



AC-powered Handheld Pulse Oximeter
(Model SA300, SA310 & SA320)
Instruction for Use

The text is subject to change without further notice.

January, 2010



Table of Contents

	Page
1. Safety information	2
2. Introduction.....	4
3. Features	5
4. Product introduction	6
5. Operation	7
5.1 Basic operation	7
5.2 Alerts	10
5.3 Setup	12
5.4 Alarm On/Off	16
5.5 Sound On/Off	17
5.6 LCD backlight control	17
5.7 Power input control	17
5.8 Wireless setup	17
6. Audio signals	18
7. Technical specifications	21
Performance	21
Probe type	21
Electrical requirements	21
Environmental requirements	22
Physical characteristics	22
Standards Marking	22
8. Problem shooting	23
Dysfunction and resolution	23
Cleaning	23
Disposal	23
EMI - Electromagnetic interference	24
9. Data transmission	25
10. Calibration	37



1. Safety information



WARNING: The SpO₂ device is to be operated by trained personnel only.



WARNING: Do not use the SpO₂ device in the presence of flammable anesthetics to prevent explosion hazard.



WARNING: Do not use the SpO₂ device in the Magnetic Resonance Imaging (MRI) ambience.



WARNING: The SpO₂ readings and pulse signals can be affected by the conditions of ambience, probe, and patient.



WARNING: Do not open up the SpO₂ device except for the battery cover. The SpO₂ device is without any user-serviceable part inside and only qualified service personnel can perform maintenance service.



WARNING: Do not expose the SpO₂ device to extreme moisture (such as rain) to ensure accurate performance and device safety.



WARNING: If the accuracy of measurement by the SpO₂ device is uncertain, check the patient's vital signs by alternate means.



Warning: This device is intended only as an adjunct in patient assessment. It must be used in conjunction with clinical signs and symptoms.



WARNING: Reposition the probe at least once every 4 hours to allow the patient's skin to breath.



WARNING: The SpO₂ device is intended for the use of adult and individual over 40kgs only.



WARNING: Do not use the SpO₂ device with other devices (such as, the cuff of blood pressure monitor) that may interfere with blood flow and cause inaccurate measurement.



Warning: The SpO₂ device will be affected by electromagnetic interference during operation.



Warning: Please remove the batteries from the battery compartment if the device will not be used for a long period of time.



2 Introduction

The AC-powered handheld pulse oximeter is to spot-check oxygen saturation in blood (SpO_2) and pulse rate; also, to issue warnings instantly. The pulse oximeter is used on adults, child, and infant with corresponding probes applied at hospital, clinics, and/or home.

The probe contains a dual light source (Red LED and Infrared red LED) and a photodetector. Bone, tissue, pigmentation, and venous vessels normally absorb a constant amount of light over time. The arteriolar bed normally pulsates and absorbs variable amounts of light during the pulsations. The ratio of light absorbed is translated in an oxygen saturation measurement (SpO_2). Because a measurement of SpO_2 is dependent on light from the probe, excessive ambient light can interfere with this measurement.

The wavelength of red LED is 660nm and Infrared LED is 905/880nm with maximum optical output power of 4mW.



3 Features

Single turn-on key for easy operation.

Adjustable backlight and LCD design for SpO₂ and pulse rate display.

SpO₂ and pulse rate programming and warning function.

On/Off switch of pulse rate indicator.

On/Off switch of warning.

Adjustment of sound volume.

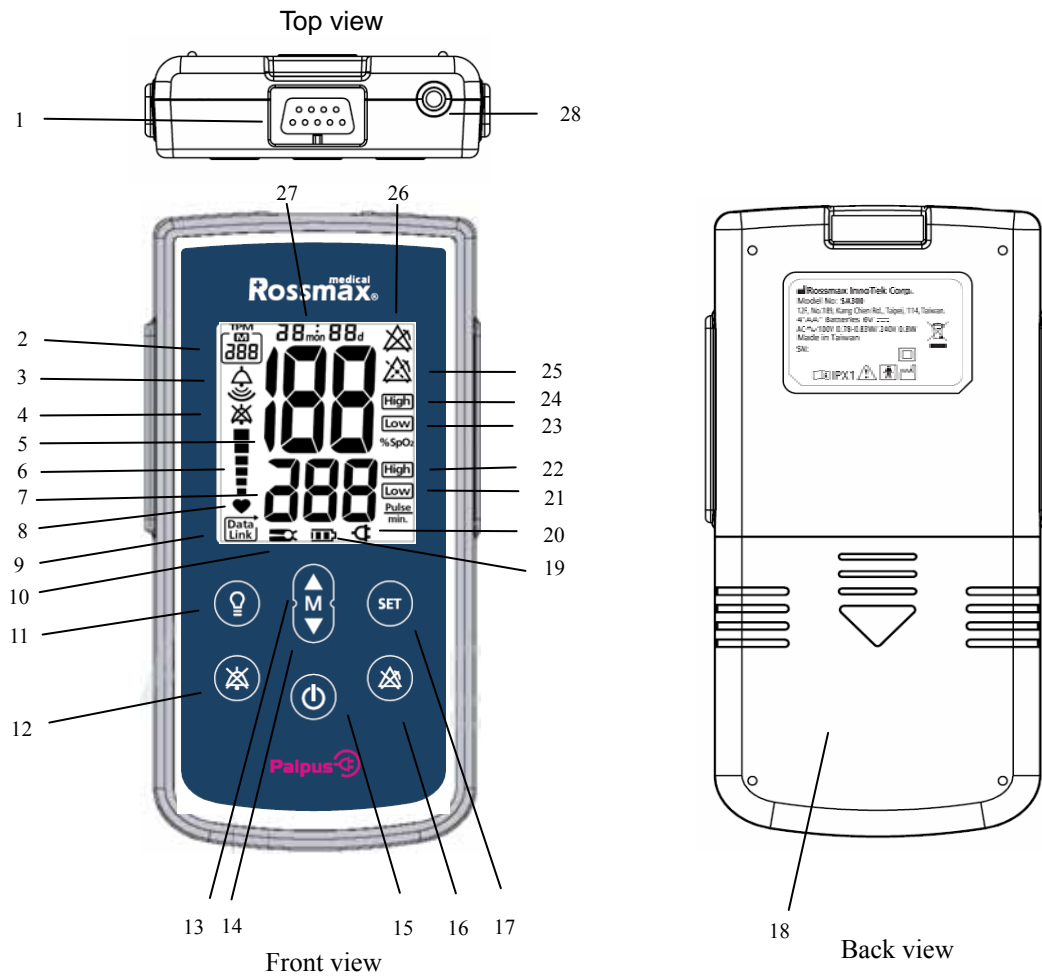
SpO₂, heartbeat, and recorded data can be printed out with wire (SA300 and SA320) or wireless (SA310 and SA320).

Powered with 4 AA alkaline batteries and/or AC-adapter.

72-hour recording and memory.



4 Product introduction



1	Probe connection	15	Power On/Off Button
2	Memory display	16	Alarm Button
3	Sound volume icon	17	SET button
4	Sound icon	18	Battery compartment
5	SpO ₂ icon	19	Battery indicator
6	Pulse strength	20	AC-power icon
7	Pulse rate	21	Low pulse rate indicator
8	Pulse search icon	22	High pulse rate indicator
9	PC-link	23	Low SpO ₂ indicator
10	Probe failure warning	24	High SpO ₂ indicator
11	LCD backlight button	25	Alarm pause indicator
12	Sound button	26	Alarm off indicator
13	”UP” Button	27	Time display
14	“Down” Button	28	AC power and transmission socket



5 Operation


5.1 Basic operation

Battery installation or AC power

Open up battery compartment cover with both hands evenly and carefully and then install four “AA” Alkaline batteries according to the (+/-) polarity. Plug AC power cable into AC power source and printout socket.

