TRANSMITTER

ZM-940PA

0614-009881

Model: ZM-940PA

Manual code no.: 0614-009881

Reader Comment Card

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International Div., Sales Promotion Section, Nihon Kohden Corp., 1-31-4, Nishiochiai Shinjuku-ku, Tokyo 161-8560, Japan

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This manual is organized.	1	2	3	4	5
I can find the information I want.	1	2	3	4	5
The information is accurate.	1	2	3	4	5
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The illustrations are appropriate and helpful.	1	2	3	4	5
The manual length is appropriate.	1	2	3	4	5

Comments:

Thank you for your cooperation. We appreciate it very much.

Name:
Occupation/Position:
Hospital/Company:
Address:

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cutting line

Contents

GENERAL HANDLING PRECAUTIONS

This device is intended for use only by qualified medical personnel.
Use only Nihon Kohden approved products with this device. Use of non-approved products or in a non-approved manner may affect the performance specifications of the device. This includes, but is not limited to, batteries, recording paper, pens, extension cables, electrode leads, input boxes and AC power.

Please read these precautions thoroughly before attempting to operate the instrument.

1. To safely and effectively use the instrument, its operation must be fully understood.

2. When installing or storing the instrument, take the following precautions:
(1) Avoid moisture or contact with water, extreme atmospheric pressure, excessive humidity and temperatures, poorly ventilated areas, and dust, saline or sulphuric air.
(2) Place the instrument on an even, level floor. Avoid vibration and mechanical shock, even during transport.
(3) Avoid placing in an area where chemicals are stored or where there is danger of gas leakage.
(4) The power line source to be applied to the instrument must correspond in frequency and voltage to product specifications, and have sufficient current capacity.
(5) Choose a room where a proper grounding facility is available.

3. Before Operation
(1) Check that the instrument is in perfect operating order.
(2) Check that the instrument is grounded properly.
(3) Check that all cords are connected properly.
(4) Pay extra attention when the instrument is in combination with other instruments to avoid misdiagnosis or other problems.
(5) All circuitry used for direct patient connection must be doubly checked.
(6) Check that battery level is acceptable and battery condition is good when using battery-operated models.

4. During Operation
(1) Both the instrument and the patient must receive continual, careful attention.
(2) Turn power off or remove electrodes and/or transducers when necessary to assure the patient's safety.
(3) Avoid direct contact between the instrument housing and the patient.

5. To Shutdown After Use
(1) Turn power off with all controls returned to their original positions.
(2) Remove the cords gently; do not use force to remove them.

(3) Clean the instrument together with all accessories for their next use.

6. **The instrument must receive expert, professional attention for maintenance and repairs. When the instrument is not functioning properly, it should be clearly marked to avoid operation while it is out of order.**

7. **The instrument must not be altered or modified in any way.**

8. **Maintenance and Inspection:**
   (1) The instrument and parts must undergo regular maintenance inspection at least every 6 months.
   (2) If stored for extended periods without being used, make sure prior to operation that the instrument is in perfect operating condition.
   (3) Technical information such as parts list, descriptions, calibration instructions or other information is available for qualified user technical personnel upon request from your Nihon Kohden distributor.

9. **When the instrument is used with an electrosurgical instrument, pay careful attention to the application and/or location of electrodes and/or transducers to avoid possible burn to the patient.**

10. **When the instrument is used with a defibrillator, make sure that the instrument is protected against defibrillator discharge. If not, remove patient cables and/or transducers from the instrument to avoid possible damage.**

WARRANTY POLICY

Nihon Kohden Corporation (NKC) shall warrant its products against all defects in materials and workmanship for one year from the date of delivery. However, consumable materials such as recording paper, ink, stylus and battery are excluded from the warranty.

NKC or its authorized agents will repair or replace any products which prove to be defective during the warranty period, provided these products are used as prescribed by the operating instructions given in the operator's and service manuals.

No other party is authorized to make any warranty or assume liability for NKC's products. NKC will not recognize any other warranty, either implied or in writing. In addition, service, technical modification or any other product change performed by someone other than NKC or its authorized agents without prior consent of NKC may be cause for voiding this warranty.

Defective products or parts must be returned to NKC or its authorized agents, along with an explanation of the failure. Shipping costs must be pre-paid.

This warranty does not apply to products that have been modified, disassembled, reinstalled or repaired without Nihon Kohden approval or which have been subjected to neglect or accident, damage due to accident, fire, lightning, vandalism, water or other casualty, improper installation or application, or on which the original identification marks have been removed.

In the USA and Canada other warranty policies may apply.

CAUTION

United States law restricts this device to sale by or on the order of a physician.

Equipment Authorization Requirement

Operation of this equipment requires the prior coordination with a frequency coordinator designated by FCC for the Wireless Medical Telemetry Service.

EMC RELATED CAUTION

This equipment and/or system complies with IEC 60601-2 International Standard for electromagnetic compatibility for medical electrical equipment and/or system. However, an electromagnetic environment that exceeds the limits or levels stipulated in IEC 60601-1-2, can cause harmful interference to the equipment and/or system or cause the equipment and/or system to fail to perform its intended function or degrade its intended performance. Therefore, during the operation of the equipment and/or system, if there is any undesired deviation from its intended operational performance, you must avoid, identify and resolve the adverse electromagnetic effect before continuing to use the equipment and/or system.

The following describes some common interference sources and remedial actions:

1. **Strong electromagnetic interference from a nearby emitter source such as an authorized radio station or cellular phone:**
   Install the equipment and/or system at another location. Keep the emitter source such as cellular phone away from the equipment and/or system, or turn off the cellular phone.

2. **Radio-frequency interference from other equipment through the AC power supply of the equipment and/or system:**
   Identify the cause of this interference and if possible remove this interference source. If this is not possible, use a different power supply.

3. **Effect of direct or indirect electrostatic discharge:**
   Make sure all users and patients in contact with the equipment and/or system are free from direct or indirect electrostatic energy before using it. A humid room can help lessen this problem.

4. **Electromagnetic interference with any radio wave receiver such as radio or television:**
   If the equipment and/or system interferes with any radio wave receiver, locate the equipment and/or system as far as possible from the radio wave receiver.

5. **Interference of lightning**
   When lightning occurs near the location where the equipment and/or system is installed, it may induce an excessive voltage in the equipment and/or system. In such a case, disconnect the AC power cord from the equipment and/or system and operate the equipment and/or system by battery power, or use an uninterruptible power supply.

6. Use with other equipment

When the equipment and/or system is adjacent to or stacked with other equipment, the equipment and/or system may affect the other equipment. Before use, check that the equipment and/or system operates normally with the other equipment.

7. Use of unspecified accessory, transducer and/or cable

When an unspecified accessory, transducer and/or cable is connected to this equipment and/or system, it may cause increased electromagnetic emission or decreased electromagnetic immunity. The specified configuration of this equipment and/or system complies with the electromagnetic requirements with the specified configuration. Only use this equipment and/or system with the specified configuration.

8. Use of unspecified configuration

When the equipment and/or system is used with the unspecified system configuration different than the configuration of EMC testing, it may cause increased electromagnetic emission or decreased electromagnetic immunity. Only use this equipment and/or system with the specified configuration.

9. Measurement with excessive sensitivity

The equipment and/or system is designed to measure bioelectrical signals with a specified sensitivity. If the equipment and/or system is used with excessive sensitivity, artifact may appear by electromagnetic interference and this may cause mis-diagnosis. When unexpected artifact appears, inspect the surrounding electromagnetic conditions and remove this artifact source.

If the above suggested remedial actions do not solve the problem, consult your Nihon Kohden distributor or representative for additional suggestions.

This equipment complies with International Standard IEC 60601-1-2 (1993) which requires CISPR11, Group 1, Class B. Class B EQUIPMENT is equipment suitable for use in domestic establishments and in establishments directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.

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Conventions Used in this Manual and Instrument

Warnings, Cautions and Notes

Warnings, cautions and notes are used in this manual to alert or signal the reader to specific information.

WARNING

A warning alerts the user to the possible injury or death associated with the use or misuse of the instrument.

CAUTION

A caution alerts the user to possible injury or problems with the instrument associated with its use or misuse such as instrument malfunction, instrument failure, damage to the instrument, or damage to other property.

NOTE

A note provides specific information, in the form of recommendations, prerequirements, alternative methods or supplemental information.

Explanations of the Symbols in this Manual and Instrument

The following symbols found in this manual/instrument bear the respective descriptions as given.

On Panel

Symbol	Description	Symbol	Description
	Defibrillation proof type BF applied part		Direct current
	Defibrillation proof type CF applied part		Serial number
	Attention, consult operator's manual		Year of manufacture
	Direction for attaching battery cover		CSA mark

Inside Battery Case

Symbol	Description	Symbol	Description
	Battery position		Attention, consult operator's manual

On LCD

Symbol	Description	Symbol	Description
	Full battery		Replace battery NIBP cannot be measured
	Replace battery		Check electrode

Introduction

The ZM-940PA transmitter transmits ECG, respiration, SpO_2, NIBP and pulse waveform from a patient to a Nihon Kohden monitor for continuous monitoring. The transmitter can change channels when connected to the QI-901PK channel writer. The front LCD displays SpO_2%, NIBP, pulse rate, pulse waveform amplitude, electrode condition mark, battery condition and NIBP measuring mode and interval.

Read the operator's manual for the receiving monitor together with this manual before operation.

CAUTION

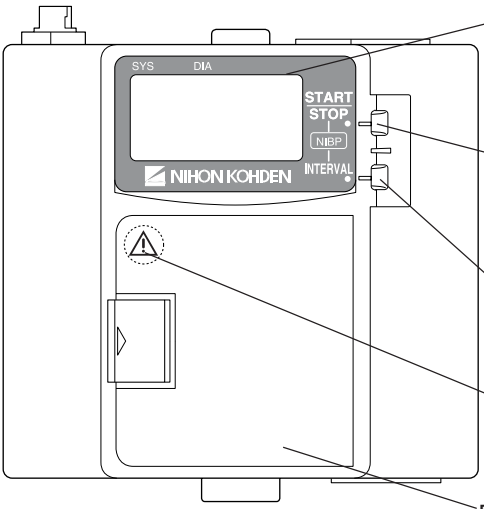
- **Do not use the same channel for different patients. Otherwise, two patients' data will be lost due to mutual modulation interference, or another patient's data may appear on the receiving monitor screen.**
- **Do not use transmitters of adjacent channels in a hospital. Otherwise, radio waves from one transmitter affect the receiver of the adjacent channel's transmitter and there may be interference.**
- **Do not use the same transmitter on more than one patient at the same time. Do not connect different sensors on different patients to the same transmitter.**

NOTE

- **To prevent interference between channels, assign a channel administrator in the hospital and only he or she should manage channel assignment.**
- **Use Nihon Kohden parts and accessories to assure maximum performance from your instrument.**
- **For stable signal reception, it is recommended to use a diversity antenna system on the receiving monitor. Otherwise, spike noise from transient fading of electric field strength (for example, people moving) may interfere with the transmitter signal and may be mistaken as an arrhythmia on the receiving monitor.**
- **NIBP cannot be measured on a neonate. (ECG, respiration and SpO_2 can be monitored on a neonate.)**

Panel Description

Front Panel



LCD:
Displays measuring data, settings and other information.

NIBP START/STOP key:
Starts/stops NIBP measurement in selected mode.

NIBP INTERVAL key:
Selects NIBP measurement mode.

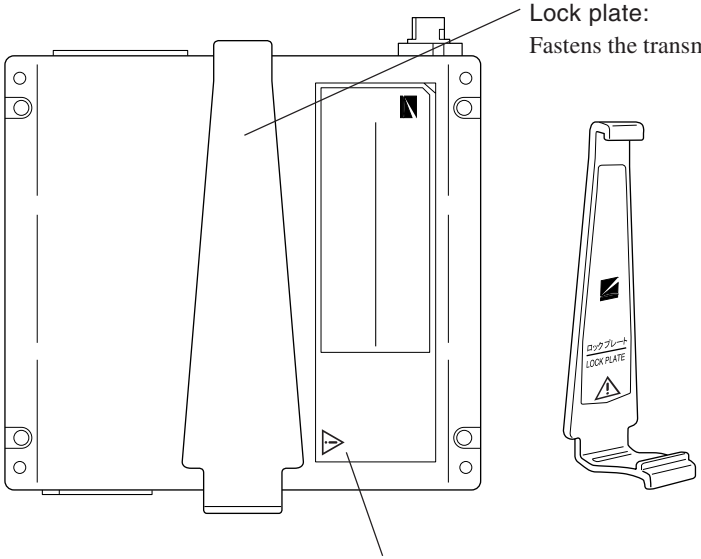
Refer to the WARNING below.
(This symbol is attached to the rear of the battery case cover.)

Battery case:
Contains three 1.5 V AA batteries.

WARNING

Close the battery case cover during operation.
If the transmitter is used with the battery case cover open, the patient may get an electrical shock when defibrillation is performed, and electrostatic discharge by the patient may intermittently interfere with the waveform or data.

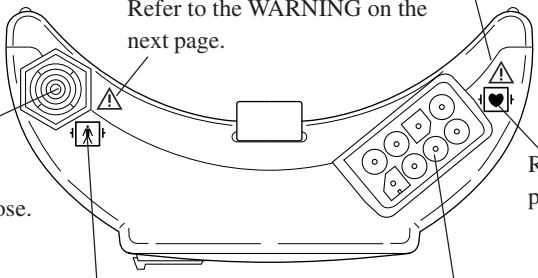
Rear Panel



WARNING

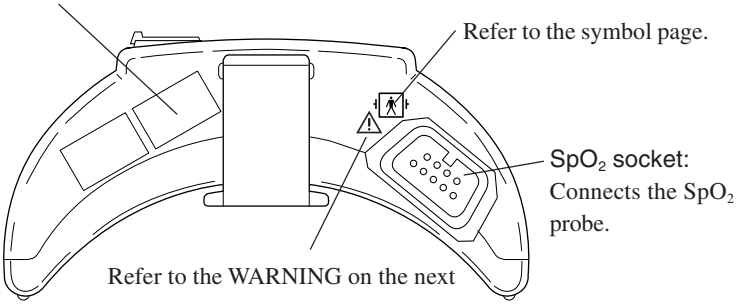
This transmitter is not waterproof. If detergent or liquid spills into the transmitter, stop using it and contact your Nihon Kohden distributor. If a wet transmitter is used, the patient or anyone in contact with the transmitter may receive an electric shock or patient leakage current over the allowed amount may flow.

Top Panel



Bottom Panel

Channel number label:
Indicates the channel number of the transmitter. Attach the channel number label to the panel of the monitor.



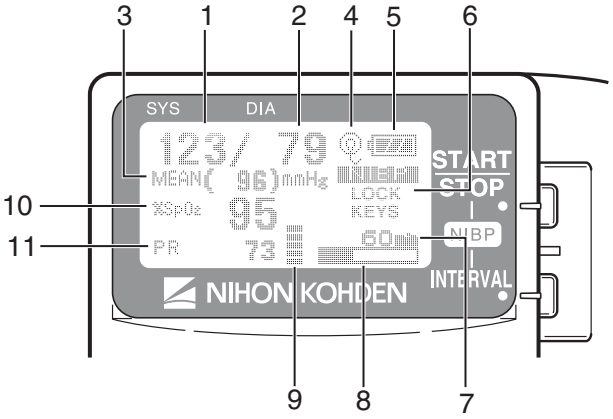
WARNING

- **Before performing defibrillation, check that the electrode leads and SpO_2 probe attached to the patient are properly connected to the transmitter. Touching the metal parts of disconnected leads and probes causes serious electrical shock or injury by discharged energy.**
- **When performing defibrillation, all persons must keep clear of the bed and must not touch the patient, any equipment connected to the patient or the metal parts of leads and probes connected to the patient. Failure to follow this warning may result in serious electrical burn, shock or other injury.**
- **When performing defibrillation, discharge as far as possible from electrodes and medicine on the chest of the patient. If there is a possibility that the defibrillator paddle could touch electrodes and medicine, remove electrodes and medicine from the patient. If the defibrillator contacts these materials, the discharged energy may cause serious electrical burn on the patient.**
- **When using this transmitter with an ESU, the ESU return plate and the electrodes for monitoring must be firmly attached to the patient. If the return plate is not attached correctly, it may burn the patient's skin where the electrodes are attached. Refer to the instruction manual for the ESU.**

CAUTION

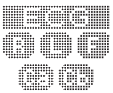
Do not shake or swing the transmitter holding the leads/cables connected to the transmitter. The transmitter may come off and injure someone or damage surrounding instruments.

LCD



No.	Name	Description
1	NIBP SYS	Displays NIBP systolic value.
2	NIBP DIA	Displays NIBP diastolic value.
3	NIBP MEAN	Displays NIBP mean value. "CUFF" is displayed with the cuff inflation pressure during measurement.
4	Check electrode mark	Appears when an electrode or electrode lead becomes detached during ECG measurement.
5	Battery replacement mark	Appears when the batteries are weak. For details, refer to the "Battery Condition Indication" section.
6	Message display area	Displays messages. When ECG is monitored with 6 electrodes and an electrode or electrode lead is detached, "Check electrode" is indicated as below, depending on the PARAMETER SETUP setting. Refer to the "Changing Parameter Setup Settings" and "ECG and Respiration Monitoring" sections.

