, 83469046
- Chuanzhen: 0516-83469046
- E-mail: XZFRD@163.com

Appendix

Weak perfusion characteristics of blood oxygen saturation

Because the performance of digital oximetry mainly depends on the precision of digital probe, the performance of its receiving tube directly determines the weak perfusion performance of digital oximetry. Relative to the traditional analog signal method to get blood oxygen saturation, in a certain degree of weak perfusion, such as more than 1%, the performance of the digital probe is stronger than the analog probe, can improve anti-interference, mainly in no matter anyone's fingers thick or thin, children or newborns can get a good performance. When simulating blood oxygen in extreme fields such as newborn or children's fingers, if the fingers are very thin, the light transmittance of the fingers is too strong, which may cause misjudgment of the probe falling off detection. If the misjudgment is not caused, because the light transmission is too strong, it will lead to the front-end amplification part of the pulse detection circuit can not be simulated amplification, (because amplification will cause loss of pulse amplifier saturation state), so the waveform amplification function will be lost. In addition, because of the high light transmission intensity, although through adjusting the luminescence intensity of the luminescence tube, the received light intensity is still very strong. Therefore, in this state, the performance of analog blood oxygen is inferior to that of digital blood oxygen.

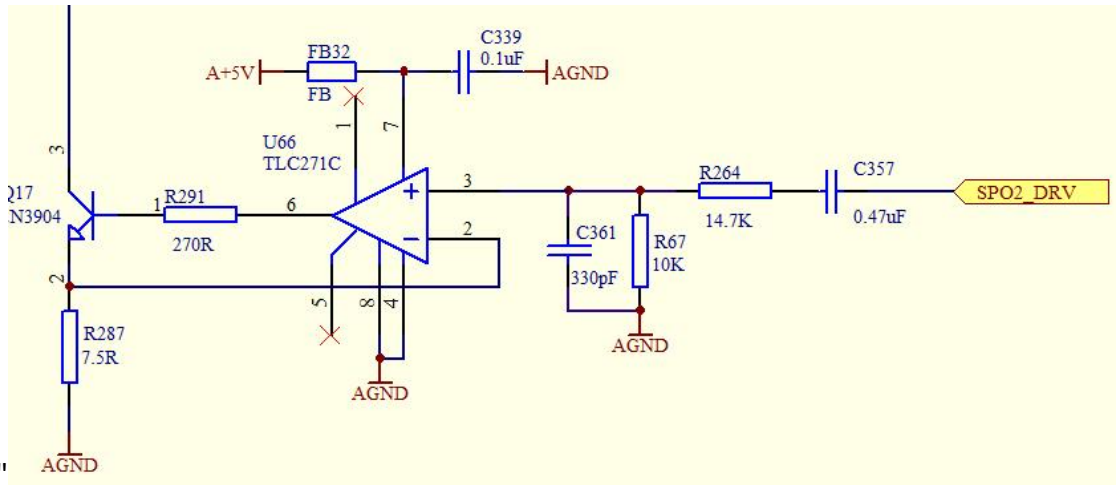
1. The digital oxygen receiving circuit has no limit on the light transmission intensity of the finger, so it improves the anti-interference ability in use and is suitable for a variety of people. However, the digital receiving tube has the potential to cause AC signal saturation after too strong DC signal. When the DC component is too large, it will cause the AC signal to work in an irregular interval, so it is suggested that the digital reception should come with luminous brightness adjustment, for the digital receiving tube work in a most reasonable space.

2. because the weak perfusion performance of digital blood oxygen completely depends on the performance of the receiving tube, so for a certain digital receiving tube, its weak perfusion performance is also determined, restricting the weak perfusion can not be further improved, after testing its weak perfusion performance can only be around 1%, can not be further improved.

3. Because the analog probe uses multistage signal amplification, for example, the pulse signal can be amplified and reduced through the adjustment of luminous intensity first, the pulse signal can be amplified by amplifying the pulse carrier signal, and finally the pulse signal can be amplified by high-precision AD and other ways to collect the pulse signal. Through the above three ways, the weak perfusion performance of blood oxygen can be improved, far more than the weak perfusion performance of digital probe. However, the above method has special circumstances, such as newborns or children, because the finger is small and thin, will lead to the finger light intensity is very strong, may lead to the first two kinds of signal amplification part performance failure, if you can overcome the above problems, the weak perfusion performance of the analog probe is much stronger than the digital probe.

