

PULSOXIMETRO OXY 110

OXY 110 PULSE OXIMETER

PULSIOXÍMETRO OXY 110

OXYMÈTRE DE POULS OXY 110

Manuale d'uso - User manual
Manuel de l'utilisateur - Guía de uso



ATTENZIONE: Gli operatori devono leggere e capire completamente questo manuale prima di utilizzare il prodotto.

ATTENTION: The operators must carefully read and completely understand the present manual before using the product.

AVIS: Les opérateurs doivent lire et bien comprendre ce manuel avant d'utiliser le produit.

ATENCIÓN: Los operadores tienen que leer y entender completamente este manual antes de utilizar el producto.

REF 34341 / SP-20



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Dear Customer,

Thank you for purchasing this quality product. Please read the manual very carefully before using this device. Failure to follow these instructions can cause measuring abnormality or damage to the Oximeter.

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Notes:

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Instructions for Safe Operation

- Check the device to make sure that there is no visible damage that may affect user's safety and measurement performance. It is recommended that the device should be inspected minimally before each use. If there is obvious damage, stop using the device.
- Necessary service must be performed only by qualified technicians. Users are not permitted to service this device.
- The oximeter must not be used with the devices and accessories not specified in User Manual.

Cautions

- Explosive hazard—DO NOT use the oximeter in environment with inflammable gas such as some ignitable anesthetic agents.
- DO NOT use the oximeter while the Patient is under MRI or CT scanning. This device is NOT MRI Compatible.

Warnings

- Discomfort or pain may occur if using the sensor of this device continuously on the same location for a long time, especially for the patients with poor micro-circulation. It is recommended that the Oximeter should not be applied to the same location for longer than 2 hours or less if any abnormal condition is found. Frequently check and re-position the Oximeter sensor.
- Misapplication of a SpO₂ probe with excessive pressure for prolonged periods can induce pressure injury.
- Place the SpO₂ probe on the finger tightly will cause venous pulse and effect blood circulation, and lead to interstitial edema, hypoxia and inaccurate measurement.

- Biocompatibility tests have been performed on all the applied parts, some exceptional allergic patients may still have anaphylaxis. Do not apply to those who have anaphylaxis.
- For the individual patients, there should be a more prudent inspecting in the placing process. The sensor can not be placed on the edema and tender tissue.
- The local law should be followed when disposing of the expired device or its accessories.
- DO NOT operate in the environment where strong electro-magnetic interference exists, such as radiogram, television, radiophone, etc.
- Please pay attention to the SpO₂ probe cable while using to avoid strangulating patient.

Attentions

- ⚠ Keep the oximeter away from dust, vibration, corrosive substances, explosive materials, high temperature and moisture.
- ⚠ If the Oximeter gets wet, please stop operating it and do not resume operation until it is dry and checked for correct operation. When it is carried from a cold environment to a warm and humid environment, please do not use it immediately. Allow at least 15 minutes for the Oximeter to reach ambient temperature.
- ⚠ DO NOT operate the button on the front panel with sharp materials or sharp point.
- ⚠ DO NOT use high temperature or high pressure steam disinfection on the oximeter and probes. Refer to related chapter for instructions regarding cleaning and disinfection.
- ⚠ The intended use of this device is not for therapy purpose.
- ⚠ The equipment is IP22 with protection against harmful solid foreign objects and ingress of liquid. So that means the equipment is protected against solid foreign objects of 12.5mm and greater, and protected against vertically falling water drops when enclosure tilted up to 15°.
- ⚠ Please pay attention to the effects of lint, dust, light (including sunlight), etc

Declaration of Conformity

The manufacturer hereby declares that this device complies with the following standards: IEC 60601-1:2005+A1: 2012, IEC60601-1-2:2014, IEC60601-1-11:2010, ISO 80601-2-61:2011 and follows the provisions of the council directive MDD93/42/EEC.

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1 Overview

1.1 Appearance

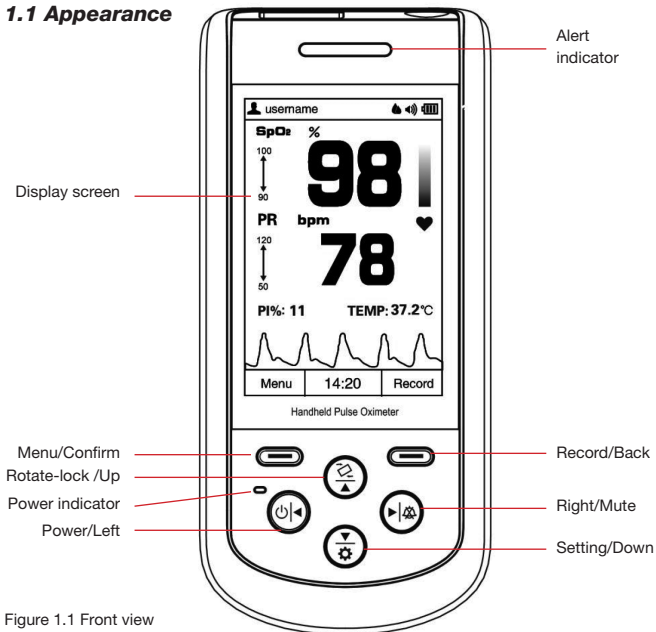


Figure 1.1 Front view

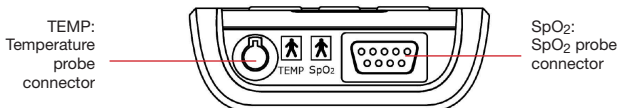


Figure 1.2 Upper-side view

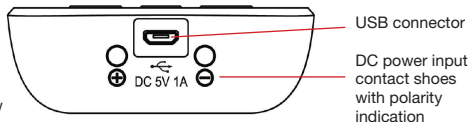















Figure 1.3 Bottom side view

1. **Display screen:** Display measurement result, trends and menus.
2.  **(Power/Left):** Power on/off the device by longtime pressing; On menu or sub-menu screen, short time press it to move the cursor left or adjust the parameter values.
3.  **(Right/Mute):** On data recall screen, longtime press this key, then the delete dialog pops up; On measuring screen, short time press it to disable or enable the sound. On menu or sub-menu screen, short time press it to move the cursor right or adjust the parameter values.
4.  **(Rotate-lock/Up):** On measuring screen, longtime pressing to enable or disable the automatic screen orientation (on horizontal or vertical direction); On menu or sub-menu screen, short time press it to move the cursor upwards or adjust the parameter value.
5.  **(Setting/Down):** On measuring screen, longtime pressing to enter into setting screen; On menu or sub-menu screen, short time press it to move the cursor downwards or adjust the parameter value.
6.  **(Menu/Confirm):** Short time press it to enter into menu screen, or to confirm the selection.
7.  **(Record/Back):** Short time press it to enter into SpO₂ record list screen, or to back to the previous level of menu.
8.  **(Alert indicator):** If the probe is not well placed or disconnected, or the measured value exceeds the preset alert limit value, then the alert indicator will flash with orange color.
9.  **(Power saving mode indicator):** If the device is set as power saving mode, then the indicator lights up. And on measuring screen, the indicator flashes with the pulse beep.
10. **Icon: "SpO₂"** (): SpO₂ Probe Connector.
11. **Icon: "TEMP"** (): Temperature Probe Connector.
12. (): **USB connector.** Used for data uploading or charging
13. ( DC 5V 1A ): DC power input contact shoes with polarity indication. Used for connecting external DC power input for charging the built-in rechargeable battery via the base



