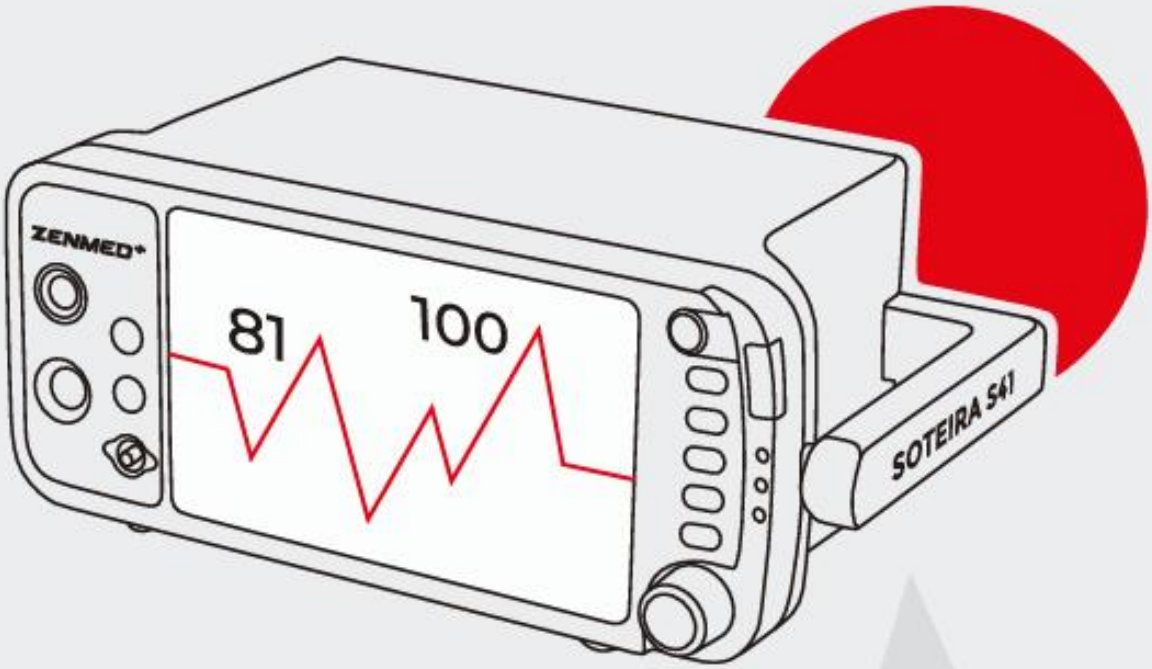
ZENMED+
Improve Quality of Life

OPERATION MANUAL



VITAL SIGNS MONITOR

SOTEIRA S41

KEMENKES RI
AKD 20502320540

List of Contents

List of Figures

Chapter 1: Introduction

1.1 About This Manual

The Operations Manual provides installation, operation, and maintenance instructions for healthcare professionals and other users, trained in monitoring respiratory and cardiovascular activity.

These instructions contain important information for the safe use of the product. Read the entire contents of this user manual, including the warnings and warnings, before using the monitor. Failure to properly follow warnings, warnings and instructions can result in death or serious injury to the patient.

1.2 Use of the Manual

This monitor allows you to choose the metering capability you need. Measured value refers to derived or calculated value; parameter refers to one or more specified measured values. For example, measurement of heart rate and %SpO2 the oximeter parameters consist of these two measured values. Monitor operation is the same regardless of the number of parameters you use. If you are not familiar with the operation of this monitor, follow each chapter in the manual in order. Each chapter builds on information from the previous chapter. Once the monitor has been set up, or if you are familiar with its operation, go to the chapter that describes the features you will use

1.3 Definition of Symbols

Symbol	Definition
	Attention, look in the instruction for use
	Type BF Defibrillation
	Defibrillator resistant type CF equipment

	NIBP Start /Stop Button
	Freeze Button
	Turn Off Alarms
	Battery Power Indicator LEDs
	AC Power LED
	Battery Charging LEDs
	Manufacture Date
IPX1	Drip Proof (Monitor Only)
	Shows separate collections for electrical and electronic equipment.

1.4 Warning Information

General Warnings, Cautions, and Notes

WARNING! Do not use this device in the presence of flammable anesthetics or other flammable substances in combination with air, an oxygen enriched environment, or nitrous oxide.

WARNING! DANGER OF ELECTRIC SHOCK when cover is removed. Do not remove the cover. Refer service to qualified personnel.

WARNING! Do not use this device in the presence of magnetic resonance imaging (MR or MRI) equipment.

WARNING! Do not plug the monitor into an outlet controlled by a wall switch.

WARNING! This device is intended for use by persons trained in health care professionals. Operators should be fully familiar with the information in this manual before using the device.

WARNING! Do not autoclave, sterilize ethylene oxide, or immerse monitors and other accessories in liquids. Evidence that liquid has been allowed to enter the monitor voids the warranty.

WARNING! This device should be used in combination with clinical signs and symptoms. This device is only intended to be an adjunct in patient assessment.

WARNING! Equipment is protected from defibrillator discharge. The pace meter and display may be temporarily affected during defibrillation, but will recover quickly.

WARNING! Vital signs monitor suitable for use in the patient environment Equipment approved by IEC 60950 should be located outside the patient environment. The patient environment is defined as any volume where intentional or accidental contact can occur between a patient and parts of a system or between a patient and other persons touching the parts of the system.

WARNING! When connecting this monitor to any instrument, verify proper operation prior to clinical use. Use only the equipment assembly specifications given in this manual. See the instrument's user manual for complete instructions. Accessory equipment connected to the monitor data interface must be certified according to the respective IED standard, ie, IEC 60950 for data processing equipment or IEC 60601-1 for electro-medical equipment. All equipment combinations must comply with the system requirements of IEC 60601-1-1. Anyone who connects additional equipment to the signal input port or signal output port configures a medical system, and as such, is responsible for ensuring that the system complies with the requirements of the IEC 60601-1-1 system standard.

WARNING! Any monitor that has been dropped or damaged should be inspected by a qualified service person to ensure proper operation before use.

WARNING! Use only the original manufacturer or recommended patient cable. Use of accessories other than those specified may result in increased electro-magnetic (EM) emissions or decreased EM immunity of the device. To avoid potential electro-static discharge interference, do not use cables that incorporate metal or metal-coated connectors.

WARNING! Medical electrical equipment, including this device, requires special precautions regarding electro-magnetic compatibility (EMC) and needs to be installed and operated in accordance with the EMC information provided in this manual.

WARNING! No defibrillator sync output on the monitor does not establish a connection between the monitor and the defibrillator

WARNING! This monitor will not operate effectively in patients who have convulsions or tremors

WARNING! This monitor is not for home use.

WARNING! Monitors should not be used, if adjacent to or stacked with other equipment. If contiguous or stacked use is required the monitors should be observed to verify normal operation in the configuration in which they are to be used.

WARNING! This monitor is not for apnea detection. The monitor has not been tested or validated for use in the detection of apnea

WARNING! Verify the proper mode of operation before placing the patient. see Selecting a Patient Type in the Monitor Settings Chapter.

WARNING! Default alarm limits are provided for convenience. Make sure the limit alarms are the right patient and condition, and adjust according to institutional policies.

WARNING! Make sure the monitor's AC kit is suitable for the AC voltage in your installation location before using the monitor. The monitor's Ac rating is indicated on the rating plate on the rear panel. If the rating is not correct, do not use the monitor.

WARNING! Disconnect the AC power supply from the wall outlet before removing it from the monitor. Leaving the AC power supply connected to an AC outlet without a monitor connected to it may result in a safety hazard.

WARNING! Do not allow moisture to touch the AC power supply plug or a safety hazard may result. Make sure hands are completely dry before handling AC power supplies.

WARNING! Do not place the monitor on the patient's bed. Do not place the monitor on the floor.

WARNING! Failure to place the monitor away from the patient could allow the patient to turn off, reset, or damage the monitor, possibly resulting in the patient not being monitored. Make sure the patient cannot reach the monitor from their bed.

WARNING! If there is any risk of the AC power supply being disconnected from the monitor during use, secure the cable to the monitor a few inches from the connection.

WARNING! This device is intended for use by trained healthcare professionals. Operators should be fully familiar with the information in this manual before using the device.

WARNING! Do not disassemble the unit. This unit is not available for service. Refer to qualified service personnel.

WARNING! It is the operator's responsibility to set alarm limits appropriately for each individual patient.

WARNING! If the accuracy of any measurement is questionable, check the patient's vital signs by alternative methods and then check the monitor for proper functioning.

WARNING! Operation of this device may be affected in the presence of powerful mobile and portable communications equipment.

WARNING! Operation of these devices may be negatively affected by the presence of computed tomography (CT) equipment.

ATTENTION! Do not allow water or other liquids to spill onto the monitor. Unplug the AC power cord from the monitor before cleaning or disinfecting the monitor.

ATTENTION! This unit contains a lithium coin battery and a rechargeable alkaline battery. This battery is not user replaceable. Refer service to qualified personnel.

ATTENTION! Pressing the front panel buttons with sharp or pointed instruments can permanently damage the keypad. Press the front panel buttons with only your finger.

ATTENTION! Blocking the ventilation holes on the rear panel of the monitor can prevent air from circulating inside the monitor, possibly resulting in damage to the device. Leave an air gap behind the monitor to allow air to circulate through the ventilation holes.

WARNING! The chemicals used in some cleaning agents can brighten plastic parts. Follow the cleaning instructions in this manual.

WARNING! If the device gets wet, remove all moisture and allow sufficient time to dry before operating.

WARNING! Follow local government regulations and recycling instructions regarding the disposal and recycling of device components and packaging.

NOTES! All materials accessible to users and patients are non-toxic.

NOTES! Each monitor's input and output connections are remote powered. Connection of this monitor to other equipment will not increase the leakage current.

Warnings, Cautions, and ECG Records

WARNING! Connect only the three-lead or five-lead ECG cable from the patient to the ECG patient cable. Do not connect any other signal source to the ECG patient cable.

WARNING! This monitor does not identify or interpret arrhythmic events. Heart rate indication can be negatively affected by: presence of cardiac arrhythmias.

WARNING! Line isolation monitor transients may resemble the actual heart waveform and thus inhibit the heart rate alarm.

WARNING! Only a five-lead ECG cable can be used with this monitor. Using the wrong cable for the selected mode may cause reference drift or additional interference to the ECG signal

NOTES! Follow institutional standards when applying ECG electrodes. Very strong Silver / Silver Chloride disposable electrodes are recommended to avoid polarizing effects resulting in large input offset potentials. The use of "squeeze bulb" type electrodes is not recommended.

NOTES! Use only a standard five-lead ECG cable.

Oximetry Warnings, Cautions, and Notes

WARNING! Long-term use or patient conditions may require periodic sensor site changes. Change sensor sites and check skin integrity, circulatory status and proper alignment at least every 4 hours.

WARNING! When attaching sensors with micro foam tape, do not stretch the tape or apply the tape too tightly. Tape that is applied too tightly can cause inaccurate readings and blisters on the patient's skin (lack of skin respiration, not heat, causes the blisters).

WARNING! Using a faulty sensor may cause inaccurate readings, possibly resulting in patient injury or death. Check each sensor. If the sensor appears to be damaged, do not use it. Use a different sensor or contact your authorized repair center for assistance.

WARNING! Using a damaged patient cable may cause inaccurate readings, possibly resulting in patient injury or death. Check the patient cable. If the patient cable appears damaged, do not use it. Contact your authorized repair center for assistance.

WARNING! Failure to carefully route the cables from the sensor to the monitor could allow the patient to become entangled in the cables, possibly resulting in patient strangulation. Route the cables in a way that will prevent the patient from becoming entangled in the cables. If necessary, use tape to secure the cable.

WARNING! If any integrity check fails, do not attempt to monitor the patient. Use a different sensor or patient cable, or contact the equipment dealer for assistance if necessary.

WARNING! Do not autoclave, sterilize with ethylene oxide, or immerse the sensor in liquid. Evidence that liquid has been allowed to enter the monitor voids the warranty.

WARNING! Use only the SpO2 sensor supplied with, or specifically intended for use with, this device.

WARNING! SpO2 measurements may be negatively affected in the presence of high ambient light. Protect the sensor area (with a surgical towel, for example) if necessary.

WARNING! Dyes that are introduced into the bloodstream, such as methylene blue green indocyanine, indigo carmine, patent blue V (PBV), and fluorescein can affect the accuracy of an SpO2 reading.

WARNING! Any condition that restricts blood flow, such as use of a blood pressure cuff or extremes in systemic vascular resistance, may result in an inability to determine accurate SpO2 and pulse readings.

WARNING! Under certain clinical conditions, a pulse oximeter may display a dash if it is unable to display the SpO2 value and/or pulse rate. Under these conditions, the pulse oximeter may also display error values. These conditions include, but are not limited to: patient movement, low perfusion, cardiac arrhythmias, high or low pulse rates or a combination of the above conditions. Failure of the physician to recognize the effect of this condition on the pulse oximeter reading can result in patient injury.

WARNING! Unplug the sensor from the monitor before cleaning or disinfecting.

NOTES! Obstruction or dirt on the red light or sensor detector can cause sensor failure. Make sure there are no obstructions and the sensor is clean. Non-invasive Blood Pressure Warnings, Cautions, and Notes.

WARNING! Blood pressure measurement may be inaccurate if cuffs and/or tubes other than those specified by the manufacturer are used.

WARNING! Repeated use of the STAT mode for periods longer than 15 minutes should be avoided to reduce the patient's risk of tissue or nerve damage. When using the monitor for prolonged periods of time, select the longest clinically appropriate measurement interval and periodically examine the patient for signs of injury and ensure proper cuff placement.

WARNING! Make sure the hose is not kinked, compressed, or restricted.

WARNING! Ensure that the operation of the equipment does not interfere with the circulation of the patient being monitored.

WARNING! Blood pressure measurements may be inaccurate for patients with arrhythmias.

WARNING! Do not verify Non-Invasive Blood Pressure calibration while the cuff is in place on the patient.

WARNING! Make sure the cuff size is correct for the patient mode selected on the monitor.

ATTENTION! To ensure that the unit remains in calibration, perform calibration verification annually.

ATTENTION! Limb and cuff movement should be minimized during blood pressure determination.

ATTENTION! Correct sizing and placement of the blood pressure cuff is critical to accurate blood pressure determination.

ATTENTION! Each recording of blood pressure can be affected by the position of the patient, his physiological condition, and other factors.

ATTENTION! Blood pressure measurement must be done by a doctor.

NOTES! There are no user serviceable adjustments for verification of Non-Invasive Blood Pressure calibration. If the monitor does not appear to be calibrated, contact your authorized repair center for assistance.

NOTES! The systolic and diastolic blood pressure measurements determined by this device are equivalent to those obtained by a trained observer using the cuff/stethoscope auscultatory method.

NOTES! The mean arterial blood pressure measurement determined by this device is equivalent to that obtained by the intra-arterial blood pressure measurement device as specified by the manufacturer.

Warnings, Cautions, and Respiratory Rate Records

WARNING! Respiratory monitoring is not recommended in active patients. This may cause a false alarm.

WARNING! Place the white and red electrodes in opposite positions to get the optimal respiration waveform. Avoid placing wires over the heart and ventricles to reduce false readings produced by cardiac coverage or pulsed blood flow. This is especially important for neonates.

Temperature Alerts, Cautions, and Notes

WARNING! Before monitoring begins, check that the sensor cable is properly connected. Pull the temperature sensor cable from the line 1 jack, the error message "T1 sensor is off" is displayed on the screen and an alarm sound can be heard. The same thing happened on the other channels.

WARNING! Be careful when handling the temperature sensor and wires. When not in use, sensors and cables must be loose. Cables that are tightly folded may cause mechanical damage.

WARNING! Temperature calibration should be performed once a year (or according to a schedule specified in hospital procedures). If calibration is required, contact the manufacturer.

WARNING! Disposable temperature sensors should only be used once.

WARNING! During the monitoring process, the temperature measurement of the instrument performs an hourly self-check that lasts for two seconds. This will not affect the normal operation of the monitor.

Chapter 2: Purpose of Use and General Information

2.1 Intended Use

This vital signs monitor is intended for use in special procedures laboratories and other areas of a hospital or clinic where a patient monitoring system is required. The monitor package includes electrocardiography (ECG), non-invasive blood pressure (NIBP), pulse oximetry (SpO2), Respiration Rate (RR) and temperature (TEMP).

The device enables patient monitoring with adjustable alarm limits and visible and audible alarm signals. These monitors provide fast and reliable measurements for patients from adults to neonates.

WARNING! The monitor is not designed or tested to be an apnea monitor.

WARNING! This monitor is not for home use.

2.2 Measurement Capability

Heart Rate / Pulse

Heart rate/pulse rate is measured by ECG parameters, oximetry and non-invasive blood pressure (NIBP). The measured values can be continuously displayed in the ECG and SpO2 parameter boxes. Heart rate/pulse rate can also be displayed in the NIBP HISTORY, which is in the TRENDS menu. You can select the source (AUTO, ECG or SpO2) of the heart rate/pulse rate displayed in the ECG parameter box. If you select AUTO, the monitor will determine the best source depending on the quality of available data and the priority of the selected source. See Selecting a Heart Rate Source in the ECG Chapter for details on the heart rate/pulse source displayed in the ECG parameter box.

Electrocardiography (ECG)

The monitor provides five-lead continuous ECG processing, with a choice of standard leads, and screening of electrocautery discharges. The ECG (HR) measured value and main lead selection are displayed in the ECG parameter box, and the ECG waveform is continuously displayed.

Oximetry

The oximetry parameter provides continuous non-invasive monitoring of oxygen saturation (%SpO2) in blood and pulse (PR). Measured values for oximetry (%SpO2 and PR) and pulse strength bar graphs are shown in the SpO2 parameter box. A plethysmogram, or oxygen saturation waveform, can be continuously displayed. A variety of disposable and reusable sensors are available for patient monitoring.

Non-invasive Blood Pressure (NIBP)

The non-invasive blood pressure parameter (NIBP) provides systolic, diastolic, and mean arterial blood pressure values, as well as heart rate. Measured values for non-invasive blood pressure (SYS, DIA, and MAP) are displayed in the NIBP parameter box. NIBP measurements can be performed in automatic, manual, or STAT mode.

Respiration Rate (RR)

The monitor provides the respiration rate and Resp waveform by measuring the chest impedance between the two ECG electrodes on the patient's chest. The measured RR is displayed in the RR parameter box. And the RR waveform is displayed on the RR waveform Channel.

Temperature (TEMP)

Two independent channels are available for temperature monitoring (T1 and T2). Each channel is compatible with the manufacturer's YSI 400 series disposable temperature sensor, or equivalent. The measured values for each temperature channel (T1 and T2) are displayed in the TEMP parameter box.

CO2

The monitor determines the concentration of CO2 in breathing gases by measuring the amount of light absorbed by these gases. EtCO2 is shown as a numerical value in millimeters of mercury (mmHg), percent (%), or kilopascals (kPa). In addition, a CO2 waveform (capnogram) can be displayed which is a valuable clinical tool with which to assess the integrity of the patient's airway and the proper placement of the endotracheal tube. The respiratory rate is calculated by measuring the time interval between detected breaths.

Chapter 3: Controls and Features

3.1 Indicators and Displays

This monitor has a high-resolution, high-contrast color LCD screen. It provides continuous real-time display of up to four waveforms. It also shows measured values, chronological data, measurement trends, alarm limits and patient information.