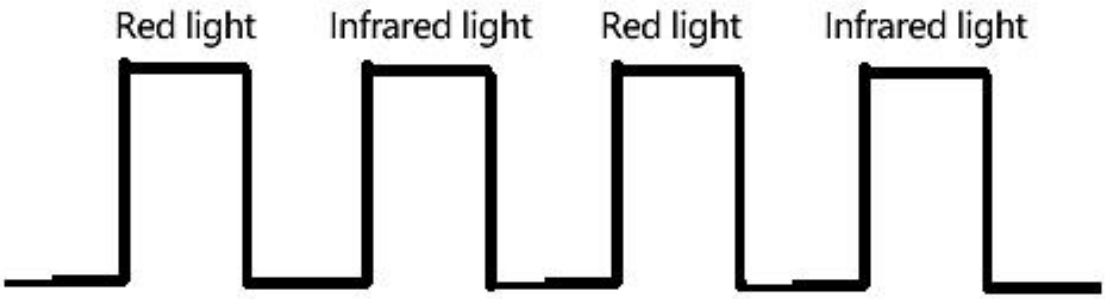
Test method of blood oxygen saturation

The diode driving part can adjust the current through the diode to change the luminous intensity through the analog quantity



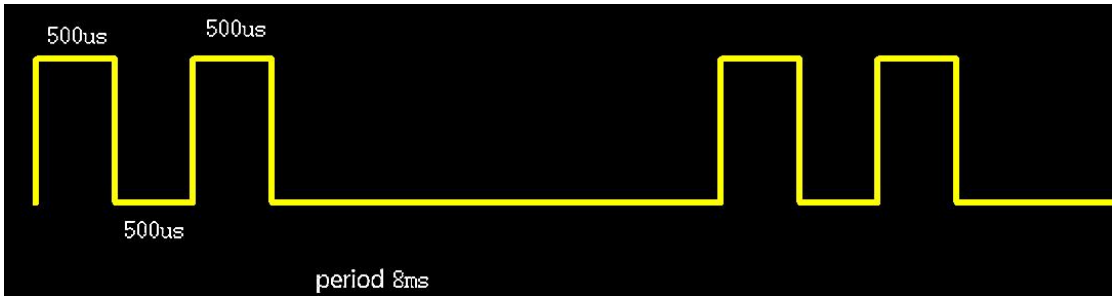
"SPO2_DRV"

The tube alternately emits red and infrared light, similar to the following waveform



The cycle can be set by itself, but it should not be too fast. It should be controlled at about 2ms

The following waveforms are also acceptable.

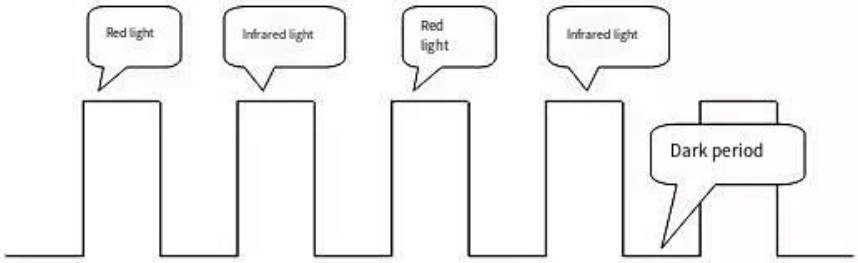


As shown in the figure above, the total period is 8ms, the red glow pulse is 500us, the infrared light emits after 500us interval, the period is also 500us, and then the rest of the cycle is all dark.

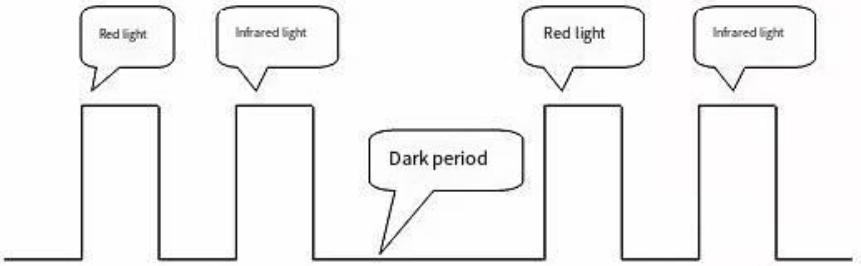
The sequential circuit of the blood oxygen device to drive the luminescent tube is shown below. There are four modes:

1. Red light and infrared light alternate, pulse period is the same, dark period and luminous period are equal.

The luminescence period can be set to 200us-1ms. The Dash series Nellcor module uses a 500us luminous cycle



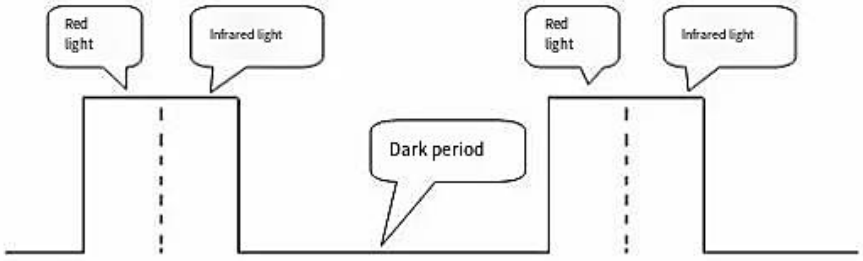
2. The timing sequence of red light and infrared light is fixed, as shown in the figure below: the luminous order of red light and infrared light can be interchanged, but the period is the same, the setting range is 200us-1ns, the dark period between red light and infrared light can be 200-1ms, and the luminous period between each group is fixed, which can be customized according to requirements, and the default can be set to 8ms.