LEADS OFF DISPLAY set to CHAR
ECG ELECTRODE set to AHA



LEADS OFF DISPLAY set to CHAR
ECG ELECTRODE set to IEC

LEADS OFF DISPLAY set to IMAGE

No.	Name	Description
7	NIBP measurement mode	Displays NIBP measurement mode. When set to auto mode, the measurement interval is displayed.
8	NIBP interval bar graph	In auto NIBP measurement, the remaining time from the last measurement to the next measurement is displayed as a bar graph.
9	Pulse level bar graph	Displays pulse level in 7 steps.
10	%SpO_2	Displays SpO_2 data.
11	PR	Displays pulse rate when NIBP or SpO_2 is measured. When the SpO_2 probe is attached to the patient, the real time pulse rate is displayed. When the SpO_2 probe is not attached to the patient, the pulse rate at the end of NIBP measurement is displayed.

Notes on Parameter Settings

When monitoring NIBP and SpO_2, the following setting must be set as indicated in the table to properly transmit the monitoring data to the receiving monitor. Otherwise, SpO_2 cannot be monitored properly during NIBP measurement.

Some receiving monitors require the software to be upgraded. For details, contact your Nihon Kohden distributor.

SpO_2 probe attachment site	INHIBIT SpO_2 DURING NIBP setting
Probe attached to the same limb as the cuff	ON
Probe attached to the limb without cuff*	OFF

* When the SpO_2 probe is attached to the same limb as the NIBP cuff and the cuff is inflated, the SpO_2 value becomes unstable and SpO_2 or PR alarm may occur.

Important Safety Information

General

WARNING

- **Never use this transmitter in the presence of any flammable anesthetic gas or high concentration oxygen atmosphere. Failure to follow this warning may cause explosion or fire.**
- **Never use this transmitter in a high-pressure oxygen medical care tank. Failure to follow this warning may cause explosion or fire.**
- **Do not take this transmitter into the MRI test room. This transmitter is not designed to be used during MRI tests.**

Output Signal

WARNING

Do not use the output signal from the receiving monitor as the synchronization signal for other equipment such as IABP, MRI, echocardiography or defibrillator because there may be time delay between the monitor and the other equipment caused by waveform transmission delay and spike noise may interfere on the output signal and be mistaken as a trigger.

Preparation

Installing (Replacing) Batteries

WARNING and CAUTION for Battery Handling

WARNING

- **Do not dispose of the battery in fire because it may explode.**
- **Do not use a disassembled or damaged battery. The contents of the battery are harmful and the battery may catch fire.**
- **If the contents of the battery contact the skin or clothes, immediately wash it thoroughly with water.**
- **Never short-circuit the + and – terminals. The battery may overheat and catch fire.**
- **Take care that the patient does not swallow batteries.**

CAUTION

- **Refer to the battery and battery charger manuals for details on handling the batteries.**
- **Do not handle the batteries with wet hands.**
- **When the transmitter is not in use, remove batteries. When batteries are installed, battery power is consumed even if measurement is not performed. Especially, when NiMH batteries remain in the transmitter when the transmitter is not in use, the battery may become unusable from overdischarge and leak liquid which will damage the transmitter.**
- **The battery charger must be used outside the patient environment.**

Battery Lifetime

Use three AA type alkaline dry cell batteries. NiMH rechargeable batteries can also be used.

Type	Lifetime (Measuring parameters)		
	ECG, SpO_2, NIBP	ECG, SpO_2	ECG only
NiMH secondary	2 days	2 days	2.5 days
Alkaline primary	1 day	2.5 days	3 days

The above data is when new batteries are used at room temperature, NIBP is measured in auto mode at 60 minute intervals and SpO_2 is measured on an index finger of a male patient with weight 60 kg.

Operation time depends on the thickness of SpO_2 probe attachment site.

NOTE

When using rechargeable NiMH batteries, shallow charging/discharging shortens battery capacity. For details, refer to the battery operator's manual.

Installing (Replacing) Batteries

CAUTION

Battery replacement must be performed by medical staff. When replacing batteries of the transmitter currently used for a patient, disconnect electrode leads from the transmitter before replacing batteries or do not touch the patient during replacement.

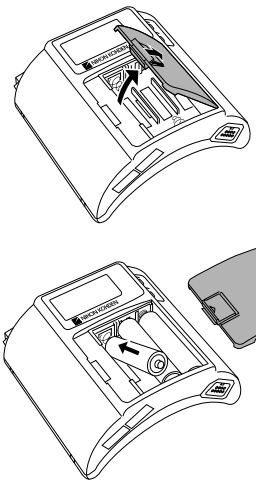
If electrode leads are attached to the patient and a person replacing batteries touches the patient during battery replacement, patient leakage current over the allowed amount may flow.

CAUTION

- **Replace all batteries at the same time.**
- **Do not use different types of batteries together.**

NOTE

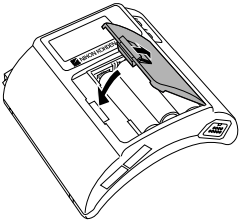
Insert the batteries with the correct polarity (+ and –).



Procedure

1. Remove the battery case cover.

2. Insert three new or fully charged batteries into the battery case observing the correct polarity.



3. Close the cover.

NOTE

Remove the batteries before disposing of the transmitter.

Situations Requiring Battery Replacement

Replace the batteries when any of the following occurs.

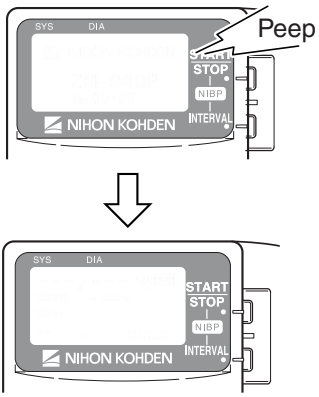
- The transmitter LCD displays the "▰" or "▱"mark.
- The transmitter generates a constant alarm (continuous "peep" sound).
- The transmitter LCD does not display anything when the power is turned on.
- The monitor displays the battery replacement message on the screen.

Battery Condition Indication

The battery condition is indicated as follows.

Indication	Condition	Receiving Monitor
▰	Fully charged battery	Batteries are full. There is no indication on the monitor.
▰	Batteries are low. Replace batteries.	Message requiring battery replacement is displayed.
▱	Batteries are low. NIBP cannot be measured. Replace batteries.	
No indication	Dead batteries	No signal can be transmitted to the monitor. There is no indication on the monitor.

Turning the Transmitter On/Off



Turning On the Power

When the batteries are installed correctly, the power is turned on. A one second "peep" sounds and the startup screen appears. (There is no "peep" sound when there is no battery power.)

NOTE

Replace the batteries when the LCD displays the "▭" or "▭"mark.

Turning Off the Power

To turn off the power, remove batteries.

Check Items Before Use

Before turning on the transmitter power, check the following to confirm that the transmitter can be used in normal and safe condition.

Appearance

- There are no damaged or dirty parts on the outside of the transmitter (LCD, keys, sockets, battery case cover, battery case, lock plate, etc.).
- The transmitter is completely dry.
- The electrode lead, SpO_2 probe and NIBP cuff are not broken.
- There are no damaged or dirty parts on the disposable SpO_2 probe, disposable electrodes or disposable NIBP cuff.

Batteries

- The battery polarity is correct.
- The battery case spring is firmly fixed and the battery is not loose.
- The battery case cover is firmly closed.

Channel Setting

- The transmitter channel corresponds to those of the receiving monitor.
- There is no transmitter in the surrounding area with the same channel.

Check Items After Power On

After turning on the power, check the following.

Power On

- The transmitter generates about a one second “peep” sound and the startup screen appears.
- The transmitter does not generate a continuous “peep” sound.
- The transmitter does not give excessive heat.
- The transmitter LCD displays a “” mark.
- The transmitter does not interfere with the operation of other medical instruments in use.

Basic Operation

- The “signal loss” message is not displayed on the receiving monitor when the transmitter is inside the receiving range of the monitor.
- The battery replacement message is not displayed on the monitor.
- The keys on the transmitter function properly.
- The LCD brightness is appropriate. To adjust brightness, refer to the “Changing System Setup Settings” section.

Check Items After Use

To use the transmitter in safe and optimum condition for next time, check the following.

Before Turning Power Off

- Temporarily changed settings are changed back to the previous settings.
- There was no malfunction on the transmitter.

Storage

- ECG electrode leads, SpO_2 probe and NIBP cuff are cleaned and disinfected.
- When the transmitter gets wet, liquid is wiped off and the transmitter is thoroughly dried.
- There are enough consumables, such as disposable electrodes.
- The transmitter power is turned off by removing batteries from the transmitter.
- Dead batteries are disposed of properly.

Changing the Transmitter Channel

The channel of the transmitter can be changed. The optional QI-901PK Channel Writer is required.

WARNING

The following action must be taken to properly receive the transmitter signal of the correct patient on the receiving instrument. Otherwise, there may be signal loss or signals may mix causing a serious accident, such as monitoring a different patient.

- **Assign a channel administrator in the hospital and only he or she should manage channel assignment on his or her responsibility.**
- **The channel administrator must manage the channels in the facility so that there is no signal interference.**
- **When the transmitter channel is changed, the channel administrator must check that the channel on the receiving monitor is also changed and the signal is properly received.**
- **The channel administrator must replace the channel number label on the transmitter with the new one after changing the channel.**

NOTE

The software version of the QI-901PK channel writer must be 02-01 or later to change the channel on the ZM-940PA transmitter.

To check the transmitter channel, refer to “CHANNEL” in the “Changing System Setup Settings” section.

Changing Parameter Setup Settings

The initial settings on the PARAMETER SETUP screen must be changed before monitoring. Changing these settings during monitoring interrupts monitoring.

Parameter Setup Setting List

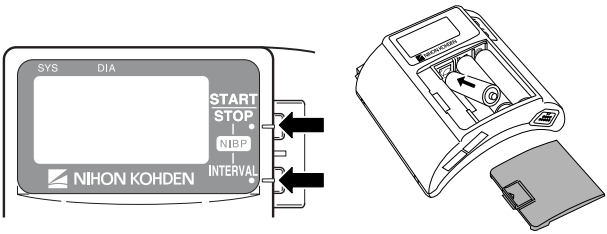
The factory default settings are underlined.

Setting Item	Description	Settings
SELECTABLE INTERVALS	Select the NIBP measurement modes for the mode selection.	STAT, 5, 10, 15, 30, 60, 120, 240
INITIAL INTERVAL	Select the initial NIBP measurement mode at power on.	MAN., 5 min, 10 min, 15 min, 30 min, 60 min, 120 min, 240 min
INITIAL CUFF PRESS	Select the NIBP cuff inflation pressure.	120 mmHg, 150 mmHg, 180 mmHg, 210 mmHg, 240 mmHg
NIBP MODE AFTER STAT	Select the NIBP measurement mode after completing STAT measurement.	MAN., 5 min, 10 min, 15 min, 30 min
START/FINISH SOUND	Turn ON or OFF the sound for NIBP measurement start/finish.	ON, OFF/ON, OFF
OLD NIBP DATA AFTER	Select whether to hide or dim the NIBP data after measurement and how long to wait after measurement to dim or hide it.	DATA: HIDE, DIM AFTER: 5 min, 10 min, 30 min
INHIBIT SpO_2 DURING NIBP	Turn SpO_2 monitoring on or off during NIBP measurement.	ON, OFF
2ND PARAMETER	Set SpO_2 and PR display order.	SpO_2, PR
LEADS OFF DISPLAY	Select the mode for displaying electrode off. This setting is only available when ECG is monitored with 6 electrodes.	CHAR, IMAGE
ECG ELECTRODE	Select the electrode lead type. This setting is only available when CHAR is selected for LEADS OFF DISPLAY.	IEC, AHA

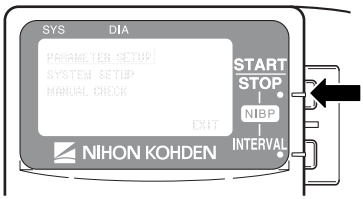
Displaying the PARAMETER SETUP Screen

1. Remove one battery.

2. While pressing the NIBP START/STOP and NIBP INTERVAL keys, install the battery. The SETUP screen appears.

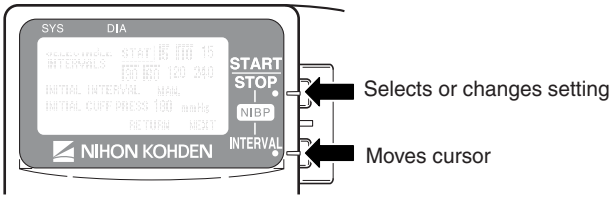


3. Press the NIBP START/STOP key to enter the PARAMETER SETUP screen.



When the cursor is moved to “EXIT” by pressing the NIBP INTERVAL key and the NIBP START/STOP key is pressed, the startup screen appears, then the monitoring screen appears.

4. To select or change a setting, press the NIBP START/STOP key.
To move the cursor, press the NIBP INTERVAL key.

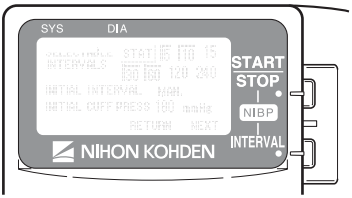


When the cursor is moved to “RETURN” by pressing the NIBP INTERVAL key and the NIBP START/STOP key is pressed, the SETUP screen appears.

Changing Settings

SELECTABLE INTERVALS

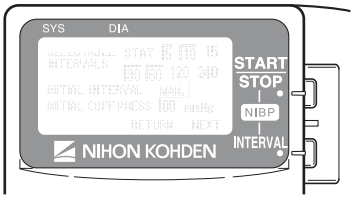
During monitoring, when the NIBP INTERVAL key is pressed, the measurement mode changes according to the modes selected in this item. MANUAL mode is already selected for the mode selection.



1. Press the NIBP INTERVAL key to move the cursor to the desired mode.
2. Press the NIBP START/STOP key to select or unselect the mode. Selectable modes are: STAT, 5, 10, 15, 30, 60, 120 and 240 min.

INITIAL INTERVAL

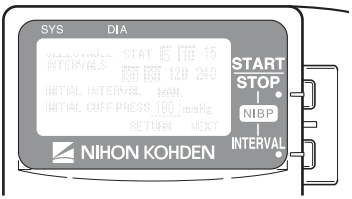
Select the initial NIBP measurement mode at power on.



1. Press the NIBP INTERVAL key to move the cursor to “INITIAL INTERVAL”.
2. Press the NIBP START/STOP key to select the mode. Selectable modes are the modes selected for “SELECTABLE INTERVALS” and “MAN.” (MANUAL).

INITIAL CUFF PRESS

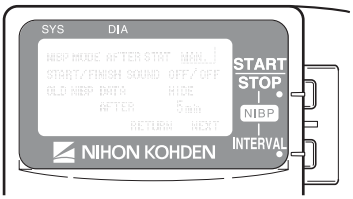
Select the NIBP cuff inflation pressure.



1. Press the NIBP INTERVAL key to move the cursor to “INITIAL CUFF PRESS”.
2. Press the NIBP START/STOP key to select the inflation pressure from 120, 150, 180, 210 and 240 mmHg.

NIBP MODE AFTER STAT

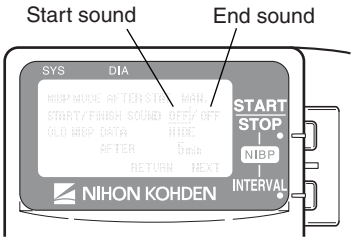
Select the NIBP measurement mode after completing the STAT measurement.



1. Press the NIBP INTERVAL key to move the cursor to “NIBP MODE AFTER STAT”.
2. Press the NIBP START/STOP key to select the mode. The selected mode is automatically selected for “SELECTABLE INTERVALS” as well.

START/FINISH SOUND

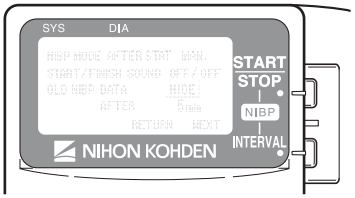
Turn on or off the sound for NIBP measurement start and finish.



1. Press the NIBP INTERVAL key to move the cursor to “START/FINISH SOUND”.
2. Press the NIBP START/STOP key to turn ON or OFF.

OLD NIBP DATA/AFTER

Select whether to dim or hide the NIBP data after measurement and how long to wait after NIBP measurement to dim or hide it.

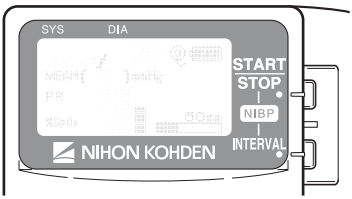


1. Press the NIBP INTERVAL key to move the cursor to “OLD NIBP DATA/AFTER”.
2. Press the NIBP START/STOP key to select the setting.