1.2 Product Name and Model

Name: Handheld Pulse Oximeter

Model: SP-20

1.3 Structure

It consists of the main unit and SpO₂ probe.

(**Note:** with optional temperature prob, this Oximeter can make temperature measurement.)

1.4 Features

- It is lightweight, small in size and easy to carry
- Color LCD to display plethysmogram and parameters
- Measure SpO₂, Pulse Rate and Temperature simultaneously
- PI (Perfusion Index) display is available
- Up to 500 hours data storage for SpO₂ and PR and can be recalled
- 16 user IDs for marking data and can be added
- A built-on holder for convenient standing on desktop and display viewing
- Real-time battery status display and low battery voltage indication
- Auto power off is available
- Audible and visual alert function is available
- Data uploading to PC for management (Optional)
- Power saving mode is available

1.5 Intended Use

This Handheld Pulse Oximeter is intended for measuring and recording the pulse rate, functional oxygen saturation (SpO₂) and temperature (optional). It is applicable for detecting SpO₂, pulse rate and temperature of adult and neonate patients in clinical institutions and homes.

1.6 Working Environment

Operating temperature: 5~40°C

Operating humidity: 15%~93% (non-condensing)

Atmospheric pressure: 70kPa~106kPa

2 Power Supply

1. Internal power supply with built-in battery:

Built-in battery specification: 2000mAh lithium battery.

2. External power from the AC power adapter:

Use the AC power adapter provided by the manufacturer. Make sure the mains power supply is 100-240VAC with 50/60Hz.

3. The Base:

Input: Micro USB connector, 5VDC/1A

Output: Contact pins. 5VDC/1A

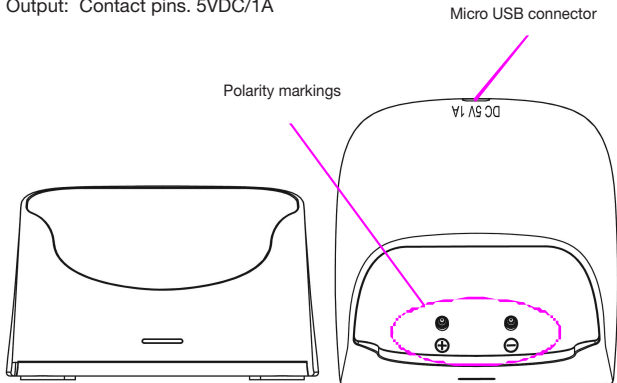



Figure 2.1A Base--front view

Figure 2.1B Base--top view

Description:

The base is used to hold the oximeter, and also for charging the oximeter. You can charge the oximeter by the following methods:

- 1) When the oximeter is held by the base, you can connect one end of the USB cable to the USB connector on the back of the base marked with "DC 5V/1A", and the other end to the USB power source with output capacity of 5V DC/1A;
- 2) If the oximeter is not held by the base, then you can just connect one end of the USB cable to the USB connector on the device marked with , and the other end to the USB power source with output capacity of 5V DC/1A.

Notes:

- 1) During charging, if the oximeter is held by the base, please do not tilt the base backwards too much, or the USB cable and the USB connector may be damaged.
- 2) Put the device into the base properly, and pay attention to the polarity markings, as shown in figure 2.2.

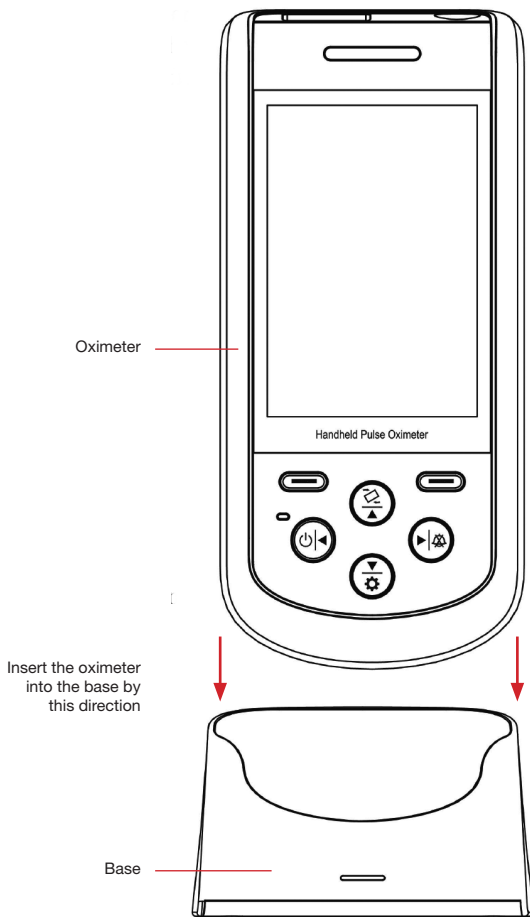


Figura 2.2 Connection between oximeter and base

3 Make Measurement

3.1 SpO₂ Measurement

Operation procedures:

1. Connect the SpO₂ probe to the connector on the upper-side of the device marked with "SpO₂". (**Note:** When disconnecting the connector, be sure to hold the head of the connector firmly and pull).
2. The red blinking light inside the clip of the SpO₂ probe indicates a successful connection.
3. Insert one finger (index finger is preferred, the nail should be not too long) into the clip of the probe according to the finger mark, as shown in figure 3.1.
4. The device will begin to take the measurement, and the measured result will be displayed on the screen, as shown in figure 4.2.

