AccuMed

User Manual

Instructions to User

Thank you very much for purchasing our product!

This Manual is written and compiled in accordance with the council directive MDD93/42/EEC for medical devices and harmonized standards. The Manual is written for the current Pulse Oximeter. In case of modifications and software upgrades, the information contained in this document is subject to change without notice.

The Manual describes, in accordance with the Pulse Oximeter's features and requirements, main structure, functions, specifications, correct methods for transportation, installation, usage, operation, repair, maintenance, storage, etc. as well as the safety procedures to protect both the user and equipment. Refer to the respective chapters for details.

Please read the Manual very carefully before using this equipment. These instructions describe the operating procedures to be followed strictly; failure to follow these instructions can cause measuring abnormalities, equipment damage and personal injury. The manufacturer is NOT responsible for the safety, reliability, and performance issues and any monitoring abnormality, personal injury, and equipment damage due to user's negligence of the operating instructions. The manufacturer's warranty service does not cover such faults.

Due to the continual re-inovation, the specific products you received may not be totally in accordance with the description of this User Manual. We would sincerely apologize for this.

This product is medical device, and can be used repeatedly. Its life span is 3 years.

WARNING:

- **An uncomfortable or painful feeling may develop if using the device ceaselessly, especially for the microcirculation barrier patients. It is recommended that the sensor should not be applied to the same finger for over 2 hours.**
- **For the individual patients, there should be a more prudent inspecting in the placing process. The device cannot be clipped on the edema and tender tissue.**
- **The light (the infrared is invisible) emitted from the device is harmful to the eyes, so the user and the maintenance man, cannot stare at the light.**
- **Testee cannot use enamel or other makeup.**
- **Testee's fingernail cannot be too long.**
- **Please peruse the relative content about the clinical restrictions and warnings.**
- **This device is not intended for treatment.**

1 Safety

1.1 Instructions for Safe Operations

- Check the main unit and all accessories periodically to make sure that there is no visible damage that may affect patient's safety and monitoring performance about the cables and transducers. It is recommended that the device should be inspected once a week at least. When there is obvious damage, stop using the monitor.
- Necessary maintenance must be performed by qualified service engineers ONLY. Users are not permitted to maintain it by themselves.
- The oximeter cannot be used together with devices not specified in User's Manual. Only accessories that are recommended by the manufacture can be used with this device.
- This product is calibrated before leaving the factory.

1.2 Warnings

- Explosive hazard—DO NOT use the oximeter in environments with flammable gas such as some ignitable anesthetic agents.
- DO NOT use the oximeter while the testee is undergoing a MRI and CT.
- People who are allergic to rubber cannot use this device.
- The disposal of scrap instruments, their accessories, and packing (including battery, plastic bags, foam, and paper boxes) should follow the local laws and regulations.
- Please check the packing before use to make sure the device and accessories are totally in accordance with the packing list, or else the device may have the possibility of working abnormally.
- Please don't measure this device with function test paper for the device's related information.