Probe connection

Rossmax PA100, or compatible probe is used (please check the pin lineup carefully for installation).

 Warning: It may damage the efficiency of the device if not apply with a Rossmax, or compatible probe.

Plug the probe into the connection on the top of the device carefully (Fig. 5-1). If extension cord is needed, please use Rossmax, or compatible cord.

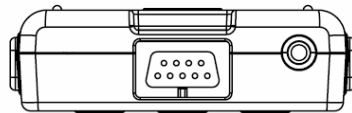




Fig.5-1


 Warning: The function of the device could be compromised with the use of extension cord other than Rossmax, or compatible cord.

Power On

Press the “power switch” key  for 1 second to activate the device. The beep sound will last for 2 seconds to signal the power on of the device. All icons appear on the LCD screen and with backlight lasts for 60 seconds. The device is then in the “self-test” mode with the software version shown. The measurement starts at the completion of the “self-test.” The device is with a default of time setup mode (please refer to time setup).



Pulse search

The pulse search icon  flickers once every second while the device is in idling. Yellow backlight flickers once per second with alarm on.

The icon of pulse search will stop flickering while in use and it remains on the LCD screen. The pulse strength is shown from low to high.

Measurement

The readings of oxygen saturation, pulse rate, and pulse strength will appear on LCD screen in 8 seconds. While the probe is off, yellow backlight flickers once per second and with alarm on; also, the SpO2 and BPM readings will remain on the display for 10 seconds before off.

If the measurement fails, the icon of “- -“ will appear on LCD screen and with yellow backlight flickering once per second and two beeps sounded continuously.

SpO₂ (Fig. 5-2)

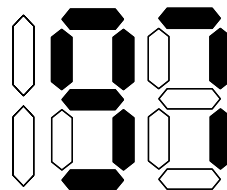


Fig.5-2

LCD icon design for an easy reading of 35%~100%

Pulse rate (Fig. 5-3)

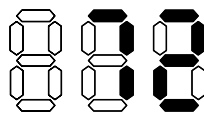


Fig. 5-3

LCD icon design for an easy reading of 30bpm~250bpm

Pulse strength (Fig. 5-4)

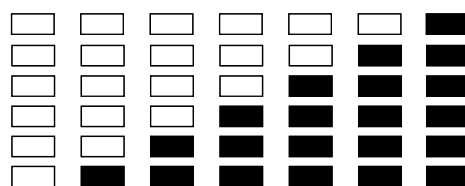








Fig. 5-4

Pulse indicator shows the strength of heartbeat bottom up including the




frequency of heartbeat.

Sound of heartbeat



The heartbeat is sounded through the buzzer; therefore, the heartbeat rate is known from the frequency of sound. Press the “Sound Button”  to silence the buzzer and the LCD screen will have the “sound icon”  shown. Press the “Sound Button”  again to exit the silence mode and the “sound icon”  will disappear from the LCD icon and replaced by  or  instead.


LCD backlight control


Press the “LCD backlight button”  to turn off backlight while the ambient light is sufficient.




Press the “LCD backlight button”  again to turn on the backlight while the ambient light is insufficient.



Memory reading and memory delete


Enter the memory mode with the  or  to read out the SpO2 and heart rate in memory.

Enter the memory reading mode, the  will appear on the screen and with the SpO2 and heart rate value shown; moreover, the recording time/date will be revealed too.

If there is not any SpO2 and heart rate value in memory, the icon “- -” will appear on the screen and the  is with 0 value shown. It means that is not any data stored in the memory.


The memory is for a rolling recording with 288 data in total. Press  to call out next memory data; press  to call out prior data. Press  to exit the memory reading mode.

In the memory reading mode, press  for 2 seconds to enter the “memory delete” mode. The screen shows **DE** and **NO** that means not to have the data deleted, so please press  for 2 seconds to save data and exit the mode.

Press the arrow key to have the screen shown **DE** and **AL** that means to have data deleted. Press  for 2 seconds to delete data and exit the mode.




The deleted data could not be restored.

Press  to exit the memory reading mode.







Power off


Press  button for 2 seconds to turn off the device without any beep sounded.

5.2 Alerts

Max. /Min. SpO₂



Max. /Min. alarm

While the alarm is activated (that is, the “ ” or “ ” is not on the screen) and SpO₂ exceeds the Max./Min. threshold; the device will sound the alarm with two beeps continuously until pressing the “ ” to turn off the device; moreover, the  will appear on the screen and with yellow backlight flickering once per second. If SpO₂ continues to exceed the Max./Min. threshold after 2 minutes, the alarm will be activated again (alarm will go off continuously).

The alarm will be off permanently if it is setup to be so (the “ ” “appears on the screen); however, the “**High** ” or “**Low** ” and Yellow backlight will flicker once every second continuously. (Please refer to 5.4 “Alarm off”).





The heartbeat sound is off while the alarm is on.

Max. /Min. Alert flickering

No matter the alarm is on or off (the “ ” or “ ” is on the screen), the “**High** ” or “**Low** ” and Yellow backlight flickers once every second continuously while the SpO₂ exceeds the Max./Min. threshold.

Max. /Min. pulse rate

Max. /Min. alarm

While the alarm is activated (that is, the “ ” or “ ” is not on the screen) and pulse rate exceeds the Max./Min. threshold; the device will sound the alarm with two beeps continuously until pressing the “ ” to turn off the device; moreover, the  will appear on the screen and with yellow backlight flickering once per second. If pulse rate continues to exceed the Max./Min. threshold after 2 minutes, the alarm will be activated again (alarm will go off continuously).



The heartbeat sound is off while the alarm is on.

Max. /Min. Alert flickering

No matter the alarm is on or off (the “” or “” is on the screen), the “**High**” or “**Low**” and Yellow backlight flickers once every second continuously while the pulse rate exceeds the Max./Min. threshold.

Probe failure alarm

If the probe is not properly attached to the device or if the probe is not Rossmax, Solaris compatible, the “” icon and Yellow backlight flicker once every second with alarm sounded continuously.

Battery

Low battery

When the battery is low, appears on the screen. Please replace the batteries as soon as possible.


When the battery is critically low, the “” icon and Yellow backlight flickers once every second with alarm sounded for 1 minute before the device is off automatically.



When “” or “” is on the screen, the alarm is off and the “” and Yellow backlight flickers once every second for 1 minutes before the device is off automatically.




5.3 Setup

Preview


Press the “” button to enter the setup mode.

The Max. value of SpO₂ (with a default value of 100), the Min. value of SpO₂ (with a default value of 86), the Max. value of pulse rate (with a default value of 140), the Min. value of pulse rate (with a default value of 45) and memory interval setup (default value of 60 seconds) appear in that order at an interval of 2.5 seconds. The device will then exit the setup mode 2.5 seconds later. The buzzer icon ( or ) and date appears on the screen continuously.

Press the  button to exit the “setup” mode.

Max. SpO₂ setup


Press the “” button for 2 seconds to enter the setup mode.


To setup of Max. SpO₂, the “**High**” icon of SpO₂ flickers once every second and with the Max. SpO₂ appears. If no adjustment is needed, press  to setup the Min. value of SpO₂ or wait 10 seconds to exit.


The default of Max. SpO₂ is for 100. The highest SpO₂ value setup is for 100%.


Press  or  button for the adjustment.

For the value between 90 and 100:


Press  to show the following values:

Current value → +1 → +2 → → 100, press  to setup Min. SpO₂.


Press  to the following values


Current value → -1 → -2 → → Min. +1, press  to setup Min. SpO₂.

For the value between 62 and 90:

Press  to show the following values:


Current value → +2 → +4 → → 100, press  to setup Min. SpO₂.

Press  to show the following values:


Current value → -2 → -4 → → Min. +2, press  to setup Min.



SpO₂.

Press the  to exit the mode with having the default value saved.


