

NK-HEALTHPROTECT WIRELESS SURGE SOLUTION POWERED BY PREFENSE®

EARLY DETECTION AND NOTIFICATION SYSTEM

Clinical Reference Guide

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INTRODUCTION

Prefense® Early Detection and Notification System™ is designed to protect patients from medical harm. The combination of the Life Scope® G3 and the Prefense display allows hospital patients to freely ambulate while measuring HR, NIBP, SpO₂ and Respiration.

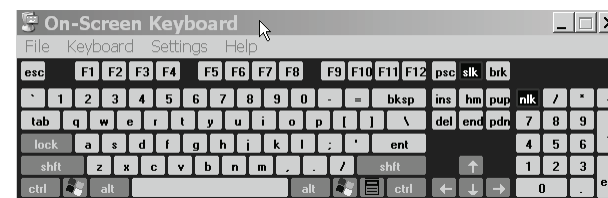
Prefense allows you to monitor your patient’s vital signs and waveforms, along with other patient information.

BASIC OPERATIONS

Control and Input The operation of Prefense is controlled through the mouse, external or on-screen keyboard.

External Keyboard Input From the external keyboard, you can input letters and numbers. You can also select an item and scroll data with the arrow keys on the keyboard.

On Screen Keyboard From any individual patient screen you can click on the Toggle on-screen keyboard key to turn on or off the on screen keyboard and then use the mouse to click on the keyboard keys.

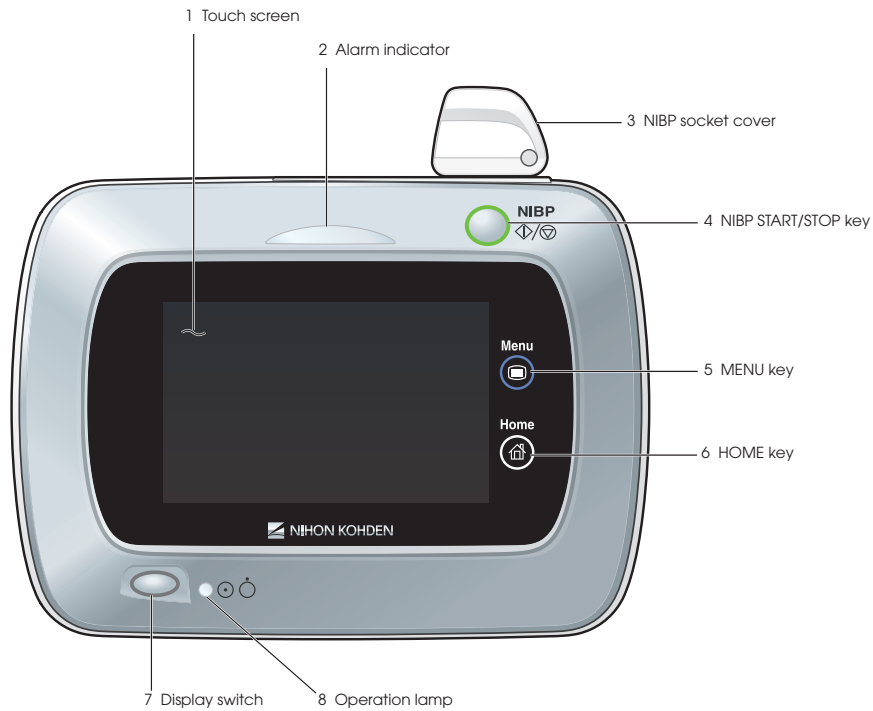


Mouse Input Mouse input is available throughout the screens. Click items and menus on the screen to select them.

NOTE: The right mouse button has no function.

