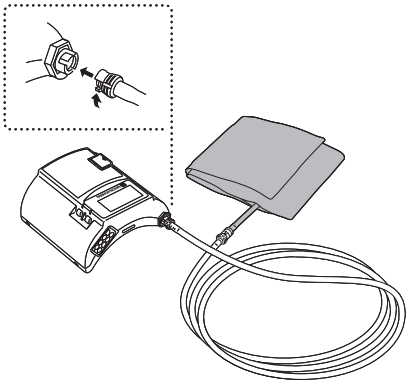
When Using Disposable Cuffs or YP-960T series Reusable Cuffs

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 is 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 reflux of blood and stop injection.

CAUTION

Do not attach the cuff to the site where there is injury or inflammation. If the skin gets irritated or redness appears on the skin from the cuff, change the attachment site or stop using the cuff. Take extreme care on the patients with delicate skin.

CAUTION

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 increase.

CAUTION

Do not reuse disposable parts and accessories.

CAUTION

NIBP and SpO_2 can be measured on the same limb, but the SpO_2 monitoring might not be accurate during NIBP measurement. Be careful when reading the SpO_2 values.*

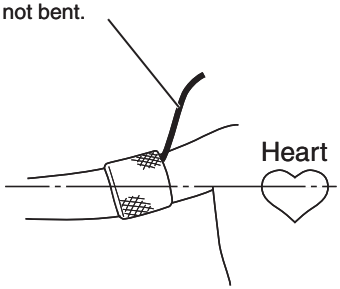
* Monitoring SpO_2 during NIBP Measurement
When the SpO_2 probe is attached to the same limb as the NIBP cuff, the blood flow decreases during NIBP measurement and pulse wave cannot be detected and SpO_2 cannot be monitored properly. When "INHIBIT SpO_2 DURING NIBP" on the PARAMETER SETUP screen is set 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.

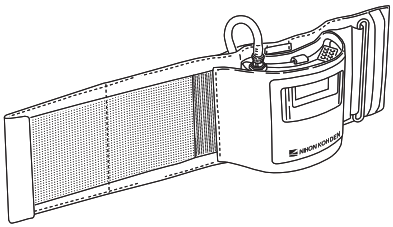
Cuff Position

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

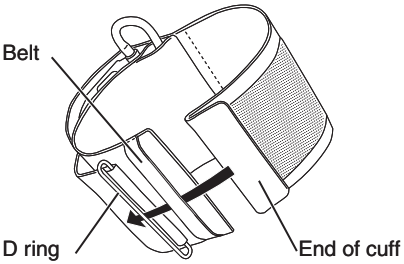


Place the cuffed upper arm (brachium) at the same height as the patient's heart. If the cuff is not at the same level as the heart, the weight of the blood affects the blood pressure reading. The pressure difference per unit height is 0.7 mmHg/cm. The blood pressure reading decreases when the arm is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

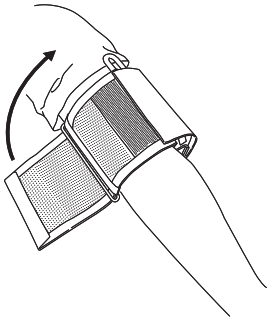
Attaching the Transmitter on an Arm (Using the YP-943P/944P NIBP Cuff)



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

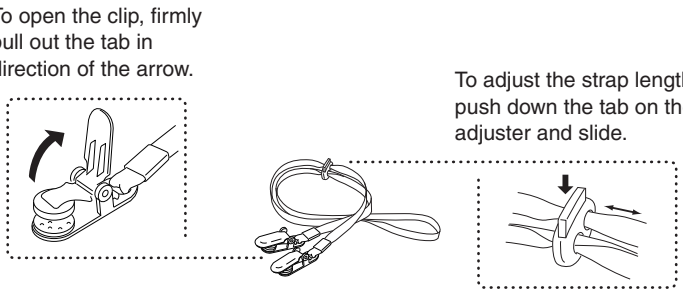
The cuff must not wrap around the elbow.

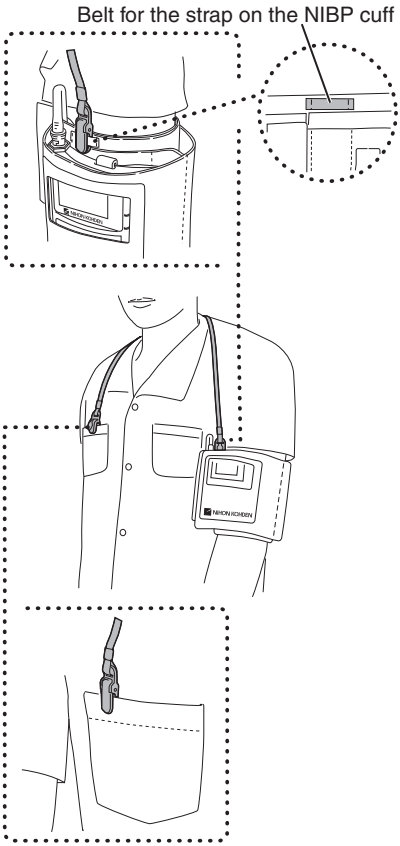
Attaching the Strap to the Transmitter

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.

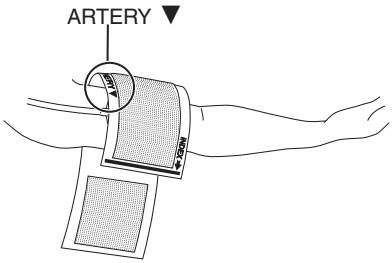
Attach a strap provided with the transmitter to the NIBP cuff and patient clothes.