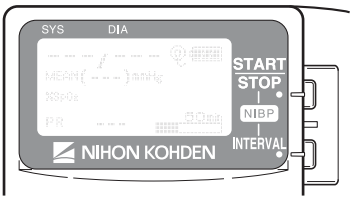
DATA: DIM NIBP data is dimmed after the “AFTER” interval.
HIDE NIBP data is hidden after the “AFTER” interval. “– – –” is displayed on the screen.

AFTER: Select the interval after NIBP measurement to dim or hide.

Dimmed



Hidden



INHIBIT SpO_2 DURING NIBP

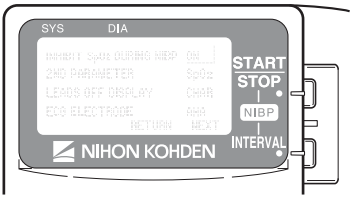
Set whether or not to monitor SpO_2 during NIBP measurement.

When the SpO_2 probe is attached to the same limb as the NIBP cuff and this setting is set to OFF, the pulse may become unstable and SpO_2 or PR alarm may occur. It is recommended to set this setting to ON so that SpO_2 is not measured during NIBP measurement.

When the SpO_2 probe is attached to the other limb from the NIBP cuff, this setting can be set to OFF.

NOTE

When this "INHIBIT SpO_2 DURING NIBP" is set to OFF, refer to the "Monitoring SpO_2 during NIBP Measurement" section.

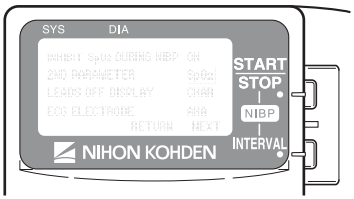


1. Press the NIBP INTERVAL key to move the cursor to "INHIBIT SpO_2 DURING NIBP".
2. Press the NIBP START/STOP key to select "ON" or "OFF".

ON: Stops SpO_2 monitoring during NIBP measurement.
OFF: SpO_2 is monitored during NIBP measurement.

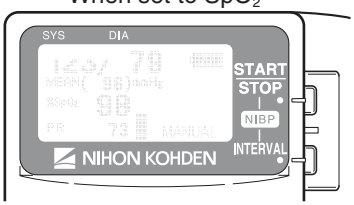
2ND PARAMETER

Set the display order of SpO_2 and PR.

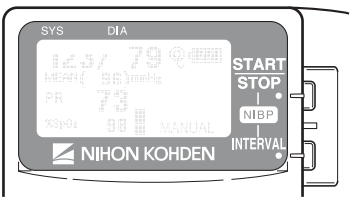


1. Press the NIBP INTERVAL key to move the cursor to "2ND PARAMETER".
2. Press the NIBP START/STOP key to select "SpO_2" or "PR".

When set to SpO_2

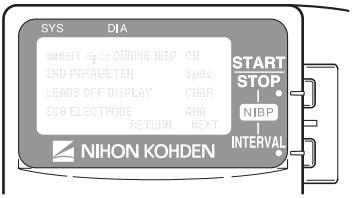


When set to PR



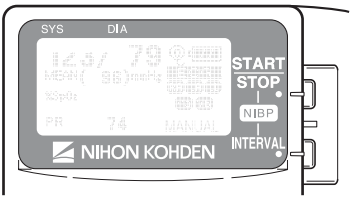
LEADS OFF DISPLAY

Select the mode for displaying electrode off. This setting is only available when ECG is monitored with 6 electrodes.

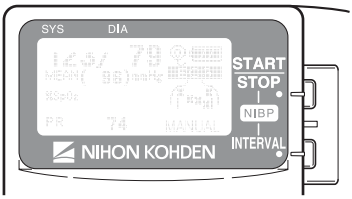


1. Press the NIBP INTERVAL key to move the cursor to “LEADS OFF DISPLAY”.
2. Press the NIBP START/STOP key to select “CHAR” or “IMAGE”.

When set to CHAR

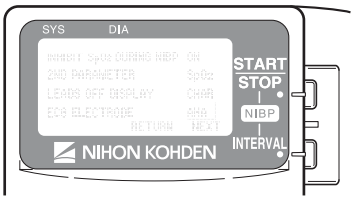


When set to IMAGE



ECG ELECTRODE

Select the electrode lead type. This setting is only available when “CHAR” is selected for LEADS OFF DISPLAY.



1. Press the NIBP INTERVAL key to move the cursor to “ECG ELECTRODE”.
2. Press the NIBP START/STOP key to select “IEC” or “AHA”.

   AHA: RA, LA, LL, Va, Vb
   IEC: R, L, F, Ca, Cb

Changing System Setup Settings

NOTE

Changing System Setup settings must be done only by a qualified personnel.

System Setup Setting List

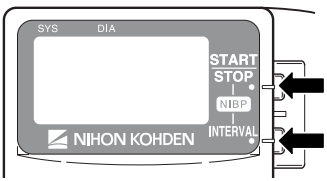
The factory default settings are underlined.

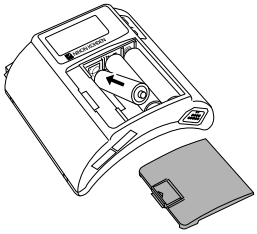
Setting Item	Description	Settings
CHANNEL	Displays the transmitter channel.	———
PRESSURE UNIT	Select the units for NIBP.	mmHg, kPa
LANGUAGE	Select the language for screen display.	JPN, ENG
BRIGHTNESS	Select the LCD brightness.	1, 2, 3, 4
SYSTEM INITIALIZE	Initializes all settings to the factory default settings.	———

Displaying the SYSTEM SETUP Screen

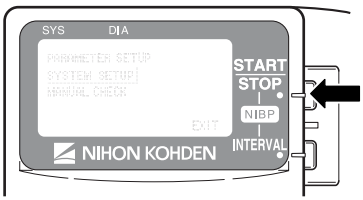
1. Remove one battery.

2. While pressing the NIBP START/STOP and NIBP INTERVAL keys, install the battery. The SETUP screen appears.





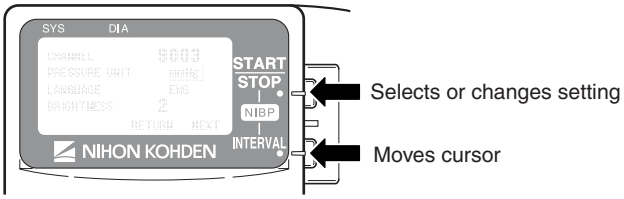
3. Press the NIBP INTERVAL key to move the cursor to “SYSTEM SETUP”.



4. Press the NIBP START/STOP key to enter the SYSTEM SETUP screen.

   When the cursor is moved to “EXIT” by pressing the NIBP INTERVAL key and the NIBP START/STOP key is pressed, the startup screen appears, then the monitoring screen appears.

5. To select or change a setting, press the NIBP START/STOP key.
   To move the cursor, press the NIBP INTERVAL key.

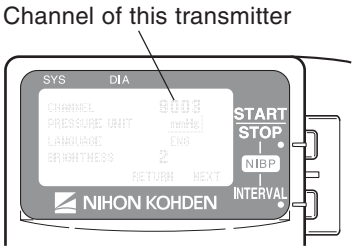


When the cursor is moved to “RETURN” by pressing the NIBP INTERVAL key and the NIBP START/STOP key is pressed, the SETUP screen appears.

Changing Settings

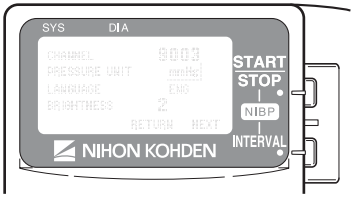
CHANNEL

The channel of this transmitter is displayed.



PRESSURE UNIT

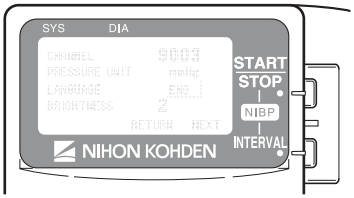
Select the unit for NIBP.



1. Press the NIBP INTERVAL key to move the cursor to “PRESSURE UNIT”.
2. Press the NIBP START/STOP key to select “mmHg” or “kPa”.

LANGUAGE

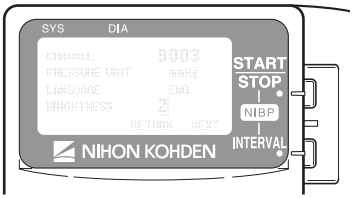
Select the language for screen display.



1. Press the NIBP INTERVAL key to move the cursor to “LANGUAGE”.
2. Press the NIBP START/STOP key to select the language.

BRIGHTNESS

Select the LCD brightness.

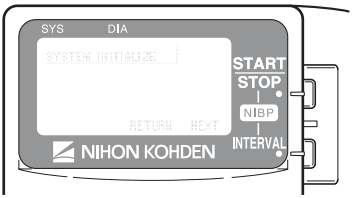


1. Press the NIBP INTERVAL key to move the cursor to “BRIGHTNESS”.
2. Press the NIBP START/STOP key to select the LCD brightness from 1 to 4.
   1 2 3 4
   Light ..... Dark

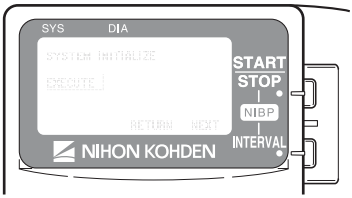
SYSTEM INITIALIZE

Do the following procedure to initialize the settings to the factory default settings.

1. Press the NIBP INTERVAL key to move the cursor to “SYSTEM INITIALIZE”.



2. Press the NIBP START/STOP key. The “EXECUTE” message appears.



3. Press the NIBP START/STOP key to initialize the settings to the factory default settings.

Attaching NIBP Cuff, Electrodes and SpO_2 Probe to the Patient

The transmitter can be attached to an arm of the patient or placed on the bedside. The required length of the electrode leads and SpO_2 probe cable depends on how the transmitter is to be attached to the patient.

NOTE

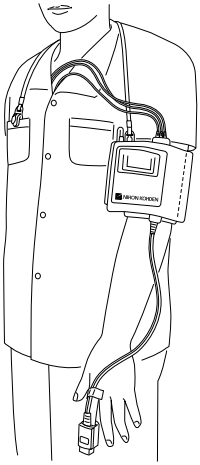
Monitoring SpO_2 during NIBP Measurement

When the SpO_2 probe is attached to the same limb as the NIBP cuff, the blood flow decreases during NIBP measurement and pulse wave cannot be detected and SpO_2 cannot be monitored properly. When "INHIBIT SpO_2 DURING NIBP" on the PARAMETER SETUP screen is set to ON (factory default setting), SpO_2 monitoring is paused during NIBP measurement to avoid SpO_2 alarm occurrence. However, when monitoring SpO_2 on the same limb as NIBP, be careful when reading SpO_2 values.

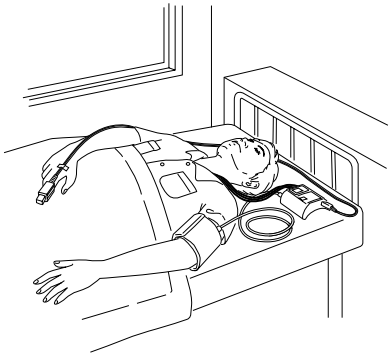
When monitoring SpO_2 is important, attach the probe to the limb to which the NIBP cuff or catheter is not attached.

Attachment Examples

When transmitter is attached on an arm



When transmitter is placed on a bedside



NOTE

When placing the transmitter on a bedside, place it on a stable and flat place. If the transmitter falls off, it may be damaged.

Attaching the NIBP Cuff

Selecting the NIBP Cuff

Select the NIBP cuff appropriate for the patient.

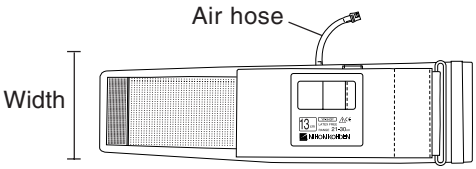
NOTE

NIBP cannot be measured on neonates using this transmitter.

Reusable Cuffs

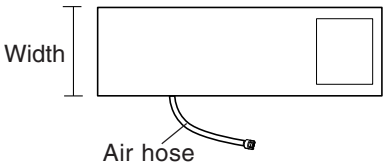
When attaching the transmitter to the patient arm, a special NIBP cuff is required. An optional YN-990P extension hose (1.5 m) is available to extend the length between the NIBP socket on the transmitter and NIBP cuff (e.g. when not attaching the transmitter to the patient arm and placing the transmitter on a bedside).

Reusable cuff		Model	Width (cm)	Air hose length (cm)
For adult	Standard	YP-943P	13	15
	Large	YP-944P	15	15



When not attaching the transmitter to the patient arm, the following cuffs can be used. To use these cuffs, an optional YN-990P extension hose (1.5 m) is required.

Reusable cuff		Model	Width (cm)	Air hose length (cm)
For infants		YP-960T	5	15
For children	Small	YP-961T	7	
	Standard	YP-962T	10	
For adults	Standard	YP-963T	13	
	Large	YP-964T	15	



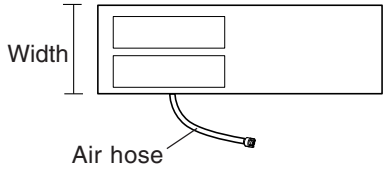
Disposable Cuffs

CAUTION

The disposable cuffs are not sterilized. If necessary, sterilize the disposable cuffs using glutaraldehyde solution by following the instructions for the glutaraldehyde.

When not attaching the transmitter to the patient arm, the following disposable cuffs can be used. To use these cuffs, an optional YN-990P extension hose (1.5 m) is required.

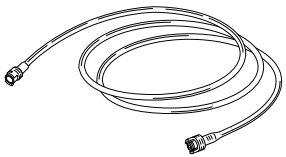
Reusable cuff		Model	Width (cm)	Air hose length (cm)
For infants		YP-910P	6	20
For children		YP-912P	9	
For adults	Small	YP-913P	12	
	Standard	YP-914P	14	
	Large	YP-915P	16	



Extension Hose

CAUTION

When using an extension hose, check that the extension hose is not bent or squeezed. Otherwise, the cuff may not inflate or deflate. If the cuff cannot deflate, it may cause congestion on the patient at the cuff attachment site.



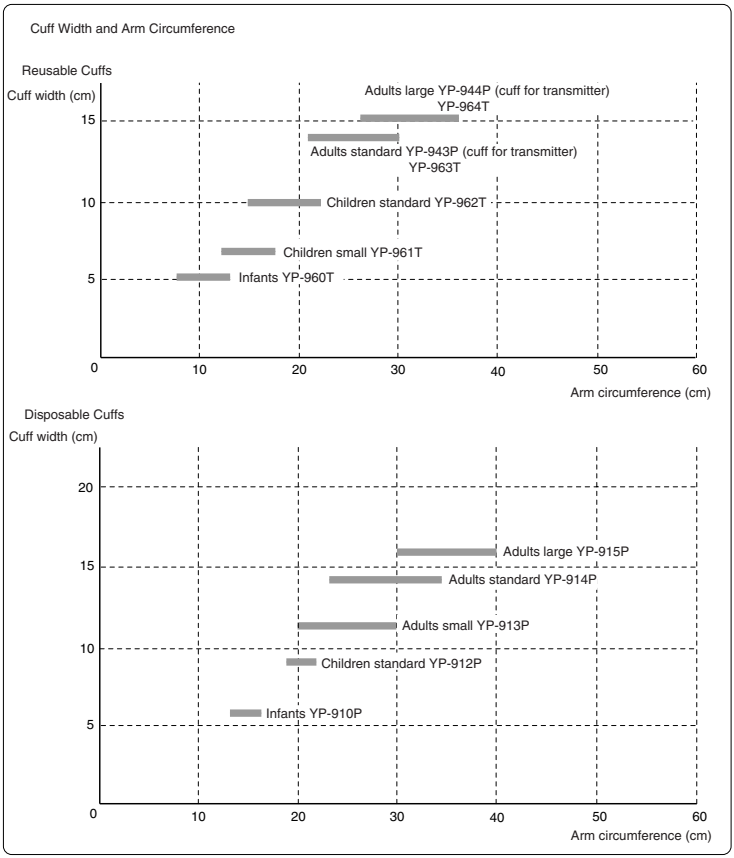
YN-990P extension hose, 150 cm

Reference for selecting a cuff

The AHA (American Heart Association) recommends that the cuff width be 40% of the circumference of the upper arm. Refer to the following graph and select the cuff which suits the patient's arm.