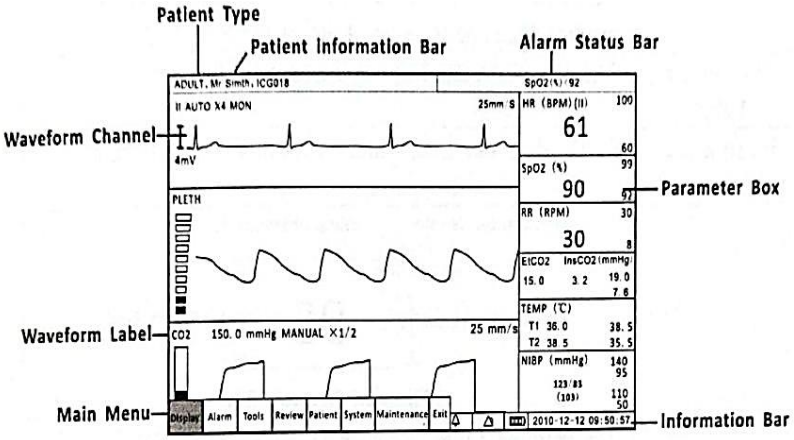
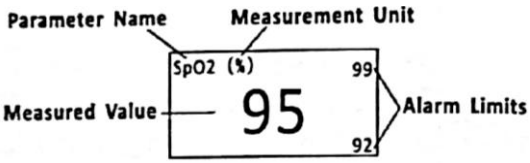


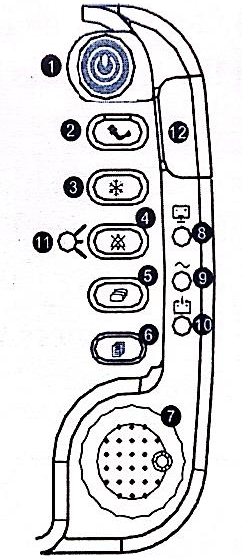
Figure 3.1 Display

Patient Tape	• You must select the patient type (ADULT, CHILD, or NEONATE) before monitoring the patient. When you change the patient type: • Alarm limits will be reset to default settings. (if not in LIMIT STATIC mode) The NIBP inflation pressure setting will be reset for adult, pediatric, or neonatal patients. • NIBP mode will be reset to MANUAL
Patient Information	The patient's name and bed number will be displayed here.
Status Bar Alerts	Indicates an active alarm event

Main Menu	The main menu provides the means to modify monitor settings, such as alarm limits and patient information, and perform monitoring functions. There are several entry points to the monitor menu system including the main Menu, the parameters menu, and the waveform menu.
Wave form Channel	Up to three channels of waveforms can be displayed simultaneously. Each channel can be assigned to a waveform of any enabled parameter, graph, table or blank. The waveform labels provide access to a menu for each waveform where you can adjust various waveform-related settings. For some parameters, such as the ECG, the waveform label displays information about the primary lead and the size of the ECG tracing.
Waveform Label	The waveform label shows the name of the waveform.
Information Bar	Shows date and time, battery symbol and volume icon etc.
Parameter Box	
	The parameter box provides access to the menu for parameters where you can adjust various settings related to the parameters. The parameter box contains: parameter or measurement name, numeric values for the selected measurement, high and low alarm limits, and units of measurement. In the

	figure, the parameter is SpO2, the numerical measured value is pulse oxygen saturation (SpO2), the limit alarm shown is for pulse oxygen saturation (SpO2), and the unit of measurement is percent (%).
Parameters Name	Monitored and displayed parameter names
Numerical Measured Value	The numerical value for the selected measurement (such as HR or SpO2) is displayed. Values can be derived or calculated. A hyphen (--) in place of a measured numeric value indicates that the measure is invalid or unavailable
Alarm High and Low Limits	The high and low alarm limits for the measured numeric values are displayed. If you don't set alarm limit for newly patient, the default high and low limit will be used
Units of Measurement	The unit of measurement can be changed for pressure. Units of pressure measurement can be displayed as millimeters of mercury (mmHg) or kilopascals (kPa).

3.2 Buttons

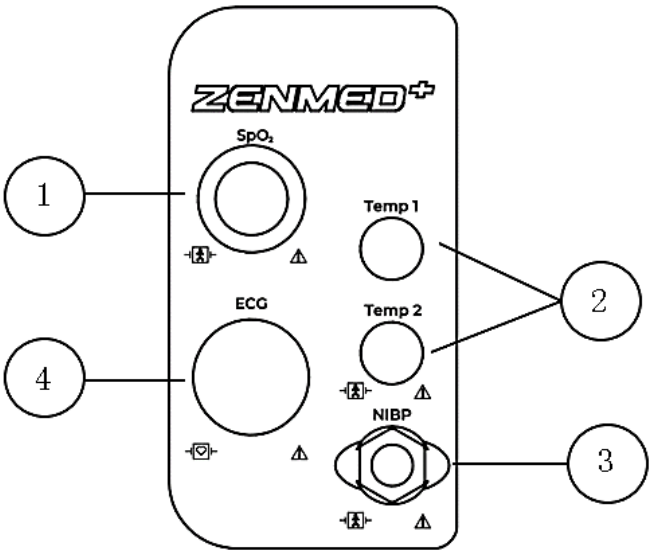


No.	Information	Instruction
1	On / Off	Hold down this button for 3 seconds to turn the monitor on or off
2	NIBP	Press this button to activate direct non-invasive blood pressure measurement (NIBP). To cancel an ongoing NIBP measurement, press the button again.
3	Freeze	Press this button to freeze the displayed waveform.
4	Silent Alarm	Press alternately to mute the alarm volume for 30 seconds, 60 seconds, 90 seconds, 120 seconds or indefinitely.
5	Mode Lock	Use this button to switch between the four main display modes: 1 ECG

		mode, 3 ECG modes, oxy CRG mode, and large digit mode.
6	Menu Button	Press to enter or exit the main menu.
7	Play Button	The rotary knob is a control dial with a push switch selection. It's in front of the monitor, in the lower right corner. Rotate the dial to navigate the cursor around the view. Press the knob to select the highlighted option
8	Battery Supply LED	The Green Battery Supply LED will illuminate to indicate that the monitor is powered by a battery.
9	AC Power LED	The green AC Power LED will illuminate to indicate that the monitor is connected to an AC power source.
10	Battery Charge LED	The Green Charge LED will illuminate to indicate that the monitor is charging.
11	Silent Alarm LED	The Silent Alarm LED flashes red to indicate that the alarm volume has been muted for 30 seconds, 60 seconds, 90 seconds, 120 seconds, or indefinitely.
12	Working Status LEDs	The LED is green when the monitor is working normally and red when there is an alarm.

3.3 Left Panel

The left side panel of your monitor contains all of the patient connector sockets.



No.	Information	Instruction
1	Oximetry Connector (SpO2)	Attach the SpO2 sensor to the monitor. Measured values for blood oxygen saturation (%SpO2) and pulse rate (PR) will be displayed when the sensor is attached to the patient
2	Dual Temperature Connectors (Top T1 and Bottom T2)	If the temperature is set on your monitor, the TEMP parameter box will appear on the screen when the patient connector is attached to the monitor. The measured value for temperature (TEMP) will be displayed when the sensor is attached to the patient

3	Non-Invasive Blood Pressure Connector (NIBP)	Attach the NIBP cuff to the monitor. Measured values for non-invasive blood pressure (systolic, diastolic and mean) will be displayed when the latest NIBP measurement is completed.
4	ECG Connector	Attach the ECG lead to the monitor. The measured value for ECG heart rate (HR) will be displayed when the ECG Lead is placed on the patient

3.4 Back Panel

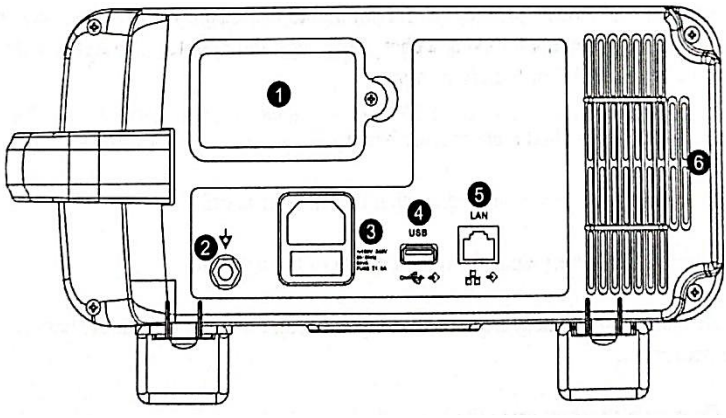


Figure 3.2 Back Panel

3.5 Internal Battery

The built-in rechargeable battery is intended primarily for backup and switching use. Charge the battery after the monitor is operated on battery power or after the monitor has been shipped or stored. To charge the battery, connect the AC power cord to the monitor and to an AC power source. There are no regulatory

requirements for using a charged battery; the monitor operates in exactly the same way under AC or battery power.

To replace the built-in rechargeable battery:

1. Disconnect the AC power and make sure the monitor is off.
2. Remove the battery door from the bottom of the monitor.
3. Disconnect the battery from the battery cable and remove it from the battery compartment.
4. Connect the new battery to the battery cable.
5. Insert the battery and cables into the battery compartment.
6. Replace the battery door to the bottom of the monitor.
7. Connect the AC power cord to the monitor and to an AC power source and allow the battery to fully charge.
8. Dispose of batteries properly. See CAUTION below.

WARNING! The internal rechargeable battery is user replaceable. It may contain a Lithium Ion (Li-ion), Nickel Metal Hydride (NIMH), or Sealed Lead Acid (SLA) battery. Disposal of such batteries must be carried out in accordance with local and federal guidelines.

NOTES! Typical battery life is 2 to 5 years depending on usage.

NOTES! When the monitor is connected to AC power, the internal battery charges while the monitor is on or off. The Battery Charge LED flashes while the battery is charging; it is stable when the battery is fully charged. Let the battery be fully charged before using the monitor on battery power.

NOTES! When about 15 minutes of battery usage remains, a red battery icon is displayed in the information bar and a high priority alarm will appear.

NOTES! Battery charging time will increase at high temperatures (temperatures above 30 degrees Celsius).

NOTES! A fully charged battery lasts 2 to 3.5 hours depending on usage of the monitor

Chapter 4: Setting Up the Monitor

4.1 Open Monitor and Check Delivery

1. Carefully remove the monitor and its accessories from the shipping carton. Save the packing materials in case the monitor needs to be shipped or stored.

2. Compare the packing list with the supplies and equipment you receive to make sure you have everything you need

4.2 Quick Setup Instructions

Follow these setup steps each time you begin monitoring patients. See the Detailed Setup Instructions in this chapter for a thorough explanation of each step.

1. Select the installation site.
2. Check the monitor's AC rating.
3. Connect the AC power cord.
4. Press the ON/OFF button to turn on the monitor.
5. Manage patient information.
6. Use the main menu to define some general configuration information and parameter options
7. If necessary, set the time and date on the display

4.3 Detailed Setting Instructions

1. Set the monitor in a room where the temperature is 0-50°C and 15-95% relative humidity, no condensation.
2. a. If the monitor is in an area with a higher or lower temperature, wait a few minutes before setting up and using the monitor.
3. Check the monitor's AC rating. Check the monitor's AC rating plate to ensure the nominal voltage at your installation location matches the monitor's rating.

4. If the AC rating is not correct, do not use the monitor. Contact your authorized repair center for assistance.
5. Plug the AC power cord into the power connector on the back of the monitor.
6. Plug the other end of the AC power cord into a grounded, three-wire hospital-grade outlet.
7. Ensure that the front panel AC Power LED is on.

WARNING! Do not plug the monitor into an outlet controlled by a wall switch.

8. Press the ON/OFF button to turn on the monitor.

A screen will light up, the monitor will initiate a brief system check, and then automatically enter monitoring mode.

NOTES! The monitor performs a number of system checks during its startup time. If the monitor detects an error with its internal circuitry, a message is displayed and the monitor will not enter monitoring mode.

4.4 Basic Operations

Press the menu button to bring up our main menu. There are 8 options in the main menu which shows as follows.

Showing	Alarm	Equip ment	Overvi ew	Patie nt	System	Mainte nance	GO OUT

Choice	Instructions
Appearance	Sets the display mode
Alarm	Adjust alarm limit for parameters, open/close alarm switch
Equipment	Select an event and perform drug calculations
Overview	Review trend data, graphs and alarms stored on the monitor
Patient	Select patient type, gender, add patient name, age and bed number

System	Set system information
Maintenance	Return to default settings and do some maintenance

4.5 System Settings

Press the menu button to bring up the main menu and turn the rotary knob on the monitor to move the cursor to the "System" option. Then press the rotary knob to enter the submenu. The setting window will be shown as below,

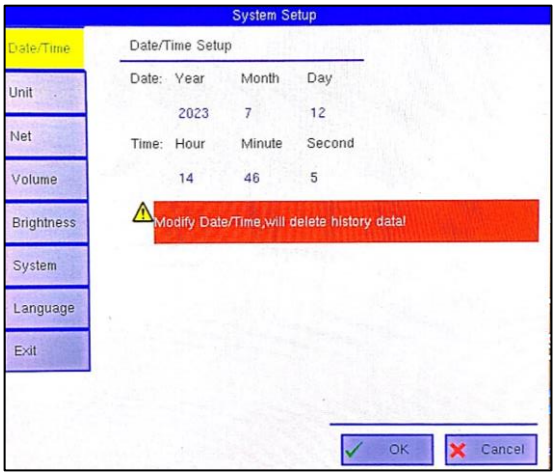


Figure 4.1 System Settings

4.5.1 Timing

If necessary, set the time and date on the display. The time and date indicators are located in the lower right corner of the screen. The monitor's real-time clock and calendar keep track of the time and date, even when the monitor is turned off or not connected to AC power. Time and date stamps are used for NIBP tabular trends, displayed and printed trends, and all other prints. The time display format is based on the 24 hour clock. For example, 5:00 am displays as 5:00 am and 5:00 pm displays as 5:00 pm.

1. Press the menu button to bring up the main menu and turn the rotary knob to move the cursor to the "System" option.
2. Press the rotary knob to access the “System” submenu. Turn the knob to highlight the "Time" option.
3. Press the rotary knob to access the time setting submenu and rotate the knob to highlight the desired option.
4. Press the rotary knob to select an option. Turn the rotary knob to increase or decrease the value. Press again to exit.
5. Turn the dial to “OK” or “Cancel” to save or delete your settings.

4.5.2 Unit Settings

Units of measurement can be changed for TEMP and NIBP. The unit of measurement selected will remain in the monitor's memory until changed, even if the monitor is turned off.

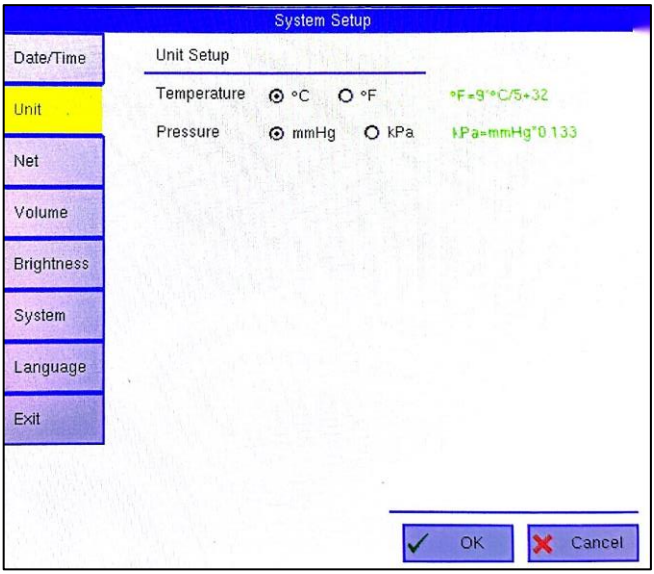


Figure 4.2 Unit Settings

1. Press the menu button to bring up the main menu and turn the rotary knob to move the cursor to the "System" option.

2. Press the rotary knob to access the “System” submenu. Turn the knob to highlight the "Units" option.

3. Press the rotary knob to access the unit setting submenu and rotate the knob to highlight the desired unit and press to select.

TEMP can be converted from degrees Celsius (°C) to degrees Fahrenheit (°F).

- ℃=5x(°F-32)/9
- F=9xC/5+32

PRESSURE can be converted to millimeters of mercury (mmHg) or kilopascals (kPa). The default setting is mm Hg.

- kPa=mmHg X 0.133
- mm Hg=kPa/0.133

4. Turn the dial to “OK” or “Cancel” button and press to save or delete your settings

4.5.3 Net Settings

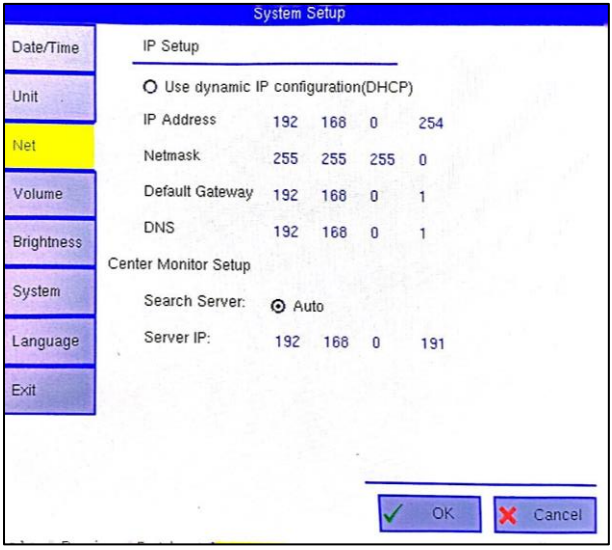


Figure 4.3 Clean Settings

1. Press the menu button to bring up the main menu and turn the rotary knob to move the cursor to the "System" option.
2. Press the rotary knob to access the "System" submenu. Turn the knob to highlight the "Net" option and press the knob to select.
3. You can choose to use dynamic IP configuration or set the IP address manually.
4. Turn the dial to “OK” or “Cancel” button and press to save or delete your settings.

4.5.4 Volume Settings

You can adjust the audible alarm volume and pulse rate to one of seven levels separately. When the alarm sounds (and silence alarm is not activated), the alarm tone will sound at the selected volume. The default setting of alarm and pulse volume is fourth level. You cannot set the alarm volume to OFF.

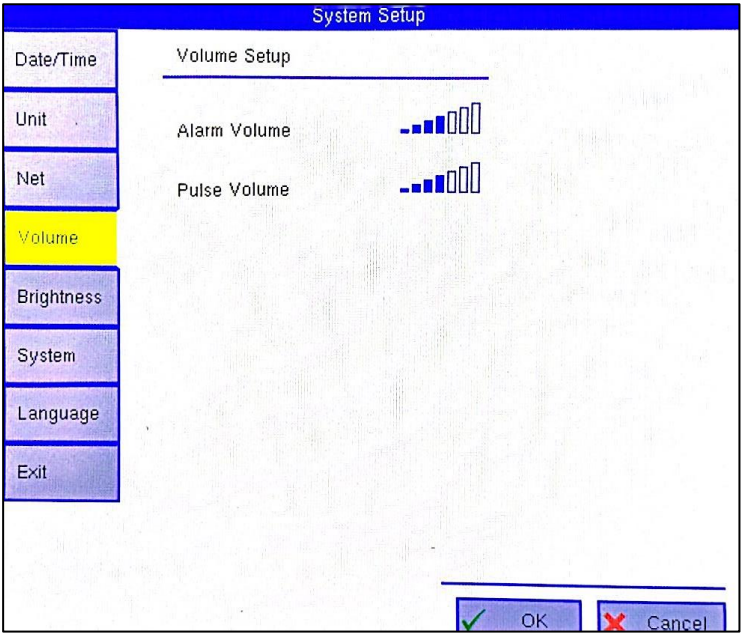


Figure 4.4 Volume Settings

1. Press the menu button to bring up the main menu and turn the rotary knob to move the cursor to the "System" option.
2. Press the rotary knob to access the “System” submenu. Turn the knob to highlight the "Volume" option.
3. Press the rotary knob to access the volume setting submenu and rotate the knob to highlight the desired volume and press to select.
4. Turn the knob to increase or decrease the volume and press to exit
5. Turn the rotary knob to the "OK" or "Cancel" button and press to save or delete your settings.