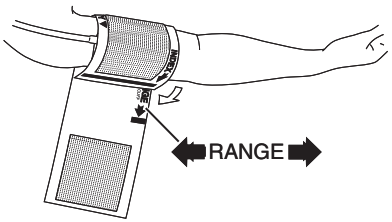


1. Adjust the length of the strap.
2. Clip one end of the strap to the belt for the strap on the NIBP cuff.
3. Clip the other end of the strap to the patient's clothes as shown left.

Placing the Transmitter on the Bed (Using the Disposable Cuffs or YP-960T series Reusable 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.

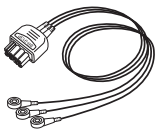
Attaching Electrodes

Selecting Electrode Lead

CAUTION

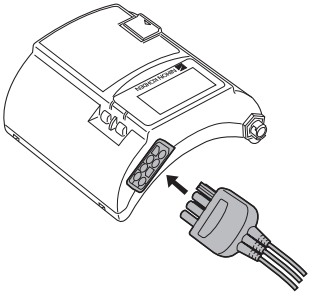
Only use Nihon Kohden specified electrodes and electrode leads. When other type of electrodes or electrode leads are used, the "CHECK ELECTRODES" message may be displayed and monitoring may stop.

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

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

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

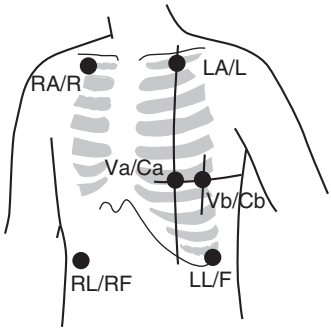
Follow the physician's instructions for electrode placement when available.
For ECG monitoring, electrodes are attached only on the chest to allow patient movement and obtain continuous stable ECG. Following leads are examples. When also monitoring respiration, refer to the "Electrode Position for Respiration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

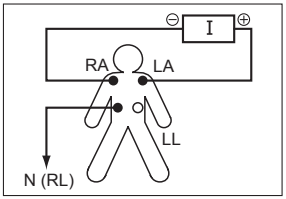


Electrode Position	Symbol		Lead Color	
	AHA	IEC	AHA	IEC
Left infraclavicular fossa	LA	L	Black	Yellow
Right infraclavicular fossa	RA	R	White	Red
Below lowest rib on the left anterior axillary line	LL	F	Red	Green
Right anterior axillary line at the same level as LL/F	RL	RF	Green	Black
Fifth intercostal 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

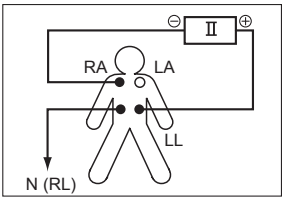
Lead Position

Standard limb leads

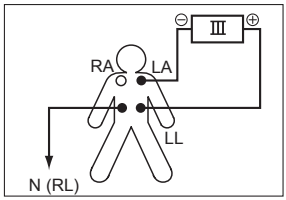
Lead I



Lead II

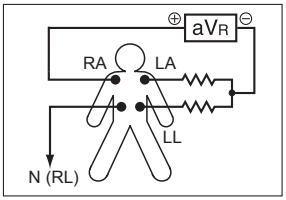


Lead III

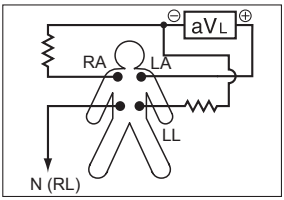


Monopolar limb leads

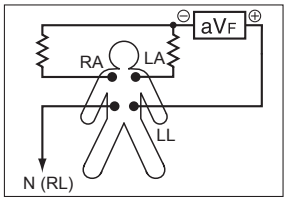
aV_R lead



aV_L lead

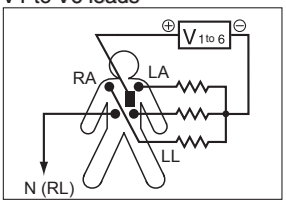


aV_F lead



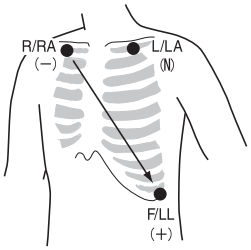
Monopolar chest leads

V1 to V6 leads



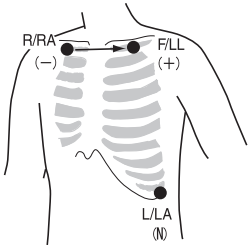
Three Electrodes

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

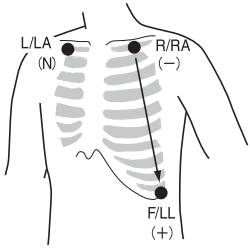


Electrode Position	Symbol		Lead Color	
	AHA	IEC	AHA	IEC
Left infraclavicular fossa	LA	L	Black	Yellow
Right infraclavicular fossa	RA	R	White	Red
Below lowest rib on the left anterior axillary line	LL	F	Red	Green

- 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

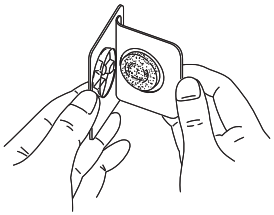
CAUTION

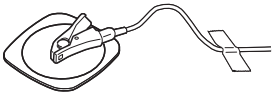
Do not reuse disposable parts and accessories.