NOTE

- **If a range of arm circumference appropriate for the cuff is prescribed, use a cuff within that range.**
- **To obtain accurate measured values, select a wide cuff which can be attached to the upper arm. Measuring with a very narrow cuff may result in measured values higher than the actual values.**
- **The YP-943P NIBP cuff is for standard size adult. Do not use this cuff when it does not fit the patient.**

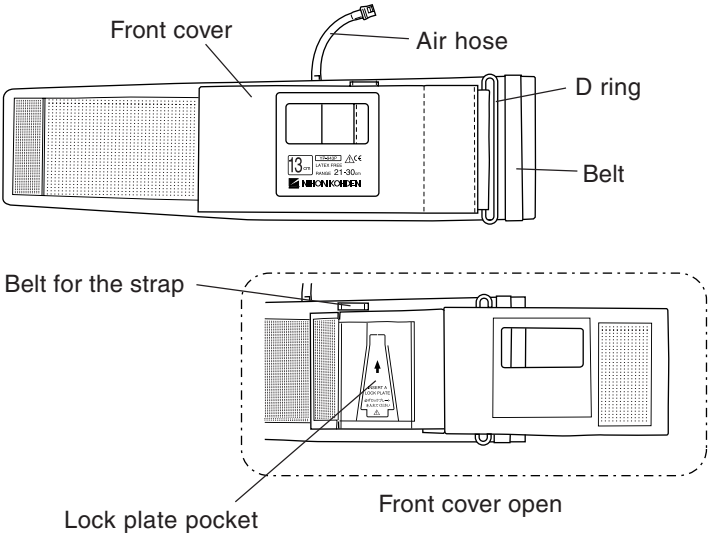


Connecting the NIBP Cuff to the Transmitter

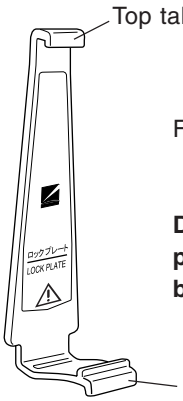
When Using YP-943P/944P NIBP Cuff

To attach the YP-943P/944P NIBP cuff to the transmitter, the lock plate is required.

YP-943P/944P NIBP cuff



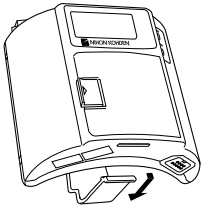
Lock plate



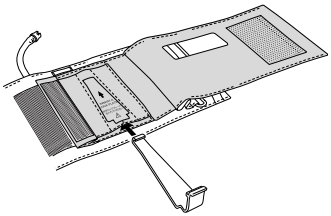
For attaching the NIBP cuff to the transmitter

NOTE

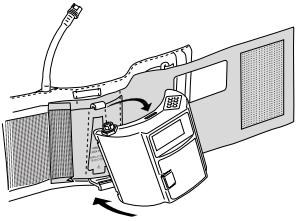
Do not roll up or put weight on the cuff with the lock plate attached to it. Otherwise, the lock plate may break.



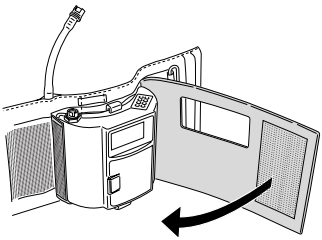
1. Remove the lock plate from the transmitter.



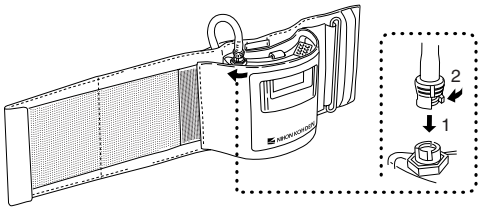
2. Insert the lock plate into the lock plate pocket on the NIBP cuff.



3. Attach the transmitter to the lock plate by inserting the tabs on the lock plate into the slots on the transmitter.



4. Cover the transmitter with the front cover of the NIBP cuff.



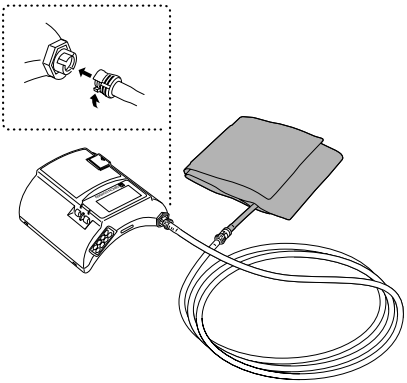
5. Connect the air hose to the NIBP socket on the transmitter. Turn the cuff connector joint until it clicks.

When Using YP-960T series or YP-910P series NIBP Cuff

To use these NIBP cuffs, an optional YN-990P extension hose (1.5 m) is required.

NOTE

Connect the joints properly. If there is an air leak, NIBP cannot be measured properly.



1. Connect the NIBP cuff to the extension hose.
2. Connect the other end of the extension hose to the NIBP socket on the transmitter. Turn the joint clockwise until it clicks.

   To disconnect the cuff from the transmitter, turn the hose joint counterclockwise.

Attaching the NIBP Cuff to the Patient

WARNING

Be careful when measuring NIBP on a patient with known bleeding disorders or coagulation. After NIBP measurement, there may be dot hemorrhage, or circulatory disorder by thrombus where the cuff was attached.

CAUTION

- **Do not wrap the cuff on an arm or thigh which is used for injection. NIBP measurement on an arm or thigh which is used for injection may cause a reflux of blood and stop injection.**
- **Do not wrap the cuff too tight. It may cause poor blood circulation and congestion. If the cuff is wrapped too loosely, the NIBP value may be increased.**
- **If the skin gets irritated or redness appears on the skin from the cuff, change the attachment site or stop using the cuff.**

- **NIBP and SpO_2 can be measured on the same limb, but the SpO_2 monitoring may not be accurate during NIBP measurement. Be careful when reading the SpO_2 values.***
- **Do not reuse disposable cuffs.**

---

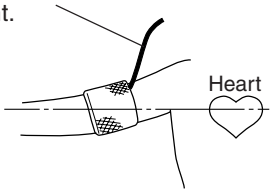
* Monitoring SpO_2 during NIBP Measurement
When the SpO_2 probe is attached to the same limb as the NIBP cuff, the blood flow decreases during NIBP measurement and pulse wave cannot be detected and SpO_2 cannot be monitored properly. When "INHIBIT SpO_2 DURING NIBP" on the PARAMETER SETUP screen is set to ON (factory default setting), SpO_2 monitoring is paused during NIBP measurement to avoid SpO_2 alarm occurrence. However, when monitoring SpO_2 on the same limb as the NIBP, be careful when reading SpO_2 values.

NOTE

- **Measuring NIBP at a site other than the upper arm gives different values from those measured at the upper arm. When making diagnosis based on the NIBP values, measure NIBP on an upper arm.**
- **To accurately detect the pulsatile flow of the artery, the cuff should be wrapped around a bare upper arm.**
- **Do not use an abnormal cuff. The cuff deteriorates from use and cleaning. Before use, check the cuff and confirm that there is no flaw, crack or hole in it. Be careful not to damage the inflation bag. If the inflation bag has a hole or a flaw, it may burst during use. Dispose of an abnormal cuff and replace it with a new one.**
- **Refer to the NIBP cuff manual for details.**

Cuff Position

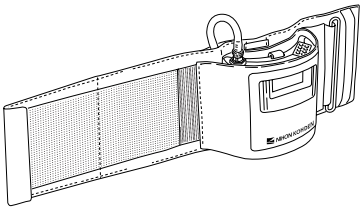
When placing the transmitter on a bed, make sure that the hose is not bent.



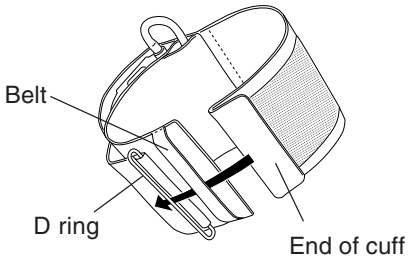
Place the cuffed upper arm (brachium) at the same height as the patient's heart. If the cuff is not at the same level as the heart, the weight of the blood affects the blood pressure reading. The pressure difference per unit height is 0.7 mmHg/cm. The blood pressure reading decreases when the arm is higher than the heart and increases when lower.

The best measuring condition is when the patient is lying on his/her back with arms and legs relaxed. If the cuff position cannot be on the same level as the heart, the displayed blood pressure reading must be mathematically adjusted.

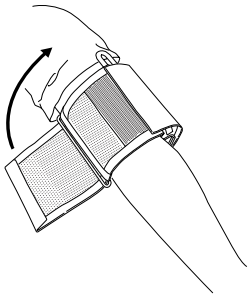
Using the YP-943P/944P NIBP Cuff



1. Attach the NIBP cuff to the transmitter. Refer to the "Connecting the NIBP Cuff to the Transmitter" section.



2. Insert the end of the cuff into the belt and then through the D ring as shown at left.



3. Fold back the cuff at the D ring and fasten it using the velcro tape.

   Make sure that the cuff is not attached on a joint.

NOTE

The cuff must not wrap around the elbow.

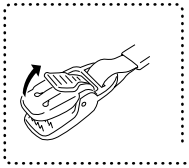
Attaching the Strap to the Transmitter

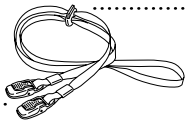
NOTE

- **Use the strap to prevent the transmitter from falling.**
- **Do not attach the clip to hard objects such as thick cloth or zipper. It will break the clip.**

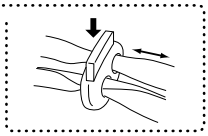
Attach a strap provided with the transmitter to the NIBP cuff and patient clothes.

To open the clip, firmly pull out the tab in direction of the arrow.

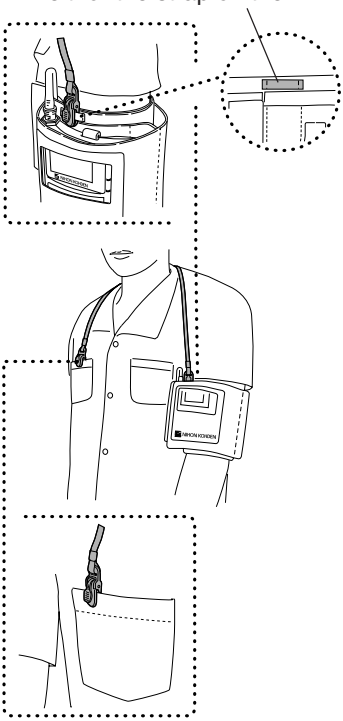




To adjust the strap length, push down the tab on the adjuster and slide.

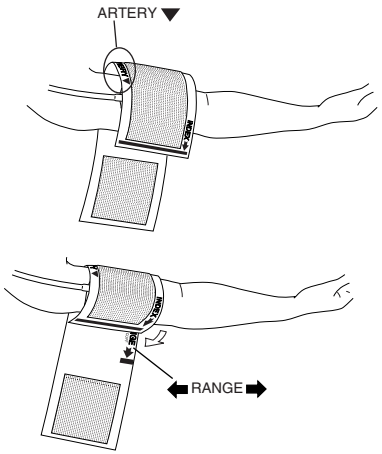


Belt for the strap on the NIBP cuff



1. Adjust the length of the strap.
2. Clip one end of the strap to the belt for the strap on the NIBP cuff.
3. Clip the other end of the strap to the patient's clothes as shown left.

Using the YP-960T series Reusable Cuffs or YP-910P series Disposable Cuffs



1. Put the cuff on the upper arm so that the ▼ mark of "ARTERY ▼" aligns with the artery of the patient.

2. Wrap the cuff so that "INDEX ➡" comes within the "⬅ RANGE ➡".

   If "Index ➡" is not within the "⬅ RANGE ➡", change the cuff size.

Attaching Electrodes

Selecting Electrode Lead

CAUTION

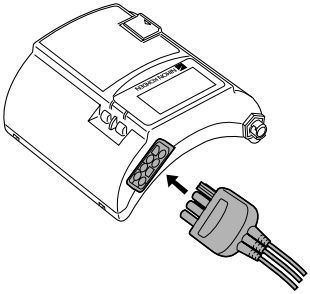
Use only Nihon Kohden specified electrode leads. With electrodes and electrode leads other than specified ones, the "CHECK ELECTRODE" message appears and monitoring may stop.

The following electrode leads can be used on the transmitter (option).

BR-903PA, 3 electrodes, clip type	BR-913PA, 3 electrodes, snap type	BR-906PA, 6 electrodes, clip type	BR-916PA, 6 electrodes, snap type
			

Connecting the Electrode Lead to the Transmitter

Connect the electrode lead to the ECG/RESP socket on the transmitter.



When the transmitter is attached on an arm

CAUTION

Hold the connector of the electrode lead when connecting/disconnecting the electrode lead. If you disconnect the electrode lead by pulling the lead, it damages the electrode lead.

Selecting the Electrode Position

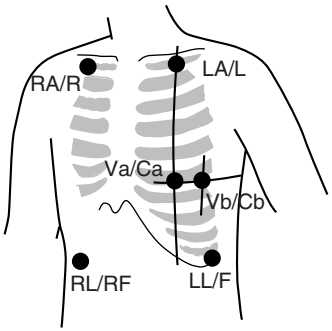
Follow the physician's instructions for electrode placement when available.
For ECG monitoring, electrodes are attached only on the chest to allow patient movement and obtain continuous stable ECG. Following leads are examples. When also monitoring respiration, refer to the "Electrode Position for Respiration Monitoring" section.

NOTE

The optimum electrode positions for ECG measurement of a patient are not always optimum for respiration measurement of the patient. Select positions suitable for both ECG and respiration measurements, or positions which have priority for one measurement.

Six Electrodes

The 6-electrode method with lead II and lead V5 is effective for monitoring myocardial ischemia. You can improve monitoring accuracy considerably by adding lead V4 to this combination. Va and Vb can be at any position of the standard 12 leads V1 to V6, but V4 and V5 are most appropriate for myocardial ischemic monitoring.

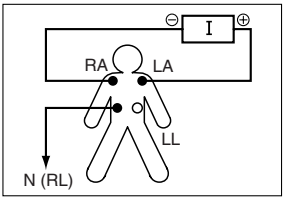


Electrode Position	Symbol		Lead Color	
	AHA	IEC	AHA	IEC
Left infraclavicular fossa	LA	L	Black	Yellow
Right infraclavicular fossa	RA	R	White	Red
Below lowest rib on the left anterior axillary line	LL	F	Red	Green
Right anterior axillary line at the same level as LL/F	RL	RF	Green	Black
Fifth intercostal space on the left midclavicular line. (V4 position of standard 12 leads)	Va	Ca	Brown-blue	White-brown
Left anterior axillary line at the same level as Va. (V5 position of standard 12 leads)	Vb	Cb	Brown-orange	White-black

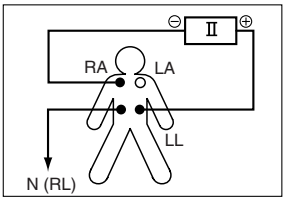
Lead Position

Standard limb leads

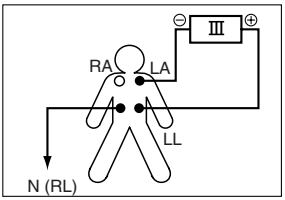
Lead I



Lead II

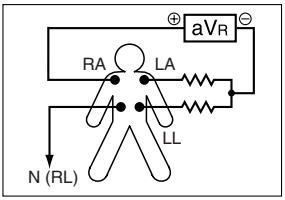


Lead III

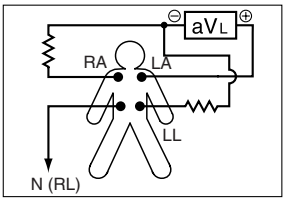


Monopolar limb leads

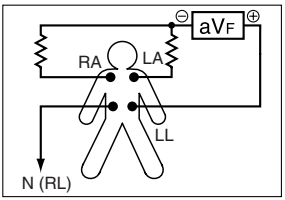
aV_R lead



aV_L lead

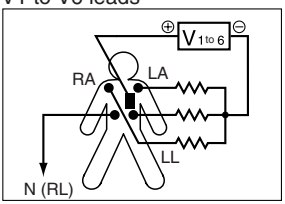


aV_F lead



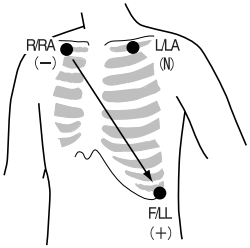
Monopolar chest leads

V1 to V6 leads



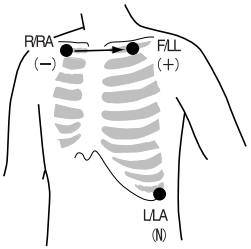
Three Electrodes

- Lead MII, which is similar to standard lead II, used when ECG measurement has priority

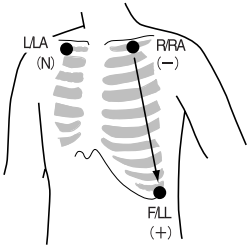


Electrode Position	Symbol		Lead Color	
	AHA	IEC	AHA	IEC
Left infraclavicular fossa	LA	L	Black	Yellow
Right infraclavicular fossa	RA	R	White	Red
Below lowest rib on the left anterior axillary line	LL	F	Red	Green

- Lead MI, which is similar to standard lead I
  Change F/LL and L/LA of the lead MII.