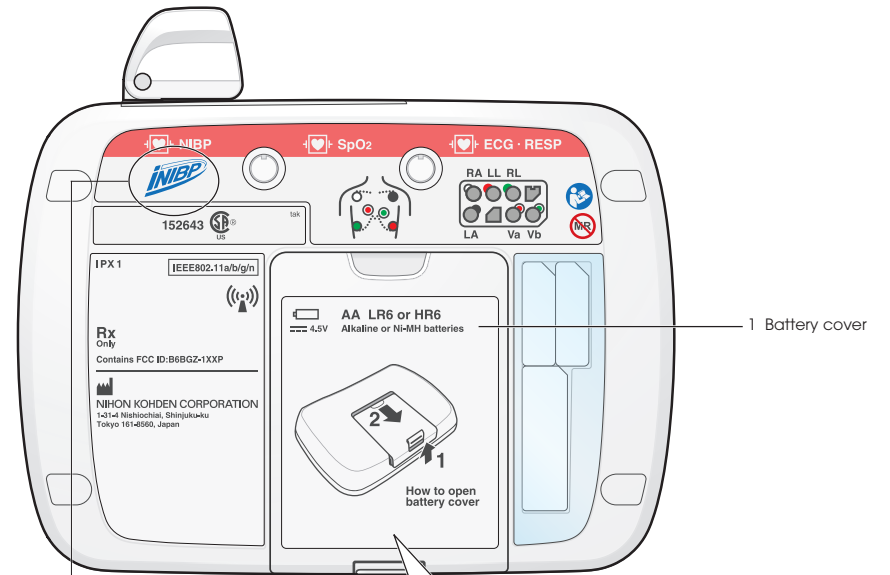
GZ-140 VITAL SIGNS TELEMETER

Front Panel

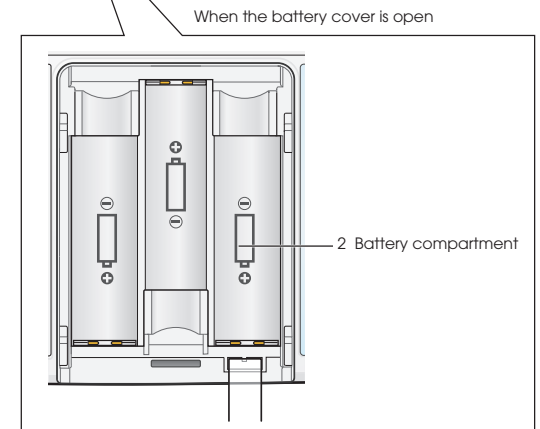


- | | |
|---|--|
| <p>1 Touch screen
The vital sign telemeter can be operated by touching the screen directly.</p> <p>2 Alarm indicator
Blinks or lights when an alarm is activated.</p> <p>3 NIBP connector cover
Covers the NIBP connector.</p> <p>4 NIBP START/STOP key
Starts or stops NIBP measurement.</p> | <p>5 MENU key
Displays the MENU window.</p> <p>6 HOME key
Displays the home screen.</p> <p>7 Display switch
If the monitor mode setting is OFF, the display switch turns the display on/off during operation.</p> <p>8 Operation lamp
Lights during operation.</p> |
|---|--|

Rear Panel

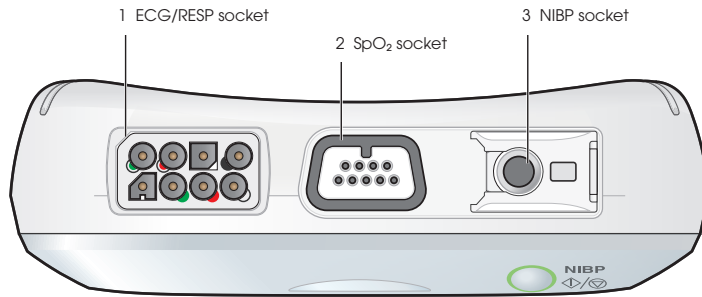


Label indicates that iNIBP Mode (Inflation Mode) is available with the vital sign telemeter.



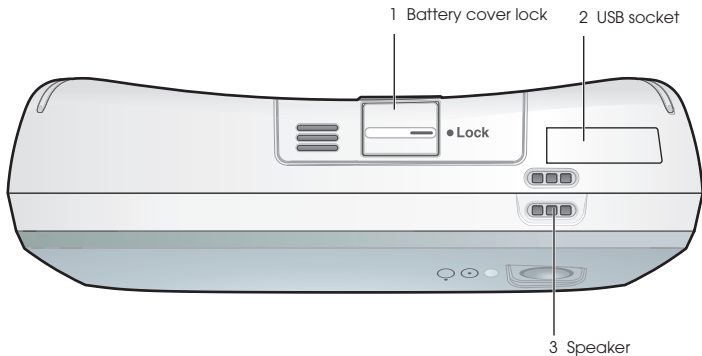
- 1 Battery cover
Open the cover to insert batteries.
- 2 Battery compartment
Insert three AA (LR6/HR6) batteries. Match the polarity marks on the batteries and the polarity marks inside the battery compartment.

Top Panel



- 1 ECG/RESP socket
Connects to the electrode leads.
- 2 SpO₂ socket
Connects to the SpO₂ probe.
- 3 NIBP socket
Connects to the NIBP air hose.