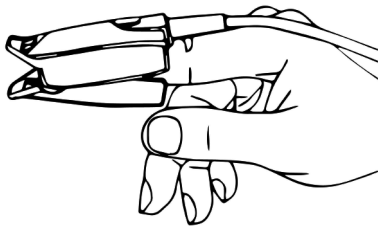


Figure 3.1 demonstration for SpO₂ probe

Safety instructions for SpO₂ measurement

- Long term use of the SpO₂ probe on the same place may result in discomfort or pain, especially for those with microcirculatory problems. It is recommended that the probe should NOT be applied to the same place for over two hours, change the measurement site periodically and when necessary.
- When the ambient temperature is over 35°C, please change the measuring site every two hours; when the ambient temperature is over 37°C, please do NOT use the SpO₂ sensor, as using in high temperatures can cause burns.
- Do NOT place the SpO₂ probe on a finger with edema or fragile tissue.
- Do NOT put the SpO₂ probe and pressure cuff on the same limb, otherwise the blood pressure measurement may affect the SpO₂ measurement.
- The device is calibrated to display functional oxygen saturation.
- 🔔 Do NOT allow the sensor cable to twist or bend.
- 🔔 Check the SpO₂ sensor and cable before use. Do NOT use a damaged SpO₂ sensor.
- 🔔 When the temperature of the SpO₂ sensor is abnormal, do not use it further.
- 🔔 Remove nail polish or other cosmetic products from the fingernail.
- 🔔 The fingernail should be of normal length.

- ⚠ The SpO₂ sensor cannot be immersed into water, liquid or cleanser.
- ⚠ The SpO₂ sensor can be repeatedly used. Please clean and disinfect before reuse.
- 🔧 Connector with the label “SpO₂” can only be connected with SpO₂ probe, and connector with the label “TEMP” can only be connected with the temperature probe.

3.2 Temperature Measurement (optional)

The infrared temperature probe is a delicate transducer. To operate please follow these steps and procedures. Failure to accurately operate may cause damage to the probe.

The infrared temperature probe is as shown in figure 3.2.

Please place the infrared temperature probe in a stable ambient temperature for 30 minutes before taking a measurement.

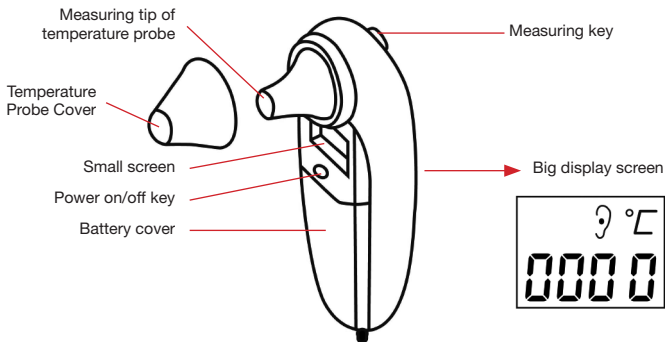


Figure 3.2 the infrared temperature probe

Operation procedure:

1. Connect the infrared temperature probe to the connector on the upper side of device marked with “TEMP”.
2. When the screen shows as the big display screen in figure 3.2 and the temperature unit °C is blinking, the user can begin to take the measurement.
3. Insert the tip of the temperature probe into the earhole and press the measuring key to start the measurement. A short beep means the measurement has finished and the result will be displayed on the big display screen on temperature probe and the display screen of the Oximeter.

Note:

- If the temperature probe detects a hardware failure, the display screen on the infrared temperature probe will show “Err” and will not enter into measurement mode.

- The infrared temperature probe will switch to standby state automatically if there is no operation for 1 minute. If a further measurement is needed, press the measuring key and repeat step 2 and step 3.
- Normal body temperature varies depending on the position/area the measurement is taken from. The following table shows the varying temperature ranges of the different body positions.

Temperature varying range at different body positions:

Arm	34.7~37.3°C
Oral	35.5~37.5°C
Rectal	36.6~38.0°C
Ear	35.8~38.0°C

Safety Instruction for Temperature Measurement

- ⚠ Do NOT take a measurement when the patient is moving.
- ⚠ Patients with tympanitis or otitis problems should NOT use this device.
- ⚠ When the infrared temperature probe is connected to the device, the probe will consequently be at power-on status, therefore pressing the power on/off key on the temperature probe will not cause any effect.

4 Operation

4.1 Power on/off the Oximeter

- Long pressing  Power/Left key for 1~2 seconds, then the oximeter will be

powered on. The oximeter will do self-test and then the software version and warning message "Professional attendance is required for continuous monitoring!" will be shown on the screen, as shown in figure 4.1 (refer to your oximeter for actual version).

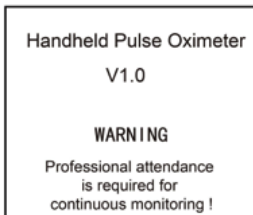



Figure 4.1

4.2 Default Display Screen

Press  power key for 2 seconds to start up the Oximeter, then the screen will display the default screen, as shown in Figure 4.2.

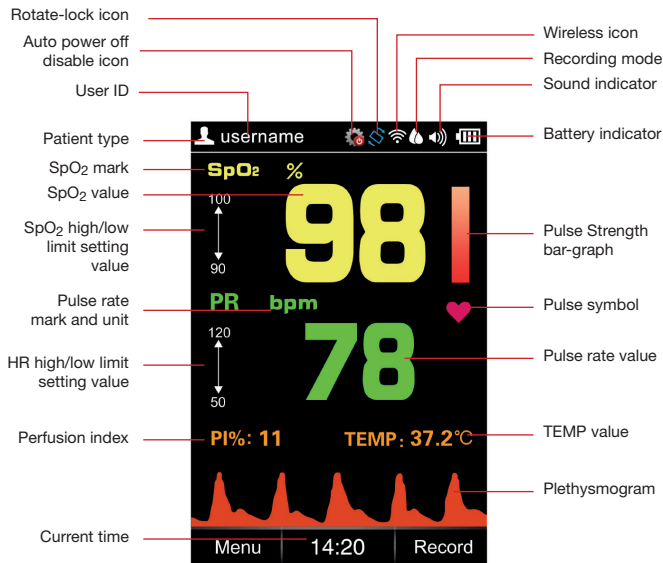




Figure 4.2A Default Display Screen---in vertical

Description:

- During measurement, if the finger is not inserted properly, or the probe is not connected or the probe is off from the finger, then “Check Probe” message prompts on the screen, and “bibibi...” alert sound appears simultaneously. Alert sound is sustaining for about 3 minutes, and if there is no any key operation in this period, then the device will power off automatically (if the auto power off function is enabled).
- During measurement, longtime pressing Rotate-lock/Up key , then the Rotate-lock white icon  appears on the upper right corner of the screen, it

means the auto rotation function is enabled, if you place this oximeter horizontally, then the display shows in horizontal, as shown in figure 4.2B.