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.

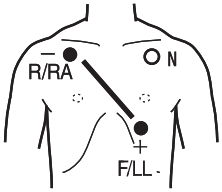
Electrode Position Examples

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

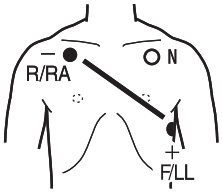
In this position, respiration measurement is available; however, there is a difference in amplitude between different patients.



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

Position 2

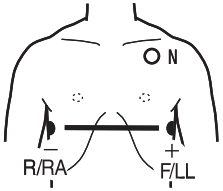
In this position, the waveform amplitude is usually large and the ECG lead is similar to Lead MII. This position can be generally recommended.



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

Position 3

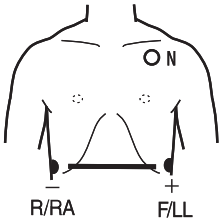
In this position, the respiration waveform is optimum, but the ECG lead is unusual.



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

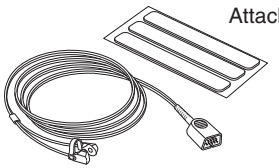
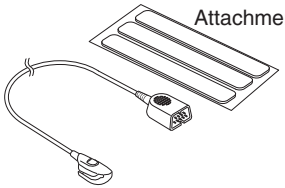
Only use Nihon Kohden specified electrodes, electrode leads, SpO_2 probes, and NIBP cuffs. Otherwise, the maximum performance from the transmitter cannot be guaranteed.

CAUTION

Do not use a damaged or disassembled probe. It causes incorrect measurement and may injure the patient.

Reusable Probes

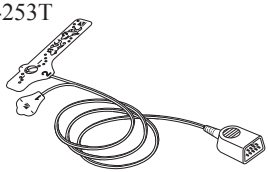
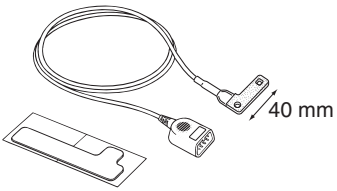
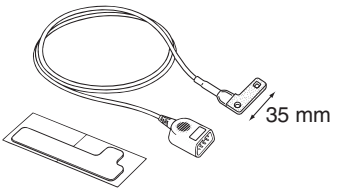
When using a TL-201T finger probe, choose the appropriate cable length for attachment.

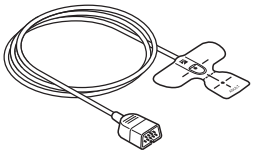
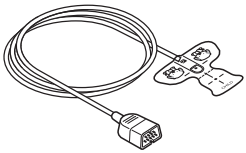
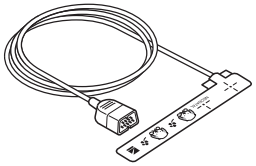
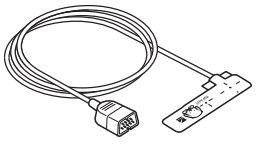
Probe	Cable Length	Patient	Attachment Site
Finger probe TL-201T 	0.6 m	Adult or child 20 kg or more	Finger
	1.6 m		
Multi-site probe TL-220T 		Adult or infant 3 kg or more	Finger or toe
		Neonate 3 kg or less	Instep and sole
Finger probe TL-630T1/TL-630T3/TL-631T1/TL-631T3  Cable length TL-630T1/TL-631T1: 0.6 m TL-630T3/TL-631T3: 1.6 m		TL-630T1/630T3: Adult or child 50 kg or more TL-631T1/631T3: Adult or child 20 kg or more	Finger or toe

Disposable Probes

CAUTION

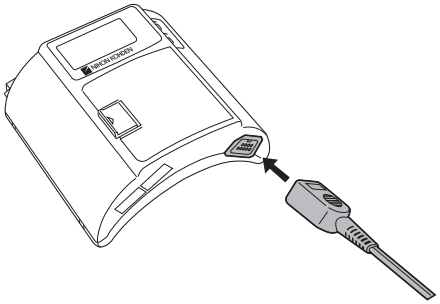
The disposable probe is not sterilized. Use the disposable probe only for a single patient. Never reuse the disposable probe for another patient because it causes cross infection.

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
TL-051S/TL-052S  Cable length TL-051S: 0.8 m TL-052S: 1.6 m	Adult 50 kg or more	Finger
	Neonate 3 kg or less	Instep and sole
TL-061S/TL-062S  Cable length TL-061S: 0.8 m TL-062S: 1.6 m	Adult or child 15 to 50 kg	Finger
	Infant 3 to 15 kg	Toe

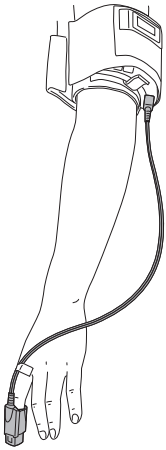
Probe	Patient	Attachment Site
TL-271T/TL-271T3  Cable length TL-271T: 0.8 m TL-271T3: 1.6 m	Adult 30 kg or more	Finger or toe
TL-272T/TL-272T3  Cable length TL-272T: 0.8 m TL-272T3: 1.6 m	Child 10 to 50 kg	
TL-273T/TL-273T3  Cable length TL-273T: 0.8 m TL-273T3: 1.6 m	Neonate 3 kg or less	Instep and sole
	Adult 40 kg or more	Finger or toe
TL-274T/TL-274T3  Cable length TL-274T: 0.8 m TL-274T3: 1.6 m	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

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

CAUTION

Hold the connector when connecting/ disconnecting the SpO_2 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 the TL-201T finger probe, do not fasten the probe and cable to the finger by wrapping with tape. This may cause burn, congestion or pressure necrosis from poor blood circulation.
- When using probes other than the TL-201T finger probe, to avoid poor circulation, 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.