Bottom Panel



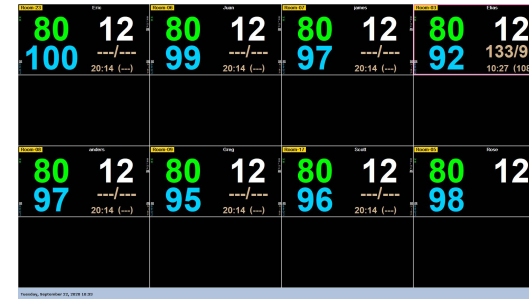
- 1 Battery cover lock
Locks the battery cover.
- 2 USB socket
Connects the vital sign telemeter to a PC.
NOTE: Do not use the vital sign telemeter with the USB socket cover opened.
- 3 Speaker
Outputs the key click sounds and alarm sound.
NOTE: If the speaker is obstructed, the alarm sound cannot be heard.

ADMIT/PAUSE/CHARGE

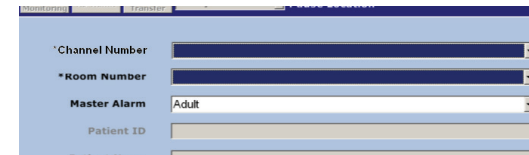
**Click HOME key to exit any menu. Enter information using on-screen or computer keyboard.

Patient Admission - Enter Patient Information

1. Choose the appropriate window on the Home screen - Click into the desired ADMIT window.



2. Choose the channel number for the transmitter room number and then the room number for the patient - click on down arrows and choose from the lists.
3. Change Master Alarms, if necessary (such as adult or pediatric settings) - click on the down arrow and choose the alternate.



4. Enter patient ID and name - click into each field and enter the information. Up to 32 characters can be entered for the name; up to 16 characters can be entered for the ID.
5. Click the Start Monitoring key at top of the screen.

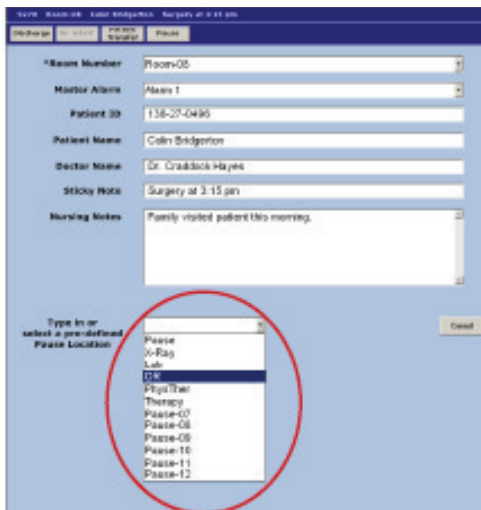
Note: Doctor Name, sticky notes, and nursing notes entries are optional. Sticky notes appear on the HOME screen with name. Doctor name and nursing notes appear in the REPORT printed from the VITAL SIGNS screen.

Re-Admit a Patient

1. Choose the appropriate window on the Home screen - Click into the ADMIT window with the desired transmitter number.
2. Click on the RE-ADMIT key at top of the screen.
3. Choose the patient - click on the down arrow and choose from the list.
4. Change the Master Alarms if necessary.
5. Click the START MONITORING key at top of the screen.

Pause Monitoring (remove transmitter and pause alarms)

1. Choose the appropriate window on the HOME screen - Click into the ADMIT window with the desired transmitter number.
2. Click the ADMIT/DISCHARGE key at the bottom of the screen.
3. Click on the PAUSE key at the top of the screen.
4. Choose the PAUSE location/reason - click on the down arrow and select the appropriate location/reason, or type in your own reason.



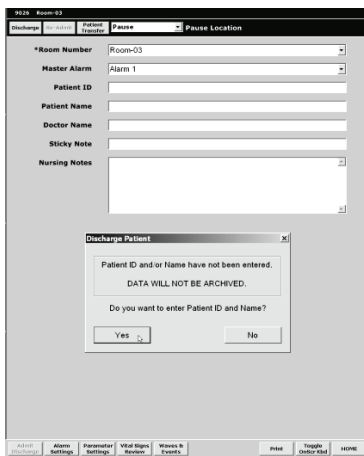
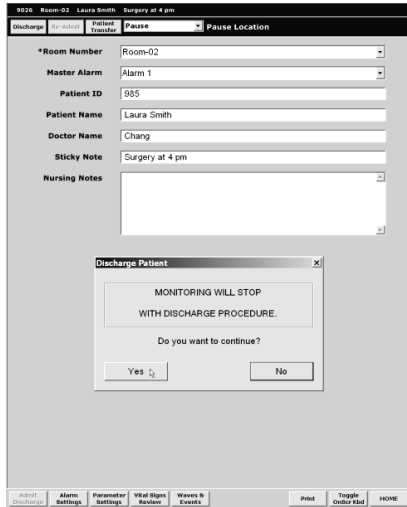
The location/reason is displayed on the HOME screen.



Monitoring resumes automatically when the patient is reconnected to the transmitter. If it does not, return to the ADMIT/DISCHARGE screen and click on the RESUME key at the top of the screen.