Min. SpO₂


While in the Min. SpO₂ setup mode, the **Low** icon will flicker once every second and with the Min. SpO₂ value shown on the screen. If adjustment of SpO₂ is not needed, press  to enter the Max. pulse rate setup mode or wait 10 seconds to exit.

The default value of Min. SpO₂ is 86. The lowest SpO₂ value setup is for 60%.


Press  or  for adjustment.


For the value between 90 and 99:


Current value → +1 → +2 → → Max. -1, press  to setup Max. pulse rate.

Current value → -1 → -2 → → 60, press  to setup Max. pulse rate.


For the value between 60 and 90:

Current value → +2 → +4 → → Max. -2, press  to setup Max. pulse rate.

Current value → -2 → -4 → → 60, press  to setup Max. pulse rate.


Press the  to exit the mode with having the default value saved.

Max. pulse rate

While in the Max. pulse rate setup mode, the **High** icon will flicker once every second and with the Max. value shown on the screen. If adjustment is not needed, press  to setup Min. pulse rate or wait 10 seconds to exit.

The default value of Max. pulse rate is 140.

Press  or  for adjustment.

Press  to show the following values.

Current value → +5 → +10 → → 250, press  to setup Min. pulse rate.



Current value → -5 → -10 → → Min. +5, press **SET** to setup Min. pulse rate.

Press the **POWER** to exit the mode with having the default value saved.

Min. pulse rate

While in the Min. pulse rate setup mode, the **LOW** icon will flicker once every second and with the Min. value shown on the screen. If adjustment is not needed, press **SET** to enter the memory interval mode (for SA120 and SA210 only) or enter the sound volume setup mode or wait 10 seconds to exit the setup mode.

The default value of Min. pulse rate is 45.

Press **▲** or **▼** for adjustment.

Press **▲** to show the following values.

Current value → +5 → +10 → → Max. -5, press **SET** to enter the memory interval mode (for SA120 and SA210 only) or the sound volume setup mode.

Current value → -5 → -10 → → 30, press **SET** to enter the memory interval mode (for SA120 and SA210 only) or the sound volume setup mode.

Press the **POWER** to exit the mode with having the default value saved.

Memory interval mode

While in the memory mode, the **M** and memory interval mode appears on the screen. If no modification is needed, press the **SET** to enter the sound control mode or to wait for 10 seconds to exit the SET mode.

The default of the memory is for 5 minutes. It could be set for 7 intervals including 2-second, 3-second, 5-second, 10-second, 30-second, and 60-second. “0” stands for no memory setup.

Press the **▲** or **▼** to setup.


Press the **▲** and the following values appear:

Current value (5)→(10)→(30)→(60), stay unchanged from this point on and press the **SET** to enter the sound control mode.



Press the **▼** and the following values appear:


Current value (10)→(5)→(3)→(2), stay unchanged from this point on and press the **SET** to enter the sound control mode.




Press the  to exit the mode with having the default value saved.

Sound volume control





For the control of sound volume, the  icon flickers once every second. If adjustment is not needed, press  to enter time setup or wait 10 seconds to exit the setup mode.


The default sound volume is shown as .

Press  or  for adjustment.





Press  to show the following values:


For example:

Current value  (small volume) →  (large volume), remains at  without further change, press  to exit the setup mode or to enter time setup.

Press  to show the following values.


For example:



Current value  (large volume) →  (small volume), remains at  without further change, press  to exit the setup mode or to enter time setup.




The setup of sound volume will be signaled with a beep for 1 seconds except for Model the setup of mute (.




Press the  to exit the mode with having the default value saved.

Time setup

The time setup mode starts out with the “year,” “month,” “date,” “hour,” and “minute” by pressing the . If no setup is needed, wait for 10 seconds to exit the mode automatically. The default date of the device is at 0 hour 0 minute on January 1, 2000.




Setup the “year” first by pressing the  or the  in the range of 01~99 (the last two digits of the year).




Press the  to enter the “month” mode with the  or the  in the range of 1~12.


Press the  to enter the “date” mode with the  or the .






in the range of 1~31.

Press the  to enter the “hour” mode with the  or the  in the range of 0~23.

Press the  to enter the “minute” mode with the  or the  in the range of 0~59.

Press the  again to exit the SET mode.

Press the  to exit the mode.



 Warning: Press  to exit the mode and without having the setup value reserved.

If the battery is not installed, the battery is low, or the battery is out of the compartment for over 30 minutes, date and time will resume the default value when the device is reactivated.




5.4 Alarm On/Off



Alarm pause


The power on setup is with an alarm sounded to remind that the value exceeds the alert threshold.


Press  to have  appeared on the screen and it is without a warning sound in 2 minutes when it exceeds the alarm setup and the alarm will be reactivated after 2 minutes.

Alarm off

Press  for 2 seconds and  will appear on the screen and  will flicker once every second that means no alarm will be sounded while the value exceeding the default

Press  for 2 seconds and  icon will disappear from the screen that means the alarm will be sounded while the value exceeding the default.



 Please be aware of this setup.



 For probe failure, the alarm off or pause setup will be off automatically and the alarm will sound automatically.



The alarm setup is on while the unit is turned on.

5.5 Sound On/Off


The sound setup is on while the power is on and the sound volume is shown as  or .

Press  to turn off the sound of heartbeat and with the  shown.

The sound setup is on while the unit is turned on.

5.6 LCD backlight control

Press  to turn off the LCD backlight while the ambient light source is sufficient for operation.



Press  again to turn on the LCD backlight while the ambient light source is insufficient for operation.

Backlight turns off automatically in 60 seconds.


5.7 Power input control

Power input by battery or AC adapter. Once AC power is on, the power supply of the device is switched to AC power. Once AC power is off, the power supply of the device is switched to battery power.

5.8 Wireless setup
















Adjust the “arrow up”  key and “arrow down”  key to

program wireless on and wireless off. The  stands for














wireless function is on. The  stands for wireless function is off.







6. Audio signals

NO	Name	LCD Display	Sound	Control
1	Power on	Display LCD syllabus with backlight on.	Beep for 2 seconds	Power On/Off button for 1 seconds
2	Pulse search	The icon  flickers once every second	---	---
3	Max./Min. SpO ₂ warning	 or  and yellow backlight flickers once every second	Beep-beep sounded repeatedly.	Default
			Mute for 2 minutes, then, beep-beep sounded repeatedly.	 Mode
			Mute before power off	 Mode
4	Max./Min. pulse rate warning	 or  and yellow backlight flickers once every second	Beep-beep sounded repeatedly.	Default
			Mute for 2 minutes, then, beep-beep sounded repeatedly.	 Mode
			Mute before power off	 Mode
5	Probe failure alert	 and yellow backlight Flickers once every second	Beep-beep sounded repeatedly.	None
6	Low battery alert	 and yellow backlight Flickers once every second	Beep-beep-beep sounded in cycle for 1 minute and then power off.	Battery power
7	Heartbeat	Pulse strength relies on the frequency of heartbeat	Mute	 Mode
			According to heartbeat	Other than 
8	On/Off button	---	Mute	Press On/Off button for 2 seconds
9	Alarm Off	 Appears on the screen and flickers once every second	---	Press  for 2 seconds



10	Alarm pause	 Appears on the screen	---	Press 
11	Max. SpO ₂ setup	High appears on the screen and SpO ₂ value flickers once every second	---	Press  for 2 seconds
12	Min. SpO ₂ setup	Low appears on the screen and SpO ₂ value flickers once every second	---	Press  for 2 seconds
13	Max. Pulse rate setup	High appears on the screen and pulse rate value flickers once every second	---	Press  for 2 seconds
14	Min. Pulse rate setup	Low appears on the screen and pulse rate value flickers once every second	---	Press  for 2 seconds
15	Sound volume	 or  flickers once every second	Mute	 Mode
			Sound volume is signaled with a beep for 1 second	Other than 
16	Sudden drop of SpO ₂ (2% SpO ₂ drop alert)	No change	Beep-beep sounded and stop	Default
		No change	Mute for 2 minutes, then, Beep-beep sounded and off	 Mode
		No change	Mute before power off	 Mode
17	Default preview	The Max. value of SpO ₂ , then the Min. value of SpO ₂ , the Max. value of pulse rate, the Min. value of pulse rate and the memory interval mode (default value of 5 minutes for SA120 and	None	Press 