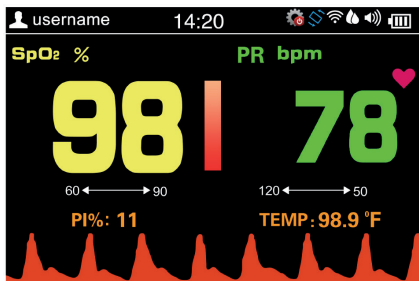











Figure 4.2B Default Display Screen---in horizontal

- Sound indicator  means the device is on mute status, the user can resume the indication sound by short pressing  key again. Short time press  key can turn off (or resume) the device sound (including pulse beep sound, audible alert and key click), while the pulse symbol  still blinks. During the measurement, over-limit event or probe off event can activate the alert indication sound. Refer to Section 6.2 for detailed alert indication sound.
- If the memory is full, the corresponding memory full icon appears on the screen,  means temperature memory is full,  means SpO₂ spot-check record memory is full,  means SpO₂ trend record memory is full. No display of the icon means the current corresponding storing space is not full. If the memory is full, the data storing will continue in such way the new record will overwrite the oldest record, so that it's recommended to upload the stored data into the computer in time.




4.3 Menu

On the default measuring screen, short time press  Menu/Confirm key for entering into main menu screen (as shown in Figure 4.3).

There are 9 functional icons in main menu screen, press Up/Down/Left/Right key can move the cursor to make selection and press  Menu/Confirm key again to confirm the selection.

- User ID: Add new or edit the current User ID.
- User: Select patient type, “Adult” and “Neonate” for option.

Note: when the device is set to the neonate patient type, then the User icon

 turns to grey , and the patient type on upper left corner turns to pink .

- Recording mode: Select the data recording mode, “Spot-check Record” and “Trend Record” for option.
- SpO₂ record: Recall and review the records stored on the oximeter, two types of record for option: “Spot-check Record” and “Trend Record”, see Section 4.4 for details.

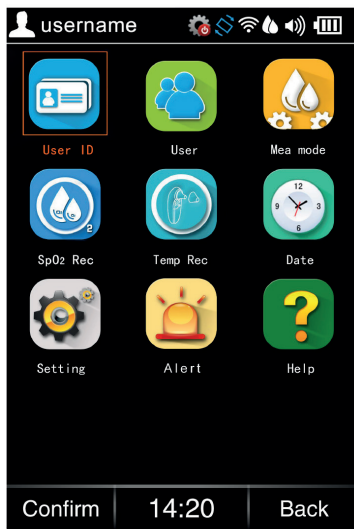



Figure 4.3 Main menu

- TEMP Record: Review the temperature record list.
- Date: Set the time and date, see Section 4.3.6 for details.
- Setting: Set the system parameter, including brightness, sound volume, display language, power saving mode etc., see Section 4.3.7 for details.
- Alert: Set the low alert limit for SpO₂ and the high/low alert limit for PR, see Section 4.3.8 for details.
- Help: To view the tips information of SpO₂ measurement and temperature measurement, see Section 4.3.9 for details.

4.3.1 User ID

On main menu screen, move the cursor on “User ID” and press Confirm key (), then the oximeter enters into User ID Setup screen, as shown in figure 4.4.

User ID		
creative	OK	Edit
01e	OK	Edit
02	OK	Edit
23	OK	Edit
33	OK	Edit
33e	OK	Edit

Figure 4.4A User ID setup screen


Move the cursor on “Edit” and press Confirm key (), when the cursor turns to blue, then the user can edit the User ID, and move the cursor on “OK” to confirm the edit, the edit screen is as shown in figure 4.4B.

Figure 4.4B User ID edit screen

UserID									
ID:	<input type="text"/>								
1	2	3	4	5	6	7	8	9	0
q	w	e	r	t	y	u	i	o	p
a	s	d	f	g	h	j	k	l	z
x	c	v	b	n	m	Del	OK		

4.3.2 User




On main menu screen, move the cursor on “User” and press Confirm key (), then the oximeter enters into Patient type Setup screen, as shown in figure 4.5.

Figure 4.5 Patient type setup screen

User	
Adult	
Neonate	



4.3.3 Recording Mode

On main menu screen, move the cursor on “Recording Mode” and press Confirm key , then the oximeter enters into Recording Mode Setup screen, as shown in figure 4.6.

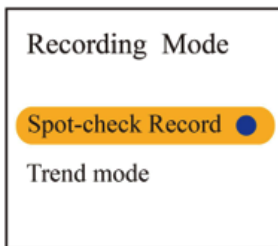


Figure 4.6 Recording mode setup screen

Note: When selecting “Spot-check Record” for data recording, the measuring time should last over 10 seconds to get one spot-check reading, or no reading value will not be recorded in Spot-check data record; When selecting “Trend Record”, the measuring time should exceed 30 seconds, or no one record will be recorded in Trend data record list.

4.3.4 SpO₂ Record



On main menu screen, move the cursor on “SpO₂ Record” and press Confirm key , then the oximeter enters into SpO₂ record review method selecting screen, as shown in figure 4.7.



Figure 4.7 SpO₂ record review method selecting screen

Refer to Section 4.4 for details.

4.3.5 TEMP Record

On main menu screen, move the cursor on “TEMP Record” and press Confirm key , then the oximeter enters into temperature record list screen, as shown in figure 4.8.

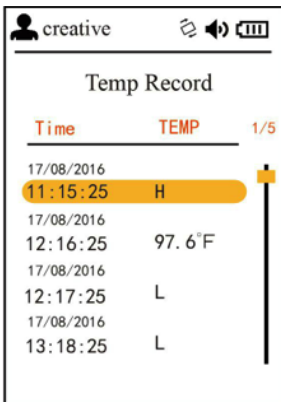



Figure 4.8 TEMP record list screen

4.3.6 Date

On main menu screen, move the cursor on “Date” and press Confirm key , then the oximeter enters into date setup screen, as shown in figure 4.9.

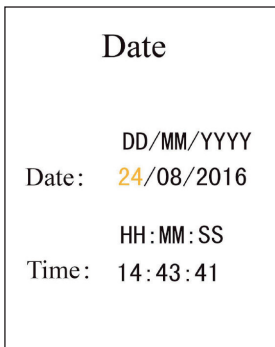




Figure 4.9 Date setup screen


Date setting procedure:

1. Move the cursor stays on the Year of the date, press Confirm key  to active Year option, the cursor flashes on the Year of the date;
2. Press Up/Down key to adjust Year;
3. Press  (Confirm) key to confirm and exit from date setting;
4. The procedures of adjusting Month, Day, Hour, Minute and Second value are the same with Year adjustment.