- Lead MIII, which is similar to standard lead III.
  Change R/RA and L/LA of the lead MII.



If the electrode position shown above is not available due to chest surgery, attach the electrodes to the root of the limbs or below the clavicles for stable ECG monitoring.

Attaching Electrodes to the Patient and Connecting the Electrode Leads to Disposable Electrodes

Prepare the Patient Skin

Shave off excessive body hair.

To reduce skin impedance, clean the electrode site with cream or with a cotton pad moistened with alcohol. Thoroughly dry the skin with a clean cotton pad.

NOTE

- **For a patient with frequent body movement, rub the sites with Skinpure skin preparation gel. However, do not use Skinpure skin preparation gel on sensitive skin.**
- **Do not place electrodes on a wound or on an inflamed, wrinkled or uneven skin surface.**

Attaching Electrodes to the Patient

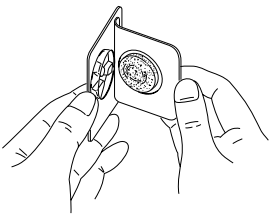
CAUTION

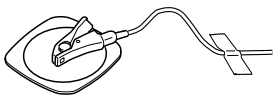
Do not reuse disposable products.

NOTE

- **To maintain good contact between the electrode and skin, check that the paste of the disposable electrode is not dry.**
- **When contact between the disposable electrode and skin becomes poor, replace electrodes with new ones immediately. Otherwise, contact impedance between the skin and the electrode increases and the correct ECG cannot be obtained.**

Refer to the electrode operator's manual for details.





1. Carefully remove the backing paper from the electrode. Avoid touching the adhesive surface.
2. Place the electrode on the previously cleaned skin. Pay attention to the electrode lead color and symbol.
3. Clip the electrode lead to the electrode.
4. Fasten the electrode lead wire with surgical tape with an extra length of wire between the tape and the electrode. This lessens the movement of electrode leads by body movement and helps stable monitoring.

Electrode Position for Respiration Monitoring

Place the R/RA and F/LL electrodes so that the lungs are between the electrodes.

NOTE

The optimum electrode positions for ECG measurement of a patient are not always optimum for respiration measurement of the patient. Select positions suitable for both ECG and respiration measurements, or positions which have priority for one measurement.

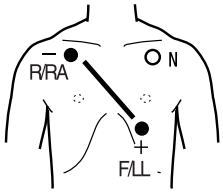
Electrode Position Examples

NOTE

The following examples are when monitoring with 3 electrodes. ECG cannot be monitored correctly when electrodes are attached as the following examples when monitoring with 6 electrodes.

Position 1

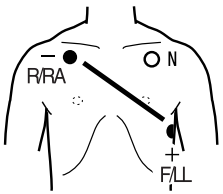
In this position, respiration measurement is available; however, there is a difference in amplitude between different patients.



R or RA	F or LL
Right infraclavicular fossa	Fifth intercostal space on the left midclavicular line, V4

Position 2

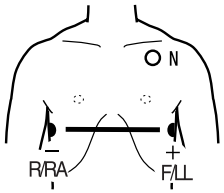
In this position, the waveform amplitude is usually large and the ECG lead is similar to Lead MII. This position can be generally recommended.



R or RA	F or LL
Right infraclavicular fossa	Fifth intercostal space on the left midaxillary line, V6

Position 3

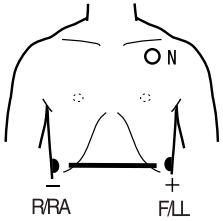
In this position, the respiration waveform is optimum, but the ECG lead is unusual.



R or RA	F or LL
Right midaxillary at the horizontal level of V4	Fifth intercostal space on the left midaxillary line, V6

Position 4

In this position, the respiration measurement is influenced by the impedance variation of the abdomen, so the cardiac pulse wave included in the respiration wave is reduced. Note that the waveform is inverted in phase compared with the chest movement (the waveform goes down during inspiration). It is difficult to measure the ECG at the same time.



R or RA	F or LL
Lowest rib on the right anterior axillary line	Lowest rib on the left anterior axillary line

Attaching the SpO_2 Probe

Selecting the SpO_2 Probe

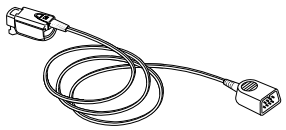
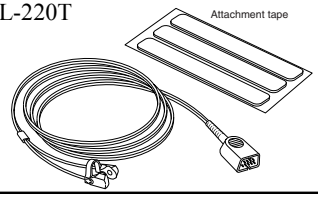
Select an appropriate probe for the patient.

CAUTION

- **Use Nihon Kohden specified SpO_2 probe to assure maximum performance from your instrument.**
- **Do not use damaged or disassembled probe. It causes incorrect measurement and may hurt the patient.**

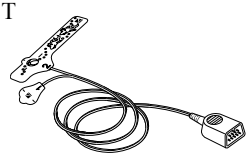
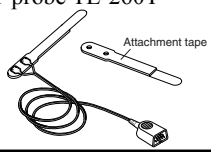
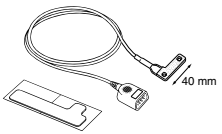
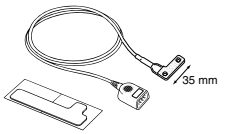
Reusable Probes

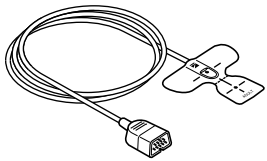
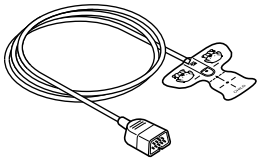
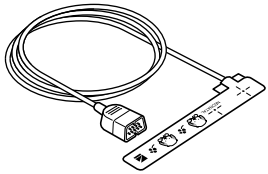
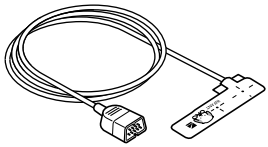
When using a TL-201T finger probe, choose the appropriate cable length for attachment.

Probe	Cable Length	Patient	Attachment site
Finger probe TL-201T 	0.6 m	Adult or children 20 kg or more	Finger
	1.6 m		
Multi-site probe TL-220T 		Adult or Infant 3 kg or more	Finger or toe
		Neonate 3 kg or less	Instep and sole

CAUTION

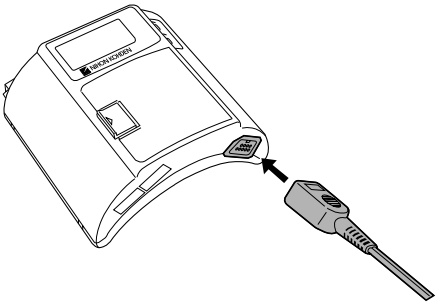
- **Use the disposable probe only for one patient. Never reuse the disposable probe for another patient because it causes cross infection.**
- **Disposable probes are not sterilized.**

Probe	Patient	Attachment site	
TL-251T 	Adult 30 kg or more	Finger or toe	
TL-252T 	Child 3 to 40 kg	Finger or toe	
TL-253T 	Neonate 3 kg or less	Instep and sole	
Multi-site Y probe TL-260T 	Low birth weight infant 1 kg or less	Instep and sole	Attachment tape S
	Neonate or Child 3 kg or more	Finger or toe	Attachment tape S
	Neonate 3 kg or less	Instep and sole	Attachment tape L
TL-051S/052S  Cable length TL-051S: 80 cm TL-052S: 160 cm	Adult 50 kg or more	Finger	
	Neonate 3 kg or less	Instep and sole	
TL-061S/062S  Cable length TL-061S: 80 cm TL-062S: 160 cm	Child or Adult 15 to 50 kg	Finger	
	Infant 3 to 15 kg	Toe	

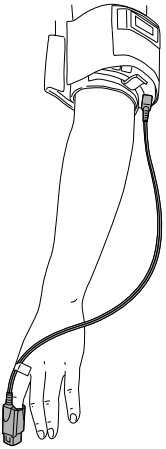
Model	Patient	Attachment site
TL-271T 	Adult 30 kg or more	Finger or toe
TL-272T 	Child 10 to 50 kg	
TL-273T 	Neonate 3 kg or less	Instep
	Adult 40 kg or more	Finger or toe
TL-274T 	Infant 3 to 20 kg	

Connecting the SpO_2 Probe to the Transmitter

Connect the probe to the SpO_2 socket on the transmitter.



When the transmitter is attached on an arm



CAUTION

Hold the connector when connecting/disconnecting the probe. If you disconnect the SpO_2 probe by pulling the cable, it damages the cable.

Attaching the Probe to the Patient

Attach the probe to the patient by referring to the probe's manual. Make sure that the light emitter and photo detector of the probe face each other at the attachment site.

WARNING

- **When using a TL-201T finger probe, do not fasten it to a finger by wrapping the probe to the site with some tape. It may cause poor blood circulation, congestion, pressure necrosis or burn.**
- **When using probes other than a TL-201T finger probe, do not wrap the tape too tight. Check the blood circulation condition by observing the skin color and congestion at the skin peripheral to the probe attachment site. Even for short-term monitoring, there may be burn or pressure necrosis from poor blood circulation, especially on neonates or low birth weight infants whose skin is delicate. Accurate measurement cannot be performed on a site with poor peripheral circulation.**

- **Check the circulation condition by observing the skin color of the measuring site and the pulse waveform. Change the measuring site every 8 hours for disposable probes and every 4 hours for reusable probes. The skin temperature may increase at the attached site by 2 or 3°C (4 or 5°F) and cause a burn or pressure necrosis. When using the probe on the following patients, take extreme care and change the measurement site more frequently according to symptoms and degree.**
  - **A patient with a fever**
  - **A patient with a peripheral circulation insufficiency**
  - **Neonate or low birth weight infant with delicate skin**

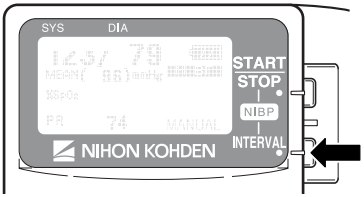
CAUTION

- **If the attachment site is dirty with blood, clean the attachment site before attaching the probe. If there is nail polish on the attachment site, remove the polish. Otherwise, the amount of transmitted light decreases and the measured data may be incorrect or measurement cannot be performed.**
- **If the skin gets irritated or redness appears on the skin from the probe, change the attachment site or stop using the probe.**
- **When the probe is attached on an appropriate site with sufficient circulation, but the error message confirming the probe attachment repeatedly appears, the probe may be deteriorated. Replace it with a new one.**
- **Do not use a probe that is deteriorated by aging. Accurate measurement cannot be performed.**
- **When using probes other than a TL-201T finger probe on a neonate, be careful when removing the adhesive tape from neonatal skin.**
- **When removing a probe taped to the skin, do not pull the cable. Otherwise the cable may break.**
- **When removing the probe from the attachment tape, do not pull the sensor cable. Otherwise the cable may get damaged.**
- **Before using the TL-260T multi-site Y probe, be sure to attach the probe to the sponge attachment tape S or L. Do not use the probe without the sponge attachment tape attached. It causes incorrect measurement and may damage the attachment site on the skin.**
- **When fixing the TL-260T multi-site Y probe with the sponge attachment tape, confirm that the adhesive part of the tape is not on the skin. The adhesive may cause oversensitive symptoms on the skin such as redness or itch. If the adhesive touches the skin, remove it carefully and slowly because neonatal skin is very delicate.**
- **Do not use a dirty sponge attachment tape. The measurement value may be incorrect.**
- **Refer to the probe instruction manual for details.**

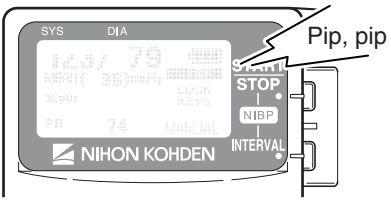
Locking the Keys on the Transmitter

To prevent the patient from pressing the keys on the transmitter during monitoring, you can lock the NIBP START/STOP and NIBP INTERVAL keys.

1. Press the NIBP INTERVAL key for about 3 seconds.



2. A “pip, pip” sounds and the “LOCK KEYS” message is displayed on the LCD.



When the NIBP START/STOP key or NIBP INTERVAL key is pressed while the keys are locked, the “PRESS INT. KEY 3S TO UNLOCK” message appears.

To unlock the keys:

1. Press the NIBP INTERVAL key for about 3 seconds.

2. A “pip, pip” sounds and the keys are unlocked. The “UNLOCK KEYS” message appears and the keys are unlocked.

Monitoring

When preparation is done, monitoring starts.

NIBP Oscillometric Method
NIBP is measured from the change in amplitude pattern of pulsatile oscillation in cuff pressure as the cuff pressure is reduced from above systolic to below diastolic pressure. The occlusive-oscillometry method uses this to determine the systolic, diastolic and mean arterial pressure.

NIBP Monitoring

Selecting the Initial Cuff Inflation Pressure

The initial cuff inflation pressure can be changed on the PARAMETER SETUP screen. The default setting is 180 mmHg. To change the setting, refer to the "Changing Parameter Setup Settings" section.

Selecting the Measurement Mode and Interval

Measurement Modes
There are three measurement modes: manual, auto and STAT. The selected mode or interval is displayed at the lower right of the screen.

The measurement mode and interval can be changed by pressing the NIBP INTERVAL key. When the key is pressed, the measurement mode changes according to the modes selected at "SELECTABLE INTERVALS" on the PARAMETER SETUP screen. MANUAL mode is already selected for the mode selection.

To select the modes for the mode selection, refer to the "Changing Parameter Setup Settings" section.

Manual Measurement
In Manual mode, a single NIBP measurement is performed when the NIBP START/STOP key is pressed.

STAT (Continuous) Measurement
In STAT mode, measurement is continuously repeated for 15 minutes after the NIBP START/STOP key is pressed.

When the STAT measurement for 15 minutes is completed, the measurement mode automatically changes to the Manual mode or Auto mode of selected interval depending on the "NIBP MODE

AFTER STAT" setting on the PARAMETER SETUP screen. The default setting is Manual mode. Refer to the "Changing Parameter Setup Settings" section.

The STAT measurement completes within 15 minutes. When more than 12 minutes elapse from the start of measurement, there will be no more measurement performed and the measurement mode changes to the mode selected for "NIBP MODE AFTER STAT" on the PARAMETER SETUP screen.

Auto Measurement
In Auto mode, measurement is performed automatically at the preset time intervals.

In Auto mode, a single measurement can be performed by pressing the NIBP START/STOP key between auto measurements.

Measuring NIBP

WARNING

- **Be careful when measuring NIBP on a patient with known bleeding disorders or coagulation. After NIBP measurement, there may be dot hemorrhage, or circulatory disorder by thrombus where cuff is attached.**
- **NIBP measurement may be incorrect in the following cases.**
  - **When using an electrical surgery unit.**
  - **When there is body movement.**
  - **When the pulse wave is small (insufficient peripheral circulation).**
  - **Too many arrhythmia.**
  - **When there is vibration.**
  - **When there is a rapid blood pressure change.**
  - **During CPR.**
- **When performing NIBP measurements in STAT mode or 5 minute intervals, periodically remove the cuff from the patient for ventilation. Otherwise, the skin temperature may increase at the cuff attachment site by 2 or 3°C (4 or 5°F). When measuring a patient with a fever or peripheral circulation insufficiency, it may cause a burn.**

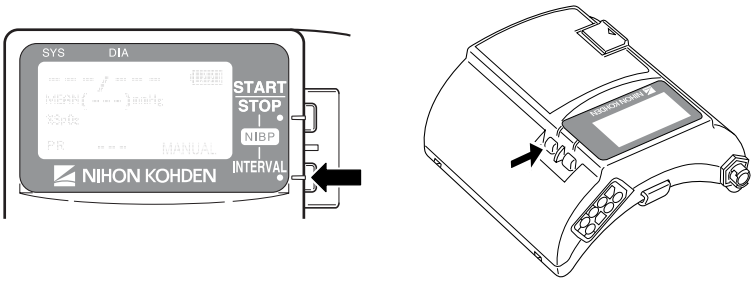
CAUTION

When performing NIBP measurement repeatedly, have a rest between measurements to recover adequate circulation.