Patient Discharge

1. Choose the appropriate window on the HOME screen - Click into the patient window with the appropriate transmitter number.
2. Click the ADMIT/DISCHARGE key at the bottom of the screen.
3. Click the DISCHARGE key at the top of the screen.
4. Click on YES to confirm the discharge and complete data deletion.



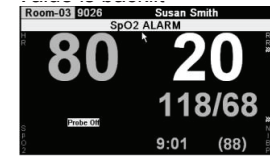
If you have not entered a patient name and/or ID, a warning message appears. No data can be archived for readmissions without the patient information.

Click on NO and enter the patient information before discharging to the archive.

ALARMS

There are three levels of audible alarms that are automatically set when you admit your patient. These may be customized differently on your unit:

Alarm Level	Alarm Sound	Alarm Message
Crisis or high	Continuous "pips"	Highlighted red message
Warning or medium	Continuous "bing bong"	Highlighted yellow or orange message
Advisory or low	"Bong"	Highlighted yellow or blue message



A higher priority alarm notice will replace a lower priority alarm notice. However, you may view all alarm notices in Waves & Events.

Symbol	Description
	Alarm/Alarm notice
	Alarm suspend/silence with remaining minutes at Prefense
	All alarms off, vital sign alarm off

Review Alarmed Events and Real-time Information

When an alarm occurs, an ALARM NOTICE appears in the patient window, and it remains until the event is reviewed.

To silence the alarm and review the event:

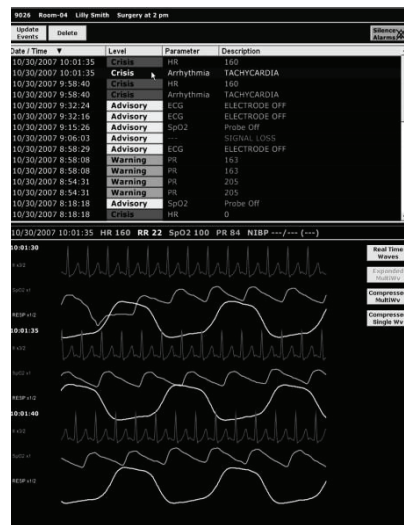
1. Click into the patient's window.
2. Click on SILENCE ALARMS to temporarily silence the audible alarm while you assess the patient.



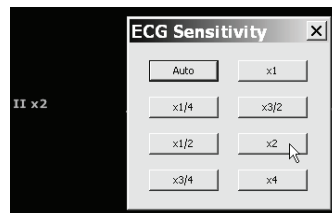
The real time waveforms are displayed in the screen. The ALARM HISTORY is displayed at the top of the screen, and the associated vital signs for the alarmed event are displayed in the center of the screen.

3. Click on an event to view the associated information.

The keys offer options for viewing the waveforms that are associated with the alarm history: EXPANDED MULTI-WAVE, COMPRESSED MULTI-WAVE, COMPRESSED SINGLE WAVE and then an option to view REAL TIME WAVES.

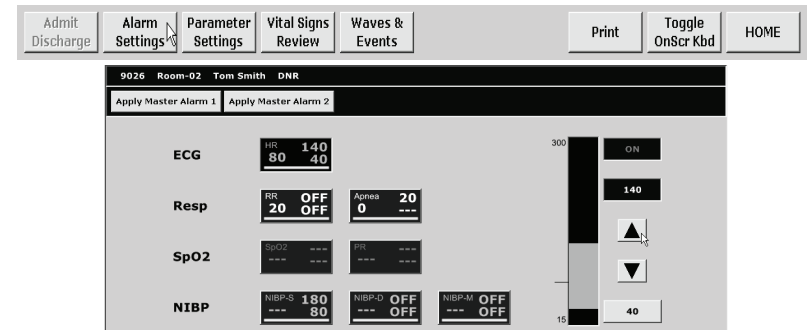


4. Click onto the wave to open a window with options for different waveform sensitivities (sizes). This sensitivity applies to all waveform views.
5. Click on the PRINT key to print these waveforms to the printer.



Change Vital Signs Alarms

1. Click into the appropriate patient window on the HOME screen.
2. Click the ALARM SETTINGS key at the bottom of the screen.

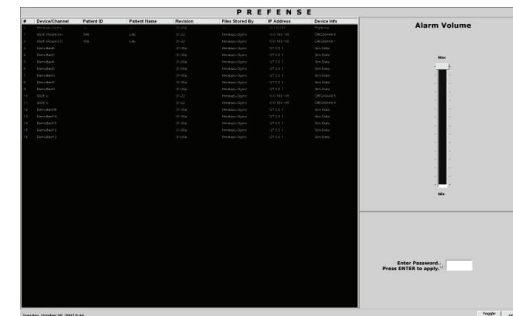


3. Click on the desired PARAMETER SETTINGS key.
4. Click the high or low value to select it for changes.
5. Click ▲ to increase value or ▼ to decrease value.
6. Click the HOME key to exit.