4.5.5 LCD Brightness Setting

You can adjust the brightness of the LCD screen. There are seven brightness levels And the default setting is the seventh level.

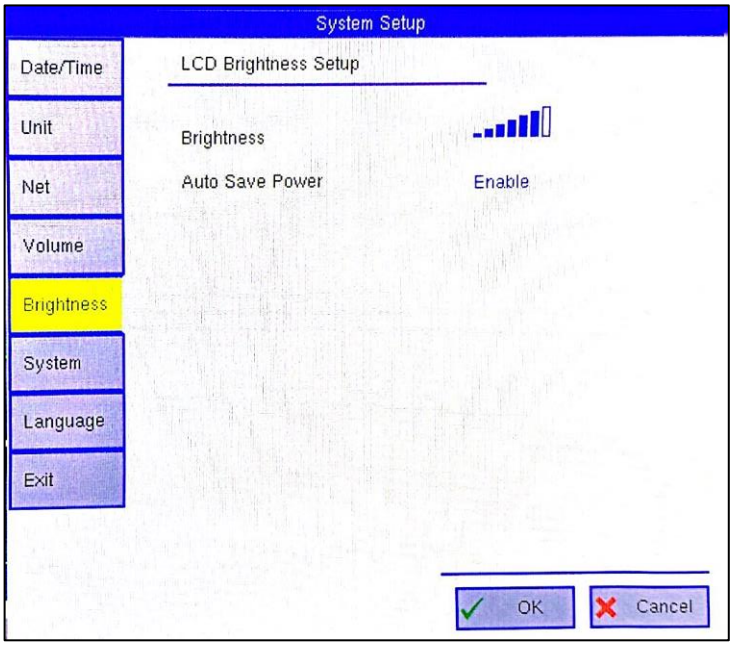


Figure 4.5 LCD Brightness Settings

1. Press the menu button to bring up the main menu and turn the rotary knob to move the cursor to the "System" option.
2. Press the rotary knob to access the “System” submenu. Turn the knob to highlight the "LCD" option.
3. Press the rotary knob to access the LCD settings submenu and rotate the knob to highlight brightness and press to select.
4. Turn the knob to increase or decrease the brightness level and press to exit.
5. Turn the dial to “OK” or “Cancel” button and press to save or delete your settings.

4.5.6 Power Settings

When the monitor is connected to an AC power source, the frequency must be set relatively.

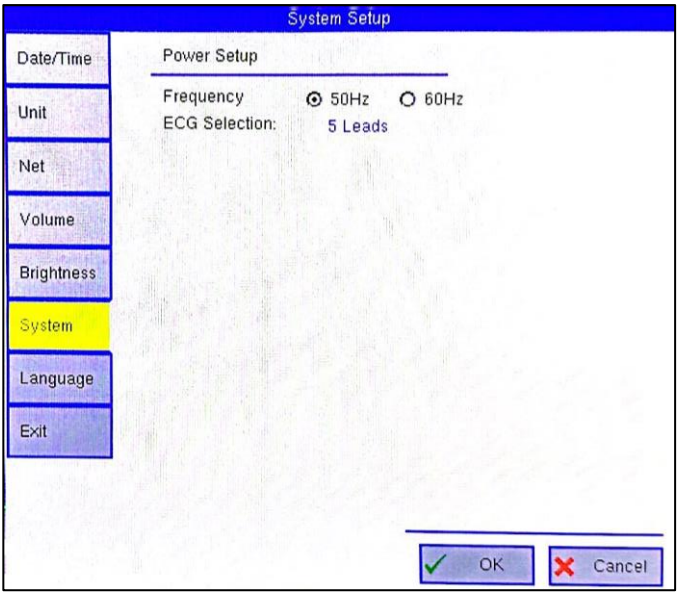


Figure 4.6 Power Settings

1. Press the menu button to bring up the main menu and turn the rotary knob to move the cursor to the "System" option.
2. Press the rotary knob to access the “System” submenu. Turn the knob to highlight the "Power" option.
3. Press the rotary knob to access the power setting submenu and rotate the knob to highlight the desired frequency and press to select.
4. Turn the dial to “OK” or “Cancel” button and press to save or delete your settings

4.5.7 Language Setting

There are two languages available on this monitor: Chinese and English.

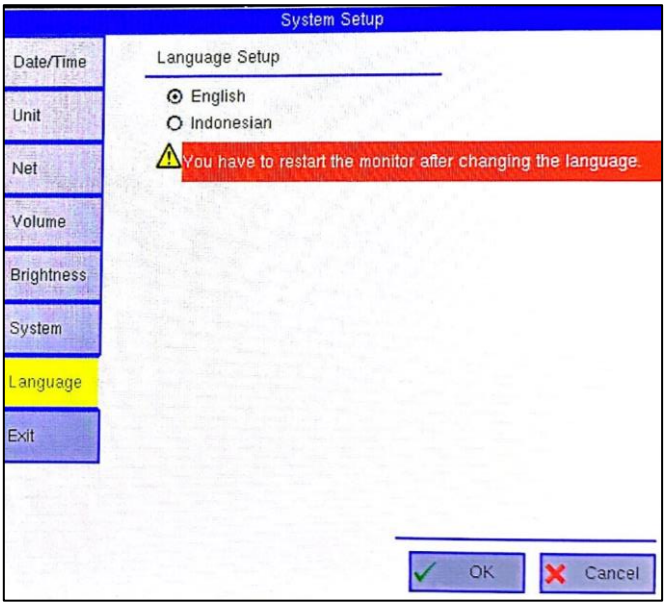


Figure 4.7 Language Settings

1. Press the menu button to bring up the main menu and turn the rotary knob to move the cursor to the "System" option.
2. Press the rotary knob to access the "System" submenu. Turn the knob to highlight the "Language" option.
3. Press the rotary knob to access the language setting submenu and rotate the knob to highlight the desired language and press to select
4. Turn the dial to “OK” or “Cancel” button and press to save or delete your settings

4.6 Manage Patient Information

4.6.1 How to Use the Keyboard

To enter characters and data into the monitor, the on-screen keyboard is used. there is information to enter, press the play button and an on-screen keyboard will appear

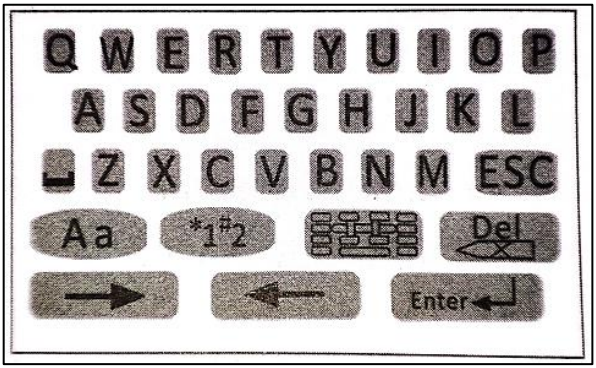


Figure 4.8 On-Screen Keyboard

Tombol	Instruksi
	Space. Press when space is needed
	Press this button to access the character board
	Press this button to exit the character board.
	Press to change the character pad to letters and toggle between uppercase and lowercase
	Press to change the character pad to numbers and punctuation
	Delete button
	Press these two buttons to move the cursor
	Press to confirm your writing

4.6.2 Patient Settings

The monitor displays physiological data and keeps it in trend as soon as the patient is connected. Before monitoring the patient, the doctor must enter patient information correctly.

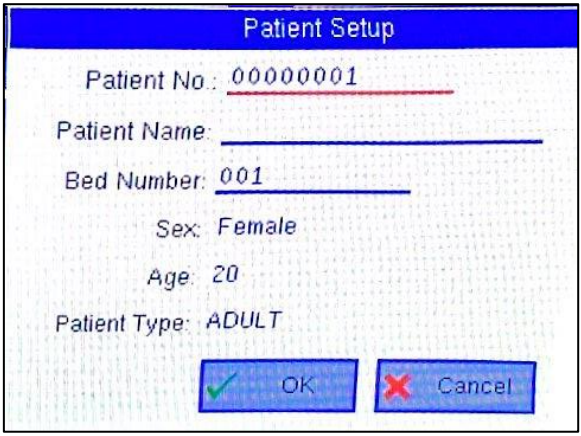


Figure 4.9 Patient Preparation

1. Press the menu button to bring up the main menu and turn the rotary knob to move the cursor to the "Patient" option and press to select.
2. Enter patient information: select each field and use the on-screen keyboard or choose from alternatives to enter information.

Item	INSTRUKSI
NO.	Enter the patient's medical record number, for example 678.
Name	Enter the patient's first and last name (surname), for example: John Smith.
Bed Number	Enter the patient's bed number, for example: ICU007.
Sex	Select Male or Female.
Age	Enter the patient's age, for example: 25
Patient Type	Select the patient type: ADULT, CHILD and NEONATE.

3. Turn the rotary knob to the "OK" or "Cancel" button and press to save or delete your settings

4.7 Display Settings

Press the menu button to bring up the main menu and turn the rotary knob to move the cursor to the "View" option and press to select.

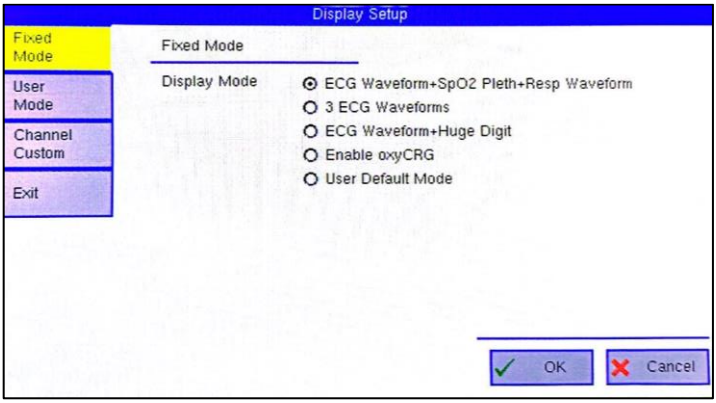
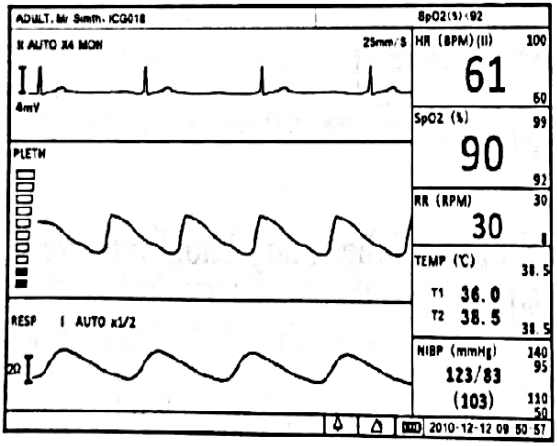
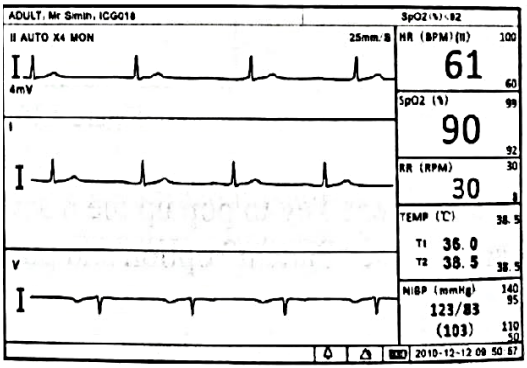


Figure 4.10 Display Settings

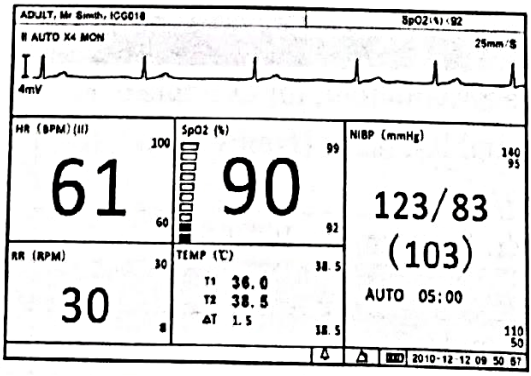
There are four main fixed display modes, and you can switch between them by pressing the Mode button.



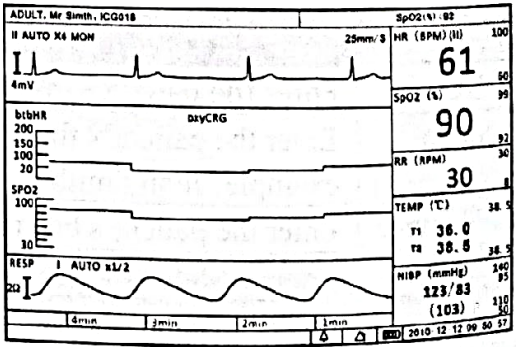
a) ECG Display Mode



b) ECG Display Mode



c) Large Digit Display Mode



d) Display Mode oxyCRG

4.7.1 Display Mode Customization

In addition to the four main display modes above, users can also customize display modes and save as user format modes.

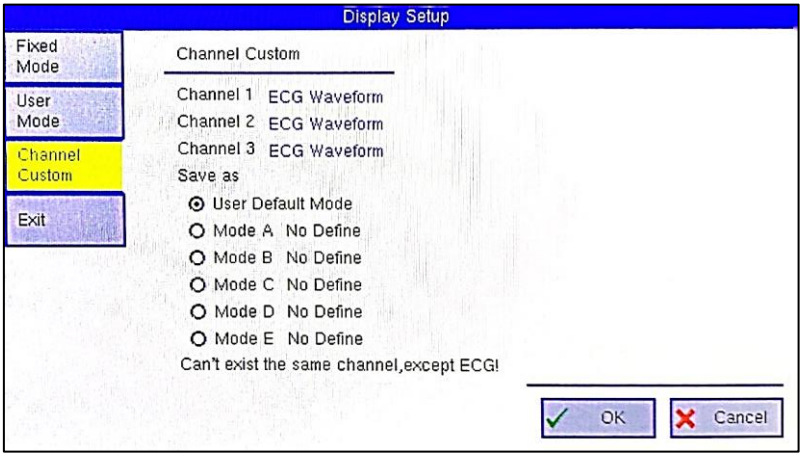


Figure 4.11 Custom Format

1. Press the menu button to bring up the main menu and turn the rotary knob to move the cursor to the "View" option.
2. Press the rotary knob to access the "View" submenu. Turn the knob to highlight the "Custom Format" option.
3. Press the rotary knob to access the special format submenu. There are three channel waveforms. You can customize each channel by selecting from ECG, PLETH, Graph, Table, RESP or blank.
4. Press the rotary knob to select and select the desired display option.
5. Turn the dial to highlight “Not Save”, press to select and rotate the knob to choose a format such as Format 1 to save your settings.
6. Turn the dial to “Ok” or “Cancel” button and press to save or delete your settings

Chapter 5: Monitoring Patients

Follow the steps in Chapter 4: Setting Up the Monitor; the remainder of this chapter assumes that the monitor has been installed and set up correctly.

5.1 General Monitoring Instructions

Regardless of the parameter or measured value you wish to monitor, follow these steps when you are ready to place the patient. Each step is explained further in this chapter.

1. Assemble the patient and sensors.
2. Select the waveform to display.
3. Adjust the settings in the parameter box.
4. Set high and low alarm limits.
5. Use these features as needed:
    - Respond to alarms
    - NIBP mode
    - Freeze Mode
    - trend
    - View Saved Trending Data

5.2 Attaching Patients

Attach the patient to the desired sensor and connect the sensor cable to the monitor. Parameter values will appear automatically on the display when the sensor cable is connected to the monitor

5.3 Adjust Waveform Settings

Select a waveform, trend table, graph or blank to display in the three waveform channels by using the Display Settings function and adjust the settings for each waveform.

Press and turn the rotary knob on the monitor to move the cursor. Highlight a waveform channel and press the knob to access the waveform menu in the middle of the display. The available settings for the selected waveform will be displayed.

See the chapter dedicated to each parameter for more details on setting the waveform

5.4 Adjust Parameter Box Settings

1. Turn the rotary knob on the monitor to move the cursor. Highlight the parameter box and press the knob to access the parameter menu in the center of the display. The available settings for the selected parameter will be displayed.

2. Each parameter allows you to enable or disable its alarm detection capability in the parameters menu. For example, if the SpO2 alarm is on, the alarm will sound when the high or low alarm limits are violated. If you set off the SpO2 alarm and the high or low alarm limits are violated, the alarm will not sound.

NOTES! When you change the patient type or turn off, this setting will default to ON.

3. For parameters where more than one measurement can be monitored such as blood pressure (systolic, diastolic and mean), only the SYS and DIA high and low limit settings can be displayed.

5.5 Set Alarm Limits

Set high and low alarm limits for each parameter.

- When the numerical measured value matches or exceeds the high or low limit set for that parameter, an alarm will be issued. For example, if the low alarm limit for SpO2 is 85 and the patient's measured value for SpO2 is 85 or less, an alarm will be issued.

- The Vital Signs Monitor provides clinically appropriate default high and low alarm limits for each measured numerical value.

You can choose different high and low limits, depending on each patient's monitoring requirements. For a list of default alarm limits, see Chapter 15: Specifications.

WARNING! Verify that alarm limits are clinically appropriate for your patient and comply with institutional policies.

NOTES! Alarms can be tested while the monitor is in use by setting the alarm limits such that the measured value is outside the limits. Return alarm limits to clinically appropriate settings after testing.

1. Make sure the sensors for each parameter are connected to the monitor, and the parameters or measured values are displayed on the screen.
2. Press the menu button to bring up the main menu at the bottom of the screen. Turn the rotary knob on the monitor to move the cursor, highlight "Alarm" and press the knob to select.
3. Highlight the name of each measured value and press the knob to choose.
4. Highlight high alarm limit and press the knob to select.
5. Turn the rotary knob to select the desired value and press the knob to select.
6. Turn the dial to highlight the low alarm limit and press the knob to select.
7. Turn the rotary knob to select the desired value and press the knob to select.
8. Turn the dial to “Ok” or “Cancel” button and press to save or delete your settings.

5.6 Use These Features As Needed

5.6.1 Responding to an Alarm

1. When the numerical measured value matches or exceeds the high or low limit set for the parameter, an alarm will sound. An audible alarm tone will sound, an alarm event will

appear in the alarm status bar, and a violated measured value will flash in the parameter box.

2. The alarming action will stop when the measured value is once again within the alarm limits. Your monitor will automatically stop alarming as soon as the measured value returns within the alarm limits, or you will be asked to manually acknowledge the alarm by pressing the alarm mute button.

NOTES! Only qualified personnel may temporarily silence the alarm, or activate it indefinitely.

3. If the alarm limit is still violated after two minutes, the audible alarm tone will sound again. If, within two minutes of silent alarm, another measured value matches or exceeds its alarm limit, the alarming action will proceed, including an audible alarm tone.
4. If appropriate for your patient, you can turn off the alarm detection capability for one parameter so that when a measured value matches or exceeds the alarm limit, the monitor will not issue an alarm.

5.6.2 NIBP Modes

Non-invasive blood pressure measurement (NIBP) can be performed in automatic, manual or STAT mode. In automatic mode, the monitor will measure the patient's NIBP periodically, according to the interval you select. In manual mode, the monitor will measure the patient's NIBP only when you press the NIBP button. In STAT mode, the monitor will measure the patient's NIBP continuously for five minutes.

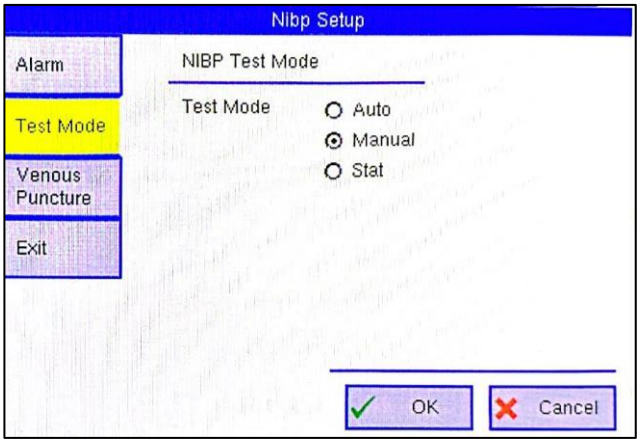


Figure 5.1 NIBP Modes

To change NIBP mode:

1. Press and turn the rotary knob on the monitor to move the cursor. Highlight the NIBP parameter box and press to select.
2. Highlight test mode and press the select dial.
3. Turn the dial to choose a mode (Auto, Manual, or Stat), and press the knob to choose.