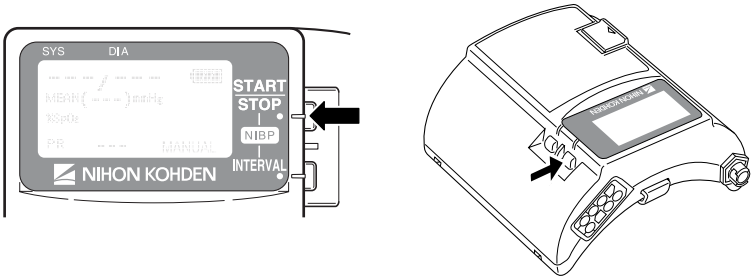
NOTE

- **When measuring patients who are conscious, help the patient to relax. Measurement may not be accurate if the patient's arm is tense or if the patient talks.**
- **The data for measurement on a leg tends to be higher than measurement on the arm. When making diagnosis based on the NIBP values, measure NIBP on an upper arm.**
- **Do not apply pressure to the cuff or air hose. NIBP may not be measured correctly because of noise or NIBP measurement may stop due to the NIBP safety circuit.**
- **When the transmitter is attached to the patient arm and the NIBP measurement is performed when moving, tell the patient to relax and keep quiet. Otherwise, measurement may be stopped or remeasurement is repeated due to body movement.**
- **If there is an abnormal noise generated during measurement, stop using the transmitter and contact your Nihon Kohden distributor.**
- **Do not measure NIBP of a patient on whom an IABP is being used. Measurement may be incorrect due to the mixing of the patient's own pulse and IABP pulse.**
- **NIBP cannot be measured on a neonate using this transmitter.**

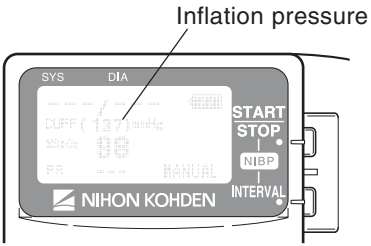
1. Select the measurement mode by pressing the NIBP INTERVAL key.



2. Press the NIBP START/STOP key to perform measurement.



The cuff is inflated and the inflation pressure is displayed on the screen.



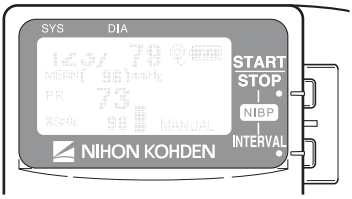
In manual mode: Measurement is performed once.
In STAT mode: Measurement is performed repeatedly for 15 minutes.
In auto mode: The first measurement is performed when the NIBP START/STOP key is pressed. The second measurement is performed when the current time in the transmitter reaches the selected time interval.

To stop measurement during measurement, press the NIBP START/STOP key again.

In STAT mode, after completing the STAT measurement, the measurement mode changes to the mode set for "NIBP MODE AFTER STAT" on the PARAMETER SETUP screen.

In auto mode, to stop measurement in auto mode, change the mode to manual. To cancel one measurement, press the NIBP START/STOP key during measurement.

After the measurement is complete, the measured data is displayed on the screen and is transmitted to the monitor.



When SpO_2 is not monitored, the pulse rate at the end of NIBP measurement is displayed.

During auto mode measurement, the measurement mode can be changed. During the interval, press the NIBP INTERVAL key to change the mode. When "MANUAL" is displayed for more than one second, the measurement in auto mode is stopped.

A buzzer can be set to sound at the start and end of NIBP measurement. Refer to the "Changing Parameter Setup Settings" section.

Data Display After NIBP Measurement

When the time set at "OLD NIBP DATA" on the PARAMETER SETUP screen elapses after the last measurement, the NIBP data is dimmed or hidden. Whether to dim or hide the old data can also be selected at "OLD NIBP DATA". Refer to the "Changing Parameter Setup Settings" section.

Monitoring SpO_2 during NIBP Measurement

When the SpO_2 probe is attached to the same limb as the NIBP cuff, the blood flow decreases during NIBP measurement and pulse wave cannot be detected and SpO_2 cannot be monitored properly. When "INHIBIT SpO_2 DURING NIBP" on the PARAMETER SETUP screen is set to ON (factory default setting), SpO_2 monitoring is paused during NIBP measurement to avoid SpO_2 alarm occurrence. However, when monitoring SpO_2 on the same limb as the NIBP, be careful when reading SpO_2 values.

ECG and Respiration Monitoring

When the electrodes are attached and the ECG leads are connected to the electrodes, heart rate, ECG, respiration rate and respiration waveform appear on the monitor.

When 6 leads are used on this transmitter, up to 8 lead (I, II, III, aVR, aVL, aVF, Va and Vb) of ECG waveforms can be displayed on the receiving monitor. The heart rate is also measured. When 3 leads are used, one channel ECG waveform of lead II can be displayed on the receiving monitor. Refer to the operator's manual of the monitor for details.

Respiration is monitored by measuring changes in impedance between the RA and LL ECG electrodes. This transmitter sends the changes in impedance to the monitor as a respiration waveform. The monitor displays the respiration waveform and calculates respiration rate. Refer to the operator's manual of the monitor for details.

WARNING

Interaction Between Minute Ventilation Rate-Adaptive Pacemakers and Cardiac monitoring and Diagnostic Equipment*

The bioelectric impedance measurement sensor of a minute ventilation rate-adaptive implantable pacemaker may be affected by the transmitter which is connected to the same patient. If this occurs, the pacemaker may pace at its maximum rate and the transmitter may give incorrect data to the monitor. If this occurs, disconnect the electrode leads from the patient or change the setting on

the pacemaker by referring to the pacemaker's manual. For more details, contact your pacemaker distributor or Nihon Kohden distributor.

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* Minute ventilation is sensed in rate-adaptive pacemakers by a technology known as bioelectric impedance measurement (BIM). Many medical devices in addition to pacemakers use this technology. When one of these devices is used on a patient with an active, minute ventilation rate-adaptive pacemaker, the pacemaker may erroneously interpret the mixture of BIM signals created in the patient, resulting in an elevated pacing rate.

For more information, see the FDA web site.
http://www.fda.gov/cdrh/safety.html

WARNING

When using this transmitter with an ESU, the ESU return plate and the electrodes for monitoring must be firmly attached to the patient. If the return plate is not attached correctly, it may burn the patient's skin where the electrodes are attached. Refer to the instruction manual for the ESU.

CAUTION

Turn off the power of cell telephones, small wireless devices and other devices which produce strong electromagnetic interference. Otherwise, the waveforms and measurements are affected by such interference and the displayed data may be incorrect.

NOTE

- **Noise generated from an electrosurgery unit may interfere on an ECG waveform, but will not damage it.**
- **If an electric blanket is used and incorrect heart rate is displayed on the monitor, turn off the pacing spike detection on the monitor.**
- **Turn the pacing spike detection to ON on the monitor when monitoring a pacemaker patient. Pacing pulse is detected by the transmitter and transmitted to the monitor. If the pacing spike detection is turned OFF, QRS and pacemaker spike may not be distinguished and pacemaker failure may not be recognized.**

Electrode Detachment

In the following conditions, the check electrode indication is displayed on the LCD of the transmitter and the "CHECK ELECTRODE" message is displayed on the monitor.

- Electrode is detached from skin.
- Electrode lead is disconnected from the electrode.
- Polarization voltage between the electrode and skin is excessively high.

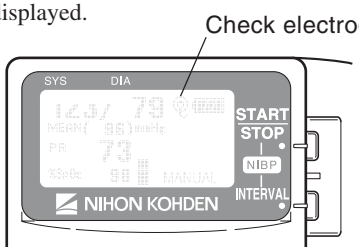
In these cases, check the cause and if necessary, replace electrodes with new ones.

CAUTION

When the "ELECTRODE OFF" or "CHECK ELECTRODE" message is displayed on the receiving monitor, check electrodes and electrode leads and remove the cause. While the "ELECTRODE OFF" or "CHECK ELECTRODE" message is being displayed, there is no ECG monitoring and no alarms.

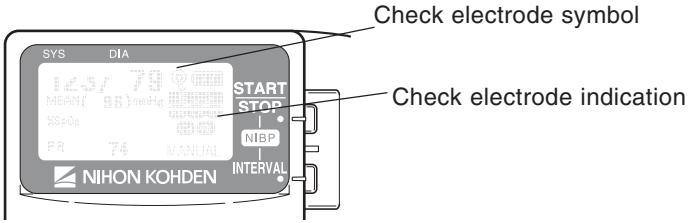
Check Electrode Indication on the Transmitter when Monitoring with 3 Electrodes

The "⚲" mark is displayed.



Check Electrode Indication on the Transmitter when Monitoring with 6 Electrodes

The "⚲" mark and either the detached lead or detached electrode position is indicated, depending on the LEADS OFF DISPLAY setting on the PARAMETER SETUP screen.



When LEADS OFF DISPLAY is set to CHAR, the detached lead is indicated

When LEADS OFF DISPLAY is set to IMAGE, the detached electrode position is indicated with X

SpO_2 Monitoring

When monitoring starts, SpO_2 and pulse waveform are sent to the monitor and SpO_2, pulse rate and pulse level bar graph are displayed on the transmitter LCD.

WARNING

- **Measurement may be incorrect in the following cases.**
  - **When the patient's carboxyhemoglobin or methemoglobin increases abnormally.**
  - **When dye is injected in the blood.**
  - **When using an electrical surgery unit.**
  - **During CPR.**
  - **When there is body movement.**
  - **When there is vibration.**
  - **When measuring at a site where there are venous pulses.**
  - **When the pulse wave is small (insufficient peripheral circulation).**
  - **When using an IABP (intra-aortic balloon pump).**
- **Check the circulation condition by observing the skin color of the measuring site and pulse waveform. Change the measuring site every 8 hours for disposable probes and every 4 hours for reusable probes. The skin temperature may increase at the attached site by 2 or 3°C (4 or 5°F) and cause a burn or pressure necrosis. When using the probe on the following patients, take extreme care and change the measurement site more frequently according to symptoms and degree.**
  - **A patient with a fever**
  - **A patient with peripheral circulation insufficiency**
  - **Neonate or low birth weight infant with delicate skin**
- **When not monitoring SpO_2, disconnect the SpO_2 cable from the transmitter. Otherwise, noise may interfere from the probe sensor and incorrect data is displayed on the screen.**

CAUTION

- **Turn off the power of cell telephones, small wireless devices and other devices which produce strong electromagnetic interference. Otherwise, the waveforms and measurements are affected by such interference and the displayed data may be incorrect.**
- **Normally external light does not affect monitoring, however, strong light such as an operating lamp or sunlight may affect monitoring. If affected, cover the measuring site with a blanket.**

- **Do not pull or bend the probe cable, and do not run over the probe cable with caster feet. Do not immerse the probe cable in detergents or water. Failure to follow these cautions may cause cable discontinuity, short circuit, skin burn on the patient and incorrect measurement data. Replace any broken probe with a new one.**
- **When the probe is attached on an appropriate site with sufficient circulation and the error message confirming the probe attachment repeatedly appears, the probe may be deteriorated. Replace it with a new one.**
- **When the probe failure message appears on the screen, replace it with a new one. Otherwise SpO_2 data may not be accurate.**
- **While a patient is on medication which causes vasodilation, the pulse waveform may change and in rare cases the SpO_2 value may not be displayed.**

NOTE

In order to maintain sufficient blood circulation, keep the measurement site warm by covering it with a blanket or something similar. Warming the site is effective, especially for a patient with a small pulse amplitude.

SpO_2 and PR Display Order

You can select the display order for SpO_2 and PR (pulse rate) on the LCD. Refer to the "Changing Parameter Setup Settings" section.

Monitoring SpO_2 during NIBP Measurement

When the SpO_2 probe is attached to the same limb as the NIBP cuff, the blood flow decreases during NIBP measurement and pulse wave cannot be detected and SpO_2 cannot be monitored properly. When "INHIBIT SpO_2 DURING NIBP" on the PARAMETER SETUP screen is set to ON (factory default setting), SpO_2 monitoring is paused during NIBP measurement to avoid SpO_2 alarm occurrence. However, when monitoring SpO_2 on the same limb as NIBP, be careful when reading SpO_2 values.

When monitoring SpO_2 is important, attach the probe to the limb to which the NIBP cuff or catheter is not attached.

When SpO_2 monitoring is paused during NIBP measurement, the SpO_2 value just before the start of NIBP measurement and an M mark are displayed on the transmitter for 30 seconds. When NIBP measurement is not completed after 30 seconds, "– – –" is displayed for the SpO_2 value. The same data also appears on the monitor screen.

NOTE

- **When continuous SpO_2 monitoring is necessary, attach the probe to the limb to which the NIBP cuff is not attached and set "INHIBIT SpO_2 DURING NIBP" on the PARAMETER SETUP screen to OFF.**
- **When the probe is attached to the same limb as the NIBP cuff, set the sync source to a parameter other than SpO_2 on the receiving monitor.**
- **When monitoring SpO_2 during STAT NIBP measurement, attach the probe to the limb to which the NIBP cuff is not attached.**

Display and Message List

Battery Indication

Indication	Cause	Countermeasure
	Fully charged battery	———
	Batteries are low.	Replace batteries.
	Batteries are low. NIBP cannot be measured.	
No indication	Dead batteries	

ECG/Respiration

Indication	Cause	Countermeasure
	Electrode lead is disconnected from the electrode.	Firmly connect the electrode lead to the electrode.
	Electrode lead is disconnected from the transmitter.	Firmly connect the electrode lead to the transmitter.
	Electrode lead discontinuity.	Replace the electrode lead with a new one.
	Electrode is not firmly attached to the skin.	Replace the electrode with a new one.
	Polarization voltage is abnormally high.	

When monitoring ECG with 6 electrodes, the electrode or lead detached position is indicated by either lead or electrode position. This is set at LEADS OFF DISPLAY on the PARAMETER SETUP screen. Refer to the “Changing Parameter Setup Settings” section.

LEADS OFF DISPLAY set to CHAR
ECG ELECTRODE set to AHA

LEADS OFF DISPLAY set to CHAR
ECG ELECTRODE set to IEC

LEADS OFF DISPLAY set to IMAGE

SpO_2

Message		Cause	Countermeasure
	During NIBP measurement	SpO_2 monitoring is paused for NIBP measurement.	Wait for NIBP measurement to finish.
	Detecting body movement	Considerable body movement.	When the message is displayed frequently, check the patient condition and, if necessary, change the attachment site.
		The probe is not attached to the patient properly.	
SpO_2 CHECK PROBE		The probe is not attached to the patient properly.	Attach the probe to the patient properly.
SpO_2 CHECK PROBE SITE		The probe is not attached at the appropriate site.	Attach the probe to a site 6 to 14 mm thick.
		Probe is expired.	Replace the probe with a new one.
SpO_2 DETECTING PULSE		Searching for the correct pulse wave.	Wait until the pulse wave is detected.
		The SpO_2 value cannot be obtained because the waveform is unstable.	Attach the probe to the patient properly.
		The probe is not attached to the patient properly.	
SpO_2 LIGHT INTERFERENCE		SpO_2 measurement site is under fluorescent light, surgical light, sunlight, etc.	Cover the measurement site with a blanket or cloth.
SpO_2 PROBE FAILURE		Probe is expired.	Replace the probe with a new one.
		Probe is damaged or short-circuited.	Replace the probe with a new one.
SpO_2 WEAK PULSE		Poor peripheral circulation.	Check the patient condition and change the attachment site.
		The probe is attached too tightly and is obstructing the blood circulation.	Check the probe attachment condition and if necessary, reattach the probe.

NIBP

Message	Cause	Countermeasure
NIBP AIR LEAK	The cuff and extension hose are not properly connected.	Connect them properly.
	The cuff hose (or extension hose) is not properly connected to the NIBP socket.	
	The cuff or extension hose is damaged.	Replace with a new one.
NIBP CANNOT DETECT PULSE	The patient's pulse wave is small.	Measure by palpation or auscultation.
	The cuff is not wrapped on the patient properly.	Wrap the cuff on the patient properly.
NIBP CUFF OCCLUSION	Transmitter malfunction.	Immediately remove the cuff from the patient and contact your Nihon Kohden distributor.
NIBP HIGH CUFF PRESS	Enormous pressure was applied by the pressure of the cuff.	Remove the cause.
NIBP INFLATION PRESS LOW	Insufficient cuff inflation pressure.	Wait for the remeasurement to be performed with increased cuff inflation pressure.
NIBP MEAS TIME-OUT	The measuring time exceeded the specified time due to arrhythmia, body movement, vibration or, cuff or air hose being squeezed.	Remove the cause if the cause is body movement, vibration or squeezing of cuff or hose.
NIBP MODULE FAILURE	Module malfunction.	Contact your Nihon Kohden distributor.
NIBP REMEASURING	NIBP is being remeasured due to arrhythmia, body movement, vibration or, cuff or air hose being squeezed.	If the message still appears after remeasurement, remove the cause if the cause is body movement, vibration or squeezing of cuff or hose.
NIBP SAFETY CIRCUIT RUNNING (When this message is displayed, measurement cannot be performed for 40 seconds.)	Measurement stopped by the safety circuit.	Check that the hose is not bent or squeezed.
		Wait 40 seconds, then perform remeasurement. If the message still appears, contact your Nihon Kohden distributor.
NIBP SYS OUT OF RANGE	The maximum blood pressure cannot be measured even when the cuff inflation pressure exceeded 280 mmHg when using adult cuff.	Measure by palpation or auscultation.
NIBP WEAK PULSE	The patient's pulse wave is too small.	Measure by palpation or auscultation.
	The cuff is wrapped too loosely.	Wrap the cuff properly.
	The cuff size is not appropriate.	Use the appropriate cuff.
NIBP ZEROING	NIBP zero balance is being adjusted.	Do not touch the cuff during zeroing. Wait for the message to disappear.