Date Format: DD-YY-MM; Time Format: HH:MM:SS

Note: The setting operations of other parameters (such as User ID, User, Auto Power Off, Power Saving etc.) are the same with date setting.

4.3.7 Setting

On main menu screen, move the cursor on “Setting” and press Confirm key  , then the oximeter enters into system setting screen, as shown in figure 4.10.

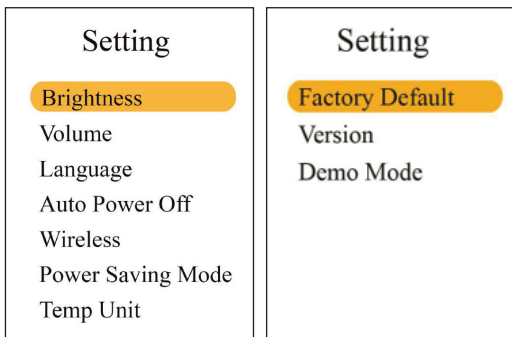


Figure 4.10 System setting screen

Description:

- **Brightness:** To set the brightness of backlight, 6 levels for optional, the factory default is level 3, as shown in figure 4.10A.
- **Volume:** To set the sound volume (including alert sound, pulse beep sound and key click sound), 6 levels sound volume for optional, the factory default is level 3, as shown in figure 4.10B.
- **Language:** This oximeter provides the display with two languages: English and Simplified Chinese, the factory default is “English”, as shown in figure 4.10C.
- **Auto power off:** To turn on/off the Auto Power Off mode, the factory default is “On”, as shown in figure 4.10D.
- **Wireless:** To turn on/off the wireless connection function, the factory default is “On”, as shown in figure 4.10E.
- **Power saving mode:** To turn on/off the Power Saving mode, the factory default is “On”, as shown in figure 4.10F
- **TEMP unit:** To set the temperature unit, “°C (Celsius)” and “°F (Fahrenheit)” for option, the factory default is “°F”, as shown in figure 4.10G.
- **Factory Default:** Enter into the factory default setting, as shown in figure 4.10H.
- **Version:** For viewing version number of the software, as shown in figure 4.10I
- **Demo:** Enter into the Demonstration mode, as shown in figure 4.10J.

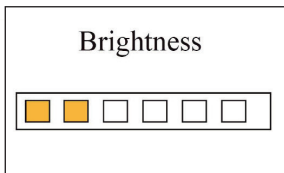


Figure 4.10A Brightness setup

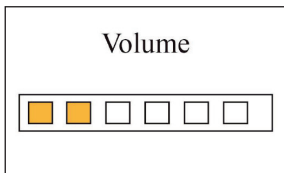


Figure 4.10B Volume setup

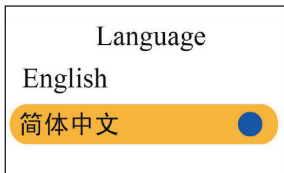


Figure 4.10C Language setup

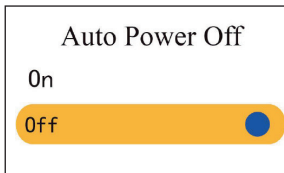


Figure 4.10D Auto Power OFF setup

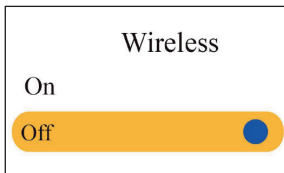


Figure 4.10E Wireless setup

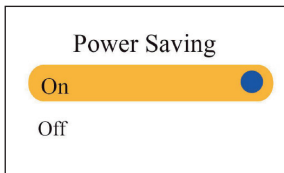


Figure 4.10F Power Saving setup

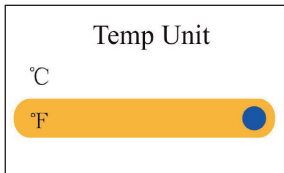


Figure 4.10G TEMP unit setup

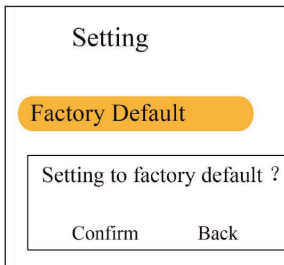


Figure 4.10H Default setting



Figure 4.10I Version info

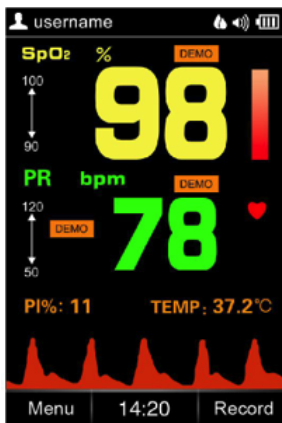



Figure 4.10J Demo mode

Notes:

- When the Auto Power Off is set to “On” option, if there is no key operation for 3 minutes, then the oximeter will power off automatically.
- When the Power Saving Mode is set to “On” option, during the measurement, if there is no key operation for 1 minute, the screen display will be dim for power saving. The display brightness will resume to normal condition by pressing any key.

4.3.8 Alert

On main menu screen, move the cursor on “Alert” and press Confirm key , then the oximeter enters into alert setting screen, as shown in figure 4.11.

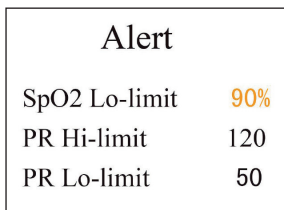



Figure 4.11 Alert setting screen

- **SpO₂ Lo-Limit:** SpO₂ low limit setting; range: 50%~99%, the step is 1%. The factory default value for adult is 90% and 95% for Neonate.
- **PR Hi-Limit:** High limit setting of pulse rate; range: 100~240bpm. From 100 to 150, the step is 1bpm, and from 150 to 240, the step is 5bpm. The factory default value for adult is 120bpm and 160bpm for neonate.
- **PR Lo-Limit:** Low limit setting of pulse rate; range: 30~99bpm, and the step is 1bpm. The factory default value for adult is 50bpm and 60bpm for neonate.

Note: When the SpO₂ reading is lower than or equal to the preset alert setting or the PR reading is higher than or equal to the preset high limit or the PR reading is lower than or equal to the preset low limit, then the over-limit alert event will be activated, that's, the alert sound "bibibibi..." occurs, and the corresponding reading(s) blinks. When measured on neonate, if the SpO₂ reading is lower than or equal to the preset alert setting for 10 seconds, then the alert sound and blinking display will be activated.

4.3.9 Help

On main menu screen, move the cursor on "Help" and press Confirm key , then the oximeter help information screen, which shows SpO₂ and temperature measurement tips, as shown in figure 4.12.