		SA210 only) appear in that order at an interval of 2.5 seconds. The device will then exit the setup mode 2.5 seconds later.		
18	Unable to measure	Blood saturation & heart rate appears (- -) and yellow backlight flickers once every second	Beep-beep sounded repeatedly.	None
19	Battery power	 or  or  icon	None	None
20	AC power	 icon	Beep for 1 second	None



7. Specifications

Performance

Scope of measurement

SpO₂: 35% - 100%

Pulse rate: 30 – 250 bpm (beats per minute)

Precision

SpO₂: 70% - 100%: ±2 %

35% - 69%: unspecified

Pulse rate: 30 – 250 ± 3 bpm

Data Update period: less than 2 seconds

Averaging: 8 for SpO₂; 8 for Pulse rate

Alarm condition delay: Less than 8 seconds for spo₂;
 less than 16 seconds for pulse rate

Alarm signal generation delay: Less than 1 seconds for spo₂ and pulse rate.

Probe type

Probe: PA100

Extension cord: PE100, or AC031-113

Electrical specifications

Power supply

AC Adaptor or battery power

AC Adaptor specifications

Voltage input : 100 - 240V AC 0.2A 50/60Hz

Voltage output : 5V DC 1.2A

Battery (4 “AA” Alkaline batteries)

Battery capability: Can be used for 24 hours continuously depending on the type of battery used.

Environmental conditions

Operating temperature 5 - 40 (41 - 104)

Storage temperature

Packaged: -20 - 70 (-4 - 158)

Naked: -20 - 60 (-4 - 140)

Relative humidity: 15% -95% (no condensing)



Physical characteristics

Weight: 0.15Kg (excluding battery, probe and AC power cord) (0.33 ponds)

Size: 5.70 in. x 2.85 in. x 0.89 in. (14.5cm x 7.25cm x 2.25cm)

Accessories

Protection pouch x 1 pc

USB transmission cable x 1pc (SA300 and SA320)

USB Wireless dongle (SA310 and SA320)

Standards

IEC60601-1-2, Class B

IEC60601-1, Type BF

ISO 9919: 2005

Markings

	Type BF (Body Floating)
IPX 1	Drip proof
	ATTENTION Read instructions for use before use.
	Date of manufacture
	Used batteries should not be disposed of in the household rubbish. Batteries should be deposited at a collection point for used batteries At the end of its life, the appliance should not be disposed of in household rubbish. Enquire about the options for environment-friendly and appropriate disposal. Take into account local regulations.
	Complies with the European Medical Device Directive 93/42/EEC



8 Problem shooting

Dysfunction and resolution



- On the screen means probe dysfunction
- Be sure that the probe is connected to the device correctly
- Use only Rossmax, Solaris probe with the device

Low battery

- Please replace the battery

Switch On failure

- Check the power of battery or AC power supply
- Check the placement of battery or AC power source
- Return to manufacturer for calibration

Cleaning

Surface cleanings is by using a soft cloth dampened with either a commercial, non-abrasive cleaner or a solution of 70% isopropyl alcohol in water, and lightly wiping the surfaces of the oximeter.

Note: Please switch off pulse oximeter before cleaning.

Clean the SpO2 probe, LED and photo-sensor with moist cloth or cotton ball and alcohol gently.

The aforementioned general cleaning process is not for infection prevention. Please contact the specialist for the process of contagious infection.

Disposal



Used batteries should not be disposed of in the household rubbish. Batteries should be deposited at a collection point for used batteries.



At the end of its life, the appliance should not be disposed of in household rubbish. Enquire about the options for environment-friendly and appropriate disposal. Take into account local regulations.



Electromagnetic interference

Caution: This device has been tested and found to comply with the limits for medical devices to the IEC 60601-1-2 and MDD 93/42/EEC. These limits are designed to provide reasonable protection against harmful interference in a typical medical installation. However, because of the proliferation of radio-frequency transmitting equipment and other sources of electrical noise in healthcare environments (for example, electrosurgical units, cellular phones, mobile two-way radios, electrical appliances, and high-definition television), it is possible that high levels of such interference due to close proximity or strength of a source may result in disruption of performance of this device.

This handheld pulse oximeter is not designed for use in environments in which the pulse can be obscured by electromagnetic interference. During such interference, measurements may seem inappropriate or the monitor may not seem to operate correctly.




9. Data transmission

The device can be connected to computer with the special cable designed for this unit.

Data transmission:


- (1) Connect the socket on the top of the device to the computer (SA300 and SA320).
- (2) Built-in wireless transmission installment (SA310 and SA320)

 **Warning:** Wire data transmission and wireless data transmission cannot be functioned simultaneously.

Data transmission mode


Data transmission mode: General data transmission and memory transmission.

General data transmission is to have the current heart rate and SpO2 transmitted by linking the transmission cable to the plug on the top of the SpO2 device at a rate of 10 seconds.

Memory data transmission is to be processed in the memory mode. Connect the transmission cable to the connecting port of the device at one end and to the computer (please refer to the software introduction in the instruction manual about the built-in Microsoft Windows®) at the other, under the memory mode, press  to have the data in memory transmitted to the computer for printing.

Cable

USB cable is enclosed (alternative) for use. Connect one end of the USB cable to the computer and the other end to the phone jack of the device. The USB cable is to be used with the CD software enclosed in the package.

 **WARNING:** Inadequate connection will cause damage to the device. Please use the cable provided for this device.

Port

The port on the top of the device is for data transmission (Fig 9-1).

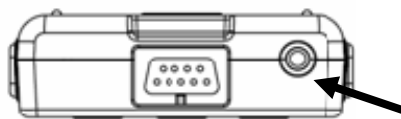



Fig 9-1

 **WARNING:** Please do not plug any foreign object or unspecified plug to



the device for protection.

Transmission

Transmission is for 115,200 baud.

Data transmission

General data transmission is for Time, SpO2 and heart rate value.

Memory data transmission is in the format of date/time/SpO2/heart rate.

After connecting the transmission cable to the device, the **Data Link** is blinking on the screen to show the online status.

USB software

- (1) Activate Windows® and insert the CD "SA USB Driver".
- (2) The screen display is as below.



- (3) Please refer to the "software setup" below for data receiving at the end of software installation.