The master alarms are the default settings for this unit. The Master 1 setting is automatically applied with each patient. Use Master 2 for alternative settings, such as with pediatric patients, to apply a different set of alarm parameters for this patient.

Adjust Alarm Volume

1. Click the date and time on the bottom left of the HOME screen.
2. Click and drag the volume control to increase or decrease the alarm volume (or click into the bar at the desired level)

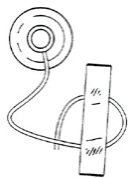


ECG SIGNAL ACQUISITION – SKIN PREPARATION

The ECG waveform is monitored for heart rate, arrhythmias, ST segment measurements and pacemaker activity. Electrical impulses are conducted through the gel on the ECG electrodes, so moist gel is required for proper detection. Inadequate detection can cause electrical noise on the ECG tracing and inaccurate interpretation by the monitor. We recommend that electrodes are changed at least daily to promote adequate signal detection, but follow the recommendations of your electrode manufacturer and/or hospital policy.

Proper skin preparation is also important for respiration monitoring, as the respiration parameter uses the same electrodes. It is most important to remove hair and dead skin cells for accurate detection, and to remove skin oils so the electrodes will adhere to the patient's skin.

1. Trim excess hair per hospital protocols.
2. Gently abrade skin areas with dry gauze to remove dead skin cells.
3. If skin is oily, clean the site with soap/water and friction and then wipe off with dry gauze. You may use an alcohol prep according to your policy if needed.
4. Attach the lead wire to the electrode
5. Attach the electrode to the patient, pressing the circumference of electrode to secure it.
6. Position the ECG cable to prevent tangling.



Stress Loop: The lead wires can transmit electrical interference to the monitor, so to minimize this interference with patient movement, fasten the individual lead wire to the skin with surgical tape.

To view different ECG leads using the three electrode cable:

Lead I	Position
White (-)	(RA) Right chest under the clavicle
Black (N)	(LL) Left anterior-axillary line edge of rib.
Red (+)	(LA) Left chest under the clavicle

Lead II	Position
White (-)	Right chest under the clavicle
Black (N)	Left chest under the clavicle
Red (+)	Left anterior-axillary line at edge of lower rib

Lead III	Position
White (-)	Left chest under the clavicle
Black (N)	Right chest under the clavicle
Red (+)	Left anterior-axillary line at edge of lower rib

MCL I	Position
White (-)	Left chest under the clavicle
Black (N)	Right chest under the clavicle
Red (+)	4th intercostals space, right sternal border

Once electrodes are repositioned on the patient, change the lead name in the Parameter Settings menu

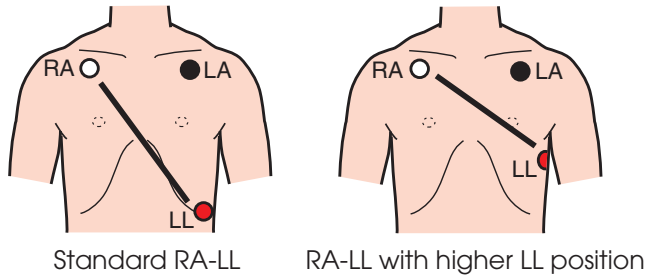
Turn ECG Measurement On or Off

1. Click into the appropriate patient window on the HOME screen.
2. Click the PARAMETER SETTINGS key at the bottom of the screen.
3. Click on the ECG Measurement down arrow to toggle between ON/OFF.

RESPIRATION (RESP) DATA ACQUISITION

The Nihon Kohden monitor uses the ECG monitoring system to detect respiration using the thoracic impedance method. This method measures changes in impedance between the right arm and left leg electrodes (ECG Lead II - R and F). Movement in the chest and abdomen influences measurement, and amplitude varies greatly depending on placement of the electrodes. Repositioning of the ECG electrodes may be necessary for optimal respiration monitoring.

Electrode lead and position



It is preferable to place the LL electrode on the lowest left rib at the anterior axillary line. This position is L electrode when the L positioning is important for ECG monitoring.

This position is used for improved respiration detection and is recommended when respiration monitor is priority. The respiration amplitude is larger and more easily detected. The LL electrode is positioned higher on the chest at the 5th ICS, left mid-axillary line.

The rate displayed is a moving number that updates every three seconds and is based on the previous detected breaths.

The keys to accurate respiratory detection are 1) fresh electrodes; 2) the recommended electrode placement; 3) the appropriate respiratory lead selection and 4) the appropriate sensitivity for the patient.