WARNING

Check the circulation condition by observing the skin color at the measurement site and pulse waveform. Change the measurement site every 8 hours for disposable probes and every 4 hours for reusable probes (every 8 hours for TL-630T/TL-631T series probe). 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.

- Patient with a fever
- Patient with peripheral circulation insufficiency
- Neonate or low birth weight infant with delicate skin
- Patient who is receiving photodynamic therapy*

* Photodynamic therapy is a treatment to remove the affected tissue by using a photosensitizing agent and exposing the tissue to light. This treatment has a side effect of photosensitivity and the light from the finger probe sensor may cause a burn. This probe uses two light wavelengths in the range from 650 to 950 nm. The maximum light intensity is less than 5.5 mW/sr.

CAUTION

If the attachment site is dirty with blood or bodily fluids, 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 measured value may be incorrect or measurement cannot be performed.

CAUTION

If the skin gets irritated or redness appears on the skin from the probe, change the attachment site or stop using the probe. Take extreme care for the patients with delicate skin.

CAUTION

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.

CAUTION

Do not immerse the disposable probe in detergents or water. If the probe adhesive surface gets wet, adhesiveness becomes weak and the probe cannot be attached to the skin.

CAUTION

Do not use a probe which is deteriorated by aging. Accurate measurement cannot be performed.

CAUTION

Neonatal skin is delicate. Remove the probe and tape carefully and slowly.

CAUTION

When removing a probe that is taped to the skin, do not pull the probe cable because this can damage the cable.

CAUTION

When removing the probe from the attachment tape, do not pull the sensor cable because this can damage the cable.

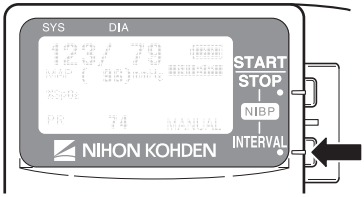
CAUTION

Refer to the probe instruction manual for details.

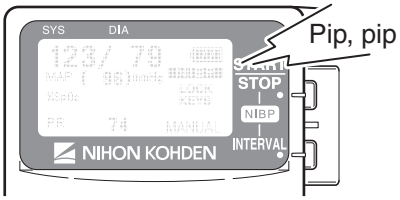
Locking the Keys on the Transmitter

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.

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 the cuff is attached.

WARNING
When performing NIBP measurements in STAT mode or 5 minute intervals, periodically remove the cuff from the patient for ventilation. 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.

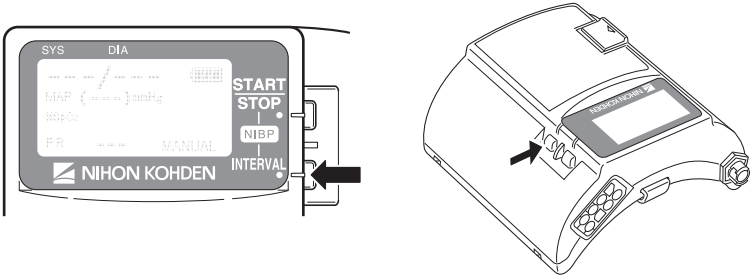
CAUTION
When performing NIBP measurement repeatedly, have a rest between measurements to recover adequate circulation.

WARNING
NIBP measurement may be incorrect in the following cases.
- When using an electrosurgical unit
- When there is body movement
- When the pulse wave is small (insufficient peripheral circulation)
- Too many arrhythmias
- When there is vibration
- When there is a rapid blood pressure change
- During CPR

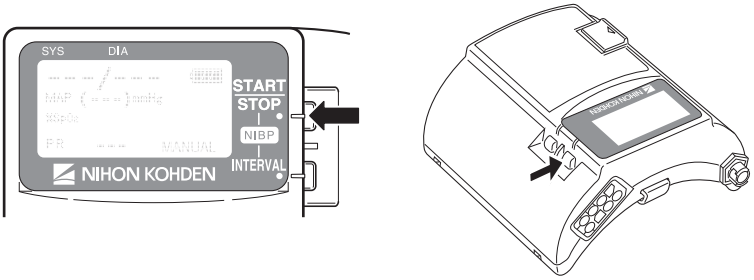
NOTE

- 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 representative.
- 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.

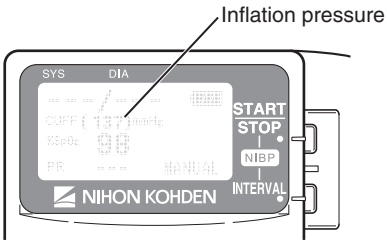
1. Select the measurement mode by pressing the NIBP INTERVAL key.



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



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



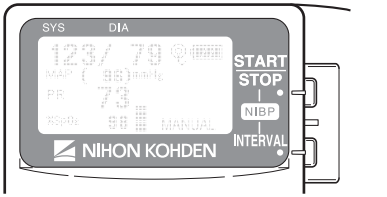
In manual mode: Measurement is performed once.
In STAT mode: Measurement is performed repeatedly for 15 minutes.
In auto mode: The first measurement is performed when the NIBP START/STOP key is pressed. The second measurement is performed when the current time in the transmitter reaches the selected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

Data Display on the Receiving Monitor
When the “Low battery ” message is displayed on the receiving monitor, NIBP might not have been measured according to the NIBP interval setting. Therefore, the NIBP data displayed on the receiving monitor might not be updated. In this case, check the measurement time of the NIBP data displayed on the receiving monitor.