5.6.3 Freeze mode

Use this feature to hold or temporarily freeze all current waveforms, even those that are not displayed. monitoring does not stop: You can still see the current measured value in the parameter box.

When you freeze a waveform, you cannot adjust any of the waveform settings.

Also, trying to perform other functions will cause freeze mode to be aborted. For example, if you freeze a waveform and then select ALARM from the main menu, an alarm bound box will be displayed in the waveform area and the waveform will no longer be in freeze mode.

To freeze a waveform:

1. Press the Freeze button on the right side of the monitor. The waveform will stop, or freeze.
2. Press "Page Up" or "Page Dn" to browse through the waveform and press "Save" to save the frozen part of the waveform in a file.

To restart the waveform, press the Freeze Key again

5.6.4 Trends

The monitor saves tabular trend data graphs every 10 seconds for up to 120 hours for the following parameters:

a. ECG
   - Heart rate
   - ST

b. Oximetry
   - Oxygen saturation (SpO2)
   - Pulse rate, when SpO2 is the selected heart rate source

c. Non-invasive blood pressure (NIBP) (systolic, diastolic, mean)

d. Temperature (T1 and T2)

5.6.5 Viewing Stored Data Trends

To view stored trend data, press the menu button and turn the rotary knob on the monitor to move the cursor to the “Review” option and press to access the review submenu shown as below.

Chart	Wave	Alarm	Return

1. Take a look at the Trend Charts
   In the review submenu, highlight "Graph" and press the play button to select. The monitor will display a trend graph and the following menu.

Select Param	Page Up	Page Down	Cursors	step	Range	table	Return

Items	Instructions
Select Parameter	Select a parameter: HR, ST, SpO2, NIBP, RR or T1/T2 and press the rotary knob to make your selection. The corresponding trend graph will be displayed in the trend graph display area
Page Up/Dn	Explore trending chart timeframes
Cursor	Use to select points on a trending chart
Step	Choose the time interval between data points. The trend graph will be adjusted. Available time intervals are 1 second, 5 seconds, 10 seconds, 20 seconds, 30 seconds, 60 seconds, 90 seconds, and 120 seconds
Range	It is used to designate the range of Y-axis values of the trending chart. The adjusted range will be stored in the monitor and will be applied when the monitor is restarted. The range has three adjustment modes: alarm limit range, maximum range and manual adjustment. After the user sets a range, the trend graph displays data within the upper/lower limits of this range. Any value that exceeds the limit is invalid
Table	Select this option to access the trend table view

2. Trend Table Review

Information in the trend table is displayed as a list. The number and categories of parameters available are the same as the trend graph. In a trend table, the median time is the time value of the cursor in the trend graph. The value of each parameter is date and time (except NIBP). The NIBP value is the first value in the current interval.

Line Up	Line Dn	Page Up	Page Dn	step	Chart	Return

Items	Instructions
Line Up/Dn	Explore timeframes
Page Up/Dn	
step	Trend table data is compressed or added step by step. The available steps are 1 minute, 5 minutes, 10 minutes, 20 minutes, 30 minutes and 1 hour.
Chart	Select this option to return to the trend chart view.

3. Freeze Wave Review

In the review submenu, highlight "Wave" and press the play button to make your selection. The following menu will appear:

Select Files	Page Up	Page Dn	Return

Items	Instructions
Select Files	Select a saved file for review
Page Up/Dn	Browse frozen waveforms page by page.

4. Alarm Reviews
   User can review 1000's of alarm records.
   In the review submenu, highlight "Alarm" and press the play button to select. The monitor will display the stored alarms for all parameters.

Chapter 6: Alarms

6.1 Alarm Parameters and Technical Alarm

A parameter alarm occurs when the numerical measured value matches or exceeds the high or low limit set for that parameter.

A technical alarm occurs when there is a malfunction with one of the sensors or connections, or when the battery is low or when a fault is detected during a self-test.

During an alarm, an audible alarm tone will sound and a message will be displayed in the alarm status bar at the top of the screen. For parameter alarm, the violated measured value will flash.

6.2 Priority of High, Medium and Low Alarms

WARNING! Only a qualified doctor can set physiological parameters above the alarm level limit according to the patient's

condition. Alarms are categorized as high priority, medium priority, or low priority.

High Priority Alarm

The high priority alarm sound consists of two single five-tone bursts at four-second intervals. The sequence is repeated every ten seconds. The high priority alarm overrides all other alarms. An alarm message will be displayed in the alarm status bar with a flashing red background; violate the measured value will flash red.

WARNING! When different priority alarms occur simultaneously, only the highest priority alarm is displayed.

Medium Priority Alarm

The medium priority alarm sound consists of two single three-tone bursts repeated every 18 seconds. An alarm message will be displayed in the alarm status bar with a flashing yellow background; violate the measured value will flash red.

Low Priority Alarm

The low priority alarm sound consists of a single one-tone burst that repeats every 20 seconds. An alarm message will be displayed in the alarm status bar with a flashing yellow background; breaking the measured value will not flash

Alarm Priority Chart

HR	Cross the line	above medium
SpO2	Cross the line	above medium
ST	Cross the line	Set priorities based on the
RR	Cross the line	
NIBP	Cross the line	

Temperature	Cross the line	patient's condition
(SpO2) overdue pulse search	Parameter alarms	tall
(ECG) leads off	Technical alarm	tall
(ECG) full channel	Technical alarm	tall
(SpO2) sensor turns off	Technical alarm	tall
(SpO2) without sensor	Technical alarm	tall
(NIBP) cuff leak	Technical alarm	tall
(NIBP) without cuff	Technical alarm	tall
(NIBP) cuff over pressure	Technical alarm	tall
(NIBP) test of timeout	Technical alarm	tall

6.3 Controlling Alarms

You can control many factors in how the monitor issues an alarm. You can turn off the alarm detection capability for one parameter. You can change the high and low alarm limits. You can quickly reset the alarm threshold relative to the patient's current measured value. You can control the volume of the audible alarm. And you can silence the alarm for two minutes, or indefinitely.

WARNING! When the whole alarm is turned off and the physiological parameters are over the limit, there will be no alarm sound and no digits will flash. Words related to technical alarms will flash but no sound can be heard.

WARNING! Users should pay close attention to alarm switching as a whole. Turning off the entire alarm is not recommended.

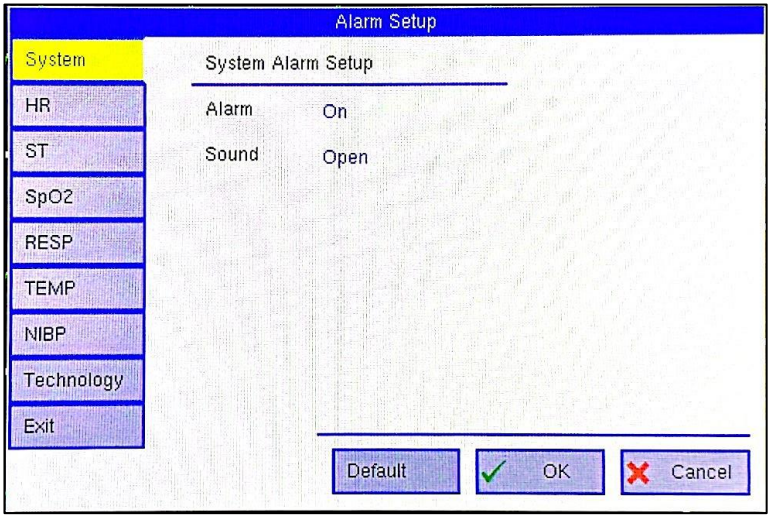


Figure 6.1 Alarm Settings

To change alarm settings,

1. Press the menu button to bring up the main menu and turn the rotary knob to move the cursor to the "Alarm" option and press the knob to select.
2. Highlight the "System" option and press to select. You can enable/disable the overall alarm switch for all parameters. You can also silence the alarm sound completely temporarily or indefinitely.
3. To change the alarm settings for a single parameter, you can highlight each parameter option and change the settings. Or you can access their parameters menu to change settings.
4. Turn the dial to “OK” or “Cancel” button and press to save or delete your settings.

6.3.1 Changing Alarm Limits

The monitor provides clinically appropriate default high and low alarm limits for each measured numerical value. You can change the high and low alarm limits, depending on each patient's monitoring requirements. You can even set the high or low alarm limit to OFF, so no alarm is issued. Check the list of default alarm limits in the specification chapter.

WARNING! The high limit of the alarm cannot be lower than the lower limit. If the high limit is lower than the low limit, the monitor will not respond.

WARNING! When the monitor is turned on for the first time, it will default to the alarm configuration for adults.

WARNING! Alarm settings are set to factory defaults. After being reset according to the patient's condition, the current alarm setting is retained for up to 30 minutes after the monitor is turned off. If the monitor is not turned back on for 30 minutes, the alarm limit is automatically reset to factory defaults.

WARNING! If the patient information has been reset, the user must reset the alarm limit based on the new "patient type".

6.3.2 Silence Alarm

The monitor is set to allow temporary or indefinite silence of audio alarms, and then alternately pressing the Alarm Mute button while an audible alarm is activated will do one of the following:

- Press the Silent Alarm button once. A 30-second timer will appear to the right of the Alarm Since icon. Audible alarms will not be reactivated if a new alarm appears. They will only be reactivated if the 30 second timer expires, or if the Alarm Mute button is pressed again.

- Press the Silent Alarm button twice. A 60-second timer will appear to the right of the Alarm Since icon. Audible alarms will not be reactivated if a new alarm appears. They will only be reactivated if the 60 second timer expires, or if the Alarm Mute button is pressed again.
- Press the Silent Alarm button three times. A 90-second timer will appear to the right of the Alarm Since icon. Audible alarms will not be reactivated if a new alarm appears. They will only be reactivated if the 90 second timer expires, or if the Alarm Mute button is pressed again.
- Press the Silent Alarm button four times. A 120-second timer will appear to the right of the Alarm Since icon. Audible alarms will not be reactivated if a new alarm appears. They will only be reactivated if the 120 second timer expires, or if the Alarm Mute button is pressed again.
- Press the Alarm Silent button five times. The Since Alarm icon will be displayed with a cross and no timer. Audible alarms will not be reactivated if a new alarm appears. They will only be reactivated if the Silent Alarm button is pressed again.

NOTES! Only qualified personnel who can change the audio alarm mute mode are permitted

Chapter 7: ECG

7.1 ECG Measurement Capability

The Vital Signs Monitor provides continuous five-lead ECG processing with a choice of standard leads and screening of electrocautery discharges. The main heart rate (HR) measured value and message are displayed in the HR parameter box, and the waveform for the main ECG lead is displayed Continuously

7.2 Warnings, Descriptions, and ECG Records

WARNING!

Connect only the five-lead ECG lead from the patient to the ECG patient lead. Do not connect any other signal source to the ECG patient cable.

WARNING!

This monitor does not identify or interpret arrhythmic events. The heart rate indication may be affected by the presence of a cardiac arrhythmia.

WARNING!

Only a five-lead ECG cable can be used with this monitor. Using the wrong cable for the selected mode may cause floating references or additional interference to the ECG signal.

NOTES!

Follow institutional standards when applying ECG electrodes. Very strong Silver / Silver Chloride disposable electrodes are recommended to avoid polarizing effects resulting in large input offset potentials. The use of "squeeze bulb" type electrodes is not recommended.

NOTES!

Line isolation monitor transients may resemble the actual heart waveform and thus inhibit the heart rate alarm.

7.3 Theory of Operation

Electric current is influenced by cardiac impulses that flow through the body tissues around the heart. Three or five electrodes, placed on the skin on opposite sides of the heart, send electrical potentials

to a circuit in the monitor. The monitor's ECG circuitry amplifies, filters, and digitizes (converts analog signals to digital signals) the received electrical potential. The digital signal is used to display the ECG waveform and calculate the ECG heart rate.

7.4 Attaching the Patient

NOTES!
Follow institutional standards when applying ECG electrodes

NOTES!
The monitor is protected from damage by the defibrillator, diathermy, and electrocautery discharge.

1. Skin Preparation for Electrode Placement
   Good electrode-to-skin contact is important for a good ECG signal, because skin is a poor conductor of electricity.
   a) Choose a site with intact skin, without any damage.
   b) Clip or shave hair from where needed.
   c) Wash the site thoroughly with soap and water, leaving no soap residue.

We do not recommend using pure ether or alcohol, as these dry out the skin and increase its resistance.

   d) Dry the skin thoroughly with quick scrubbing to increase capillary blood flow in the tissues.
   e) Use ECG skin preparation (abrasive) paper to remove dead skin cells and to increase the conductivity of the electrode sites.
2. Connect the ECG Leads
   a) Attach clips or snaps to the electrodes before placing them. If you are not using pre-gelled electrodes, apply electrode gel to the electrodes prior to placement.

b) Place the electrodes on the patient.

3. Attach the ECG lead to the patient. Make sure the cable is in the correct position of the ECG cable. The ECG cable and patient cable connectors are color coded.

NOTES! To disconnect the ECG cable, hold the Connector and pull back firmly. Do not pull the ECG cable to disconnect the ECG connector from the monitor.

Identification of the 5-Lead ECG Electrode		
Electrode Labels	Location	Color
RA	Right Arm	White
RL	Right foot	Green
LA	Left Arm	Black
LL	Left Foot	Red
V	4th Left Intercostal	Chocolate

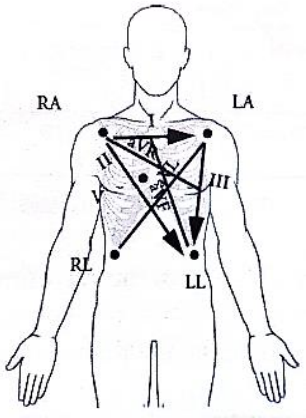


Figure 7.1 5-Lead Placement

WARNING!
Electrodes of dissimilar metals should not be used.

WARNING!
To protect the monitor from damage during defibrillation, for accurate ECG information, and to protect against noise and other interference, use only the electrodes and ECG cables specified by the manufacturer.

WARNING! Ensure that conductive parts, including the electrodes of the patient cable, do not come into contact with any conductive surfaces or grounded parts.

The monitor will automatically detect when the ECG cable is connected. The heart rate (HR) will be displayed in the HR parameter box and the main ECG waveform will appear in the waveform channel.

7.5 Selecting Waveform Settings

Use the ECG waveform menu options to select the primary ECG lead and adjust the settings for the ECG waveform size and speed.

7.5.1 Access the ECG Waveform Menu

The ECG waveform menu can be accessed from any ECG waveform channel.

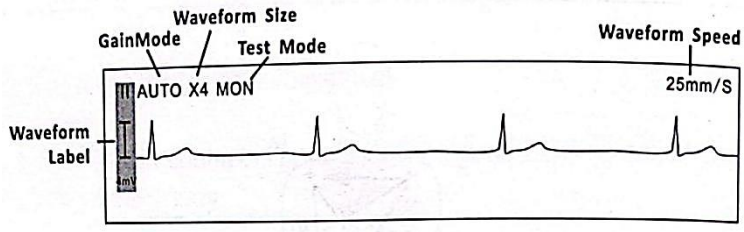


Figure 7.2 ECG display

To access the ECG waveform menu from a waveform channel:

1. Press and turn the rotary knob on the monitor to move the cursor.
2. Highlight the channel waveform for the primary ECG cable and press the knob to select. The ECG waveform menu will appear in the middle of the screen.

7.5.2 Changing the Primary ECG

Lead II is the default main lead. You can assign another lead to be the main lead using the ECG waveform menu. The selected lead leads will be displayed in a waveform label.

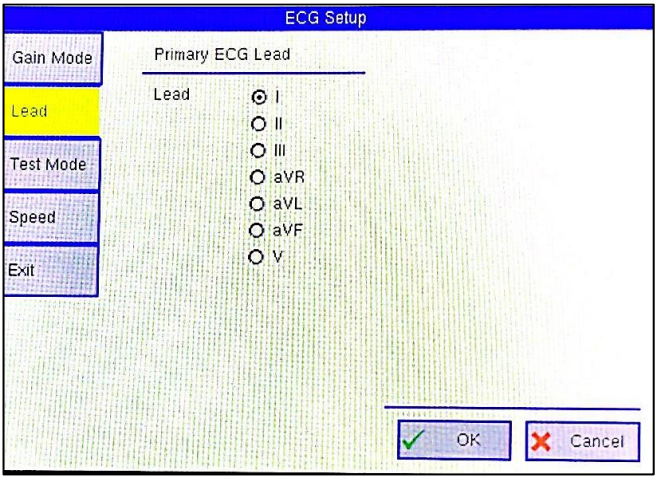


Figure 7.3 Setting the Primary ECG Lead

To change the primary lead:

1. In the ECG waveform menu, highlight LEAD and press the knob to access the ECG leads submenu.

2. Highlight the desired primary ECG cable and press the knob to select. See the following table for the main lead configurations.

I	Lead I Configuration	RA-LA
II	Lead II Configuration	RA-LL
III	Lead III Configuration	LA-LL
V	Lead V Configuration	LA-V
AVF	Augmented Lead AVF	
AL	Augmented Lead AVL	
AVR	Augmented Lead AVR	

3. Turn the knob to "Ok" or "Cancel" to save or delete your settings.

7.5.3 Selecting the Waveform Size

If any of the displayed ECG waves are too small or cropped, you can resize the ECG waveform on the screen.

The selected size (X1/4,X1/2,X1,X2, or X4) will appear in the waveform channel. The default size is times one (X1).

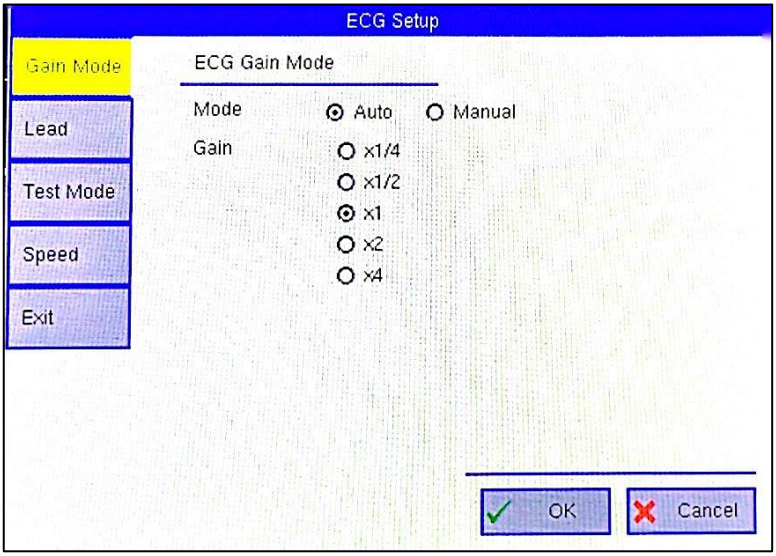


Figure 7.4 Selecting a Waveform Size

To resize the ECG waveform:

1. In the ECG band menu, highlight Gain Mode and press the knob to choose.
2. Highlight the desired wave size (X1/4,X1/2,X1,X2, or X4) and press the knob to choose.
3. Turn the dial to "OK" or "Cancel" to save or delete your settings.

7.5.4 Selecting the Speed of the Waveform

You can select the update speed of the ECG waveform.