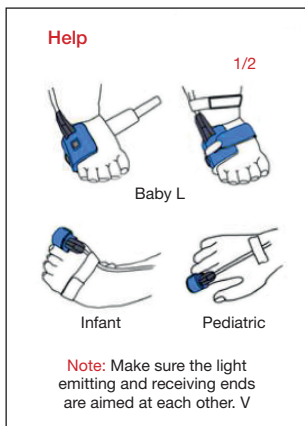


Figure 4.12 Help information
---SpO₂ measurement

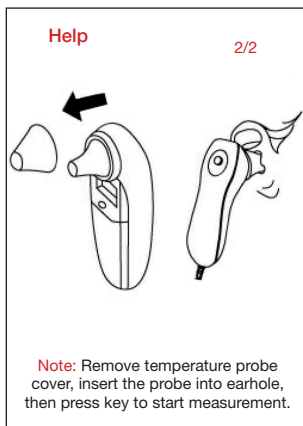


Figure 4.12 Help information
---TEMP measurement

4.4 Record

4.4.1 Data Recall


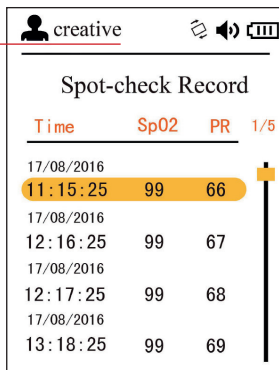
On main default screen, short time press Record/Back key () to enter into data recall screen, as shown in figure 4.13.



Figure 4.13 SpO₂ record

SpO₂ records include two types, Spot-check and Trend Record, Spot-check Record is a list showing the recording time, SpO₂ value and pulse rate value for each spot-checking event, as shown in figure 4.14.



The corresponding User and User ID for the selected record




The screenshot shows a mobile interface for a user named 'creative'. At the top, there are icons for a user profile, a list, a speaker, and a battery level. Below the title 'Spot-check Record', there is a table with four columns: Time, SpO2, PR, and 1/5. The first row is highlighted in yellow.

Time	SpO2	PR	1/5
17/08/2016			
11:15:25	99	66	
17/08/2016			
12:16:25	99	67	
17/08/2016			
12:17:25	99	68	
17/08/2016			
13:18:25	99	69	

Figure 4.14 Spot-check Record list

If Trend Record is selected, then the screen shows a list of trend data record, and each record corresponds to a period of recording at a fixed time interval (1 second), as shown in figure 4.15, press Up/Down key ( / ) to select one record you need to review.

Select one record you need to review, and press Confirm key (), then the screen shows the corresponding User, User ID, and trend graph, as shown in figure 4.16.

The corresponding
User and
User ID for the
selected record

creative		1/5
Date	Time	
17/08/2016	11:15:25	
17/08/2016	11:16:25	
17/08/2016	11:17:25	
17/08/2016	11:18:25	
18/08/2016	11:19:25	
18/08/2016	11:19:45	
19/08/2016	11:20:25	

Figure 4.15 Trend record---List

The corresponding
User and
User ID for the
selected record

SpO₂
trend graph

PR trend graph

Recording
time

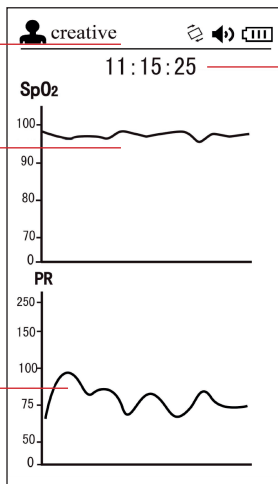



Figure 4.16 Trend record---
Trend graph

4.4.2 Data Deletion

On the record list screen shown in figure 4.14 or 4.15, move the cursor on the record you want to delete, and longtime pressing Mute/Right key (), then an

message “Are you sure to delete all?” prompts on the screen, as shown in figure 4.16.

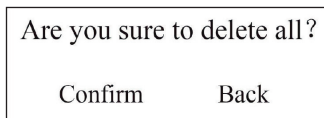




Figure 4.16 Delete records

At this time, short time press Menu/Confirm () key to confirm and delete the records. Or short time press Record/Back () key to return to record list screen.

4.4.3 Data Upload

If you want to upload the stored data (SpO₂, PR and TEMP values) to the computer, then Make sure the provided USB data cable is well connected between the device and PC before uploading data, as shown in figure 4.17. Refer to the instruction in “Oximeter Data Manager User Manual”for detailed operation.

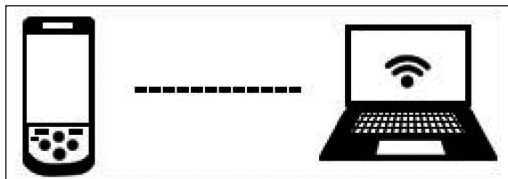


Figure 417 Data uploading screen

- **During data uploading, the user can not do any operation on the oximeter.**

When the wireless transmission function is on, the Handheld Pulse Oximeter can communicate with a host (such as computer or mobile) for viewing and management.

- Open the host's wireless function and procedure and start to scan the SP-20 Oximeter.
- The host will pair with the SP-20 Oximeter at a moment.
- After connecting, the host can display and manage the measurement data of SP-20 by wireless.

The pairing and transmitting distance of wireless function is 8 meters in the normal. If the host can't pair with the SP-20, you will try to narrow the distance between the host and SP-20.

The SP-20 can pair and transmit with the host under the wireless coexistence environment, but other wireless device may still interface with pairing and transmission between the host and the SP-20 device under uncertain environment. If the host and the SP-20 display inconsistent, you may need to change the environment.

4.4.4 Data Management

The user can go to our website to download the corresponding PC Software “Oximeter Data Manager” for this oximeter with the link:

<http://www.creative-sz.com/downloads>

With the computer installed this PC software, you can upload the data stored in the oximeter to your PC via wireless or data cable .

It's convenient for user to review the data records and statistical result, as well as archive patients' data.

5 Technical Specifications

A. Display Panel: 3.5 inch color TFT LCD;

B. Power Supply:

Internal power supply: 2000mAh lithium battery

AC power adapter: 5VDC/1A,

Working current: $\leq 180\text{mA}$

Input power for AC power adapter: $< 15\text{VA}$

The typical continuous operation time of the battery: 18 hours (when screen display is automatically off and bluetooth function is disabled).

The typical service life of the battery: 5 years.

C. SpO₂ Measurement

Transducer: dual-wavelength LED sensor with wavelength:

Red light: 663 nm, Infrared light: 890 nm.