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 waveform, 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 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 representative or Nihon Kohden representative.

* 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 the transmitter is used with an electrosurgical unit (ESU), firmly attach the entire area of the ESU return plate. Otherwise, the current from the ESU flows into the electrodes of the transmitter, causing electrical burn where the electrodes are attached. For details, refer to the ESU manual.

CAUTION

Turn off the power of mobile phones, small wireless devices and other devices which produce strong electromagnetic interference around a patient (except for devices allowed by the hospital administrator). Radio waves from devices such as mobile phones or small wireless devices may be mistaken as pulse waves and the displayed data may be incorrect.

NOTE

- Noise generated from an electrosurgical 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.

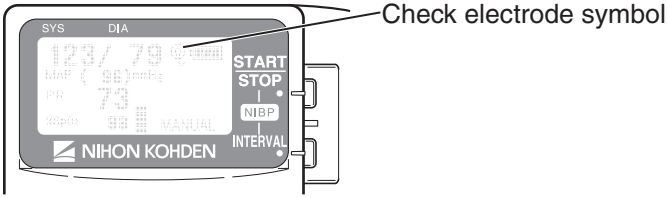
In these cases, check the cause and if necessary, replace electrodes with new ones.

CAUTION

When the "ELECTRODE OFF" or "CHECK ELECTRODE" message is displayed on the receiving monitor, ECG is not monitored properly and the ECG alarm does not function. Check the electrode, electrode leads, and if necessary, replace with new ones.

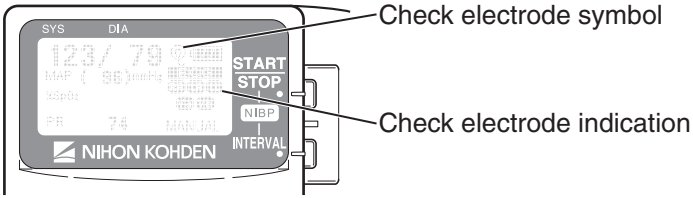
Check Electrode Indication on the Transmitter when Monitoring with 3 Electrodes

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

SpO_2 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 electrosurgical unit.
- During CPR.
- When measuring at a site with venous pulse.
- When there is body movement.
- When the pulse wave is small (insufficient peripheral circulation).

WARNING

When not monitoring SpO_2, disconnect the SpO_2 cable from the transmitter. Otherwise, noise from the probe sensor may interfere and incorrect data is displayed on the screen.

WARNING

Check the circulation condition by observing the skin color at the measurement site and pulse waveform. Change the measurement site every 8 hours for disposable probes and every 4 hours for reusable probes (every 8 hours for TL-630T/TL-631T series probe). 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.

- Patient with a fever
- Patient with peripheral circulation insufficiency
- Neonate or low birth weight infant with delicate skin
- Patient who is receiving photodynamic therapy*

* Photodynamic therapy is a treatment to remove the affected tissue by using a photosensitizing agent and exposing the tissue to light. This treatment has a side effect of photosensitivity and the light from the finger probe sensor may cause a burn. This probe uses two light wavelengths in the range from 650 to 950 nm. The maximum light intensity is less than 5.5 mW/sr.

CAUTION

Turn off the power of mobile phones, small wireless devices and other devices which produce strong electromagnetic interference around a patient (except for devices allowed by the hospital administrator). Radio waves from devices such as mobile phones or small wireless devices may be mistaken as pulse waves and the displayed data may be incorrect.

CAUTION

Do not pull or bend the probe cable, and do not put caster feet on the probe cable. Do not immerse the probe cable in chemical solutions or water. Failure to follow these instructions may cause cable discontinuity, short circuit, skin burn on the patient and incorrect measurement data. Replace any broken probe with a new one.

CAUTION

Normal external light does not affect monitoring but strong light such as a surgical light or sunlight may affect monitoring. If affected, cover the measuring site with a blanket.

CAUTION

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.

CAUTION

When a message indicates a faulty probe, stop monitoring and replace the probe with a new one.

CAUTION

While a patient is on medication which causes vasodilation, the pulse waveform may change and in rare cases the SpO_2 value might 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  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.
		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 CHANGE BATTERIES NO NIBP	NIBP cannot be measured due to low battery.	Replace batteries with new ones.
NIBP CUFF OCCLUSION	Transmitter malfunction.	Immediately remove the cuff from the patient and contact your Nihon Kohden representative.
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 representative.
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 representative.
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 representative.

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 representative.

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

Never disassemble or repair the transmitter. Disassembly and repair must be performed by qualified service personnel.

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

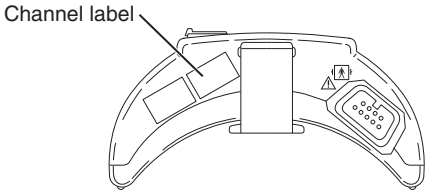
1. External Check

- 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

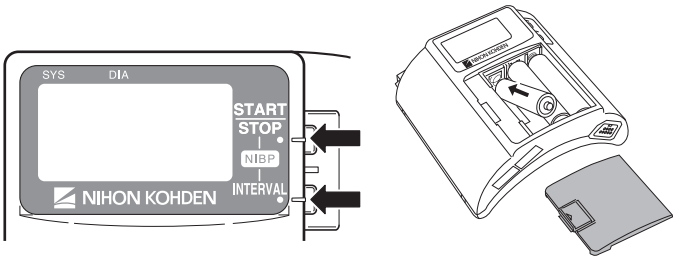
Check that the channel of the transmitter and the label match.