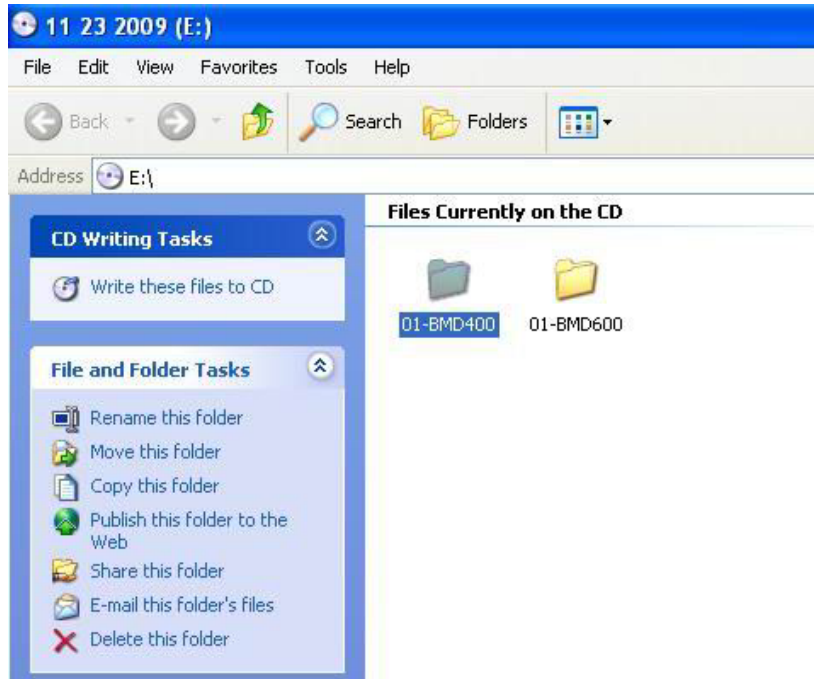




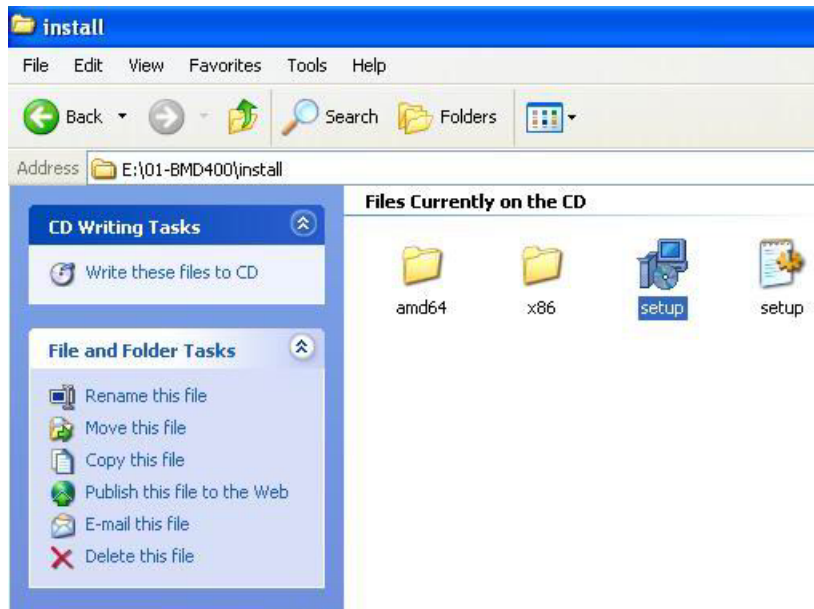
Wireless data transmission installation and setup (SA310 and SA320)

Wireless dongle software installation:

Please click the folder of "01-BMD400."



Execute "setup" to install wireless data collection software.

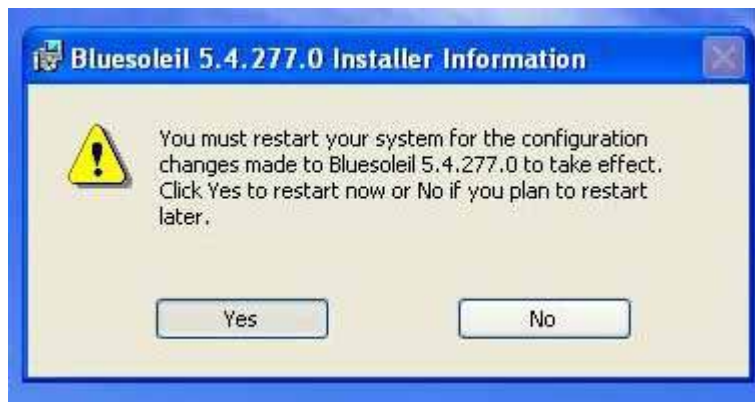




Language selection



Reactivate the system at the end of installation.

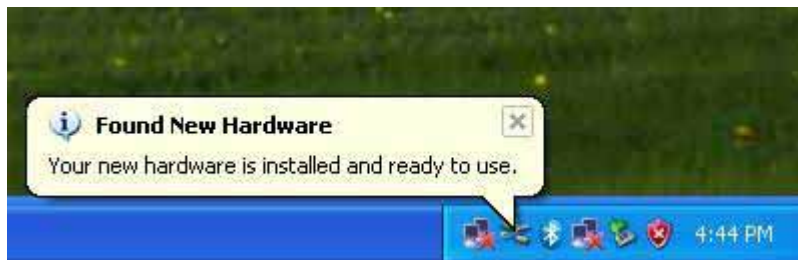





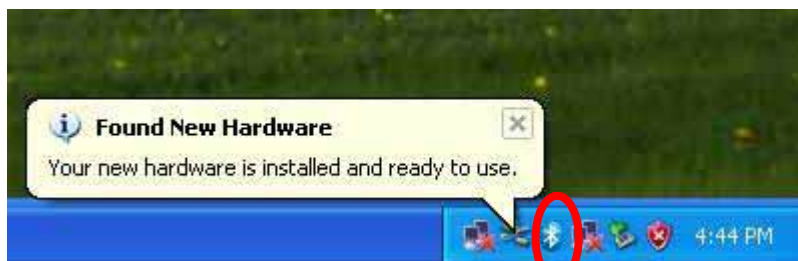
Wireless dongle application and programming:

Please use the Dongle included in the SpO2 device package

- (1) Turn on Windows® XP system and plug the dongle into the USB port of the computer to activate the search for wireless driver.
- (2) Once the wireless driver is installed completely, the wireless icon will pop up on the right hand side of tray. The software is installed properly and ready for use.



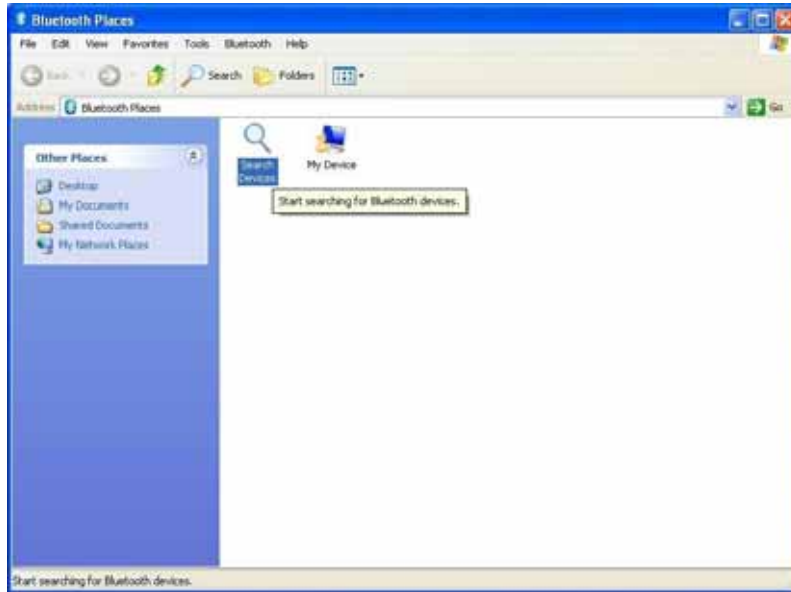
- (3) Turn on the wireless data transmission function for online service (please refer to 5-8 wireless setup)
- (4) Click twice the screen or the icon  to activate wireless data collection software.



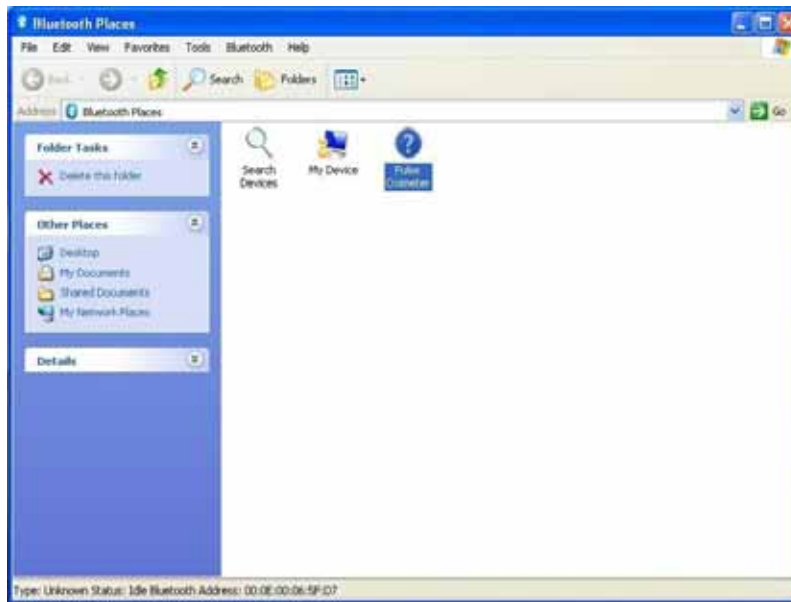
- (5) Please be sure the wireless data transmission function of SpO2 is on.