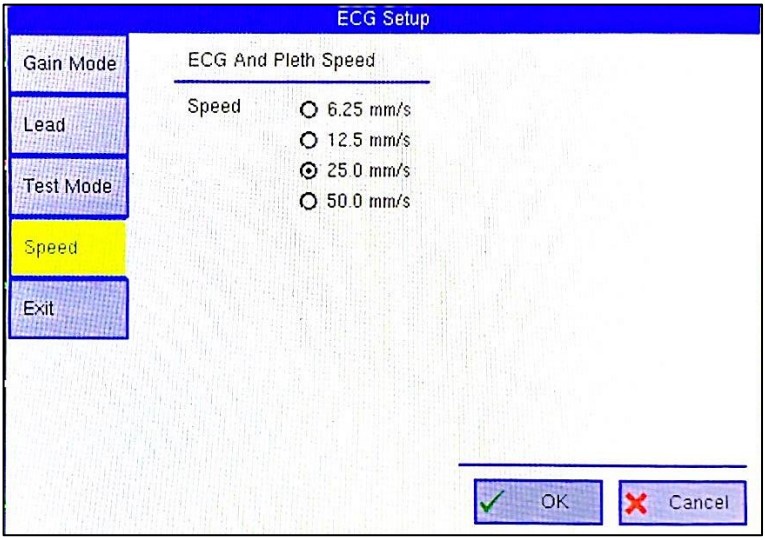


Figure 7.5 Selecting the Waveform Speed

To change the ECG wave speed:

1. In the ECG waveform menu, highlight Speed and press the knob to choose.
2. Highlight the desired wave speed (6,25, 12,5,25, or 50 mm/sec) and press the knob to choose.
3. Turn the dial to “OK” or “Cancel” to save or delete your settings.

7.6 Adjusting the Settings in the Parameter Box

7.6.1 HR Alarm Settings

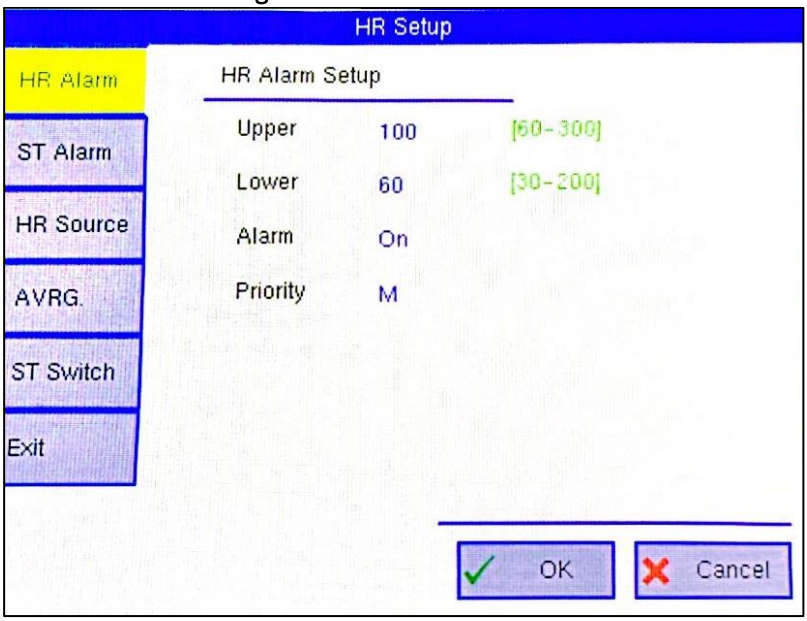


Figure 7.6 HR Alarm Settings

1. Set Alarm Detect On or Off

   You can enable or disable the alarm detection capability for heart rate values. If ALARM HR is on, an alarm will sound when the high or low alarm limit is violated. If you turn off ALARM HR and the high or low alarm limits are violated, the alarm will not sound. When you turn off the monitor and turn it back on, ALARM HR will be reset to ON; default setting is ON. See Selecting a Heart Rate Source in this chapter for information on sources of measured values for heart rate.

   To enable or disable heart rate alarm detection:

   a) Press and Turn the rotary knob on the monitor to move the cursor.

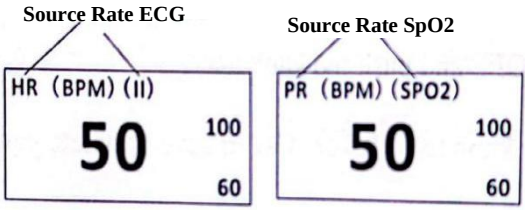
b) Highlight the HR parameter box and press the knob to access the HR parameters menu. Highlight ALARM HR and press the knob to select.
c) Select ON or OFF and press the knob to choose.
d) Turn the dial to “OK” or “Cancel” to save or delete your settings.

2. Set High and Low Alarm Limits
   a) Press and Turn the rotary knob on the monitor to move the cursor. Highlight the HR parameter box and press the knob to access the HR parameter menu.
   b) Highlight ALARM HR and press the knob to select.
   c) Move the cursor to High/Low and press the knob to select.
   d) Turn the knob to increase or decrease the number and press to confirm.
   e) Turn the dial to "OK" or "Cancel" to save or delete your settings.
3. Select Alarm Priority
   a) Press and Turn the rotary knob on the monitor to move the cursor. Highlight the HR parameter box and press the knob to access the HR parameter menu.
   b) Highlight ALARM HR and press the knob to select.
   c) Select Medium or High and press the knob to choose
   d) Turn the dial to "OK" or "Cancel" to save or delete your settings

7.6.2 Selecting a Heart Rate Source

Vital Signs Monitor can measure heart rate/pulse rate using two different parameters: ECG and oximetry (SpO^2). Regardless of the source, the measured value for heart rate can be continuously displayed in the HR parameter box. You can select the source (AUTO, ECG or SpO^2) of the displayed heart rate/rate. The default

setting is AUTO. If you select ECG, the main label (II) will be displayed in the HR parameter box on the detection of each QRS complex in the waveform. If you select SpO^2 as the source, a SpO^2 label identifying the source will be displayed in the HR parameter box on pulse detection.



Source Rate is ECG **Source Rate is Sp02**

If you select AUTO, the monitor will determine the best source depending on the quality of available data and the priority of the following sources:

a) If the ECG cable is connected to the monitor, and the ECG reading is valid, then the ECG will be the source of the heartbeat.

b) If the ECG cable is not connected or no signal is detected, the oximetry (SpO^2) cable is connected to the monitor, and the SpO^2 reading is valid, the SpO^2 will be the source of the heartbeat.

To select the heart rate source displayed in the HR parameter box:

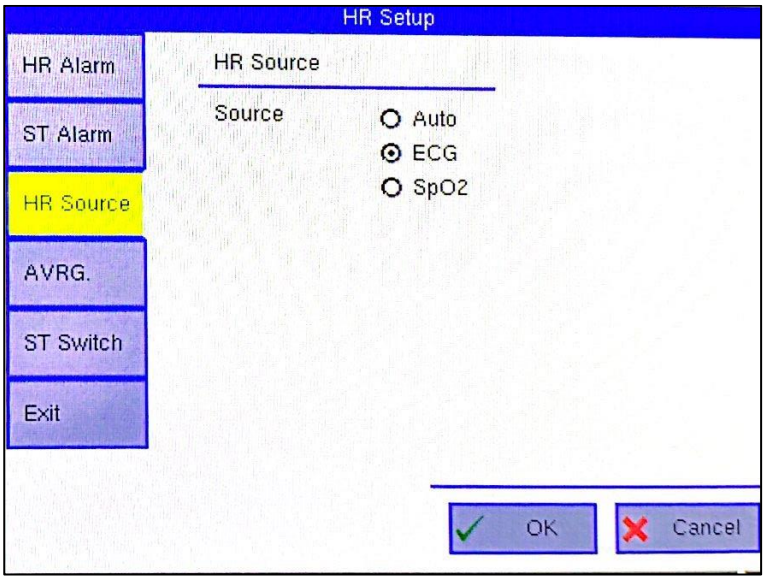


Figure 7.7 Selecting HR Sources

1. Press and turn the rotary knob on the monitor to move the cursor. Highlight the HR parameter box and press the knob to access the HR parameter menu.
2. Highlight HR Source and press the knob to select.
3. Select the desired source of measured values for heart rate (AUTO, ECG, or SpO^2) and press the knob to choose.
4. Turn the dial to "OK" or "Cancel" to save or delete your settings.

7.7 Monitoring ST

The monitor performs ST segment analysis of normal beats and atrial rhythm and calculates ST segment elevation and depression. This information can be displayed in the form of an ST number and a screenshot on the monitor.

7.7.1 Switching on the ST

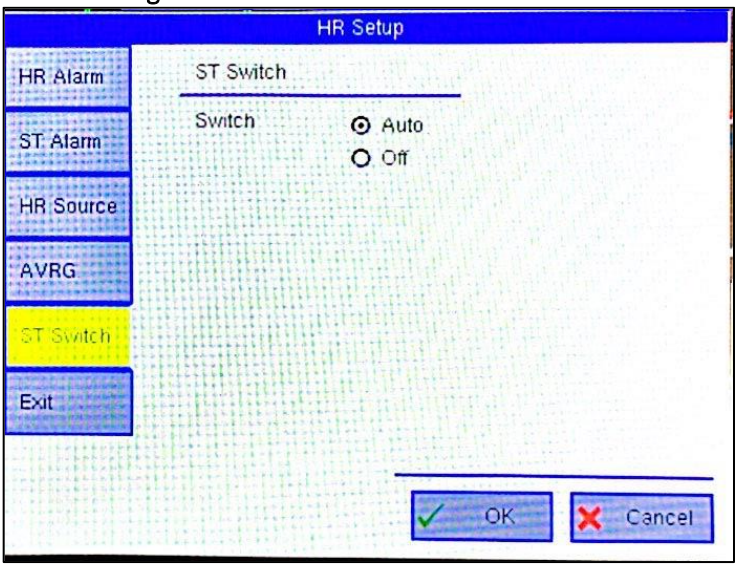


Figure 7.8 Turning on the ST Switch

1. Press and turn the rotary knob on the monitor to move the cursor. Highlight the HR parameter box and press the knob to access the HR parameter menu.
2. Highlight switch ST and press the knob to make a selection.
3. Select AUTO or OFF and press the dial to select.
4. Turn the dial to “Ok” or “Cancel” to save or delete your settings.

7.7.2 Display ST

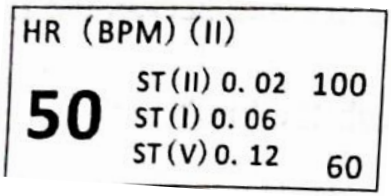


Figure 7.9 Display

7.7.3 Alarm Settings ST

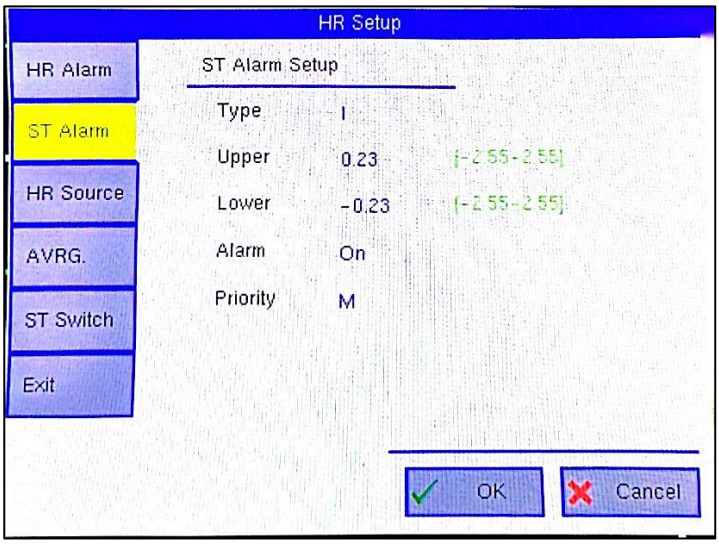


Figure 7.10 ST Alarm Settings

1. Turn Alarm Detection On or Off

   You can enable or disable the alarm detection capability for heart rate values. If ST ALARM is on, an alarm will sound when the high or low alarm limit is violated. If you turn off ST ALARM and the high or low alarm limits are violated, the alarm will not be issued. When you turn off the monitor and turn it back on, ST ALARM will be reset to ON; default setting is ON.

   To enable or disable ST alarm detection:

   a) Press and Turn the rotary knob on the monitor to move the cursor. Highlight the HR parameter box and press the knob to access the HR parameter menu.
   b) Highlight ST ALARM and press the knob to select.
   c) Select the source of the ST section from leads I, II, III, aVR, aVL, aVF, V.
   d) Select ON or OFF and press the knob to choose.

e) Turn the dial to “OK” or “Cancel” to save or delete your settings.

2. Set Alarm High and Low Limits
   a) Press and turn the rotary knob on the monitor to move the cursor. Highlight the HR parameter box and press the knob to access the HR parameter menu.
   b) Highlight ST ALARM and press the knob to select.
   c) Move the cursor to High/Low and press the knob to select.
   d) Turn the knob to increase or decrease the number and press to confirm.
   e) Turn the dial to “OK” or “Cancel” to save or delete your settings.
3. Select Alarm Priority
   a) Press and turn the rotary knob on the monitor to move the cursor. Highlight the HR parameter box and press the knob to access the HR parameter menu.
   b) Highlight ST ALARM and press the knob to select.
   c) Select Medium or High and press the knob to choose.
   d) Turn the dial to "OK" or "Cancel" to save or delete your settings.

7.7.4 Arrhythmia

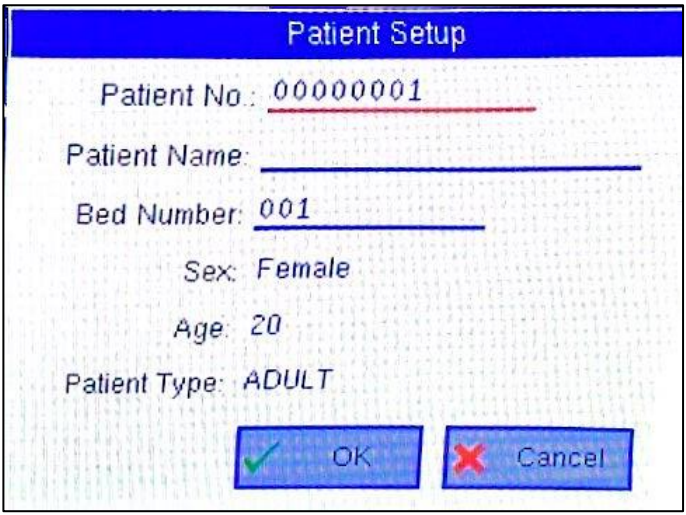


Figure 7.11 Arrhythmia settings

Arrhythmia set:

1. Press the menu button to bring up the main menu and turn the rotary knob to move the cursor to the “Patient” option and press to select.
2. Turn the rotary knob to move the cursor to the “Arrhythmia” option and press to select. You can enable/disable Arrhythmia indication.
3. Turn the dial to “OK” or “Cancel” to save or delete your settings.

Speed setting:

1. Press the menu button to bring up the main menu and turn the rotary knob to move the cursor to the "Patient" option and press to select.

2. Turn the rotary knob to move the cursor to the "Speed" option and press to select. You can activate/deactivate the speed setting flag. If you have "Speed" on, in the ECG, there will be a sign while pacing.
3. Turn the dial to "OK" or "Cancel" to save or delete your settings

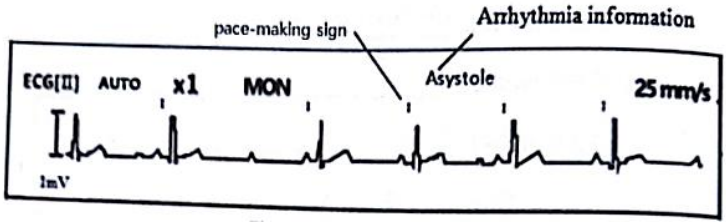


Figure 7.12 Arrhythmia settings

The monitor gives an arrhythmia alarm. When an arrhythmia is detected, it alarms the Vital Signs Monitor and displays the arrhythmia information on the electrocardiograph.

No. Series	Arrhythmia Information
1	Asystole
2	Ventricular fibrillation
3	Ventricular tachycardia
4	Ventricular rhythm
5	Upraventricular rhythm
6	Ventricular bigeminy
7	Trigeminal ventricles
8	Sino-atrial arrest

9	Sinus tachycardia
10	Sinus bradycardia
11	R-ON-T
12	Irregular HR

Chapter 8: Oxymetry

8.1 Oxymetry Measurement Capability

Parameter oximetry provides continuous non-invasive monitoring of oxygen saturation (%SpO^2) in blood and peripheral pulse (PPR). Measured values for oximetry (%SpO^2 and PPR) and pulse strength bar graphs are displayed in the SpO^2 parameter box. A plethysmogram, or oxygen saturation waveform can be continuously displayed. Various reusable sensors are available to monitor patients.

8.2 Oximetry Warnings, Descriptions, and Records

WARNING! Long-term use or patient conditions may require periodic sensor site changes. Change sensor sites and check skin integrity, circulatory status and proper alignment at least every 4 hours.

WARNING! When attaching sensors with micro foam tape, do not stretch the tape or apply the tape too tightly. Tape that is applied too tightly can cause inaccurate readings and blisters on the patient's skin (lack of skin respiration, not heat, causes the blisters).

WARNING! Using a faulty sensor may cause inaccurate readings, possibly resulting in patient injury or death. Check each sensor.

If the sensor appears to be damaged, do not use it. Use a different sensor or contact your authorized repair center for assistance.

WARNING! Using a damaged patient cable may result in inaccurate readings,

may result in patient injury or death. Check the patient cable. If the patient cable appears damaged, do not use it. Contact your authorized repair center for assistance.

WARNING! If any integrity check fails, do not attempt to monitor the patient. Use a different sensor or patient cable, or contact the equipment dealer for assistance if necessary.

WARNING! Do not autoclave, sterilize ethylene oxide, or immerse sensors in liquid. Evidence that liquid has entered the monitor voids the warranty.

WARNING! Use only the SpO^2 sensor supplied with, or specifically intended for use with, this device.

WARNING! SpO^2 measurement may be negatively affected in the presence of high ambient light. Protect the sensor area (with a surgical towel, for example) if necessary.

WARNING! Dyes introduced into the bloodstream, such as methylene blue, indocyanine green, indigo carmine, patent blue (PBV), and fluorescein can affect the accuracy of SpO^2 readings

WARNING! Any condition that restricts blood flow, such as use of a blood pressure cuff or extreme systemic vascular resistance, can result in an inability to determine accurate SpO^2 and pulse readings.

WARNING! Unplug the sensor from the monitor before cleaning or disinfecting.

NOTES! Obstruction or dirt on the red light or sensor detector can cause sensor failure. Make sure there are no obstructions and the sensor is clean

8.3 Theory of Operation of Pulse Oximetry

The pulse oximeter determines %SpO2 and pulse rate by passing two wavelengths of low-intensity light, one red and one infrared, through body tissue to a photodetector. Information about the wavelength range can be very useful to doctors. Wavelength information for this device can be found in the SpO2 Specifications section of this manual. Pulse identification was carried out using plethysmographic techniques, and oxygen saturation measurements were determined using the principle of oximetry spectrophotometry. During measurement, the signal strength generated from each light source depends on the color and thickness of the body tissue, the placement of the sensor, the intensity of the light source, and the absorption of arterial and venous blood (including the effect of timing of pulse changes) in the tissue.

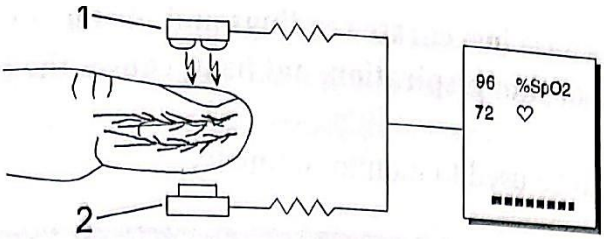


Figure 8.1 Operation Theory

1. Low intensity Red and Infrared LED light source
2. Detector

Oximetry processes these signals, separating time-invariant parameters (tissue thickness, skin color, light intensity, and venous

blood) from time-variant parameters (arterial volume and SpO^2) to identify pulse rate and calculate functional oxygen saturation. Oxygen saturation calculations are possible because blood that is saturated with oxygen is predicted to absorb less red light than blood that is deficient in oxygen.