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

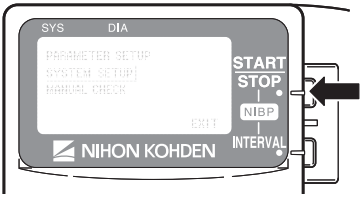


2. Remove one battery.

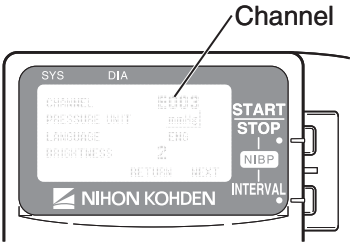
3. While pressing the NIBP START/STOP and NIBP INTERVAL keys, install the battery. The SETUP screen appears.



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.



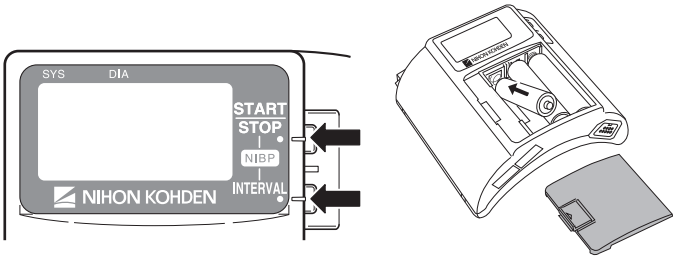
6. Check that the channel displayed on the LCD matches the label on the transmitter.

3. LCD Display

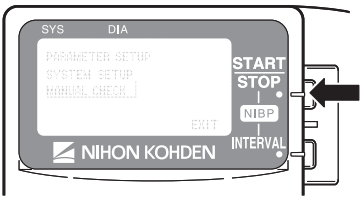
Check that there are no dots missing on the LCD.

1. Remove one battery.

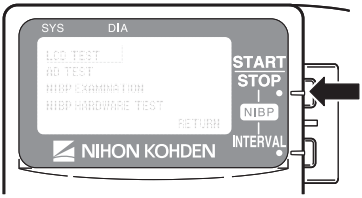
2. While pressing the NIBP START/STOP and NIBP INTERVAL keys, install the battery. The SETUP screen appears.



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

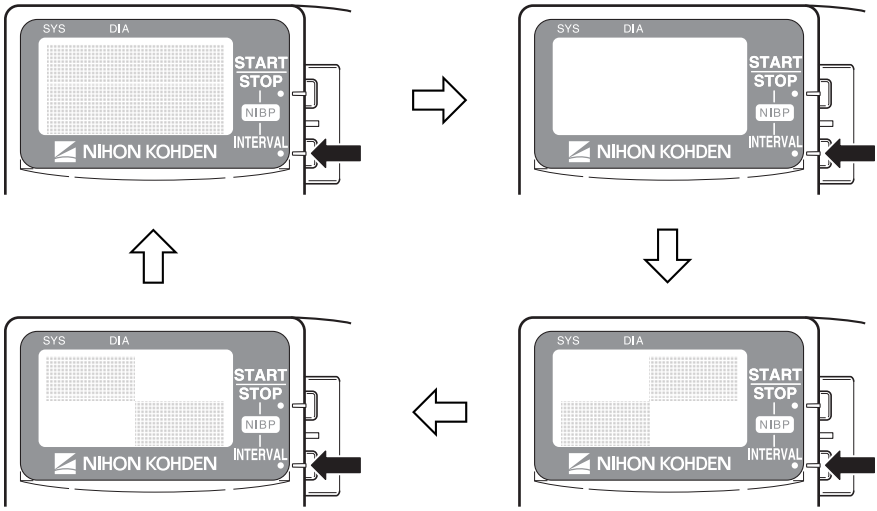


4. Press the NIBP START/STOP key to enter the MANUAL CHECK screen.



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/ZM-941PA

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.

ZM-940PA

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

ZM-941PA

Type	Lifetime (Measuring parameters)		
	ECG, SpO_2, NIBP	ECG, SpO_2	ECG only
NiMH secondary	1.5 days	2 days	2.5 days
Alkaline primary	1 day	2 days	2.5 days

The above data is when the following batteries and battery charger which are recommended by Nihon Kohden are used. The measurement is performed 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 the SpO_2 probe attachment site.

NiMH secondary: SANYO HR-3UF (W)
Battery charger: SANYO NC-M55
Alkaline primary: Nihon Kohden Medipower (equivalent to Panasonic LR6 (G))

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 or disinfecting it and contact your Nihon Kohden representative. The transmitter needs to be checked for safety and function before use.

CAUTION

Before cleaning or disinfection, remove the batteries from the transmitter. Failure to follow this instruction may result in electrical shock or transmitter malfunction.

CAUTION

Dispose of the transmitter, options and accessories as specified by Nihon Kohden. Otherwise, it causes infection or environmental contamination.

CAUTION

The transmitter cannot be sterilized. Sterilizing the transmitter may damage it.

Before cleaning or disinfecting, remove the batteries from the transmitter. Be careful not to let any liquid get inside the transmitter.