(6) Click “Search Devices” icon twice to display the screen as follows:

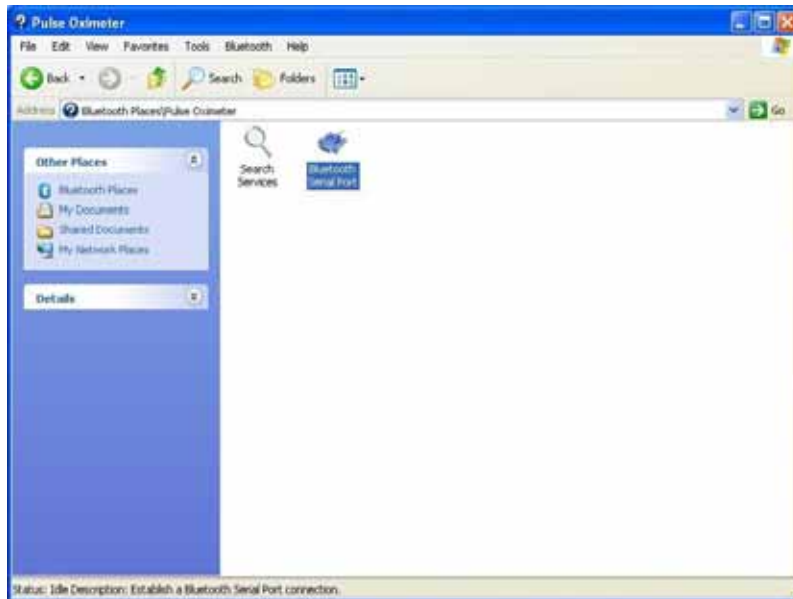


(7) On the screen below, once the peripheral wireless installation is found, select the "Pulse Oximeter." The "Pulse Oximeter" icon appears at the end of the search and clicks it twice for online setup.

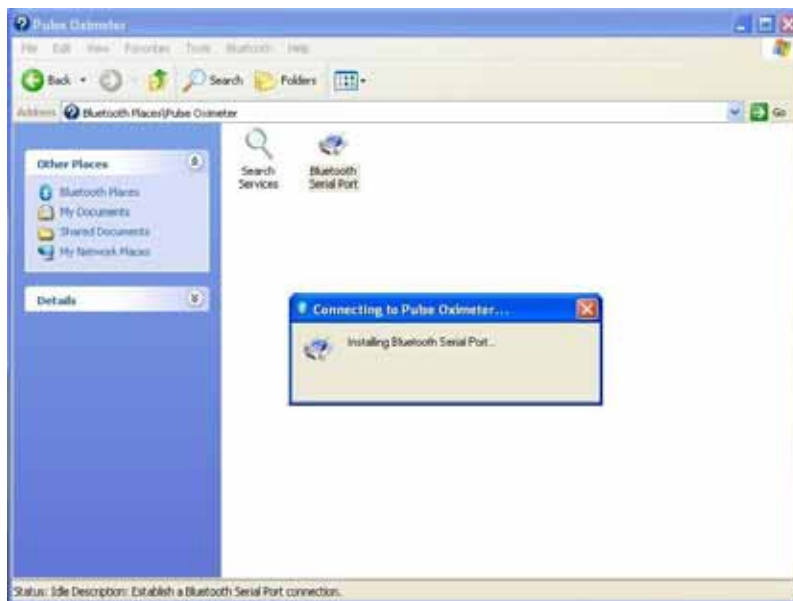




(8) Click the “Serial Port” icon twice to display the screen as follows:

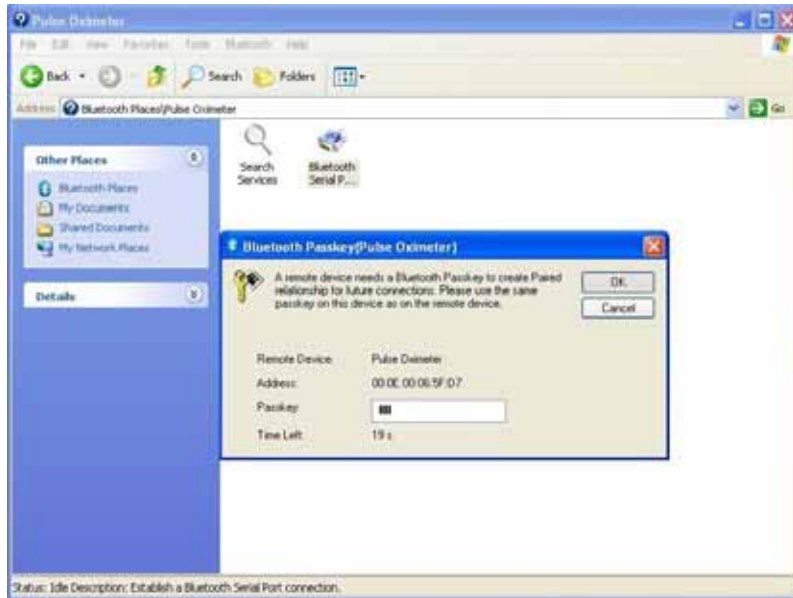


(9) The "Connecting to Pulse Oximeter" icon appears on the screen as follows:

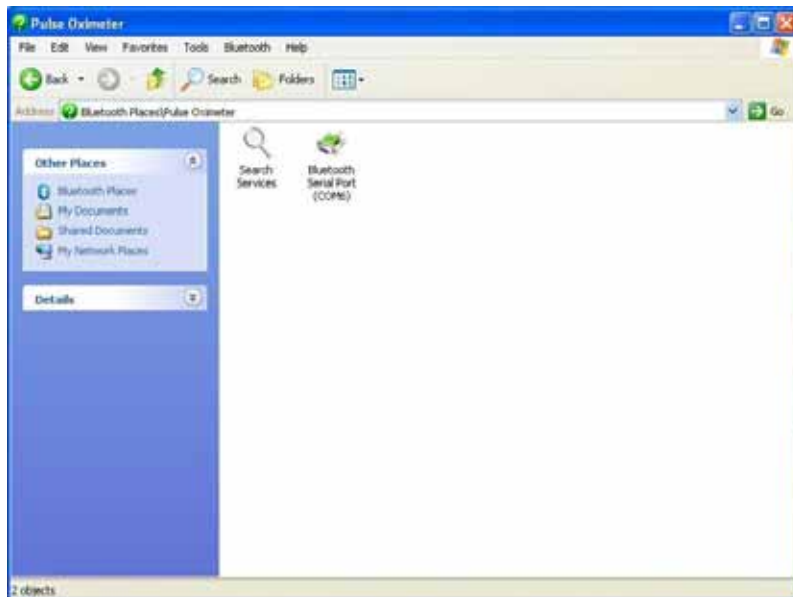




(10) Please key in four "0000" in 30 seconds and then press "OK." If the "0000" is not keyed in 30 seconds, please return to the prior screen for the procedure again.



(11) The icon will change color from blue to green once the online is successful; also, the (COM6) icon appears on the screen. COM port will display the connection port number of the computer and please document the COM Port number, for example, COM6.