3. Red light and infrared light emit continuously with no dark interval or very small dark interval, less than 100us, as shown in the figure below

As shown:

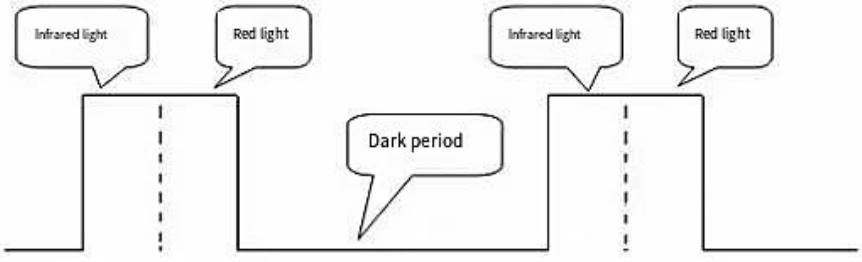
In this case, each set of luminous cycles has a fixed interval, which can be defined as 8ns or other values



4. Red light and infrared light emit continuously with no dark interval or very small dark interval, less than 100us, as shown in the figure below

As shown:

In this case, the red and infrared photoluminescence periods can be defined as 200us-ins, and each group of photoluminescence periods has a fixed interval, which can be defined as 8ns or other values

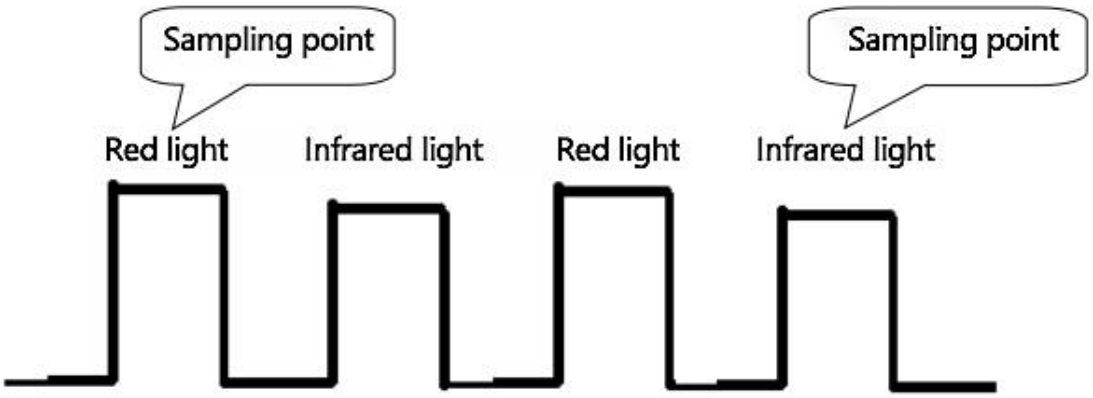


Please note:Spo2 Simulatorcan detect the first three conditions in four cases. If the blood oxygen device is the fourth luminescence driving condition, please adjust the luminescence timing to meet the three conditions. The first two driving modes are common in the market, please try your best to choose the first two driving modes.

Please try to use more than 200us for the driving time sequence of the light emitting tube. The test shows that there is a delay between the driving pulse level of the light emitting tube and the pulse level received by the silicon photocell. This delay is related to the hardware of the light emitting tube, and the time is about dozens of us.Please note this content when developing, it is recommended to sample before shutting off the pulse or at the intermediate point, and try to sample after 100us after the start of the drive pulse.

Receiving tube section circuit

The waveforms received by the receiving tube after differential amplification are similar to the above luminous waveforms, except that the blood oxygen waveforms are already contained.



Similar to the above waveform, the blood oxygen waveform data has been contained. In this case, the waveform should be amplified according to the amplitude of the waveform, and then directly collected in the AD part of CPU. It should be noted that there is no need to separate the above waveform, but only need to follow the timing of the luminous part at the CPU program end. It is OK to collect waveform at the corresponding time point. It is suggested that AD signal should be collected after closing and switching the luminescence tube, so as to obtain effective data to the maximum extent. If the pulse width is wide enough, sampling can also be done at the middle point of the pulse.