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
Alkyldiaminoethylglycine hydrochloride	0.5
Benzalkonium chloride	0.2
Benzethonium chloride solution	0.2
Chlorhexidine 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 inflation bag.
- 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

ZM-940PA

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, NIBP 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
ECG recovery time after defibrillation:	within 10 s

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 ($80\% \leq SpO_2 \leq 100\%$) ±2 ($50\% \leq SpO_2 < 80\%$) 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
Measurement accuracy:	±3 mmHg (0 ≤ NIBP ≤ 200 mmHg) ±4 mmHg (200 < NIBP < 300 mmHg) Meets or exceeds AAMI Sp-10. 1992 standard (Maximum mean error: ±5 mmHg Maximum standard deviation: 8 mmHg)

Pulse Rate

Measuring range:	30 to 200 beats/min ±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 or 37.5 kHz (12.5 kHz when interleaved)
Modulation:	Frequency shift keying
Type of emission:	F1D
Occupied bandwidth:	<20 kHz
Effective radiated power:	1.0 mW

Power Requirements

Operating voltage:	3.2 to 4.8 V
Battery type:	Three AA (R6) type NiMH secondary batteries Three AA (R6) 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	2.5 days	3 days
Alkaline primary	1 day	2.5 days	3 days

The above data is when the following batteries and battery charger which are recommended by Nihon Kohden are used. The measurement is performed 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 the SpO_2 probe attachment site.

NiMH secondary: SANYO HR-3UF (W)
Battery charger: SANYO NC-M55
Alkaline primary: Nihon Kohden Medipower (equivalent to Panasonic LR6 (G))

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
CAN/CSA-C22.2 No. 60601-2-27: 1998
CAN/CSA-C22.2 No. 60601-2-30: 2002
IEC 60601-1:1988
IEC 60601-1 Amendment 1: 1991

IEC 60601-1 Amendment 2: 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

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			

Avoiding Electromagnetic Interference (Impedance Respiration)

Impedance respiration measurement is very sensitive and affected by electromagnetic interference. Technological limitations do not allow immunity levels higher than 1 V/m for radiated RF electromagnetic fields. Electromagnetic fields with field strengths above 1 V/m may cause measurement error. Do not use electrically radiating equipment near the impedance respiration measurements.

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 (1 V/m 80 MHz to 2.5 GHz for respiration)	$d = 1.2\sqrt{P}$ 80 MHz to 800 MHz $d = 2.3\sqrt{P}$ 800 MHz to 2.5 GHz ($d = 3.5\sqrt{P}$ 80 MHz to 800 MHz for respiration $d = 7.0\sqrt{P}$ 800 MHz to 2.5 GHz for respiration) 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 1 V/m for respiration and 3 V/m for all other functions.

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 $d = 1.2\sqrt{P}$ (For respiration: $d = 3.5\sqrt{P}$)	800 MHz to 2.5 GHz $d = 2.3\sqrt{P}$ (For respiration: $d = 7.0\sqrt{P}$)
0.01	0.12	0.12 (0.35*)	0.23 (0.7*)
0.1	0.38	0.38 (1.1*)	0.73 (2.2*)
1	1.2	1.2 (3.5*)	2.3 (7.0*)
10	3.8	3.8 (11*)	7.3 (22*)
100	12	12 (35*)	23 (70*)

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.

(* For respiration)

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.

Recovery Time after Defibrillation

The transmitter returns to the normal operating mode within 10 seconds after defibrillation. The stored settings are not affected.

System Composition for EMC Test

The ZM-940PA bedside monitor is tested to comply with IEC 60601-1-2: 2001 with the following composition.

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

ZM-941PA

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, NIBP 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
ECG recovery time after defibrillation:	within 10 s

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 ($80\% \leq SpO_2 \leq 100\%$) ±2 ($50\% \leq SpO_2 < 80\%$) Less than 50% is not specified When considering the measuring accuracy of the SpO_2 probe: ±2 ($80\% \leq SpO_2 \leq 100\%$) ±3 ($70\% \leq SpO_2 < 80\%$) 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
Measurement accuracy:	±3 mmHg (0 ≤ NIBP ≤ 200 mmHg) ±4 mmHg (200 < NIBP < 300 mmHg) Meets or exceeds AAMI Sp-10. 1992 standard (Maximum mean error: ±5 mmHg Maximum standard deviation: 8 mmHg)

Pulse Rate

Measuring range:	30 to 200 beats/min ±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:	<740 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:	1395.0250 to 1399.9750 MHz 1427.0250 to 1431.9750 MHz
Channel spacing:	50 kHz or 37.5 kHz (12.5 kHz when interleaved)
Modulation:	Frequency shift keying
Type of emission:	F1D
Occupied bandwidth:	<20 kHz
Effective radiated power:	5.0 mW (factory default setting) Can be changed to 1.0 mW if required

Power Requirements

Operating voltage:	3.2 to 4.8 V
Battery type:	Three AA (R6) type NiMH secondary batteries Three AA (R6) type alkaline dry cell primary batteries

Battery lifetime:

Type	Lifetime (Measuring parameters)		
	ECG, SpO_2, NIBP	ECG, SpO_2	ECG only
NiMH secondary	1.5 days	2 days	2.5 days
Alkaline primary	1 day	2 days	2.5 days

The above data is when the following batteries and battery charger which are recommended by Nihon Kohden are used. The measurement is performed 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 the SpO_2 probe attachment site.