1.3 Attentions

- Keep the oximeter away from dust, vibration, corrosive substances, explosive materials, high temperatures, and moisture.
- If the oximeter gets wet, please stop using it.
- When it is carried from a cold environment to a warm or humid environment, please do not use it immediately.
- DO NOT operate keys on front panel with sharp materials.
- High temperature or high pressure steam disinfection of the oximeter is not permitted. Refer to User Manual in the relative chapter for instructions on cleaning and disinfection.
- Do not have the oximeter immerged in liquid. When it needs cleaning, please wipe its surface with medical alcohol on soft material. Do not spray any liquid on the device directly.
- When cleaning the device with water, the temperature should be lower than 60ºC.
- As to the fingers which are too thin or too cold, it would probably affect the normal measure of the patients' SpO_2 and pulse rate. Please clip a thick finger such as thumb and middle finger deeply enough into the probe.
- Do not use the device on infants or neonatal patients.
- The product is suitable for children above four years old and adults (weight should be between 15kg to 110kg).
- The device may not work for all patients. If you are unable to achieve stable readings, discontinue use.
- The update period of data is less than 5 seconds, which is changeable according to different individual pulse rate.
- The waveform is normalized. Please read the measured value when the waveform on screen is equably and steady-going. This measured value is optimal value and the waveform at the moment is the standard one.
- If some abnormal conditions appear on the screen during the test process, pull out the finger and reinsert to restore normal use.
- The device has a normal life span of three years since the first electrified use.
- The hanging rope attached the product is made from non- allergy material. If particular groups are sensitive to the hanging rope, stop using it. In addition, pay attention to the use of the hanging rope. Do not wear it around the neck to avoiding cause harm to the patient.
- The instrument does not have a low-voltage alarm function. It only shows the low-voltage. Please change the battery when the battery energy is used up.
- When the parameter is specific, the instrument does not have an alarm function. Do not use the device in situations where alarms are required.
- Batteries must be removed if the device is going to be stored for more than one month, or else batteries may leak.
- A flexible circuit connects the two parts of the device. Do not twist or pull on the connection.

2 Overview

The pulse oxygen saturation is the percentage of HbO_2 in the total Hb in the blood, so-called the O_2 concentration in the blood. It is an important bio-parameter for the respiration. For the purpose of measuring the SpO_2 more easily and accurately, our company developed the Pulse Oximeter. At the same time, the device can measure the pulse rate.

The Pulse Oximeter features small size, low power consumption, convenient operation, and portability. It is only necessary for patients to put one of their fingers into a fingertip photoelectric sensor for diagnosis, and a display screen will directly show the measured value of Hemoglobin Saturation.

2.1 Classification:

Class II b, (MDD93/42/EEC IX Rule 10)

2.2 Features

- Operation of the product is simple and convenient.
- The product is small in size, light in weight (total weight is about 50g including batteries) and convenient to carry.
- Power consumption of the product is low and the two originally equipped AAA batteries can be operated continuously for 20 hours.
- The product will automatically be powered off when no signal is detected by the product within 5 seconds.

2.3 Major Applications and Scope of Application

The Pulse Oximeter can be used to measure human Hemoglobin Saturation and pulse rate through the finger, and indicate the pulse intensity by the bar-display. The product is suitable for use in family, hospital (ordinary sickroom), Oxygen Bar, social medical organizations, and also the measure of oxygen saturation and pulse rate.

⚠ **The product is not suitable for use in continuous supervision for patients.**

⚠ **The problem of overrating would emerge when the patient is suffering from toxicosis which is caused by carbon monoxide. The device is not recommended to be used under this circumstance.**

2.4 Environment Requirements

Storage Environment

a) Temperature: -40ºC~+60Cº

b) Relative humidity: ≤95%

c) Atmospheric pressure: 500hPa~1060hPa

Operating Environment

a) Temperature: 10ºC~40ºC

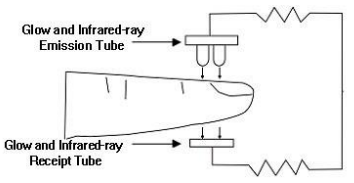
b) Relative Humidity: ≤75%

c) Atmospheric pressure: 700hPa~1060hPa

3 Principle and Caution

3.1 Principle of Measurement

Principle of the Oximeter is as follows: An experience formula of data processing is established taking use of Lambert Beer Law according to Spectrum Absorption Characteristics of Reductive Hemoglobin (Hb) and Oxyhemoglobin (HbO_2) in glow & near-infrared zones. Operation principle of the instrument is: Photoelectric Oxyhemoglobin Inspection Technology is adopted in accordance with Capacity Pulse Scanning & Recording Technology, so that two beams of different wavelength of lights can be focused onto the human nail tip through a perspective clamp finger-type sensor. Then a measured signal can be obtained by a photosensitive element, information acquired through this will be shown on screen through processing in electronic circuits and a microprocessor.