WARNING! Because measurement of SpO2 is dependent on vascular pulses, any condition that restricts blood flow, such as use of a blood pressure cuff or extremes in systemic vascular resistance, can lead to an inability to determine accurate SpO2 and pulse readings.

WARNING! Under certain clinical conditions, the pulse oximeter may display a dash if it cannot display the SpO^2 value and/or pulse rate. Under these conditions, the pulse oximeter may also display incorrect values. These conditions include, but are not limited to: patient movement, low perfusion, cardiac arrhythmias, high or low pulse rate or any combination of the above conditions. The physician's failure to recognize the effect of this condition on the pulse oximeter reading can result in patient injury

8.4 Attaching the Patient

WARNING! Long-term use or patient conditions may require periodic sensor location changes. Change sensor sites and check skin integrity, circulatory status and proper alignment at least every 4 hours.

WARNING! When attaching the sensor with the Micro foam tape, do not stretch the tape or overtighten the tape. Tape that is applied too tightly can cause inaccurate readings and blisters on the patient's back (lack of skin breathing, not heat, causes the blisters).

1. Select the sensor to use to monitor the oximetry

Patient	The place	Description
Adult > 45 Kg	Fingers	Sensor, Adult (Reusable)
	Fingers or Toes	Sensors, Disposable, Adult Fingers
	Ear	Sensor, Ear (Reusable)
Pediatric 15 – 45 Kg	Fingers	Sensor, Adult (Reusable)
	Fingers or Toes	Sensor, Disposable, Ped. finger
	ear	Sensor, Ear (Reusable)
Neonate <3Kg (For Spot Check Only)	Hands or Feet	Sensor, Disposable, Neonate
	Foot	Sensors, Wraps. Neonate (Reusable)

2. Clean and disinfect the sensor. Use a soft cloth dampened in water or a mild soap solution and wipe the sensor with isopropyl alcohol.
WARNING! Do not autoclave, sterilize ethylene oxide, or immerse sensors in liquid. Evidence that liquid has been allowed to enter the monitor voids the warranty.

WARNING! Unplug the sensor from the monitor before cleaning or disinfecting.
NOTES! Obstruction or dirt on the red light or sensor detector can cause sensor failure. Make sure there are no obstructions and the sensor is clean

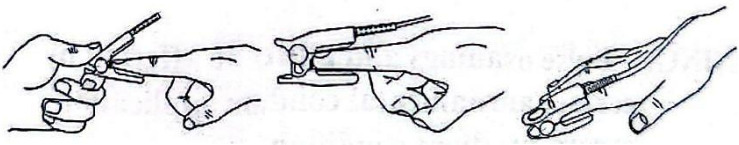
3. Check the sensor to make sure it doesn't look damaged.
   WARNING! Using a faulty sensor may cause inaccurate readings, possibly resulting in patient injury or death. Check each sensor. If the sensor appears to be damaged, do not use it. Use a different sensor or contact your authorized repair center for assistance.
   WARNING! Using a damaged patient cable may result in inaccurate readings, which may result in patient injury or death. Check the patient cable. If the patient cable appears damaged, do not use it. Contact your authorized repair center for assistance.

   WARNING! If any of the integrity checks fail, do not attempt to monitor the patient. Use a different sensor or patient cable, or contact the equipment dealer for assistance if necessary.

4. Hold the connector rather than the cable when connecting or disconnecting the sensor to the device and push the connector firmly into the wall outlet.
   - The monitor will automatically detect when the SpO2 patient cable is connected and the oximetry parameter will be active
5. Attach the sensor to the patient.
   a) Make sure the red light on the sensor is on.
   b) Select the appropriate sensor size; whether for adults, children or for neonatal patients.

Place the adult/child SpO2 sensor:

- When placing the sensor on the patient, let the cable rest over the back of the hand as shown in Figure 8.2.



(a B C)

Figure 8.2 Positioning the Finger Sensor Cable

neonate SpO2 sensor:

- SpO^2 sensor is Y-type with a rubber casing. First insert the Y into the wrapper slot as shown in Figure 8.3. Once placed, the Neonatal SpO^2 sensor looks like Figure 8.4

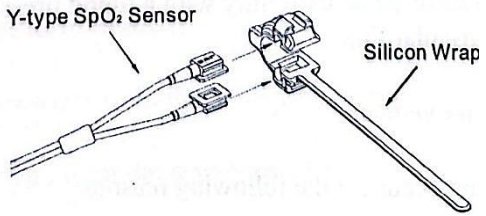


Figure 8.3 Installing the Neonate SpO_2 Sensor

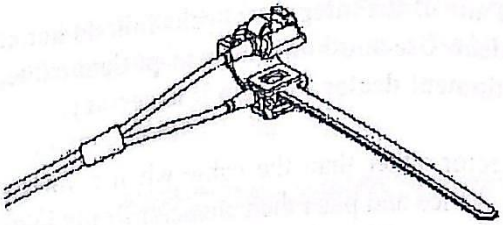


Figure 8.4 Installing the SpO_2 Sensor

Place the sensor on the foot or hand. Secure the wrapper (approx. 20mm long) to ensure correct sensor position as shown in Figure 8.5. Do not tighten the wrap too tightly as this may affect blood flow.

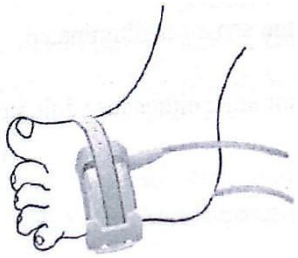


Figure 8.5 Installing the Neonate SpO2 Sensor

8.5 Performance Considerations

WARNING! Pulse oximetry and pulse signal readings can be affected by: certain environmental conditions, sensor application errors, and certain patient conditions.

NOTES! The Patient Simulator does not calibrate the oximeter. The oximeter does not require calibration. The Patient Simulator provides known SpO2 values and pulse rates to the oximeter allowing the oximeter performance to be checked.

Inaccurate measurements can be caused by:

- Faulty sensor application
- Placement of sensors in extremities with blood pressure cuffs, arterial catheters, or intravascular lines
- Ambient light
- Prolonged patient movement

Loss of pulse signal can occur for the following reasons:

- The sensor is too tight
- A blood pressure cuff is inflated on the same extremity to which the sensor is attached
- There is occlusion of the artery proximal to the sensor

Select the appropriate sensor, apply as directed, and observe all warnings and Cautions given in the instructions for use that accompany the sensor. Clean and remove any substances such as nail polish from the application site. Check periodically to ensure that the sensor remains correctly positioned on the patient.

WARNING! Network damage can be caused by incorrect application or duration of use of the SpO_2 sensor. Check the location of the sensor as directed in the sensor's instructions for use. High ambient light sources such as surgical lamps (especially those with a xenon light source), bilirubin lamps, fluorescent lamps, infrared heating lamps and direct sunlight can interfere with the performance of the SpO_2 sensor. To prevent interference from ambient light, ensure that the sensor is installed correctly, and cover the sensor location with an opaque material.

NOTES! Failure to take this precaution in high ambient light conditions may result in inaccurate measurements

If patient movement is causing problems, try one or more of the following solutions to fix the problem:

- Make sure the sensor is installed properly and securely
- Move the sensor to a less active site
- Use adhesive sensors that tolerate some patient movement
- Use a sensor with a fresh adhesive backing

8.6 Selecting Waveform Settings

Use the pleth menu options to adjust the speed of the SpO2 waveform, or plethysmogram.

8.6.1 Access the Waveform Menu

The pleth menu can be accessed from the pleth waveform channel. To access the pleth menu of waveform channels:

- Press and turn the rotary knob on the monitor to move the cursor. Highlight the pleth waveform channel and press the knob to select. A pleth menu will appear in the middle of the screen.

8.6.2 Filling a Waveform

You can choose to fill the pleth or not.

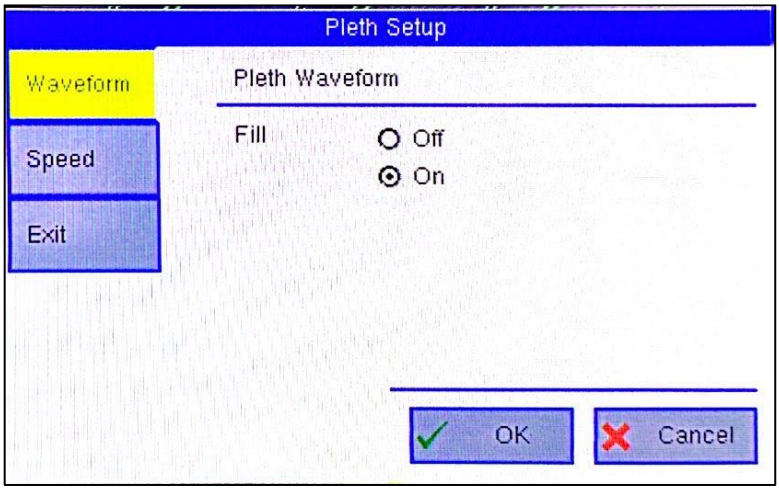


Figure 8.6 Filling the Waveform Pleth

1. In the pleth menu, highlight WAVEFROM and press the knob to make a selection.
2. Highlight the desired option (On/Off) and press the knob to select.
3. Turn the dial to “Ok” or “Cancel” to save or delete your settings.

8.6.3 Selecting Surge Speed

You can choose the speed at which Pleth is displayed.

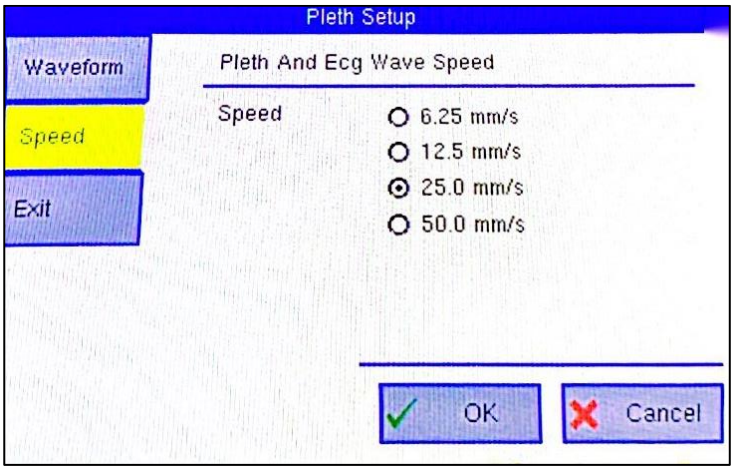


Figure 8.7 Selecting Pleth Wave Speed

To change the speed of the pleth:

1. On the pleth menu, highlight SPEED and push the knob to select.
2. Highlight the desired wave size (6,25,12,5,25, or 50 mm/sec) and press the knob to choose.
3. Turn the dial to "OK" or "Cancel" to save or delete your settings.

NOTES! The ECG wave speed will be changed according to the pleth speed.

8.7 Adjusting the Settings in the Parameter Box

8.7.1 SpO^2 Alarm Setting

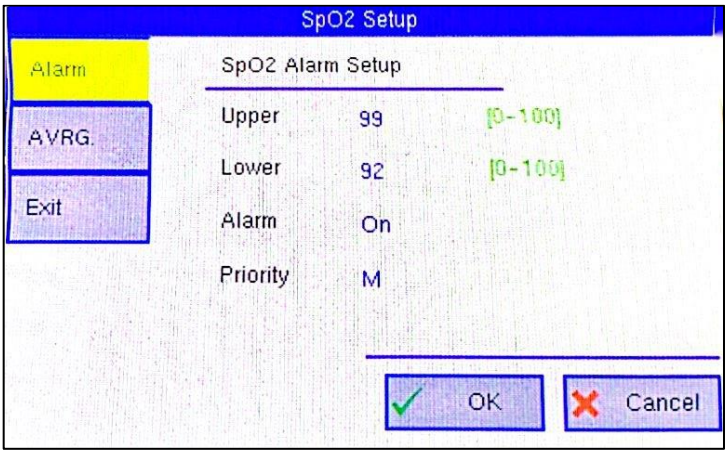


Figure 8.8 SpO^2 Alarm Settings

1. Turn Alarm Detection On or Off
   You can enable or disable the alarm detection capability for oxygen saturation values. If the SpO2 ALARM is on, an alarm will sound when the high or low alarm limit is violated. If you turn off the SpO2 ALARM and the high or low alarm limits are violated, the alarm will not sound. When you turn off the monitor and turn it back on, ALARM Sp02 will be reset to ON; default setting is ON.

To enable or disable SpO2 alarm detection:

a) Press and Turn the rotary knob on the monitor to move the cursor. Highlight the SpO_2 parameter box and press the knob to access the SpO_2 parameter menu.
b) Highlight ALARM and press the knob to select.
c) Select ON or OFF and press the knob to choose.
d) Turn the dial to “OK” or “Cancel” to save or delete your settings.

2. Set High and Low Alarm Limits
    a) Press and Turn the rotary knob on the monitor to move the cursor. Highlight the SpO_2 parameter box and press the knob to access the SpO_2 parameter menu.
    b) Highlight ALARM and press the knob to select.
    c) Move the cursor to High/Low and press the knob to select.
    d) Turn the knob to increase or decrease the number and press to confirm.
    e) Turn the dial to "Ok" or "Cancel" to save or delete your settings.
3. Select Alarm Priority
    a) Press and Turn the rotary knob on the monitor to move the cursor. Highlight the SpO_2 parameter box and press the knob to access the SpO_2 parameter menu.
    b) Highlight ALARM SpO2 and press the knob to select.
    c) Select Medium or High and press the knob to choose.
    d) Turn the dial to "Ok" or "Cancel" to save or delete your settings.

8.7.2 Choose the Average Period for the Oximetry Parameters

NOTES! SpO_2 is averaged by the number of pulses over which the SpO_2 values are averaged; pulse average is the number of seconds over which the pulse values are averaged.

Measured values for oximetry (%SpO_2 and PR) can be determined by averaging sensor readings over a selected number of beats or seconds. For example, if you select 16 Beats, the displayed measured value for oxygen saturation (%SpO_2) will be the average of the oxygen saturation readings over sixteen pulses; the displayed measured value for pulse (PR) will be the average of the number of pulses over sixteen seconds.

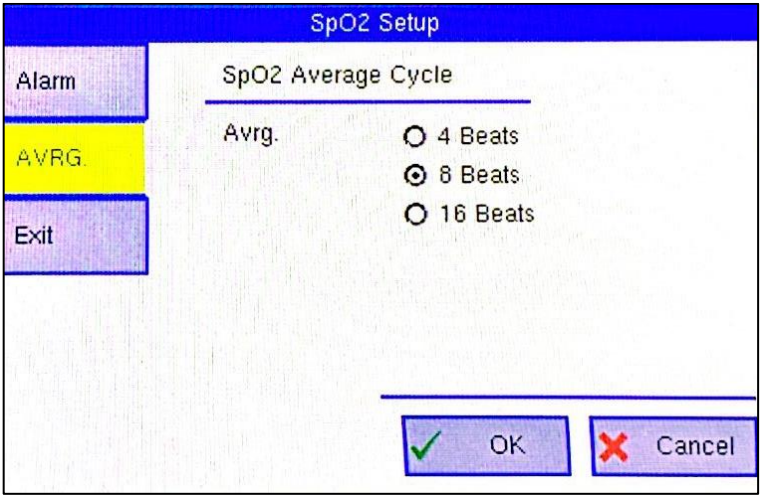


Figure 8.9 Choose Average SpO2 Period

To select an averaging period:

1. Highlight AVRG. and press the knob to select.
2. Select the desired averaging period (4 beats, 8 beats, 16 beats) and press the knob to choose.

Average Period of SpO^2 Reading	PR Reading Average Period
4 Beats	4 Seconds
8 Beats	8 Seconds
16 Beats	16 Seconds

3. Turn the dial to "OK" or "Cancel" to save or delete your settings.

Chapter 9: Non-Invasive Blood Pressure

9.1 Non-Invasive Blood Pressure Measurement Capability

The non-invasive blood pressure parameter (NIBP) provides systolic, diastolic, and mean blood pressure values. Measured values for non-invasive blood pressure (SYS, DIA, and MAP) are displayed in the NIBP parameter box. The measured value will be stored every 10 seconds. NIBP measurements can be performed in automatic, manual or STAT mode.

9.2 Non-Invasive Blood Pressure Warnings, Descriptions, and Records

WARNING! Blood pressure measurement may be inaccurate if cuffs and/or tubes other than those specified by the manufacturer are used.

WARNING! Ensure that the cuff size is correct for the patient mode selected on the monitor.

WARNING! Repeated use of the STAT mode for periods longer than 15 minutes should be avoided to reduce the patient's risk for soft tissue or nerve damage. When using the monitor for an extended period of time, choose the longest clinically appropriate measurement interval and check the patient periodically for signs of injury and ensure proper cuff placement.

WARNING! Make sure the hose is not kinked, compressed, or restricted.

WARNING! Check that the operation of the equipment does not impair the circulation of the patient being monitored.

WARNING! Blood pressure measurements may be inaccurate for patients with arrhythmias.

WARNING! Do not verify Non-Invasive Blood Pressure calibration while the cuff is in place on the patient.

WARNING! Limb and cuff movement should be minimized during blood pressure determination.

WARNING! Correct sizing and placement of the blood pressure cuff is critical to the accuracy of blood pressure determination.

WARNING! Each recording of blood pressure can be affected by the position of the patient, his physiological condition, and other factors.

WARNING! Blood pressure measurements should be interpreted with a doctor.

NOTES! There are no user serviceable adjustments for Non-Invasive Blood Pressure calibration verification. If the monitor does not appear to be calibrated, contact your authorized repair center for assistance.

NOTES! The systolic and diastolic blood pressure measurements determined by this device are equivalent to those obtained by a trained observer using the auscultatory cuff/stethoscope method, within the limits specified by the Chinese National Standard, Electronic or Automatic Sphygmomanometer.

NOTES! The mean arterial blood pressure measurement determined by this device is equivalent to that obtained by the intra-arterial blood pressure measurement device as specified by the manufacturer.

9.3 NIBP Theory of Operation

The Vital Signs Monitor uses the oscillometric principle to calculate systolic, diastolic and mean arterial pressure values from the blood

pressure cuff. When the blood pressure cuff is inflated, it creates an arterial occlusion in the leg used. The cuff is then deflated by applying pressure inside the cuff. When an oscillometric pulse is identified, another similar pulse must also be identified and measured before it drops again. This method of measuring blood pressure ensures the measurement is the correct measurement and not a change in the cuff due to movement. If the measurement is not reproduced a second time, it is not recorded and the pressure is lowered. After two identical oscillations are obtained, the cuff deflates. In other words, it will only capture reproduced reads; if there is no similar oscillation at that pressure, the reading is discarded as an artifact. This type of oscillometric technology is more tolerant of motion and generally results in a higher success rate than other NIBP technologies.

9.4 Limits of Measurement

Measurement is not possible with extreme heart rates of less than 40 bpm or greater than 300 bpm, or if the patient is on a heart-lung machine.

Measurements may be inaccurate or impossible:

- If a regular arterial pressure pulse is difficult to detect
- With cardiac arrhythmias
- With excessive and continuous patient movements such as chills or convulsions
- With rapid changes in blood pressure
- With severe shock or hypothermia reducing peripheral blood flow
- With obesity, where the thick layer of fat surrounding the limbs dampens oscillations originating in the arteries
- in the extremities that are edematous.

9.5 Attaching the Patient

1. Select the appropriate blood pressure cuff for the patient and leg size by measuring leg circumference. See table below.