How to play the importance of instruments

In the current research and development process of blood oxygen instruments, because it has been a public product, so many manufacturers have no longer to do clinical performance verification, often just use the simulator for calibration accuracy, and no longer invest a lot of energy in clinical verification, but the simulator is only a verification of accuracy and consistency of the instrument, does not represent can replace clinical verification; Therefore, only after the performance test of the analog instrument, it does not mean that it can pass many clinical verification, this point is particularly important to the attention of each research and development personnel.

In the development process of this simulator, the above factors were taken into account, so some functions were added to solve the above clinical verification problems. The specific methods are as follows:

The change of light transmittance intensity corresponds to the DC component in blood oxygen detection, and the light transmittance of fingers with different skin color and thickness. The detection range can be obtained by testing the performance of corresponding products of mature products on the market, because it has undergone a lot of clinical verification. Therefore, if the developed blood oxygen equipment can achieve its detection performance, it means that the clinical treatment is close to it. Please compare and refer to the blood oxygen products of the manufacturers such as Mindray Kinkway and Libon.

By setting the limit value of light transmittance intensity, the limit parameters of mature products can be measured, and these parameters can be used as the limit parameters of self-developed products, which can be quickly verified clinically.

By setting pulse intensity and comparing mature products, the limit parameters were obtained.

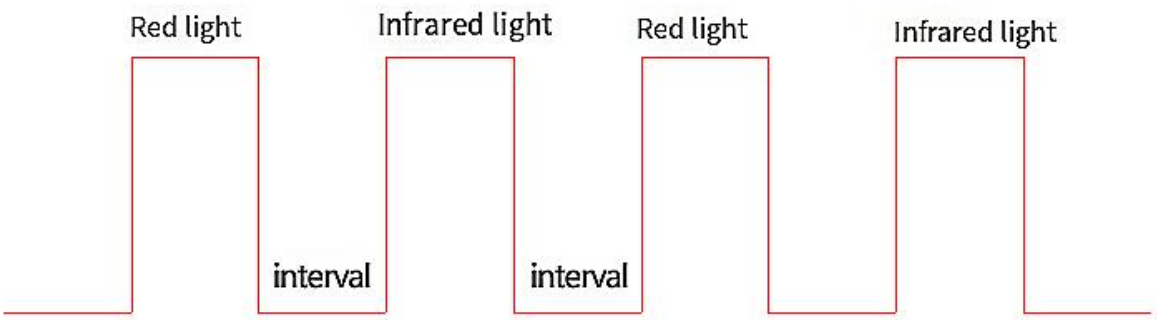
By setting the pulse slope value of triangular waveform, the limit parameters of mature products were obtained.

By comparing the limit parameters obtained by the above detection methods and applying them to the products developed by ourselves, we can approach the clinical performance as close as possible. Maximum product adaptability can be obtained through product comparison without clinical verification.

Please note that when comparing parameters, if you use an analog receiving tube, please compare the instrument with reference to the analog receiving tube, and the digital tube with reference to the instrument with reference to the digital tube, remember not to exchange the comparison.

In addition, in the process of testing mature products, it is found that when the level of the pulse group is raised before AD acquisition, it is better to dynamically adjust the level of the pulse group. In this way, the amplitude range of the pulse group before AD can always be maintained.

Influence of hardware circuit on blood oxygen value



Drive luminescence sequence diagram

Red light pulse not less than 200us Infrared light pulse not less than 200us interval not less than 200us

1.As shown in the figure above, the luminous drive should meet the above minimum requirements as far as possible due to the influence of hardware, so as to obtain a stable signal.

2. In red and infrared pulses, because of the influence of the hardware circuit, the pulse cannot be as steep as the theory. There is a rising cycle when the pulse goes up, and a falling cycle when the pulse goes off. When the blood oxygen simulator is used for calibration, because different simulators have a default threshold range for the rise cycle and fall cycle, switching cycle small devices should be selected for the luminous driven switching mos tube in the hardware circuit. Otherwise, the rise cycle and fall cycle will be too long due to the device factors. When correcting the R curve, Different simulators will lead to deviation in R curve calibration. The lower the blood oxygen value, the greater the deviation. As a result, the corresponding detection results of different simulators will be different, leading to numerical uncertainty. Therefore, it is suggested that the rise period and fall period of the switching mos tube that drives the luminescent tube should be less than 150us. The smaller the data is, the more stable it is relative to the simulator, and the smaller the difference between different blood oxygen simulators. Especially for digital receiving tubes, the longer the rising cycle and falling cycle time, the greater the impact of numerical deviation caused. Therefore, it is recommended to select the device, select the response period is small.

3. For the finger clip oximeter, in terms of both performance and energy saving, a 125Hz sampling rate with a pulse period of 200us-250us and an interval of 200us-250us and a total cycle of 8ms is better for the stability of blood oxygen value and pulse rate. For the blood oxygen instrument that does not need energy saving, the pulse cycle is controlled at 500us and the total cycle is 8ms.