⚠ WARNING

A NO CHEST MOVEMENT alarm is generated when chest movement is not detected. If the NO CHEST MOVEMENT alarm occurs, check the patient's respiration.

RESP Parameter Operations

To access the RESP parameter menu, touch the RESP value.

MAIN Tab RESP Options:

RESP Measurement — ON/OFF

Respiratory measurement using the impedance method can be turned ON or OFF. When OFF is set, "OFF" is displayed on the respiration display area.

Sensitivity — X1/4 To X4

Determines the size of RESP waveform onscreen.

RESP Monitoring - Troubleshooting

(see operator manual)

Problem - Impedance	Possible Cause	Action
Waveform is not displayed	IMP RESP MEASURE is turned OFF	Set to ON using RESP Measurement
Waveform is flat line	ECG leads or electrodes are not positioned correctly	Connect them correctly
	Electrode is dry	Change electrodes
	Skin-electrode contact impedance is high	Gently abrade electrode site with dry gauze prior to electrode placement
RESP waveform and rate are not stable	ECG electrode positions are not appropriate for RESP measurement	Reposition electrodes using recommended placement
	Electrode is dry	Change electrodes
RESP rate is not accurate	RESP waveform amplitude is too small	Change RESP sensitivity to amplitude > 5mm
	Electrode is not in proper position	Position LL electrode higher (5th ICS) and monitor R-F lead

PULSE OXIMETRY (SpO₂) DATA ACQUISITION

The Nihon Kohden SpO₂ monitor uses a SpO₂ cable, which accepts reusable or disposable probes. **The monitor uses Nihon Kohden oximetry only.**

Nihon Kohden probes are obtained from Nihon Kohden. There are many options for probes, ranging from neonate to adult, and it is important to use the appropriate probe for the size and age of the patient. There are options for probes that are used on the ear and forehead, in addition to the traditional foot or hand and finger probes. See the operator manual for additional information.

The probe is positioned with the photo emitter (cable side) on top so light is passed through the measurement site to the photo detector directly opposite of the emitter. Results are best if used on fingers without nail polish or acrylic nails. Ambient light may affect readings, so placing the extremity under cover may improve detection.

When measuring SpO₂ for long periods of time, it is recommended that site be alternated to relieve pressure on the measuring digit. Change site every four hours for reusable and every four to eight hours for disposable probes. Discontinue use of probe for skin irritation or signs of circulatory compromise.

SpO₂ Parameter Operations

To access the SpO₂ parameter menu, touch the SpO₂ value

MAIN Tab Options:

Sensitivity — x1/8, x1/4, x1/2, x1, x2, x4, x8, AUTO

Determines the size of the waveform on-screen

Response — FAST, NORMAL, SLOW

There are three response modes in the GZ Vital Sign Telemeter. Each uses a different time to enable accurate measurements according to patient conditions. When measurement condition is unstable, response becomes slower in all modes.

FAST: Select this mode for special applications that require a fast response time, such as with short apnea episodes.

NORMAL: Select this for normal monitoring.

SLOW: Select this when you need to suppress a rapid change in SpO₂.

NON-INVASIVE BLOOD PRESSURE (NIBP) DATA ACQUISITION (GZ-140P ONLY)

The Nihon Kohden NIBP monitor uses both the occlusive oscillometric method to measure systolic, diastolic and mean arterial non-invasive blood pressure as well as INIBP™. These methods may yield different results from direct, invasive arterial pressure.

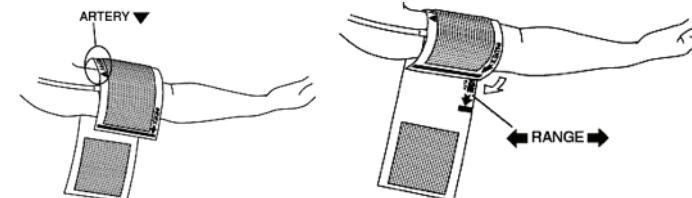
When the cuff is wrapped around a limb and the pressure is gradually increased or decreased, the oscillations in the cuff pressure increase. These oscillations in changing cuff pressure gradually increase then decrease and a peak appears.