Receiver Software Setup

Activate Microsoft Windows ® (Trademark of Microsoft). The demonstration is based on the Windows XP ® (Trademark of Microsoft).

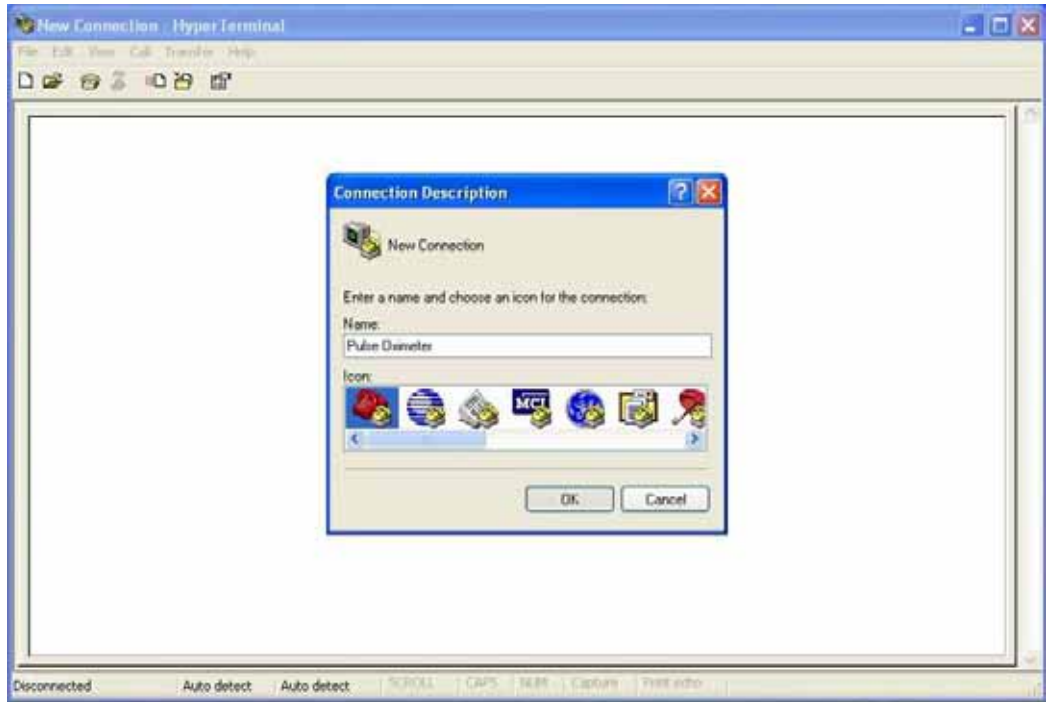
- (1) Turn on Windows, click **【Start】** , **【All Programs】**
- (2) Click **【ACCESSORIES】**
- (3) Click **【COMMUNICATIONS】**
- (4) Click **【HyperTerminal】**





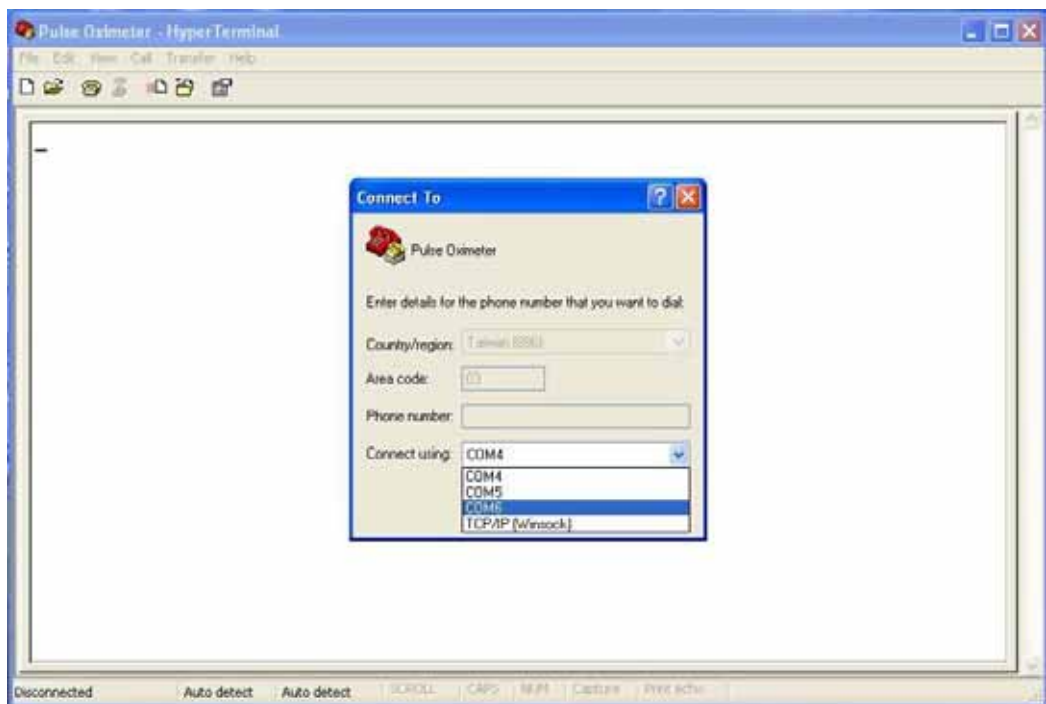
(5) Establish connection

Key in online name (For example, Pulse Oximeter) and click **【OK】**



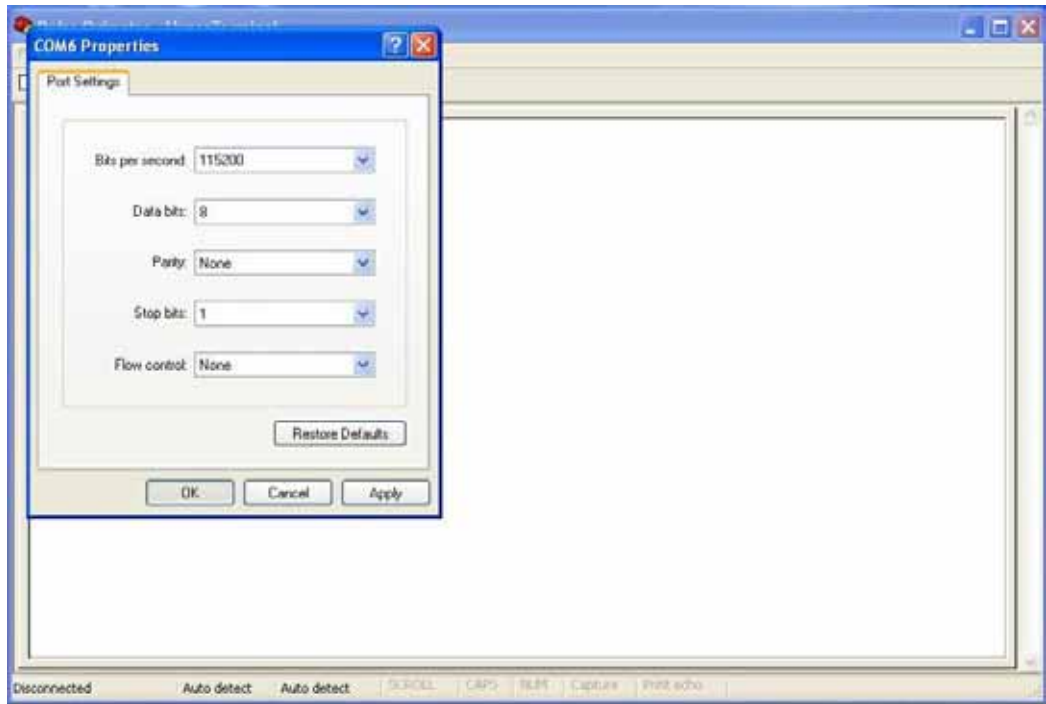
(6) Click **【COM6】** at **【Connect using】** and then press **【OK】** .

if the transmission is not connecting to the right port, please try COM2 or others. For wireless transaction, please use Wireless dongle setup to acquire COM port, such as, COM6.