Maximal average optical output power: $\leq 2\text{mW}$

Display range: 0~100%

Measuring accuracy: ARMS value (defined in ISO 80601-2-61) is not greater than 3% for SpO₂ range from 70% to 100%.

SpO₂ low alert limit setting range: 50%~99%

The device is calibrated to display functional oxygen saturation.

The functional tester cannot be used to assess the accuracy of the

SpO₂ probe or the device.

D. Pulse Rate Measurement

Display and measuring range: 30bpm~250bpm

Accuracy: $\pm 2\text{bpm}$ or $\pm 2\%$ (whichever is greater)

E. Perfusion Index Display

Range: 0.2%~20%

F. Temperature Measurement

Measuring range: 32.0°C~43.0°C

Measuring accuracy: $\pm 0.2^{\circ}\text{C}$ for temperature range from 35.0°C to 42.0°C , and $\pm 0.3^{\circ}\text{C}$ for the rest.

Response time: $\leq 5\text{s}$

Patient Group: Adult and Neonate

Measuring site: earhole

Deviation: $\leq 0.1^{\circ}\text{C}$

G. Operating Environment

Operating Temperature: $5^{\circ}\text{C} \sim 40^{\circ}\text{C}$

Operating Humidity: $15\% \sim 93\%$

Atmospheric pressure: $70\text{kPa} \sim 106\text{kPa}$

Note: portable and mobile RF communications equipment may affect the performance of the Oximeter.

H. Low Perfusion Performance

The accuracy of SpO_2 and PR measurement still meet the precision described above when the modulation amplitude is as low as 0.4%.

I. Resistance to interference of surrounding light:

The difference between the SpO_2 value measured in the condition of indoor natural light and that of darkroom is less than $\pm 1\%$.

J. Wireless (bluetooth) function

Frequency band: 2.4GHz

Working profile: BLE V4.0

K. Dimensions: 158 mm (L) × 73 mm (W) × 25 mm (H)

Net Weight: about 230g (including battery)

L. Classification

Type of protection against electric shock:

Internally powered equipment and Class II.

Degree of protection:

Type BF applied parts.

Degree of protection against harmful ingress of liquids:

The equipment is IP22 with protection against harmful solid foreign objects and ingress of liquid.

Mode of operation: Continuous operation.

Electro-Magnetic Compatibility: Group I, Class B

M. Data update period

The update time for determining SpO_2 and PR value is 8 seconds, and the displaying update time is 1 second.

Remark: The oximeter calculates the SpO_2 and PR value, every second by use of recently acquired data segment, then yields the displaying value by moving average of the latest calculated parameters. The reading value of SpO_2 and PR on the oximeter is updated every second, and the displayed plethysmogram is a normalized waveform. If the signal is no integral (such as with too much noise, or poor signal to noise ratio or signal is lost), then the SpO_2 and PR will be identified as an invalid value, that's to say, the numeric reading will disappear and be displayed as "--" instead.

Note: The oximeter is calibrated in the factory before sale, and there is no need for user to calibrate again.


6 Over-limit Indication

6.1 Limit settings





- SpO₂ low limit setting range: 50%~99%.
- Pulse Rate limits setting range:
High: 100bpm--240bpm Low: 30bpm--99bpm

During the measurement, if the measured value exceeds the preset value, the alert beeping sound will be activated, the value that is over-limit will blink at the same time.

6.2 Over-limit indication sound mute setting

- During the measurement, if the over-limit indication sound is set to on, short time press Mute/Right key (), then the over-limit indication sound will

mute, but the over-limited value still keeps blinking. At this moment, the speaker volume icon becomes  . Short press  key again can resume the sound

indication, and the speaker volume icon becomes ). **Note:**  means the speaker volume is set as 1 or 2 grid(s);  means the speaker volume is set as 3 or 4 grids;  means the speaker volume is set as 5 or 6 grids.

- During the measurement, if the probe is off or disconnected, the message “Check Probe” shows on the display screen. The alert sound starts (interval is 5 seconds) and lasts for about 3 minutes. If the probe is still off, the Oximeter will power off automatically.

7 Packing List

1. An Oximeter
2. A SpO₂ probe
3. User Manual
4. A oximeter rubber cover
5. A charging base
6. A temperature probe (optional)
7. Charging cable (optional)
8. A USB data cable (optional)

**Notes:**

1. The accessories are subject to change. See the package in your hand for detailed items and quantity.
2. All the parts of the device should NOT be replaced at will. If necessary, please use the components provided by the manufacture or those that are of the same model and standards as the accessories along with the device which are provided by the same factory.
Otherwise, negative effects concerning safety and biocompatibility etc. may be caused.
3. This device can only connect with the manufacture nominated device.

8 Repair and Maintenance

8.1 Maintenance

The expected service life(not a warranty) of this device is 5 years. In order to ensure its long service life, please pay attention to the maintenance;

- If the battery is damaged, please contact your local sales representative or the manufacture.
- Please store the device carefully to avoid being damaged by pets, pests or children.
- The recommended storage environment of the device:
Ambient temperature: -20°C ~60°C
Relative humidity: 10%~95%
Atmospheric pressure: 50kPa~107.4kPa
Storage and Transportation between uses:
– 25°C without relative humidity control;
and + 70°C at a relative humidity up to 93% (non-condensing).
- The oximeter is calibrated in the factory before sale, there is no need to calibrate it during its life cycle.

However, if it is necessary to verify its accuracy routinely, the user can do the verification by means of SpO₂ simulator, or it can be done by the local third party test house.

8.2 Cleaning and Disinfecting Instruction

- Surface-clean sensor with a soft cloth by wetting with a solution such as 75% isopropyl alcohol, if low-level disinfection is required, use a 1:10 bleach solution.
- Then surface-clean by a dampened cloth and let it air dry or wipe it with a cloth.
- Please clean and disinfect the device after using to avoid cross infection.



**High-pressure disinfection cannot be used on the device.
Do not immerse the device in liquid.**

9 Troubleshooting

Trouble	Possible Reason	Solution
Unstable SpO ₂ and Pulse Rate display	<ol style="list-style-type: none"> 1. The finger is not placed far enough inside. 2. The finger is shaking or the patient is moving. 	<ol style="list-style-type: none"> 1. Place the finger correctly inside and try again. 2. Reduce patient movement.
Unable to measure Temperature	<ol style="list-style-type: none"> 1. Temperature probe is not connected properly 	<ol style="list-style-type: none"> 2. Reinsert the probe into the device
Device will not switch on	<ol style="list-style-type: none"> 1. The batteries are drained or almost drained. 2. The device is malfunctioning. 	<ol style="list-style-type: none"> 1. Recharge battery. 2. Please contact the local service center.
No Display	<ol style="list-style-type: none"> 1. The device will power off automatically when there is no signal and no operation for 1 minute. 2. The battery voltage is low. 	<ol style="list-style-type: none"> 1. Normal. 2. Recharge battery.
No Signal	<ol style="list-style-type: none"> 1. Probe off or incorrect connection. 2. Incorrect finger insert 3. Probe is damaged. 	<ol style="list-style-type: none"> 1. Reconnect the probe. 2. Reinsert the finger. 3. Replace a new probe.