WARNING! Blood pressure measurement may be inaccurate if cuffs and/or tubes other than those specified by the manufacturer are used.

NOTES! The NIBP Cuff Kit is latex free.

Leg Circumference	Cuff
25 – 35 cm	Large (Adult)
18 – 26 cm	Large (Pediatric)
10 – 19 cm	Moderate (Pediatric)
7 – 11 cm	Small (Neonatal)

WARNING! Limb and cuff movement should be minimized during blood pressure determination.

WARNING! Correct sizing and placement of the blood pressure cuff is critical to the accuracy of blood pressure determination.

ATTENTION! Each recording of blood pressure can be affected by the position of the patient, his physiological condition, and other factors.

WARNING! Ensure that the cuff size is correct for the patient mode selected on the monitor.

2. Place the Cuff on the Patient

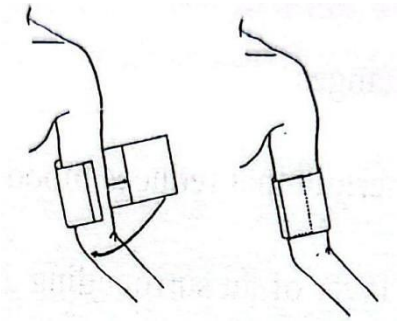


Figure 9.1 Attach the NIBP Cuff

a) Squeeze all the air out of the cuff.
b) Place the cuff on the leg at the same level as the heart. The cuff logo should be facing up, away from the patient. The width of the cuff should be about 30-60% of the leg circumference. You do not need to align the cuff along the artery.
c) Wrap the cuff around the leg and secure the Hook & Loop closure.

WARNING! The limb used for measurement must be at the same level as the heart. If this cannot be achieved, use the following correction:
Method: If the blood pressure cuff is above heart level, add 0.9mmHg (0.10kPa) to the value shown per centimeter, or 2.2mmHg (0.25kPa) per inch. If the blood pressure cuff is below heart level, subtract 0.9mmHg (0.10kPa) from the displayed value per centimeter, or 2.2mmHg (0.25kPa) per inch. If there is any doubt about the accuracy of the reading, check the patient's vital signs by other means before checking the monitor function.

3. Connect the NIBP Supply Hose to the Monitor
   WARNING! Make sure the hose is not kinked, compressed, or restricted
4. Connect the Cuff to the Supply Hose
   The NIBP parameter box is always displayed; The measured value will appear as soon as the blood pressure measurement is taken.
5. Make sure the patient type (Adult, Pediatric, or Neonatal) is appropriate for the patient.
6. If necessary, add patient information to the monitor.
7. Select the appropriate NIBP mode (AUTO, MANUAL, or STAT) for the patient.
   - Non-invasive blood pressure measurement (NIBP) can be performed in automatic, manual or STAT mode. In automatic mode, the monitor will measure the patient's NIBP periodically, according to the interval you select using the parameter box menu. In manual mode, the monitor will measure the patient's NIBP only when you press the NIBP button. In STAT mode, the monitor will measure the patient's NIBP continuously for five minutes. The default setting for NIBP mode is MANUAL.

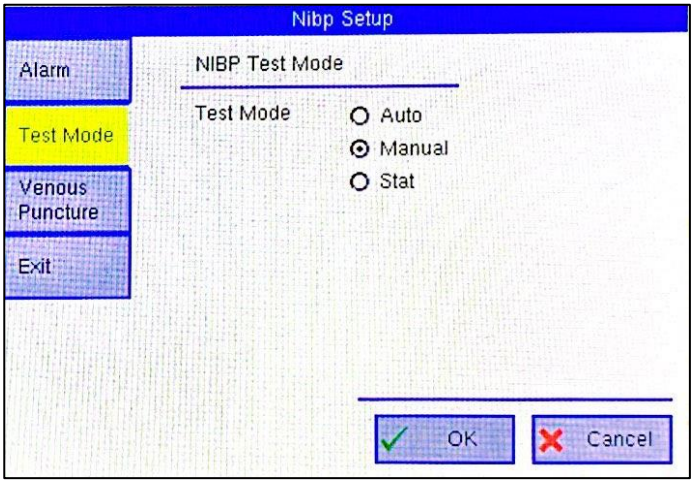


Figure 9.2 Selecting the NIBP Mode

To change NIBP mode:

1. Press and turn the rotary knob on the monitor to move the cursor. Highlight the NIBP parameter box and press the knob to make a selection.
2. Turn the rotary knob to select a test mode (AUTO, MANUAL, or STAT), and press the knob to select.

If you select AUTO or STAT, the selected mode will be displayed in the parameter box.

9.6 Adjusting Parameter Box Settings

9.6.1 NIBP Alarm Settings

1. You can enable or disable the alarm detection capability for each NIBP measured value (SYS, DIA, and MAP). If SYS ALARMS is active, an alarm will sound when the high or low alarm limits for systolic pressure are violated, regardless of the set of alarm limits displayed. If you turn off SYS ALARMS and the high or low alarm limits are violated, the alarm will not sound. When you turn off the monitor and turn it back

on, ALARM [SYS, DIA, or MAP] will be reset to ON; the default setting for each pressure value is ON.

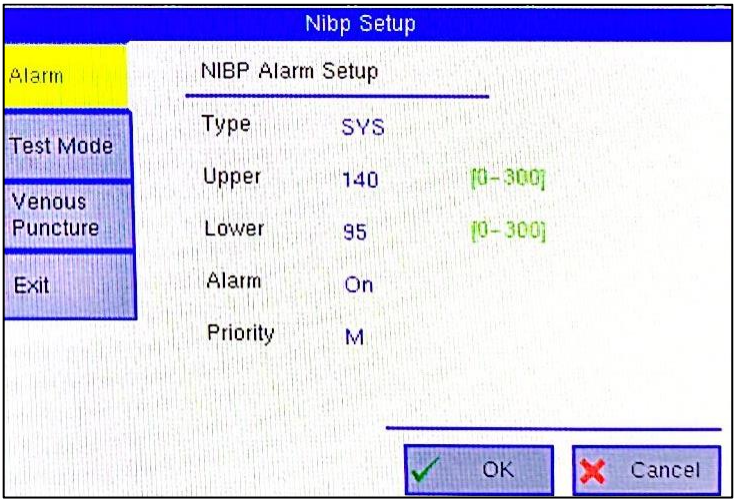


Figure 9.3 NIBP Alarm Settings

To enable or disable alarm detection for each pressure value (SYS, DIA and MAP):

a) Press and Turn the rotary knob on the monitor to move the cursor. Highlight the NIBP parameter box and press the knob to access the NIBP parameter menu.
b) Highlight NIBP ALARM and press the knob to access the alarms submenu.
c) Select each pressure value (SYS, DIA, and MAP) and select ON or OFF for each. Press the knob to select.
d) Turn the dial to "OK" or "Cancel" to save or delete your settings

2. Set High and Low Alarm Limits

The alarm limits displayed in the parameter box are high and low natural limits for SYS and DIA.

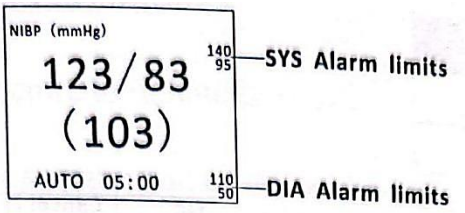


Figure 9.4 SYS and DIA Alarm Limits

a) Press and Turn the rotary knob on the monitor to move the cursor. Highlight the NIBP parameter box and press the knob to access the NIBP parameter menu.
b) Highlight ALARM and press the knob to select.
c) Select each pressure value (SYS, DIA and MAP) and move the cursor to High/Low and press the knob to select.
d) Turn the knob to increase or decrease the number and press to confirm.
e) Turn the dial to "OK" or "Cancel" to save or delete your settings

3. Select Alarm Priority
   a) Press and Turn the rotary knob on the monitor to move the cursor. Highlight the NIBP parameter box and press the knob to access the NIBP parameter menu.
   b) Highlight ALARM and press the knob to select.
   c) Select Medium or High and press the knob to choose.
   d) Turn the dial to “OK” or “Cancel” to save or delete your settings

9.6.2 Assisting Venous Puncture

You can use the NIBP cuff to generate sub-diastolic pressure. The cuff deflates automatically after a set time (adult/child 170 sec, neonate 85 sec) if you do not deflate it

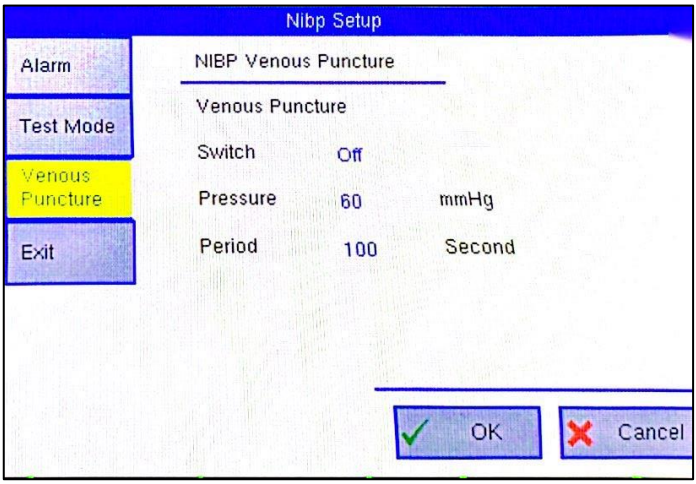


Figure 9.5 Venous Puncture

1. On the NIBP parameter menu, select Venous Puncture.
2. Puncture the vein and take a blood sample.
3. Reselect Venous Puncture to deflate the cuff.

During measurement, the NBP display shows the cuff inflation pressure and the time remaining in the vein puncture mode.

9.7 Measuring Non-Invasive Blood Pressure (NIBP)

9.7.1 Manual NIBP Modes

If you selected MANUAL as the NIBP mode, press the NIBP button on the monitor.

If the measurement is successful, you will see the systolic, diastolic, and mean arterial pressure values displayed in the NIBP parameter box.

If the measurement is not successful, you will see a dash (- --) displayed in place of the pressure value. You will see a message displayed in the NIBP parameter box.

9.7.2 Automatic NIBP Mode

If you select AUTO as NIBP MODE, the first measurement will start after the interval time has elapsed. If the measurement is successful, you will see the systolic, diastolic, and mean arterial pressure values displayed in the NIBP parameter box. The automatic measuring interval will be reset, and another measurement will start as soon as the interval time has elapsed. If the measurement is not successful, you will see a dash (- - -) displayed in place of the pressure value. You will see a message displayed in the NIBP parameter box. The automatic measurement interval will be reset.

9.7.3 NIBP STAT Modes

If you select STAT as the NIBP MODE, the first measurement starts immediately and a five-minute timer starts. NIBP measurements were taken repeatedly until five minutes had elapsed.

If the measurement is successful, you will see the systolic, diastolic, and mean arterial pressure values displayed in the NIBP parameter box and you will hear the end beep. The time of successful reading will also be displayed in the parameter box. When five minutes have elapsed or if you press the NIBP button to cancel, the mode will automatically return to the previous setting (MANUAL or AUTO).

If the measurement is not successful, you will see a dash (---) displayed in place of the pressure value. You will see a message displayed in the NIBP parameter box. The NIBP reading will not continue until the error message is recognized, but the five-minute timer will continue to run.

9.7.4 Canceling NIBP Measurement

Regardless of the mode selected (AUTO, MANUAL, or STAT), you can stop a measurement in progress by pressing the NIBP button

on the monitor. If the monitor is in auto mode (AUTO), another measurement will start after the selected interval has elapsed. If the monitor is in STAT mode and you press the NIBP button to cancel the measurement, the mode will automatically return to the previous setting (MANUAL or AUTO).

9.8 Cleaning the NIBP Cuff

1. Place the Cuff Cap on the end of the cuff tube.
   NOTES! Failure to place the cuff cap on the tube will allow water to enter the bladder. This will cause the cuff to malfunction and will damage the monitor.

2. Pre-clean the cuff removing any contaminants, hair, and debris.
3. Wash cuffs with lots of normal laundry, or hand wash.
4. Let the cuff dry.

WARNING! Don't put the cuff in the dryer.

Chapter 10: Respiration Rate

10.1 Respiratory Rate Measurement Capability

The RESP parameter provides the value of the respiration rate (RPM). The measured value for RESP is displayed in the RR parameter box.

For breathing measurement (Resp), the monitor measures the chest impedance between the two ECG electrodes on the patient's chest. Changes in impedance due to thoracic movement produce Resp waveforms on the monitor screen. The monitor counts the cycles of the waveform to calculate the respiration rate (RR).

10.2 Warnings, Descriptions, and Respiratory Rate Records

WARNING! Respiratory monitoring is not recommended in active patients. This may cause a false alarm.

WARNING! Place the white and red electrodes in opposite positions to get the optimal respiration waveform. Avoid placing wires over the heart and ventricles to reduce false readings produced by cardiac coverage or pulsed blood flow. This is especially important for neonates

10.3 Attaching to the Patient

WARNING! Respiratory monitoring is not recommended in active patients. This may cause a false alarm.

Correct patient skin preparation technique for electrode placement is important for Resp measurements: You will find this information in the chapter on ECG. Resp measurement using standard ECG cable set and lead placement. You can use one of several different sets of ECG cables to measure Resp, as long as you are using an ICU ECG cable.

The Resp signal is always measured between two ECG electrodes. If you use standard ECG electrode placement, the Resp is measured between the RA and LL electrodes

10.4 Selecting Waveform Settings

10.4.1 Selecting Wave Size

If any of the displayed RESP waves are too small or truncated, you can resize the RESP waveform on the screen. The selected size (X1/2, X1, X2, or 4) appears in the waveform channel. The default size is times one (X1).

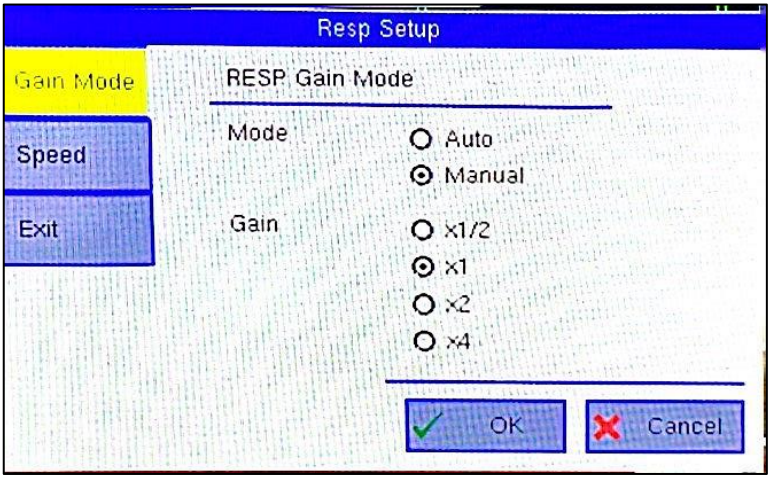


Figure 10.1 Select Response Wave Size.

To resize a RESP waveform:

1. On the RESP waveform menu, highlight Gain Mode and press the knob to choose.
2. Highlight the desired wave size (X1/2, X1, X2, or X4) and press the knob to select.
3. Turn the dial to “Ok” or “Cancel” to save or delete your settings.

10.4.2 Selecting Surge Speed

You can choose the update speed of the RESP waveform.

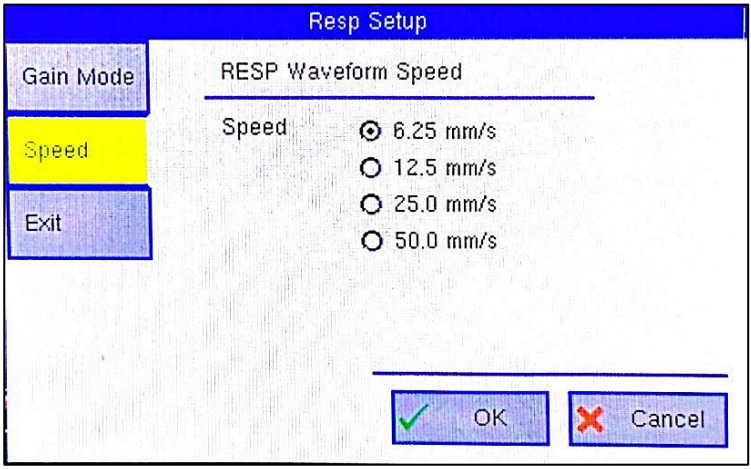


Figure 10.2 Select the Speed of the Resp Waveform.

To change the speed of the RESP Waveform:

1. On the RESP Wave menu, highlight Speed and press the knob to make your selection.
2. Highlight the desired wave size (6.25,12.5,25, or 50 mm/sec) and press the knob to choose.
3. Turn the dial to "OK" or "Cancel" to save or delete your settings.

10.5 Adjusting Parameter Box Settings

10.5.1 Breathing Rate Alarm Setting

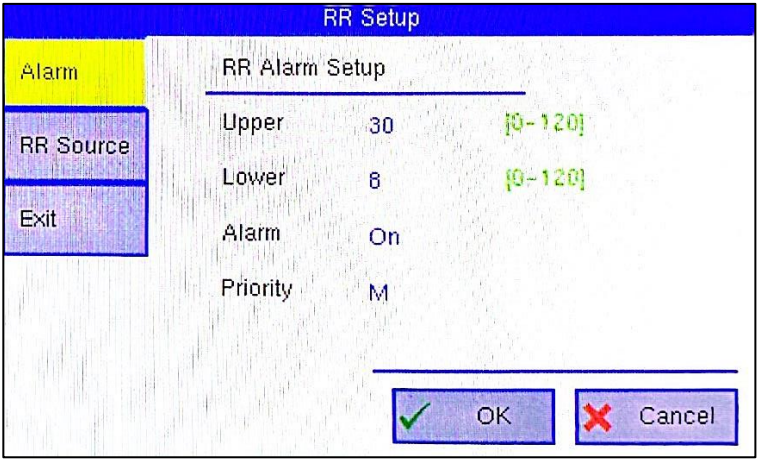


Figure 10.3 RR Alarm Settings

1. Turn Alarm Detect On or Off
   You can enable or disable the alarm detection capability for the Resp rate value. If RR ALARMS is on, an alarm will sound when the high or low alarm limits are violated. If you turn off RR ALARMS and the high or low alarm limits are violated, the alarm will not sound. When you turn off the monitor and turn it back on, RR ALARMS will be reset to ON; default setting is ON.

To enable or disable Response speed alarm detection:

a) Press and turn the rotary knob on the monitor to move the cursor. Highlight the HR parameter box and press the knob to access the RR parameter menu.
b) Highlight ALARM RR and press the knob to select.
c) Select ON or OFF and press the knob to choose.
d) Turn the dial to "OK" or "Cancel" to save or delete your settings.

2. Set High and Low Alarm Limits

a) Press and Turn the rotary knob on the monitor to move the cursor. Highlight the RR parameter box and press the knob to access the RR parameter menu.
b) Highlight ALARM RR and press the knob to select.
c) Move the cursor to High/Low and press the knob to select.
d) Turn the knob to increase or decrease the number and press to confirm
e) Turn the dial to "OK" or "Cancel" to save or delete your settings

3. Select Alarm Priority

a) Press and Turn the rotary knob on the monitor to move the cursor. Highlight the RR parameter box and press the knob to access the RR parameter menu.
b) Highlight ALARM RR and press the knob to select.
c) Select Medium or High and press the knob to choose.
d) Turn the dial to "OK" or "Cancel" to save or delete your settings.

Chapter 11: Temperature

11.1 Temperature Measurement Capability

Two independent channels are available for temperature monitoring (T1 and T2). Each channel is compatible with Smiths Medical PM1, Inc. YSI 400 series disposable temperature sensors, or equivalent. The measured values for each temperature channel (T1 and T2) are displayed in the TEMP parameter box. If the temperature channel is switched on and no measured value is available, a dash(----) will be displayed in the parameter box.