3.2 Caution

1. The finger should be placed properly in the device (see the attached illustration of this manual ,Figure 5), or else it may cause inaccurate measurement.
2. The SpO_2 sensor and photoelectric receiving tube should be arranged in a way with the subject's arteriole in a position there between.
3. The SpO_2 sensor should not be used at a location or limb tied with arterial canal or blood pressure cuff or receiving intravenous injection.
4. Make sure the optical path is free from any optical obstacles like rubberized fabric.
5. Excessive ambient light may affect the measuring result. It includes fluorescent lamp, dual ruby light, infrared heater, direct sunlight, etc.
6. Strenuous action of the subject or extreme electrosurgical interference may also affect the accuracy.
7. Testee cannot use enamel or other makeup.

3.3 Clinical Restrictions

1. As the measurement is taken on the basis of arteriole pulse, substantial pulsating blood flow of the subject is required. For a subject with weak pulse due to shock, low ambient/body temperature, major bleeding, or use of vascular contracting drug, the SpO_2 waveform (PLETH) will decrease. In this case, the measurement will be more sensitive to interference.
2. For those with a substantial amount of staining dilution drug (such as methylene blue, indigo green, and acid indigo blue), carbon monoxide hemoglobin (COHb), methionine (Me+Hb), or thiosalicylic hemoglobin, and some with icterus problem, the SpO_2 determination by this monitor may be inaccurate.
3. The drugs like dopamine, procaine, prilocaine, lidocaine, and butacaine may also be a major factor blamed for serious error of SpO_2 measurement.
4. As the SpO_2 value serves as a reference value for judgment of anemic anoxia and toxic anoxia, some patients with serious anemia may also report good SpO_2 measurement.

4 Technical Specifications

1) **Display Format:** OLED Display;
   SpO_2 Measuring Range: 0% - 100%;
   Pulse Rate Measuring Range: 30 bpm - 250 bpm;
   Pulse Wave Display: columniation display and the waveform display.
2) **Power Requirements:** 2 ×1.5V AAA alkaline batteries (or using the rechargeable battery instead), adaptable range: 2.6V~3.6V.
3) **Power Consumption:** Lower than 30mA.
4) **Resolution:** 1% for SpO_2 and 1 bpm for Pulse Rate.
5) **Measurement Accuracy:** ±2% in stage of 70%-100% SpO_2, and meaningless when stage being smaller than 70%. ±2 bpm or±2% (select larger) for Pulse Rate.
6) **Measurement Performance in Weak Filling Condition:** SpO_2 and pulse rate can be shown correctly when pulse-filling ratio is 0.4%. SpO_2 error is ±4%, pulse rate error is ±2 bpm or ±2% (select larger).
7) **Resistance to surrounding light:** The deviation between the value measured in the condition of man-made light or indoor natural light and that of darkroom is less than ±1%.
8) It is equipped with a function switch. The Oximeter can be powered off in case there is no finger in the Oximeter for 5 seconds.
9) **Optical Sensor**
   Red light (wavelength is 660nm, 6.65mW)
   Infrared (wavelength is 880nm, 6.75mW)

5 Accessories

- One hanging rope;
- Two batteries (optional);
- One User Manual.

6 Installation

6.1 View of the Front Panel

6.2 Battery

Step 1. Refer to Figure 3 and insert the two AAA size batteries in the right direction.

Step 2. Replace the cover.

⚠**Please take care when you insert the batteries as improper insertion may damage the device.**

6.3 Mounting the Hanging Rope

Step 1. Put the end of the rope through the hole.

Step 2. Put another end of the rope through the first one and then tighten it.

Figure 4 Mounting the hanging rope

7 Operating Guide

1) Insert the two batteries in the correct direction, and then replace the cover.
2) Open the clip as shown in Figure 5.