Troubleshooting

If the problem still remains after checking the following, contact your Nihon Kohden distributor.

Transmitter

Problem	Cause	Countermeasure
Nothing is displayed on the LCD after turning the power on.	Batteries are not installed correctly. The battery polarity is wrong.	Install the batteries correctly.
	Batteries are completely discharged.	Replace the batteries with new ones.
LCD is difficult to see (too dark or too light).	LCD brightness is not appropriate.	Change the LCD brightness on the SYSTEM SETUP screen. Refer to the "Changing System Setup Settings" section.
Nothing is displayed on the monitor after turning the transmitter power on.	The channel of the transmitter and monitor does not match.	Set the correct channel on the monitor.
	The software version of the multiple patient receiver is old.	Upgrade the multiple patient receiver software to receive signal from the transmitter. The software version must be 01-09 or later.
Signal receiving condition is poor.	Another transmitter of the same channel is used nearby.	Turn the transmitter power off. If the monitor still receives a signal, there is a high probability that another transmitter of the same channel is used nearby. Follow the instruction of your channel administrator and use another transmitter of a different channel.
	Signals are mixing.	Follow the instructions of your channel administrator and use another transmitter of a different channel.
	The transmitter is damaged.	Contact your Nihon Kohden distributor.

ECG/Respiration

Problem	Cause	Countermeasure
The heart rate is unstable.	Pacing detection setting on the monitor is not correct.	Turn off the pacing detection setting on the monitor. When monitoring a pacemaker patient, turn on pacing detection.
The "CHECK ELECTRODE" message appears on the receiving monitor.	Electrode lead is disconnected from the electrode.	Firmly connect the electrode lead to the electrode.
	Electrode lead discontinuity	Replace the electrode lead with a new one.
	Electrode is not firmly attached to the skin.	Replace the electrode with a new one.
	Polarization voltage is abnormally high.	Use Nihon Kohden specified electrodes.
ECG baseline is thick. (Hum is overlapping)	The gel on the electrode is dried out.	Replace the electrode with a new one.
	The gel on the electrode is coming off.	
	Electric blanket is used.	Cover the blanket with a shield cover.
	Hum filter is set to OFF on the monitor	Set the filter to ON.
Respiration waveform measurement is unstable.	The gel on the electrode is dried out.	Replace the electrode with a new one.
	The gel on the electrode is coming off.	

SpO_2

Problem	Cause	Countermeasure
SpO_2 data is unstable and not reliable.	The probe size is not appropriate for the patient.	Use the appropriate probe for the patient.
	Probe attachment condition is poor. Probe is partly detached from the skin. External light gets in.	Firmly attach the probe according to the procedure in the probe operator's manual.
	Measurement site is dirty. Patient is wearing nail polish.	Remove dirt and nail polish.
	Probe is attached to the same limb that is used for NIBP measurement.	When the probe and cuff are attached to the same limb, set "INHIBIT SpO_2 DURING NIBP" setting on the PARAMETER SETUP screen to ON.
		Attach the probe to the opposite limb. Avoid a site where blood circulation condition changes greatly.

NIBP

Problem	Cause	Countermeasure
Cuff inflation pressure is less than 10 mmHg.	The cuff hose is not connected to the NIBP socket properly.	Connect the cuff hose to the socket properly.
	The cuff is not wrapped around the arm or is wrapped too loosely.	Wrap the cuff around the upper arm.
The cuff does not inflate when the NIBP START/STOP key is pressed.	The cuff hose is not connected to the NIBP socket.	Connect the cuff hose to the socket firmly.
	The cuff hose or extension hose may be folded or squeezed when the cuff pressure display on the screen increases quickly but the actual cuff does not inflate.	Check the cuff hose and air hose.
Abnormal measurement results are displayed.	The cuff size is not correct.	Select the cuff which fits the patient's limb circumference.
	The cuff is not wrapped around the arm correctly.	Wrap the cuff around the upper arm, not too tightly or too loosely.
	NIBP data is not correct because of body movement.	Prevent the patient from moving during measurement.
	Vibration on the cuff.	Check that nothing is touching the cuff during measurement.
		Change the measuring site.
The cuff is suddenly deflated during inflation.	The NIBP START/STOP key is pressed during inflation.	———
Auto mode measurement does not start even when the time interval has passed.	The NIBP INTERVAL key is pressed and the measurement mode is changed.	Check the measurement mode and interval.
The cuff suddenly inflates.	The measurement mode is set to auto mode.	Check the time interval. If necessary, stop measurement.
Cannot connect cuff to the air hose.	Unspecified cuff is used.	Use a cuff specified by Nihon Kohden.

Problem	Cause	Countermeasure
Cannot measure NIBP.	Vibration on the cuff.	Check that nothing is touching the cuff during measurement.
	The cuff hose or extension hose is bent or squeezed.	Remove the cause.
	The cuff has worn out.	Use a new cuff.
Blood congestion occurs.	Measuring over a long period of time at short intervals.	Increase the measuring interval.
		Do not measure NIBP over a long time.
Thrombus occurs.	Measuring on a patient with known bleeding disorders or coagulation.	Do not perform NIBP measurement on such a patient.
NIBP data on the screen is --- or dark.	The time set for “OLD NIBP DATA” on the PARAMETER SETUP screen elapsed from the last measurement.	When NIBP is measured again, the data is displayed in normal brightness.
Three loud pip sounds indicting NIBP measurement cannot be started.	The cuff is not deflated enough to start another measurement.	Wait 30 seconds and measure again.

Maintenance

To use the instrument in safe and optimum condition, perform maintenance check once every six months.

CAUTION

Do not disassemble the transmitter when performing maintenance and inspection. Do not repair the transmitter. When there is any problem with the transmitter after maintenance and inspection, contact your Nihon Kohden distributor.

A maintenance check sheet is provided at the end of this section. Make a copy of this check sheet before performing maintenance check.

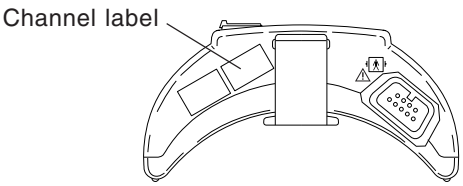
1. External Check

- There are no damaged or dirty parts on the outside of the transmitter.
- The battery case cover is not damaged, the spring is firmly fixed and the battery case cover can be closed firmly.
- NIBP socket is not damaged.
- Keys are not damaged.
- Electrode leads are not damaged.
- There is no blood or chemicals on the transmitter.

2. Transmitter Channel

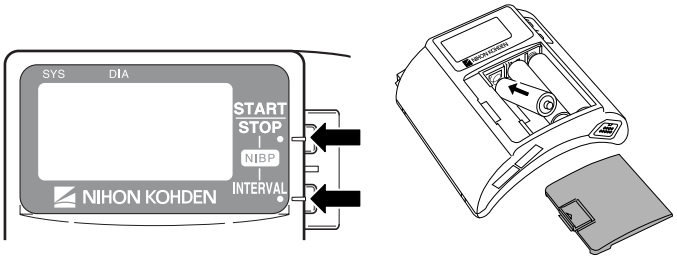
Check that the channel of the transmitter and the label match.

1. Check that the channel number label attached to the transmitter is not torn or removed.

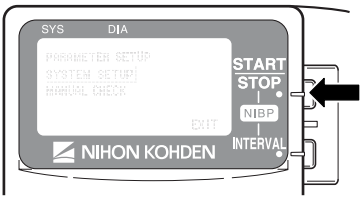


2. Remove one battery.

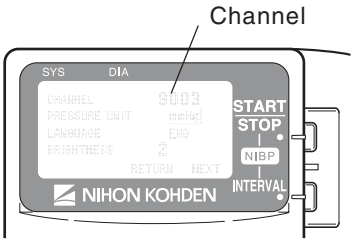
3. While pressing the NIBP START/STOP and NIBP INTERVAL keys, install the battery. The SETUP screen appears.



4. Press the NIBP INTERVAL key to move the cursor to “SYSTEM SETUP”.



5. Press the NIBP START/STOP key to enter the SYSTEM SETUP screen. The channel of this transmitter is displayed.



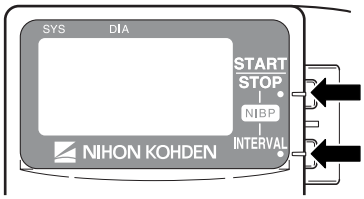
6. Check that the channel displayed on the LCD matches the label on the transmitter.

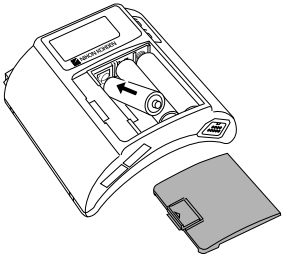
3. LCD Display

Check that there are no dots missing on the LCD.

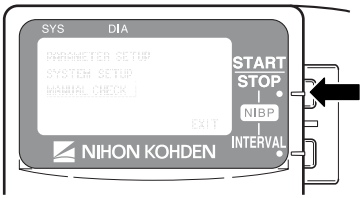
1. Remove one battery.

2. While pressing the NIBP START/STOP and NIBP INTERVAL keys, install the battery. The SETUP screen appears.

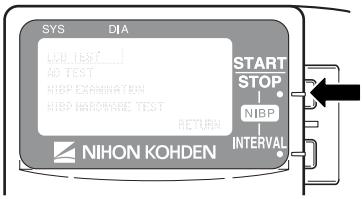




3. Press the NIBP INTERVAL key twice to move the cursor to “MANUAL CHECK”.

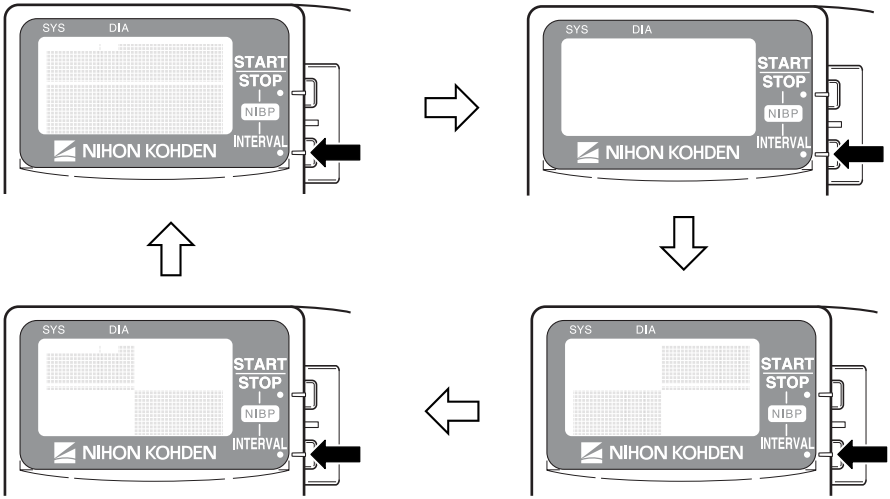


4. Press the NIBP START/STOP key to enter the MANUAL CHECK screen.



5. Check that the cursor is on “LCD TEST” and press the NIBP START/STOP key.

6. Every time the NIBP INTERVAL key is pressed, the screen changes as below. Check that there are no dots missing.



When the NIBP START/STOP key is pressed, the screen returns to the MANUAL CHECK screen.

4. Key Operation

NIBP START/STOP Key

1. Attach the NIBP cuff to your upper arm.

2. Press the NIBP START/STOP key. Check that the cuff inflates and deflates properly.

3. Press the NIBP START/STOP key again. During inflation, press the NIBP START/STOP key to check that the cuff deflates properly.

NIBP INTERVAL Key

1. Press the NIBP INTERVAL key and check that the NIBP measuring mode can be changed.

2. Select any interval and press the NIBP START/STOP key to perform auto measurement. Check that the NIBP is measured at the selected interval.

5. NIBP Cuff for Attaching Transmitter to Patient Arm

The NIBP cuff is a consumable. Check the following and when necessary, replace it with a new one.

Appearance

- There are no dirty parts.
- There are no broken stitches on the cuff.
- The label on the cuff is readable.
- The velcro tape on the cuff is not removed and there are no broken stitches.
- The lock plate is not damaged and functions properly.

Inflation bag

- The inflation bag is not torn or damaged.
- There is no water inside the inflation bag.
- The connector on the inflation bag is not damaged.

Maintenance Check Sheet

Hospital/Organization: _____

Service Personnel: _____

Instrument Name: Transmitter

Instrument Model: ZM-940PA

Instrument Serial Number: _____

Hardware Revision Number: _____

Software Revision Number: _____

1. External Check	OK	No
2. Transmitter Channel	OK	No
3. LCD Display	OK	No
4. Key Operation	OK	No
5. NIBP Cuff for Attaching Transmitter to Patient Arm	OK	No

Overall Judgement

- ☐ OK
- ☐ Can be used but needs maintenance
- ☐ Maintenance required. Cannot be used.

Repair Parts Availability Policy

Nihon Kohden Corporation (NKC) shall stock repair parts (parts necessary to maintain the performance of the instrument) for a period of 8 years from the date of delivery. In that period NKC or its authorized agents will repair the instrument. This period may be shorter than 8 years if the board or part necessary for the faulty section is not available.

Lifetime and Disposal

Disposing of Used Batteries

Battery Lifetime

Replace the batteries when the battery replacement indication appears on the transmitter. When using rechargeable batteries, recharge them.

Type	Lifetime (Measuring parameters)		
	ECG, SpO_2, NIBP	ECG, SpO_2	ECG only
NiMH secondary	2 days	2 days	2.5 days
Alkaline primary	1 day	2.5 days	3 days

The above data is when new batteries are used at room temperature, NIBP is measured in auto mode at 60 minute intervals and SpO_2 is measured on an index finger of a male patient with weight 60 kg.

Operation time depends on the thickness of SpO_2 probe attachment site.

Disposal

NOTE

Remove the batteries before disposing of the transmitter.

Before disposing of the batteries, check with your local solid waste officials for details in your area for proper disposal. It may be illegal to dispose of these batteries in the municipal waste stream.

Disposing of Electrodes, SpO_2 Probes and NIBP Cuffs

Refer to the manual of each item.

Cleaning, Disinfection and Sterilization

Transmitter and Electrode Leads

CAUTION

- **This transmitter is not waterproof. If detergent or liquid spills into the transmitter, stop cleaning/disinfecting/sterilizing it and contact your Nihon Kohden distributor. The transmitter needs to be checked for safety and function before use.**
- **Before cleaning or disinfecting the transmitter, remove the batteries from the transmitter.**
- **The transmitter cannot be sterilized.**

Cleaning

Wipe the transmitter and electrode leads with a soft cloth moistened with disinfecting alcohol or neutral detergent diluted with water. After cleaning, dry them completely.

Disinfection

CAUTION

- **Do not immerse the electrode lead connector in liquid.**
- **Do not disinfect with hypochlorous acid.**
- **Use the recommended concentration.**

Wipe the outside surface of the transmitter and electrode lead with a non-abrasive cloth moistened with any of the disinfectants listed below. Use the recommended concentration.

Disinfectant	Concentration (%)
Glutaraldehyde solution	2.0
Hydrochloric alkyl diaminoethylglycine	0.5
Benzalkonium chloride	0.2
Benzethonium chloride solution	0.2
Chlorohexidine gluconate solution	0.5

SpO_2 Probe

Refer to the probe manual.

YP-943P/944P NIBP Cuffs

CAUTION

- **Do not autoclave.**
- **Use only glutaraldehyde solution.**
- **Never allow liquid to get inside the rubber cuff.**
- **Do not sterilize or disinfect the cuff with ultraviolet light or ozone.**

Cleaning

To clean the cuff, remove the lock plate and carefully pull out the inflation bag from the cloth cover.

Cloth cover: Wash with neutral detergent and water. Thoroughly dry it. When washing in a washing machine, put it in a net.

Inflation bag: Wipe with a soft cloth or cotton moistened with disinfecting alcohol. Thoroughly dry it.

Disinfection

To disinfect the cuff, use glutaraldehyde solution. Use the recommended concentration of the disinfectant. Refer to the disinfectant manual for details. After disinfection, clean the cuff as described above.

Specifications

Measuring Parameters

Measuring waveforms:	ECG, Respiration in impedance method, pulse
Measuring numeric data:	SpO_2, NIBP, pulse rate

Transmitting Data

Waveform data:	ECG, respiration, pulse wave
Numeric data:	SpO_2 and NIBP
Status information:	Battery replacement, channel ID, type of transmitter, check electrodes, abnormal polarization voltage, pacing data, SpO_2 status

Displayed Data

SpO_2, NIBP, pulse rate, pulse wave bar graph, check electrode, battery replacement, NIBP measurement mode and status information

ECG Measurement

Channels:	4
Input range:	±5 mV or more
DC offset:	±500 mV or more
Input impedance:	5 MΩ or more (5 Hz)
Pacing pulse detection:	ANSI/AAMI EC13 Based upon Pacemaker pulse rejection Capability

Respiration Measurement

Measuring method:	Impedance method
Impedance range:	0 to 2 kΩ or less

SpO_2 Measurement

Display range:	Depends on the receiving monitor
Measuring range:	0 to 100%, in 1% steps
Minimum display range:	1%

Measuring accuracy (When the measuring accuracy of the SpO_2 probe is not considered):

±1 (80% ≤ SpO_2 ≤ 100%)
±2 (50% ≤ SpO_2 < 80%)
Less than 50% is not specified.