11.2 Warnings, Descriptions, and Temperature Notes

WARNING! Before monitoring begins, check that the sensor cable is properly connected. Pull the temperature sensor cable from the line 1 jack, the error message "T1 sensor is off" is displayed on the

screen and an alarm sound can be heard. The same thing happened with the other channels.

WARNING! Be careful when handling the temperature sensor and wires. When not in use, sensors and cables must be loose. Cables that are tightly folded may cause mechanical damage.

WARNING! Temperature calibration should be performed once a year (or according to the schedule specified in hospital procedures). If calibration is required, contact the manufacturer.

WARNING! Disposable temperature sensors should only be used once. During the process of monitoring the temperature measurement

WARNING! the instrument will perform an hourly self-check that lasts for two seconds. This will not affect the normal operation of the monitor.

NOTES! Use only the temperature sensor and interface cable specifically intended for use with this device.

11.3 Attaching a Patient

a. Select a temperature sensor. Each temperature channel is compatible with the manufacturer's YSI 400 series disposable temperature sensor, or equivalent.
b. Use temperature sensors on patients according to your facility's standards of practice and care, and according to the temperature sensor manufacturer's instructions.
c. If applicable, connect the temperature sensor to the interface cable.
d. Connect the interface cable and temperature sensor to the T1 or T2 socket on the side of the monitor. The monitor will automatically detect when the interface cable and temperature sensor are connected. The temperature

parameter will be active and the measured value for the temperature will be displayed in the TEMP parameter box.

11.4 Adjusting the Settings in the Parameter Box

11.4.1 Temperature Alarm Setting (Temp)

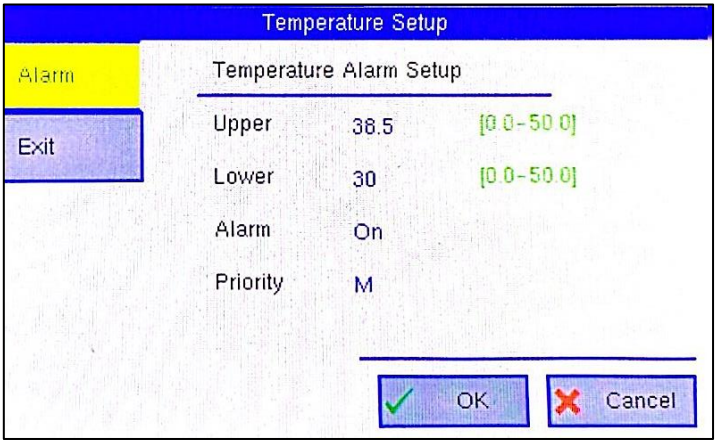


Figure 11.1 Alarm Settings

3. Turn Alarm Detect On or Off

You can enable or disable the alarm detection capability for temperature values. If ALARM is active, an alarm will sound when the high or low alarm limits for channel 1 or 2 are violated. If you set off ALARM and the high or low alarm limits for channel 1 or 2 are violated, no alarm will be issued. When you turn off the monitor and turn it back on, ALARM will be reset to ON; the default setting for each is ON.

To enable or disable TEMP alarm detection:

a) Press and Turn the rotary knob on the monitor to move the cursor. Highlight the TEMP parameter box and press the knob to access the TEMP parameter menu.
b) Highlight ALARM and press the knob to select.

c) Select ON or OFF and press button to select.
d) Turn the dial to "OK" or "Cancel" to save or delete your settings.

4. Set High and Low Alarm Limits
   a) Press and Turn the rotary knob on the monitor to move the cursor. Highlight the TEMP parameter box and press the knob to access the TEMP parameter menu.
   b) Highlight ALARM and press the knob to select.
   c) Move the cursor to High/Low and press the knob to select.
   d) Turn the knob to increase or decrease the number and press to confirm.
   e) Turn the dial to “OK” or “Cancel” to save or delete your settings.

5. Select Alarm Priority
   a) Press and Turn the rotary knob on the monitor to move the cursor. Highlight the TEMP parameter box and press the knob to access the TEMP parameter menu.
   b) Highlight TEMP ALARM and press the knob to select.
   c) Select Medium or High and press the knob to choose.
   d) Turn the dial to “OK” or “Cancel” to save or delete your settings.

Chapter 12: Troubleshooting and Maintenance

The product has been designed to operate continuously for a long time without maintenance. However, to ensure continued high levels of performance and safe operation, you should pay attention to the routine maintenance information in this section.

Carry out routine on-site maintenance every day; schedule summary and full details can be found in this section. The Vital Signs Monitor Care Guide also contains circuit diagrams, a list of parts, and descriptions required to perform battery repair and disposal.

Treatment Items	Recommendation	Maintenance Intervals
Monitor Surface	Clean and/or disinfect	As needed (see this page for guidance)
ECG cable	Clean and/or disinfect Inspection for signs of damage or deterioration; replace as needed	Every day Every day
ECG electrode	Clean and/or disinfect	When installing the device on a new patient
SpO2 sensors	Clean and/or disinfect	When installing the device on a new patient
NIBP sleeve and hose	Clean and/or disinfect Inspection for signs of damage or deterioration; replace as needed	When installing the device on a new patient Every day
Temperature Sensor	Clean and/or disinfect	When installing the device on a new patient

WARNING! Follow local government regulations and recycling instructions regarding the disposal and recycling of device components.

12.1 Cleaning the Monitor Surface

WARNING! Do not autoclave, sterilize ethylene oxide, or immerse the monitor in liquid.

WARNING! Do not allow water or other liquids to spill onto the monitor. Unplug the AC power cord from the monitor before cleaning or disinfecting.

WARNING! If equipment accidentally gets wet, it should be wiped dry externally and allowed to dry thoroughly before use.

NOTES! Use only a soft cotton cloth, or a cloth specifically designed for cleaning LCD screens, to clean the monitor screen. Do not clean the screen with tissues, paper towels or other paper-based wipes. Paper-based wipes can scratch the screen.

NOTES! Do not clean the screen with isopropyl alcohol or glutaraldehyde. This liquid can scratch the screen. Use only water or a mild soap solution to clean the screen.

Clean the surface of the monitor with a soft cloth dampened in water or a mild soap solution. If disinfectant is needed, wipe the monitor surface (but not the screen) with isopropyl alcohol or glutaraldehyde. Then clean the surface with a soft cloth dampened in water.

12.2 Long Term Storage

If the monitor is to be stored for an extended period of time, pack the monitor and its accessories in the original packing materials and shipping box. Long-term storage facilities must meet the following requirements:

- Indoor
- Temperature from -40 to 75℃
- Relative humidity from 10-95% (non-condensing)
- No periodic checks required

12.3 Operator Troubleshooting Table

Problem	Possible Sources of the Problem	Porrective Treatment
The Power LED on the front of the monitor does not light up.	Power supply cable not connected to monitor, or power source or both. The power supply cord is not connected to a controlled wall power source. The AC mains fuse is burnt.	Connect the power supply cable to the monitor and a power source. Connect the power supply cord to the monitor and a power source other than a wall switch controlled mains source. Contact a service center.
The battery power is very short when the battery is fully charged.	Damaged battery usage.	Contact a service center.
The display on the monitor does not light up.	Monitor backlight lamp is broken.	Contact a service center.

SENSOR OFF appears on the Pleth waveform channel.	The SpO2 sensor is not properly positioned towards the patient. The SpO2 sensor used is not suitable for the application. Faulty SpO2 sensor.	Position the sensors precisely. Replace the sensor or contact the equipment manufacturer. Replace the sensor or contact the equipment manufacturer.
The pulse rate is erratic, intermittent or incorrect.	The SpO2 sensor is not properly positioned towards the patient. The patient's perfusion performance is poor. The patient moves too much. There is too much ambient light around the sensor.	Position the sensors precisely. Position the sensors precisely. Make sure the patient doesn't move much. Cover or protect the SpO2 sensor with a towel or cloth.
There are no identified peripheral pulses	The SpO2 sensor is not connected	Connect the sensor with an extension cable

on the bar graph in the SpO2 parameter box.	to the monitor or patient. The SpO2 sensor is not properly positioned towards the patient. The patient's perfusion performance is poor. SpO2 sensor or tension cable is damaged.	and connect the extension cable to the monitor. Position the sensors precisely. Position the sensors precisely. Replace the sensor or contact the equipment manufacturer.
LEADS FAIL appears on the ECG waveform channel.	One or more of the ECG leads are not connected to the electrodes. One of the ECG leads is faulty, resulting in a high impedance. The electrode impedance is too high.	Connect the ECG lead to the electrodes. Replace the ECG lead. Remove and reattach the electrodes.

12.4 Maintenance Menu

12.4.1 Access the Maintenance Menu

Press the menu button to bring up the main menu and turn the rotary knob on the monitor to move the cursor to the

“Maintenance” option. Then press the play button to enter the submenu.

Machine	Login	Config	Calibrate	Return

OPTIONS	INSTRUCTIONS
Machine	Return to factory default and use DEMO mode
Login	These three menus can only be changed using a password and have an impact on "System configure" and calibration of ECG, NIBP and TEMP which can only be accessed by distributors and manufacturers.
Config	
Calibrate	

12.4.2 Back to Factory Default Values

You can set your monitor to operate using the default values you choose for alarm limit, volume, LCD brightness, parameter settings.

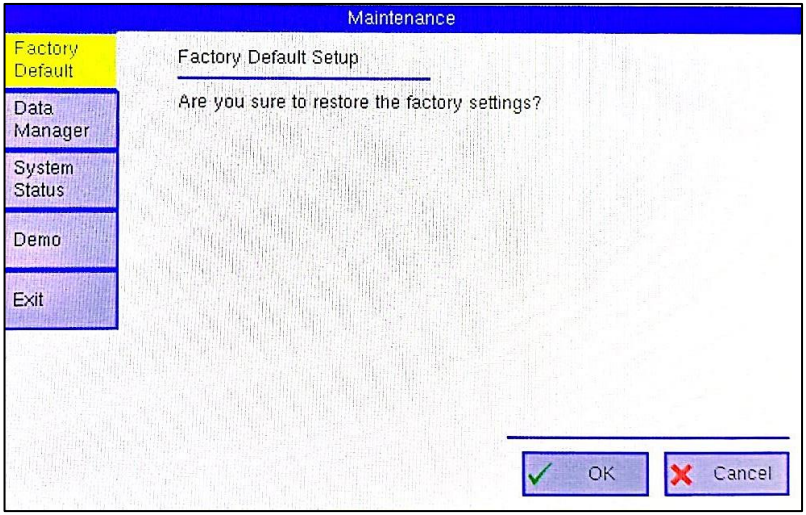


Figure 12.1 Factory Default Parameter Values

1. Press the menu button to bring up the main menu and turn the rotary knob to move the cursor to the "Maintenance" option.

2. Press the spin button to access the "Maintenance" submenu and select the "Machine" option. Turn the knob to highlight the "Factory Defaults" option.

Press the rotary knob to access the factory default submenu and rotate the knob to "OK" and press if you want to restore factory settings.

12.4.3 Using Demo Mode

This demo mode is intended for service operators. Contact your authorized repair center for assistance.

WARNING! When demo mode is active, no patient data is collected or analyzed. Never attach the patient to the device and monitor while in demo mode.

The monitor is included in the DEMO mode which will be used for training and sales activities. Installed parameters are simulated when demo mode is turned on. All monitor functions will be simulated in demo mode, including NIBP alarms, trends and history.

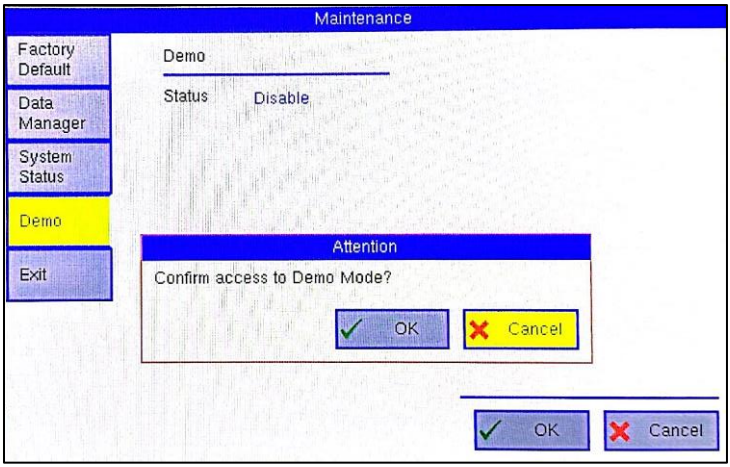


Figure 12.2 Demo Modes

To enable demo mode:

1. In the maintenance menu, point to DEMO and press the knob to make a selection.
2. Turn the rotary knob to turn OFF and press the knob to select.
3. Turn the knob to ON and press to select.
4. Turn the rotary knob to point to YES and press the knob to select. An attention will appear to remind you when you are ready for demo mode. Turn the rotary knob to point to OK and press to select.

DEMO will be displayed, gray in the middle of the monitor display.

To turn off demo mode:

1. In the maintenance menu, point to DEMO and press the knob to make a selection.

2. Turn the rotary knob to turn ON and press the knob to select.
3. Turn the rotary knob to OFF and press to select.
4. Press the OK button to turn off demo mode.

The monitor will return to its normal operating state and will collect patient data.

Chapter 13: Optional Parts and Accessories

Painto.	Description	Qty
9232	Usage Guide	1 piece
6535	Power Cable, 220V	1 piece
2369	ECG cable, 5-lead	1 piece
4221	Oximetry Sensors, Fingers, All Patients	1 piece
4222	Oximetry Sensors, Wraps, All Patients	1 piece
4223	Oximetry Sensors, Disposable, All Patients	1 piece
4235	SpO2 Extension Cable	1 piece
7354	NIBP Sleeve, Extra Small,10-15cm	1 piece
7355	NIBP sleeve, Small, 14-21.5cm	1 piece
7356	NIBP sleeve, Medium, 20.5-28cm	1 piece
7357	NIBP sleeve, Large, 27-35cm	1 piece
7358	NIBP sleeve, Extra Large, 34-43cm	1 piece
7359	NIBP sleeve, Thigh, 42-54cm	1 piece
3967	Surface Temperature Probes	1 piece

13.1 Order Information

For ordering information, contact your local distributor or the manufacturer's customer service department.

Chapter 14: Specifications

14.1 Display

7-inch diagonal TFT (Thin Film Transistor) high resolution Active Matrix LCD

Resolution: 800 X 480 pixels

14.2 Indicators

LEDs:	Work Status	LEDs
	AC Power	LED
	Battery Charge	LED
	LED Battery Supply	
	LED Silence Alarm	

14.3 Alarm Volumes

45dBA to 85 dBA at 1 meter (changeable).

14.4 Locks / User Controls

- On/Off button
- NIBP button
- Freeze button
- Alarm Silence button
- Mode Button
- Menu Button
- Spin Knob

14.5 ECG

Heart Rate Range:	20-350 bpm
Heart Rate Accuracy:	±2 bpm or ±2% (largest)
QRS Detection Range:	0.5 to 5 mV
Pulse Detection Speed:	±2 mV to ±700 mV
amplitude	
Detection Duration:	0.1-2.0ms
Heart Rate Alarm Range:	High:20-350 bpm and OFF
Low:	20-350 bpm and OFF
	Heart Rate Average: Fix 8 second averaging
Choice of Leads:	I, II, III, V, aVR, aVL, or aVF (5-lead)
Display Gain Settings:	X1/4, X1/2, X1, X2, X4
Input Range:	-5.0 mV to+5.0mV
Frequency Response:	0.05 Hz to 150 Hz
Input Impedance:	>5 Mohms difference, ANSI/AAMI EC-13 compliant.
I-Leakage:	<10uA
Patient Electrical Isolation:	>4000 VAC
Waveform display:	6.25, 12.5, 25 or 50 mm/s
Digit Video Update Rate:	1 Hz

14.6 SpO_2

SpO2 Range:	0-100%
Functional Saturation	
SpO2 Accuracy:	±2%@70-100%
Range Pulse Rate:	<70% unspecified
Pulse Rate Accuracy:	30-250 bpm
SpO2 Alarm Ranges:	
High:	0-100% and OFF
Low:	0-100% and OFF

14.7 NIBP

Blood Pressure Measurement

Measurement Method: Oscillometric with step down deflation
Range: Systolic: 10 to 280 mmH
Arterial mean: 20 to 240 mm Hg
Diastolic: 10 to 220 mm Hg
Pulse: 25 to 300 bpm
NIBP Accuracy: The algorithm is based on a human algorithm that meets the requirements of ANSI/AAMI SP10:1992 and 2002 standards for non- invasive blood pressure measurement using the oscillometric method.
Inflation Pressure Setting
Measurement Time: 30 to 50 seconds typical, .120 seconds maximum
Default Inflation Pressure: 165 mmHg-Adult
145 mmHg-Pediatric
135 mmHg-Neonate
Calibration: Factory Calibration
AUTO Interval Times: 2,3,5,10, or 30 minutes, or 1,2 hours
Alarm Range: 0-300 (in 1mmHg steps), and OFF

14.8 Respiratory Rate (Resp)

Range: 0-120 breaths per minute (rpm)
Accuracy: ±1rpm
Resolution: 1rpm
RESP Alarm Range:
High: 0-120 rpm and OFF
Low: 0-120 rpm and OFF

14.9 Temperature (Temp)

Channels: Two
Range: 25-45°C
Accuracy: ±0.2°C plus the temperature tolerance

Resolution: 0.1℃

TEMP Alarm Range:

High: 35.5-43.5°C and OFF in0.1 scale increments

Low: 35.5-43.5°C and OFF in 0.1 scale increments

14.10 CO^2

Sampling Mode: Side stream

Parameters Measured: Respiration Rate, EtCO2 and InsCO2.

CO2 Setup Time: 10 seconds.

Measurement Range:

CO2: 0~150mmHg

Breath Rate: 2~150 bpm

Accuracy: 0~40mmHg ±2mmHg
41~150mmHg ± 10% of reading.

Resolution: 0.1mmHg

Flow Rate: 50 ml/min ± 10 ml/min

Et/Ins CO2 Alarm Range:

High: 0-150mmHg and OFF

Low: 0-150mmHg and OFF

14.11 Alarm Default Limits

Parameter (Unit)		Alarm Upper Limit Default Value			Alarm Lower Limit Default Value		
		Mature	Pedia trics	Neon atal	Mature	Pedia trics	Neon atal
HR(bpm)		100	110	120	60	70	80
NIBP	Sys	140	110	90	95	80	60

(mmHg)	Dia	110	110	60	50	50	40
	Map	125	125	75	70	70	50
SpO2(%)		99	99	99	92	92	92
RR		30	40	50	8	8	8
TEMPC		38.5	38.5	38.5	35.5	35.5	35.5
I(mV)		23	22	20	-23	-22	-20
II(mV)		20	20	20	-20	-20	-20
III(mV)		20	20	20	-20	-20	-20
aVR(mV)		23	22	20	-23	-22	-20
aVL(mV)		20	20	20	-20	-20	-20
aVF(mV)		20	20	20	-20	-20	-20
V(mV)		20		20	-20	-20	-20

14.12 Power Requirements

AC Input: 100 to 240V, 50/60 Hz

14.13 Dimensions

Width: 300mm (11.81 inch)
Length: 180mm (7.09 inch)
Height: 129mm (5.08 inch)
Weight: 2.05kg (4.52 1bs)

14.14 Environmental Parameters (Environmental)

Temperature:	0 to 50℃ (When Operating)
	-40 to 75°C (Storage)
Humidity:	15 to 95% (When Operating)
	10 to 95% (Storage)

14.15 Equipment Classification

Internally Generated Protection	Class Type (Against Electric Shock)
Continuous Operation Mode (Against Liquid Ingress)	Protection Level IPX1, Spill Proof
Portable Mobility	Level Protection Level Type CF (Against Electric Shock)
Safety Requirements	EN60601-1-2002