3) Put the patient's finger into the rubber cushions of the clip (make sure the finger is in the right position), and then clip the finger.
4) Press the button once on front panel.
5) Do not shake the finger and keep the patient at ease during the process. It is not recommended for the patient to be moving.
6) Get the information directly from screen display.
7) The button has three functions. When the device is power off, pressing the button can turn it on; when the device is powered on, pressing the button shortly can change direction of the screen; when the device is powered on, long pressing the button can change brightness of the screen.

⚠ **Fingernail and the screen should be on the same side.**

8 Repairing and Maintenance

- Please change the batteries when the low-voltage displayed on the screen.
- Please clean the surface of the device before using. Wipe the device with medical alcohol first, and then let it dry in air or clean it with dry clean fabric.
- Use the medical alcohol to disinfect the product after use prevents cross infection the next time it is used.
- Please take out the batteries if the oximeter is not in use for a long period of time.
- The best storage environment of the device is - 40ºC to 60ºC ambient temperature and no higher than 95% relative humidity.
- Users are advised to calibrate the device periodically (or according to the calibrating program of hospital). It also can be performed by the state-appointed agent or just contact us for calibration.

⚠ **High-pressure sterilization cannot be used on the device.**

⚠ **Do not immerse the device in liquid.**

⚠ **It is recommended that the device should be kept in a dry environment. Humidity may reduce the life span of the device, or even damage it.**

9 Troubleshooting

Trouble	Possible Reason	Solution
The SpO_2 and Pulse Rate cannot be displayed normally	1. The finger is not properly positioned. 2. The patient's SpO_2 is too low to be detected.	1. Place the finger properly and try again. 2. Try again; Go to a hospital for a diagnosis if you are sure the device works correctly.
The SpO_2 and Pulse Rate are not displayed stably	1. The finger is not placed inside deep enough. 2. The finger is shaking or the patient is moving.	1. Place the finger properly and try again. 2. Keep the patient calm and at rest.
The device cannot be turned on	1. The batteries are dead or almost dead. 2. The batteries are not inserted properly. 3. The device is defective.	1. Change batteries. 2. Reinstall batteries. 3. Please contact the local service center.
The display is off suddenly	1. The device will power off automatically when it gets no signal within 5 seconds. 2. The batteries are almost dead.	1. Normal. 2. Change batteries.

10 Key of Symbols

Symbol	Description
	Type BF
	Warning – See User Manual
%SpO2	The pulse oxygen saturation (%)
PRbpm	Pulse rate (bpm)
	The battery voltage is insufficient (change the battery in time to avoid inexact measurements)
	1. No finger inserted 2. An indicator of signal inadequacy
+	Battery positive electrode
—	Battery cathode
	1. Power switch 2. Change direction of the screen 3. Change brightness of the screen
SN	Serial number
	Alarm inhibit
	WEEE (2002/96/EC)
IP22	International Protection

11 Function Specification

Display Information	**Display Mode**
The Pulse Oxygen Saturation(SpO_2)	OLED
Pulse Rate(PR)	OLED
Pulse Intensity (bar-graph)	OLED bar-graph display
Pulse wave	OLED
SpO_2 Parameter Specification	
Measuring range	0%~100%, (the resolution is 1%).
Accuracy	70%~100%:±2%, Below 70% unspecified.
Optical Sensor	Red light (wavelength is 660nm) Infrared (wavelength is 880nm)
Pulse Parameter Specification	
Measuring range	30bpm~250bpm (the resolution is 1 bpm)
Accuracy	±2bpm or±2% select larger
Pulse Intensity	
Range	Continuous bar-graph display, the higher display indicates a stronger pulse.
Battery Requirement	
1.5V (AAA size) alkaline batteries × 2 or rechargeable batteries	
Battery Useful Life	
Two batteries can work continually for 20 hours	
Dimensions and Weight	
Dimensions	57(L) × 31(W) × 32(H) mm
Weight	About 50g (with the batteries)