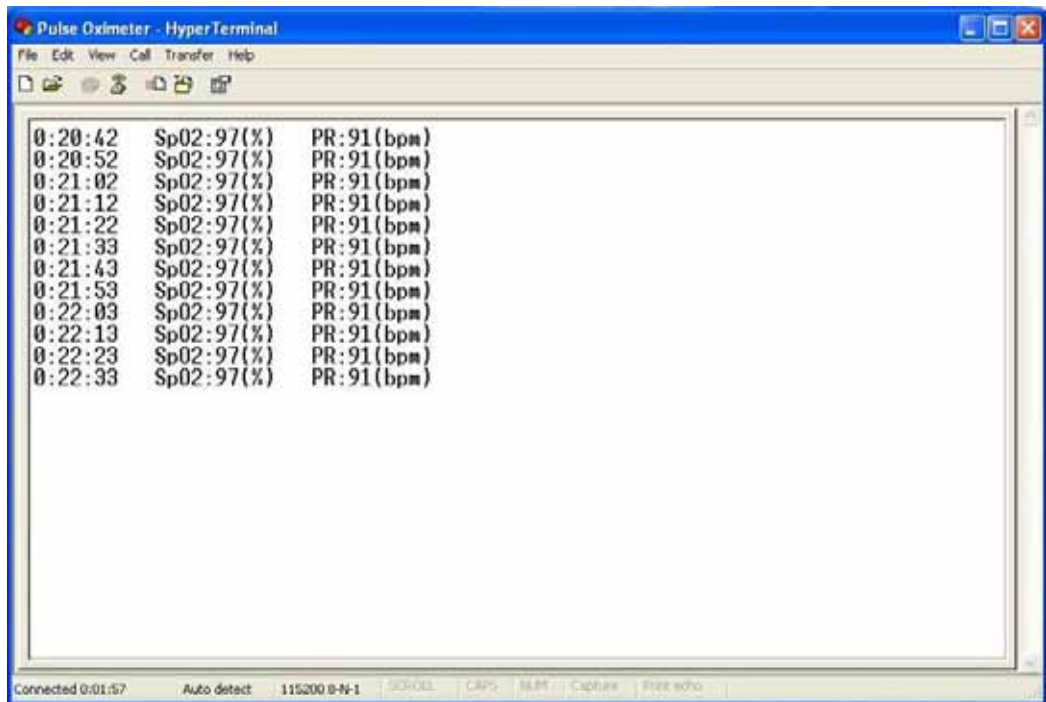




(7) Modify **【Bits per seconds】**setup to 115200; **【Data bits】** is 8; **【Parity】** is zero; **【Stop bits】** is 1; **【Flow control】** is None.

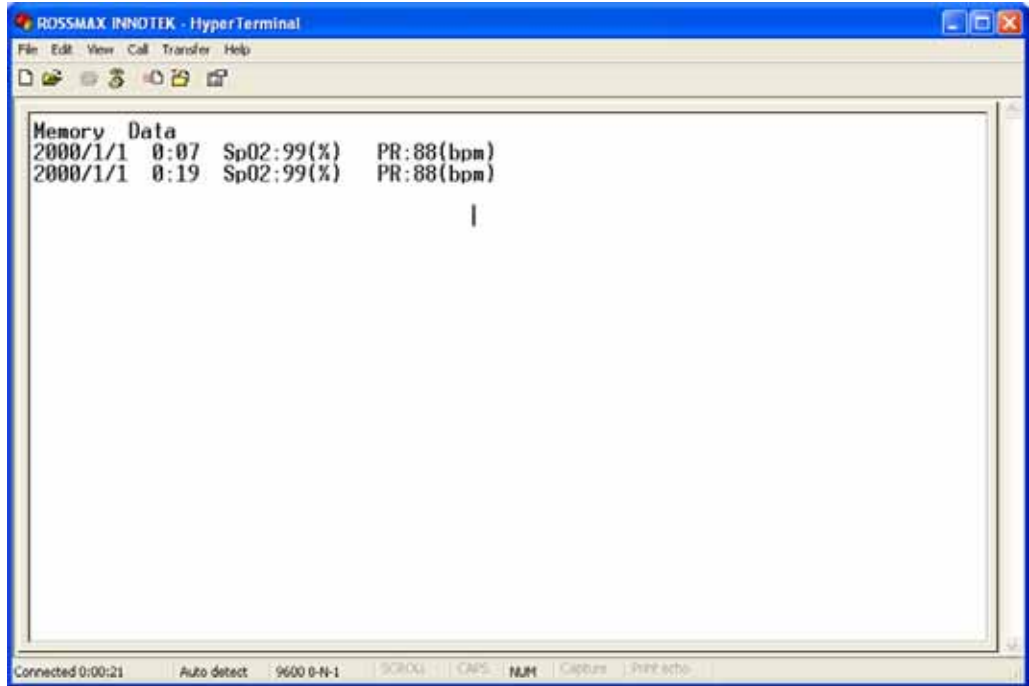


(8) Once the transmission cable is linked, it is in the general transmission mode.





(9) Memory transmission mode is as below:





10. Calibration

Most monitors used in hospitals today require the user to perform a calibration to a known standard before reliable clinical results are possible. Generally, this involves a “zero calibration” and a “gain calibration.” Pulse oximeters do not require a zero calibration because the design incorporates continuous automatic zero calibration. Gain calibration is not required because the measurement technique does not require gain accuracy. A brief review of pulse oximetry theory shows why this is possible.

Laboratory co-oximeters determine the %HbO₂ (%SaO₂) by measuring the amount a specific frequency of light is absorbed as it passes through a known volume of blood. In contrast, pulse oximetry (SpO₂) measures the change in light absorbed at systole and diastole. This allows the pulse oximeter to distinguish between the constant amount of light absorbed by the tissue, bone, venous blood, etc. from the arterial blood (the blood in the volume change due to the pulse). The absorbance of this volume of the arterial blood is calculated from the ratio of light measured at systole to that measured at diastole. Since the same gain is used for both light measurements, the amount of gain is mathematically cancelled by taking the ratio. This means that gain accuracy is not required to compute the absorbance of the arterial blood pulse, so that gain calibration is not required.

The pulse oximeter completes the measurement of SpO₂ by using the absorbance to two light frequencies (red and IR) to automatically correct for the unknown volume of blood for each pulse. It is the ratio of the two absorbencies that indicates the %SpO₂. Because this is not a linear relationship, the absorbance ratios are used to select the specific SpO₂ from the monitor’s “look up table.” The “look up table” is essentially a build-in standardization curve that was developed empirically by simultaneous measurement of %HbO₂ and the light absorbencies.

The usual reason for calibrating an instrument is to correct for changes in the sensor, electronic circuitry or the patient. Since the pulse oximeter eliminates zero calibration electronically and ignores gain variations mathematically, no calibration, beyond the manufacturer’s “calibration” of the look up table is required.



The company warrants pulse oximeter at the time of its original purchase and for the subsequent time period of one year. The company warrants SpO₂ probe free of defects at the time of its original purchase and for the subsequent time period of three months.

The warranty does not cover the followings:

The device series number label is torn off or cannot be recognized.

Damage to the device resulting from misconnection with other devices.

Damage to the device resulting from accidents.

Changes performed by users without the prior written authorization of the company.



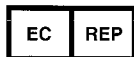
Rossmax InnoTek Corp.

12F, No. 189, Kang Chien Rd., Taipei 114, Taiwan

Tel: + 886-2-2659-7888

Fax: + 886-2-2659-7666

www.rossmaxhealth.com



IBP innovative business promotion GmbH

Botzstrasse 6, D-07743 Jena, Germany