(When considering the measuring accuracy of the SpO_2 probe):

±2 (80% ≤ SpO_2 ≤ 100%)
±3 (70% ≤ SpO_2 < 80%)
Less than 70% is not specified.

NIBP Measurement

Displayed items:	Systolic, diastolic, mean
Cuff pressure display range:	0 to 300 mmHg
Measurement modes:	Manual, STAT, auto at 5, 10, 15, 30, 60, 120 or 240 minute interval

Pulse Rate

Measuring range:	30 to 200 beats/minute ±8 beats/min (NIBP) 30 to 250 beats/min ±3% ±1 beat/min (SpO_2)

Transmitter

FCC regulation:	FCC part 95 Subpart H Wireless Medical Telemetry Service (WMTS)
Field strength limits:	<200 mV/m (at 3 m)
Undesired emission:	below 960 MHz: 200 µV/m (at 3 m) above 960 MHz: 500 µV/m (at 3 m)
Antenna:	Internal
Transmission channel:	indicated on the transmitter
Transmission frequency range:	608.0250 to 613.9750 MHz
Channel spacing:	50 kHz (25 kHz when interleave)
Type of emission:	F1D
Occupied bandwidth:	<20 kHz
Effective radiated power:	1.0 mW (conducted)

Power Requirements

Operating voltage:	3.2 to 4.8 V
Battery type:	Three AA type NiMH secondary batteries Three AA type alkaline dry cell primary batteries

Battery lifetime:

Type	Lifetime (Measuring parameters)		
	ECG, SpO_2, NIBP	ECG, SpO_2	ECG only
NiMH secondary	2 days	2 days	2.5 days
Alkaline primary	1 day	2.5 days	3 days

The above data is when new batteries are used at room temperature, NIBP is measured in auto mode at 60 minute intervals and SpO_2 is measured on an index finger of a male patient with weight 60 kg.
Operation time depends on the thickness of SpO_2 probe attachment site.

Dimension and Weight

Dimension:	114 W × 103 H × 58 D (mm)
Weight:	280 g ±30 g (excluding batteries, NIBP cuff and other accessories)

Environment

Operating environment

Operating temperature:	5 to 40°C, 41 to 104°F When using NIBP cuff, 10 to 40°C, 50 to 104°F
Operating humidity:	30 to 85% (non-condensing)
Operating atmospheric pressure:	70 to 106 kPa

Storage environment

Storage temperature:	–20 to 65°C, –4 to 149°F
Storage humidity:	10 to 95%
Storage atmospheric pressure:	70 to 106 kPa

Safety Standards

Safety standard:	CAN/CSA-C22.2 No. 601-1 M90:1990 CAN/CSA-C22.2 No. 601-1. 1S1-94:1994 CAN/CSA-C22.2 No. 601-1. 1B-90:R2002 CAN/CSA-C22.2 No. 60601-2-49-04:2004 IEC 60601-1:1988 IEC 60601-1 Amendment1:1991 IEC 60601-1 Amendment2:1995 IEC 60601-1-2:2001 IEC 60601-2-27:1994 IEC 60601-2-30:1999 IEC 60601-2-49:2001
According to the type of protection against electrical shock:	INTERNALLY POWERED EQUIPMENT
According to the degree of protection against electrical shock:	
ECG and impedance method respiration:	DEFIBRILLATION-PROOF TYPE CF APPLIED PART
SpO_2 and NIBP:	DEFIBRILLATION-PROOF TYPE BF APPLIED PART
According to the degree of protection against harmful ingress of water:	IPX0 (Ordinary equipment)
According to the degree of safety of application in the presence of a FLAMMABLE ANAESTHETIC MIXTURE WITH AIR, OR WITH OXYGEN OR NITROUS OXIDE:	Equipment not suitable for use in the presence of FLAMMABLE ANAESTHETIC MIXTURE WITH AIR, OR WITH OXYGEN OR NITROUS OXIDE
According to the mode of operation:	CONTINUOUS OPERATION

Electromagnetic Compatibility

IEC 60601-1-2 (2001)
Emissions: CISPR11 Group1,Class B

Electromagnetic Emissions

This Model ZM-940PA is intended for use in the electromagnetic environment specified below.
The customer or the user of the ZM-940PA should assure that it is used in such an environment.

Emissions test	Compliance	Electromagnetic environment guidance
RF emissions CISPR 11	Group 1	The ZM-940PA uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class B	The ZM-940PA is suitable for use in all establishments, including domestic establishments.
Harmonic emissions IEC 61000-3-2	Not applicable	
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Not applicable	

Electromagnetic Immunity

This Model ZM-940PA is intended for use in the electromagnetic environment specified below. The customer or the user of the ZM-940PA should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment -Guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±6 kV contact ±8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/ burst IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines	Not applicable	—
Surge IEC 61000-4-5	±1 kV differential mode ±2 kV common mode	Not applicable	—
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5% U_T (>95% dip in U_T) for 0.5 cycle 40% U_T (60% dip in U_T) for 5 cycles 70% U_T (30% dip in U_T) for 25 cycles <5% U_T (>95% dip in U_T) for 5 s	Not applicable	—
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
NOTE U_T is the AC mains voltage prior to application of the test level			

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
			Portable and mobile RF communications equipment should be used no closer to any part of the ZM-940PA, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. **Recommended separation distance**
Conducted RF IEC 61000-4-6	3 Vrms	3 Vrms	$d = 1.2\sqrt{P}$
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m 80 MHz to 2.5 GHz	$d = 1.2\sqrt{P}$ 80 MHz to 800 MHz $d = 2.3\sqrt{P}$ 800 MHz to 2.5 GHz where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as deter mined by an electromagnetic site survey*[1], should be less than the compliance level in each frequency range*[2]. Interference may occur in the vicinity of equipment marked with the following symbol:

NOTE 1: At 80 MHz and 800 MHz, the higher frequency range applies.

NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

*[1] Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the ZM-940PA is used exceeds the applicable RF compliance level above, the ZM-940PA should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the ZM-940PA.

*[2] Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

Recommended Separation Distances between Portable and Mobile RF Communications Equipment

The ZM-940PA is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the ZM-940PA can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the ZM-940PA as recommended below, according to the maximum output power of the communications.

Rated maximum output power of transmitter (W)	Separation distance according to frequency of transmitter (m)		
	150 kHz to 80 MHz $d = 1.2\sqrt{P}$	80 MHz to 800 MHz $d = 1.2\sqrt{P}$	800 MHz to 2.5 GHz $d = 2.3\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

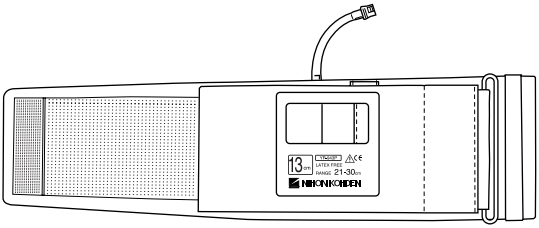
System Composition for EMC Test

The ZM-940PA bedside monitor is tested to comply with IEC 60601-1-2 (2001) with the following composition. If any part which is not specified by Nihon Kohden is used, the EMC specifications may not comply.

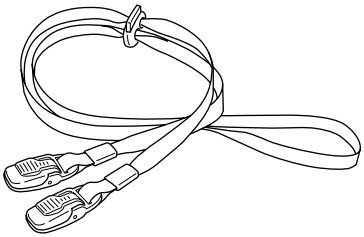
Units	Cable length
ZM-940PA transmitter	---
YP-943P NIBP cuff	0.15 m
BR-906P ECG electrode lead	0.8 m
TL-201T finger probe	1.6 m

Standard Accessories

1



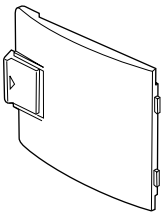
2



No.	Name	Model	Q'ty	Supply Code No.
1	NIBP cuff for adult, standard	YP-943P	1	S938B
2	Strap	---	1	Y236

The following parts are available for replacement.

3



4

Lock plate is a standard accessory of the YP-943P/944P NIBP cuff.

No.	Name	Model	Q'ty	Supply Code No.
3	Battery case cover	——	1	6144-012004
4	Lock plate	——	1	6113-049585

Options

CAUTION

Use only Nihon Kohden electrodes, electrode leads, SpO_2 probes and NIBP cuffs to assure maximum performance from your instrument.

Transmitter

Channel writer, QI-901PK

ECG/RESP

Name	Application	Model	Q'ty	Supply Code No.
Electrode lead	3 electrodes,clip type, lead length 80 cm	BR-903PA	1	K911A
	3 electrodes, snap type, lead length 80 cm	BR-913PA	1	K910B
	6 electrodes,clip type, lead length 80 cm	BR-906PA	1	K912A
	6 electrodes,snap type, lead length 80 cm	BR-916PA	1	K915A

NIBP

Name		Width (cm)	Air Hose Length (cm)	Model	Q'ty	Supply Code No.
Cuff for adult, for attaching transmitter to patient arm	Standard	13	15	YP-943P*	1	S938B
	Large	15		YP-944P*		S938C
Cuff for infants		5	15	YP-960T	1	S943A
Cuff for children	Small	7		YP-961T		S943B
	Standard	10		YP-962T		S943C
Cuff for adult	Standard	13		YP-963T		S944B
	Large	15		YP-964T		S944C
Disposable cuff for infants		6	20	YP-910P	20	---
Disposable cuff for children		9		YP-912P		---
Disposable cuff for adults	Small	12		YP-913P		---
	Standard	14		YP-914P		---
	Large	16		YP-915P		---
Extension hose		—	150	YN-990P	1	S903

* The lock plate is provided with these NIBP cuffs.

SpO_2

Name	Cable length	Model/ Code No.	Q'ty	Supply Code No.
Finger probe (reusable)	0.6 m	TL-201T	1	P225H
	1.6 m			P225F
Multi-site probe (reusable)	1.6 m	TL-220T		P225G
SpO_2 probe (for adult, disposable)		TL-251T	5	P201A
SpO_2 probe (for child, disposable)		TL-252T		P201B
SpO_2 probe (for neonate, disposable)		TL-253T		P201C
Multi-site Y probe (for low birth weight infant/child/ neonate, disposable)		TL-260T		P205A
SpO_2 probe (for adult, disposable)		TL-271T	24	P203A
SpO_2 probe (for child, disposable)		TL-272T		P203B
SpO_2 probe (for neonate/adult, disposable)		TL-273T		P203C
SpO_2 probe (for child/infant, disposable)		TL-274T		P203D
SpO_2 probe(for adult/neonate, disposable)	0.8 m	TL-051S	5	P228A
	1.6 m	TL-052S		P228B
SpO_2 probe (for child/infant, disposable)	0.8 m	TL-061S		P229A
	1.6 m	TL-062S		P229B
COTTONY tape	---	340703	20	P259
Foam tape for TL-051S/052S/ 061S/062S		---	4 × 25 package	P260
Attachment tape for TL-220T/ 251T/252T/253T			3 × 30 package	P263
Attachment tape S for TL-260T			24	P260A
Attachment tape L for TL-260T				P260B

Transmission Frequencies

USA BAND	CHANNEL SPACING C	USA BAND	CHANNEL SPACING C	USA BAND	CHANNEL SPACING C
Transmission frequency (MHz)	25 kHz step Channel No.	Transmission frequency (MHz)	25 kHz step Channel No.	Transmission frequency (MHz)	25 kHz step Channel No.
608.0250	9002	608.7750	9062	609.5250	9122
608.0500	9004	608.8000	9064	609.5500	9124
608.0750	9006	608.8250	9066	609.5750	9126
608.1000	9008	608.8500	9068	609.6000	9128
608.1250	9010	608.8750	9070	609.6250	9130
608.1500	9012	608.9000	9072	609.6500	9132
608.1750	9014	608.9250	9074	609.6750	9134
608.2000	9016	608.9500	9076	609.7000	9136
608.2250	9018	608.9750	9078	609.7250	9138
608.2500	9020	609.0000	9080	609.7500	9140
608.2750	9022	609.0250	9082	609.7750	9142
608.3000	9024	609.0500	9084	609.8000	9144
608.3250	9026	609.0750	9086	609.8250	9146
608.3500	9028	609.1000	9088	609.8500	9148
608.3750	9030	609.1250	9090	609.8750	9150
608.4000	9032	609.1500	9092	609.9000	9152
608.4250	9034	609.1750	9094	609.9250	9154
608.4500	9036	609.2000	9096	609.9500	9156
608.4750	9038	609.2250	9098	609.9750	9158
608.5000	9040	609.2500	9100	610.0000	9160
608.5250	9042	609.2750	9102	610.0250	9162
608.5500	9044	609.3000	9104	610.0500	9164
608.5750	9046	609.3250	9106	610.0750	9166
608.6000	9048	609.3500	9108	610.1000	9168
608.6250	9050	609.3750	9110	610.1250	9170
608.6500	9052	609.4000	9112	610.1500	9172
608.6750	9054	609.4250	9114	610.1750	9174
608.7000	9056	609.4500	9116	610.2000	9176
608.7250	9058	609.4750	9118	610.2250	9178
608.7500	9060	609.5000	9120	610.2500	9180

USA BAND	CHANNEL SPACING C	USA BAND	CHANNEL SPACING C	USA BAND	CHANNEL SPACING C
Transmission frequency (MHz)	25 kHz step Channel No.	Transmission frequency (MHz)	25 kHz step Channel No.	Transmission frequency (MHz)	25 kHz step Channel No.
610.2750	9182	611.1000	9248	611.9250	9314
610.3000	9184	611.1250	9250	611.9500	9316
610.3250	9186	611.1500	9252	611.9750	9318
610.3500	9188	611.1750	9254	612.0000	9320
610.3750	9190	611.2000	9256	612.0250	9322
610.4000	9192	611.2250	9258	612.0500	9324
610.4250	9194	611.2500	9260	612.0750	9326
610.4500	9196	611.2750	9262	612.1000	9328
610.4750	9198	611.3000	9264	612.1250	9330
610.5000	9200	611.3250	9266	612.1500	9332
610.5250	9202	611.3500	9268	612.1750	9334
610.5500	9204	611.3750	9270	612.2000	9336
610.5750	9206	611.4000	9272	612.2250	9338
610.6000	9208	611.4250	9274	612.2500	9340
610.6250	9210	611.4500	9276	612.2750	9342
610.6500	9212	611.4750	9278	612.3000	9344
610.6750	9214	611.5000	9280	612.3250	9346
610.7000	9216	611.5250	9282	612.3500	9348
610.7250	9218	611.5500	9284	612.3750	9350
610.7500	9220	611.5750	9286	612.4000	9352
610.7750	9222	611.6000	9288	612.4250	9354
610.8000	9224	611.6250	9290	612.4500	9356
610.8250	9226	611.6500	9292	612.4750	9358
610.8500	9228	611.6750	9294	612.5000	9360
610.8750	9230	611.7000	9296	612.5250	9362
610.9000	9232	611.7250	9298	612.5500	9364
610.9250	9234	611.7500	9300	612.5750	9366
610.9500	9236	611.7750	9302	612.6000	9368
610.9750	9238	611.8000	9304	612.6250	9370
611.0000	9240	611.8250	9306	612.6500	9372
611.0250	9242	611.8500	9308	612.6750	9374
611.0500	9244	611.8750	9310	612.7000	9376
611.0750	9246	611.9000	9312	612.7250	9378

USA BAND	CHANNEL SPACING C	USA BAND	CHANNEL SPACING C	USA BAND	CHANNEL SPACING C
Transmission frequency (MHz)	25 kHz step Channel No.	Transmission frequency (MHz)	25 kHz step Channel No.	Transmission frequency (MHz)	25 kHz step Channel No.
612.7500	9380	613.1750	9414	613.6000	9448
612.7750	9382	613.2000	9416	613.6250	9450
612.8000	9384	613.2250	9418	613.6500	9452
612.8250	9386	613.2500	9420	613.6750	9454
612.8500	9388	613.2750	9422	613.7000	9456
612.8750	9390	613.3000	9424	613.7250	9458
612.9000	9392	613.3250	9426	613.7500	9460
612.9250	9394	613.3500	9428	613.7750	9462
612.9500	9396	613.3750	9430	613.8000	9464
612.9750	9398	613.4000	9432	613.8250	9466
613.0000	9400	613.4250	9434	613.8500	9468
613.0250	9402	613.4500	9436	613.8750	9470
613.0500	9404	613.4750	9438	613.9000	9472
613.0750	9406	613.5000	9440	613.9250	9474
613.1000	9408	613.5250	9442	613.9500	9476
613.1250	9410	613.5500	9444	613.9750	9478
613.1500	9412	613.5750	9446		