10 Frequently Asked Questions

1. Q: What's SpO₂?

A: SpO₂ means the saturation percentage of oxygen in the blood.

2. Q: What's the normal range of SpO₂ value for healthy people?

A: The normal range varies by individual, but usually over 95%, otherwise, please consult your physician.

3. Q: What's the normal range of PR value for healthy people?

A: Usually, the normal range is 60bpm~100bpm.

4. Q: Why do the display value of SpO₂ and PR vary with time?

A: The measured SpO₂ and PR value changes in correspondence with the change of patient's physiological conditions.

5. Q: What to do if there is no SpO₂ and PR reading?

A: Do not shake the finger, and keep calm during the measurement. Please also avoid the oximeter and the cuff on the same limb for blood pressure and oxygen saturation measurement simultaneously.

6. Q: How to confirm that the SpO₂ reading is true or accurate?

A: Hold breath for a while (50 seconds or more), if the SpO₂ value significantly decreases, it means that the SpO₂ reading truly reflects the physiological condition change.

7. Q: When to charge the batteries?

A: The icon of low battery will appear on the screen when the battery voltages are low. By then, device need to be charged.












8. Q: What factors will affect the SpO₂ accuracy?

- A:
- Intravascular dyes such as indocyanine green or methylene blue;
 - Exposure to excessive illumination, such as surgical lamps, bilirubin lamps, fluorescent lights, infrared heating lamps, or direct sunlight;
 - Vascular dyes or external used color-up product such as nail enamel or color skin care;
 - Excessive patient movement;
 - Placement of a sensor on an extremity with a blood pressure cuff, arterial catheter, or intravascular line;
 - Exposure to the chamber with High pressure oxygen;
 - There is an arterial occlusion proximal to the sensor;
 - Blood vessel contraction caused by peripheral vessel hyperkinesias or body temperature decreasing;
 - Low perfusion condition (Perfusion Index is small).














Please contact the local distributor or manufacturer if necessary.

Appendix

I Key of Symbols

Symbol	Description
%SpO ₂	The oxygen saturation
PI%	Perfusion Index
 bpm	Pulse rate (Unit: beats per minute)
	Pulse bar graph
	Low battery voltage
	Battery is full
	Speaker mute icon
	Speaker volume icon
	SpO ₂ spot-check record memory full
	SpO ₂ trend record memory full
	Temperature memory full
	Wireless transmission icon
	/ (neonate/Adult) Patient type

Symbols
on the screen

Symbol	Description
Symbols on the panels	SpO₂ SpO ₂ probe connector
	TEMP Temperature probe connector
	 Power/Left Key
	 Mode/Right Key
	 Rotate-lock/Up Key
	 Setting/Down Key
	 Menu/Confirm key or Record/Back key
	 CE mark
	SN Serial number
	 Date of manufacture
	 Manufacturer (including address)
	 With Type BF applied part
	 See User Manual
	 Disposal of this device according to WEEE regulations
	 No alarm
	 Do not litter at will

II Common Knowledge

1 Meaning of SpO₂

SpO₂ is the saturation percentage of oxygen in the blood, so called O₂ concentration in the blood; it is defined by the percentage of oxyhemoglobin (HbO₂) in the total hemoglobin of the arterial blood. SpO₂ is an important physiological parameter to reflect the respiration function; it is calculated by the following method:

$$\text{SpO}_2 = \text{HbO}_2 / (\text{HbO}_2 + \text{Hb}) \times 100\%$$

HbO₂ are the oxyhemoglobins (oxygenized hemoglobin), Hb are those hemoglobins which release oxygen.

2 Principle of Measurement

Based on Lambert-Beer law, the light absorbance of a given substance is directly proportional with its density or concentration. When the light with certain wavelength emits on human tissue, the measured intensity of light after absorption, reflecting and attenuation in tissue can reflect the structure character of the tissue by which the light passes.

Due to that oxygenated hemoglobin (HbO₂) and deoxygenated hemoglobin (Hb) have different absorption character in the spectrum range from red to infrared light (600nm~1000nm wavelength), by using these characteristics, SpO₂ can be determined. SpO₂ measured by this oximeter is the functional oxygen saturation -- a percentage of the hemoglobin that can transport oxygen. In contrast, hemoximeters report fractional oxygen saturation – a percentage of all measured hemoglobin, including dysfunctional hemoglobin, such as carboxyhemoglobin or methemoglobin.

Clinical application of pulse oximeters: SpO₂ is an important physiological parameter to reflect the respiration and ventilation function, so SpO₂ monitoring used in clinical becomes more popularly, such as monitoring the patient with serious respiratory disease, the patient under anesthesia during operation, premature and neonate. The status of SpO₂ can be determined in time by measurement and find the hypoxemia patient earlier, thereby preventing or reducing accidental death caused by hypoxia effectively.

3 Normal SpO₂ Range and Default Low Limit

In campaign area, healthy people's SpO₂ value is greater than 94%, so the values below 94% are determined as hypoxia. SpO₂ <90% is considered as the default threshold for determining anoxia by most researchers, so SpO₂ low limit of the oximeter is set as 90% generally.

4 Factors affecting SpO₂ accuracy (interference reason)

- Intravascular dyes such as indocyanine green or methylene blue
- Exposure to excessive illumination, such as surgical lamps, bilirubin lamps, fluorescent lights, infrared heating lamps, or direct sunlight.



- Vascular dyes or external used color-up product such as nail enamel or color skin care
- Excessive patient movement
- Placement of a sensor on an extremity with a blood pressure cuff, arterial catheter, or intravascular line
- Exposure to the chamber with High pressure oxygen
- There is an arterial occlusion proximal to the sensor
- Blood vessel contraction caused by peripheral vessel hyperkinesias or body temperature decreasing

5 Factors causing low SpO₂ value (pathology reason)

- Hypoxemia disease, functional lack of HbO₂
- Pigmentation or abnormal oxyhemoglobin level
- Abnormal oxyhemoglobin variation
- Methemoglobin disease
- Sulfhemoglobinemia or arterial occlusion exists near sensor
- Obvious venous pulsations
- Peripheral arterial pulsation becomes weak
- Peripheral blood supply is not enough