⚠ WARNING

NIBP measurement may be incorrect in the following situations:

- When using an ESU
- Body movement
- Small pulse wave
- Too many arrhythmias
- Shaking from an external source
- Rapid blood pressure change
- During CPR
- Slow pulse
- Low blood pressure
- Small pulse pressure
- Cuff is too tight or too loose
- Cuff does not fit the arm
- Cuff is wrapped over thick clothing
- Cuff is deteriorated
- Arterial sclerosis
- Poor perfusion
- Diabetes
- Age
- Pregnancy
- Pre-eclampsia
- Renal disease
- Shivering
- Trembling

Cuff selection should be based on the size of the patient's arm. The American Heart Association recommends that the cuff width be 40% of the circumference of the upper arm. *Inappropriate cuff size can result in inaccurate NIBP results.*



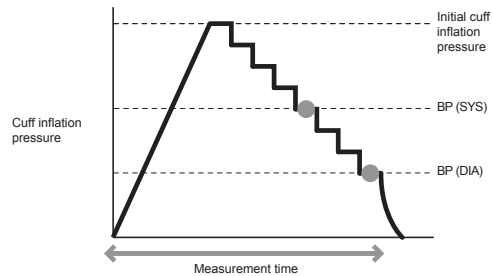
Measurement Mode

The Non-Invasive Blood Pressure parameter has two measurement modes: iNIBP (INFLATION MODE) and Conventional Mode (DEFLATION MODE).

To perform the measurement in iNIBP mode, set INFLATE MODE to ON on the NIBP - Measurement screen. To perform the measurement in Conventional Mode, set INFLATE MODE to OFF. Default is iNIBP Mode (INFLATE MODE is set to ON).

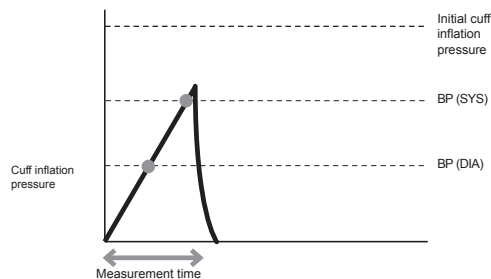
Conventional Mode (Deflation Mode)

In conventional NIBP measurement, the cuff is quickly inflated to a high initial pressure, then gradually deflated in steps. The arterial pulsations and blood pressure are detected during deflation; systolic and diastolic pressures are calculated from these measurements. The air in the cuff is released after diastolic pressure is calculated.



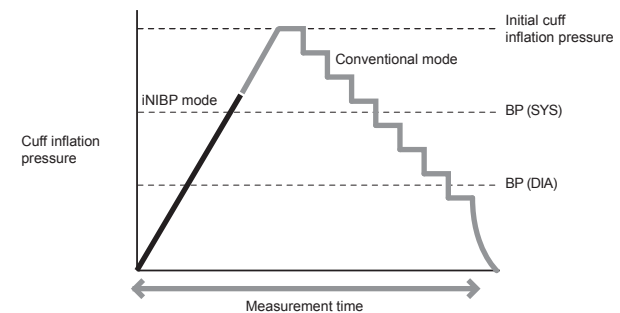
iNIBP Mode (Inflation Mode)

In iNIBP Mode, the cuff is gradually inflated until the arterial pulsations and blood pressure are detected. iNIBP Mode has a lower maximum cuff pressure and measurement is much quicker. Systolic and diastolic pressures are calculated from these measurements. The air in the cuff is released after systolic pressure is calculated.



Note:

- Use a Nihon Kohden cuff which supports iNIBP measurement.
- In the following situations, NIBP measurement in iNIBP Mode (Inflation Mode) may be challenging. To avoid repeat measurements, set INFLATE MODE to OFF before starting NIBP measurement. In the below situations, NIBP measurement may be inaccurate even when INFLATE MODE is OFF.
 - Body movement
 - Small pulse wave
 - Too many arrhythmias
 - Patient is shivering or shaking
 - Slow pulse
 - Low blood pressure
 - Small pulse
 - Cuff is too tight or too loose
 - Cuff which does not support iNIBP measurement is used
 - The size of the cuff is not appropriate
 - Cuff is wrapped over thick clothing.
- If Inflation Mode continuously turns off, the cuff might be deteriorated. Noise may interfere when a deteriorated cuff is used and NIBP cannot be measured in Inflation Mode. If this happens, replace the cuff.
- If the measurement cannot be performed in iNIBP Mode (Inflation Mode), device automatically switches measurement mode and perform measurement in Conventional Mode (Deflation Mode). Measurement in Conventional Mode is temporary and next measurement is performed in iNIBP Mode.



PARAMETER SETTINGS

1. Click into the appropriate patient window on the HOME screen.
2. Click the PARAMETER SETTINGS key at the bottom of the screen.



The following options exist:

Learn ECG - use this to reset the baseline memory of the ECG tracing. This may help for false V-tach alarms.

ECG Measure - use this to turn ECG measurement off when not in use.

ECG Lead Name - use this to change the name of the ECG lead when you reposition the ECG electrodes (I, II, III, MCL).

Arrhythmia Analysis - use this to turn arrhythmia analysis off or on. This is the program that analyzes the ECG rhythm for Asystole/V-tach/V-fib calls.

Pacing Detection - turn this on when the patient has a pacemaker so the monitor will look for the pacing impulses in the ECG rhythm.

Pacing Marker - turn this on to mark the pacing impulses on the ECG rhythm on the screen.

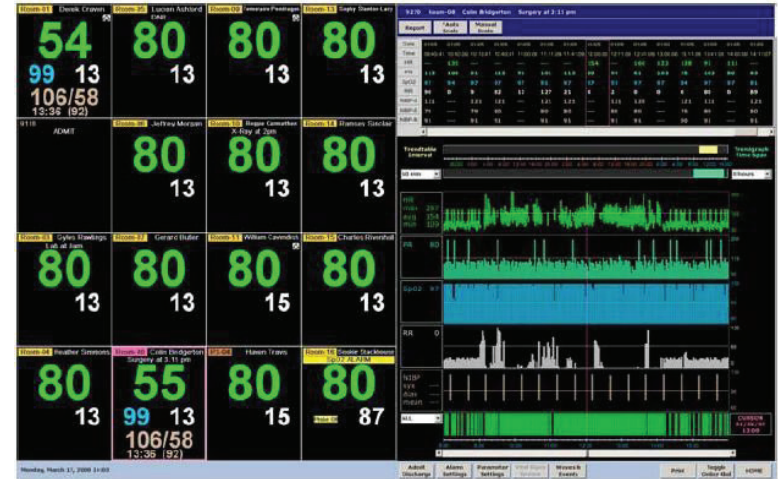
Imp. Respiration Measure - use this to turn the respiration parameter on or off



REVIEW STORED VITAL SIGNS

The VITAL SIGNS REVIEW screen displays tabular and graphical trends of all measured parameters for the last 72 hrs.

1. Click into the appropriate patient window on the HOME screen
2. Click on the VITAL SIGNS REVIEW key at the bottom of the screen



To change the interval - click on one of the down arrow keys to the left (TrendTable) or right (TrendGraph) of the screen. Options for the tabular trends are: 1 min, 5 min, 10 min, 15 min, 30 min, and 60 min. Options for the graphical trends are: 1 hour, 8 hours, 12 hours, 24 hours, 48 hours, and 72 hours. The views are displayed in the selected intervals after changing.

To scroll through time - click the “◀” “▶” keys on the timelines: Scrolls by one interval or you can move the bar to the desired interval.

To print the displayed tabular and graphical trends - click on the PRINT key at the bottom of the screen to send the request to the laser printer

To print a Report of the stored vital signs - click on the REPORT key at the top of the screen

Note: The length of this report is determined by the time interval on the Graphical Trends. The tabular trend interval determines how the tabular trends are displayed in the report - i.e. 8 hour graphical trends/ 1 hour tabular trends = 8 hour report with hourly tabular trends.

ECG TROUBLESHOOTING TECHNIQUES

Double-Counted Heart Rate

If the monitor is double-counting your patient's heart rate, a possible cause is a large P or T wave is being counted as a QRS complex.

1. Ensure fresh electrodes
2. Ensure that left leg electrode (red) is placed on the anterior axillary line at the lower rib
3. Relearn the ECG

If this does not resolve the problem, use an alternate electrode placement for another ECG lead (see the ECG Monitoring section in this guide)

Ventricular Alarms for Normal Rhythms

If the monitor is giving ventricular alarms for normal rhythms, a possible cause is the patient's rhythm appears as a wide QRS complex.

1. Ensure that the left leg electrode is positioned on the left lower rib, anterior axillary line
2. OR try an alternate electrode placement such as MCL1- rename lead label in PARAMETER SETTINGS
3. Have the monitor relearn the patient's ECG

Arrhythmias Not Alarmed

If the monitor is not alarming for arrhythmias, possible causes include:

1. Noise or artifact are interfering with arrhythmia detection
2. ARRHYTHMIA ANALYSIS is turned OFF
3. The relevant individual alarm is turned OFF

The corresponding solutions are:

1. Correct the problem that is causing the noise (See: ECG Monitoring: Skin Prep & Electrode Handling in this guide)
2. Turn ARRHYTHMIA ANALYSIS to ON in PARAMETER SETTINGS
3. Turn the appropriate alarm ON in ALARM SETTINGS

Consider using an MCL1 electrode placement (See ECG Monitoring in this guide)

CLEANING AND DISINFECTING

Please consult the Operator's Manual or the Cleaning and Disinfecting Guide for a complete list of approved cleaning and disinfecting agents.

*The use of any other disinfectant solutions may cause damage to the equipment and may void the product warranty.



**For more information, please contact us at
1-800-325-0283 or visit us.nihonkohden.com**



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Simply Delivered.™**

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