NiMH secondary: SANYO HR-3UF (W)
Battery charger: SANYO NC-M55
Alkaline primary: Nihon Kohden Medipower (equivalent to Panasonic LR6 (G))

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
CAN/CSA-C22.2 No. 601.2.27-98: 1998
CAN/CSA-C22.2 No. 60601-2-30-02: 2002
IEC 60601-1:1988
IEC 60601-1 Amendment 1: 1991
IEC 60601-1 Amendment 2: 1995
IEC 60601-1-2: 2001
IEC 60601-1-2 Amendment 1: 2004
IEC 60601-2-27: 2005
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
IEC 60601-1-2 Amendment 1: 2004

Electromagnetic Emissions

This Model ZM-941PA is intended for use in the electromagnetic environment specified below. The customer or the user of the ZM-941PA should assure that it is used in such an environment.

Emissions test	Compliance	Electromagnetic environment guidance
RF emissions CISPR 11	Group 1	The ZM-941PA 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-941PA 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-941PA is intended for use in the electromagnetic environment specified below. The customer or the user of the ZM-941PA 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			

Avoiding Electromagnetic Interference (Impedance Respiration)

Impedance respiration measurement is very sensitive and affected by electromagnetic interference. Technological limitations do not allow immunity levels higher than 1 V/m for radiated RF electromagnetic fields. Electromagnetic fields with field strengths above 1 V/m may cause measurement error. Do not use electrically radiating equipment near the impedance respiration measurements.

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-941PA, 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 (1 V/m 80 MHz to 2.5 GHz for respiration)	$d = 1.2\sqrt{P}$ 80 MHz to 800 MHz $d = 2.3\sqrt{P}$ 800 MHz to 2.5 GHz ($d = 3.5\sqrt{P}$ 80 MHz to 800 MHz for respiration $d = 7.0\sqrt{P}$ 800 MHz to 2.5 GHz for respiration) 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-941PA is used exceeds the applicable RF compliance level above, the ZM-941PA 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-941PA.

*2 Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 1 V/m for respiration and 3 V/m for all other functions.

Recommended Separation Distances between Portable and Mobile RF Communications Equipment

The ZM-941PA is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the ZM-941PA can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the ZM-941PA 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 $d = 1.2\sqrt{P}$ (For respiration: $d = 3.5\sqrt{P}$)	800 MHz to 2.5 GHz $d = 2.3\sqrt{P}$ (For respiration: $d = 7.0\sqrt{P}$)
0.01	0.12	0.12 (0.35*)	0.23 (0.7*)
0.1	0.38	0.38 (1.1*)	0.73 (2.2*)
1	1.2	1.2 (3.5*)	2.3 (7.0*)
10	3.8	3.8 (11*)	7.3 (22*)
100	12	12 (35*)	23 (70*)

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.

(* For respiration)

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.

Recovery Time after Defibrillation

The transmitter returns to the normal operating mode within 10 seconds after defibrillation. The stored settings are not affected.

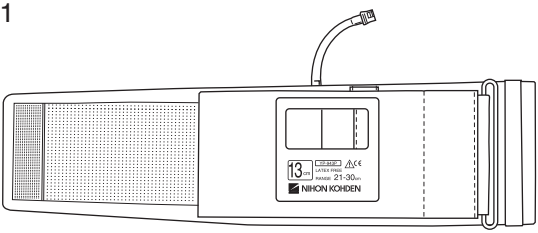
System Composition for EMC Test

The ZM-941PA bedside monitor is tested to comply with IEC 60601-1-2: 2001 and IEC 60601-1-2 Amendment 1: 2004 with the following composition.

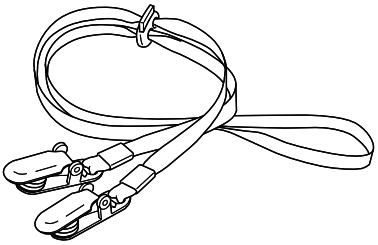
Units	Cable length
ZM-941PA transmitter	—
YP-943P NIBP cuff	0.15 m
BR-906P ECG electrode lead	0.8 m
TL-201T finger probe	1.6 m

Standard Accessories

1



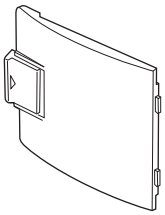
2



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

Only use Nihon Kohden specified electrodes, electrode leads, SpO_2 probes, and NIBP cuffs. Otherwise, the maximum performance from the transmitter cannot be guaranteed.

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 infant		5	15	YP-960T	1	S943A
Cuff for child	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 infant		6	17	YP-810P	20	S945C
Disposable cuff for child		8	17	YP-811P		S945D
Disposable cuff for adult	Small	10	17	YP-812P		S946E
	Standard	14	20	YP-813P		S946F
	Medium large	15	20	YP-814P		S946G
	Large	17	20	YP-815P		S946H
	Extra large	18	20	YP-816P		S946I
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
Finger probe (reusable)	0.6 m	TL-630T1		P310A
	1.6 m	TL-630T3		P310C
	0.6 m	TL-631T1		P311A
	1.6 m	TL-631T3		P311C
SpO_2 probe (for adult, disposable)	1.6 m	TL-251T	5	P201A
SpO_2 probe (for child, disposable)		TL-252T		P201B
SpO_2 probe (for neonate, disposable)		TL-253T		P201C
SpO_2 probe (for adult, disposable)	0.8 m	TL-271T	24	P203A
	1.6 m	TL-271T3		P203E
SpO_2 probe (for child, disposable)	0.8 m	TL-272T		P203B
	1.6 m	TL-272T3		P203F
SpO_2 probe (for neonate/adult, disposable)	0.8 m	TL-273T		P203C
	1.6 m	TL-273T3		P203G
SpO_2 probe (for child/infant, disposable)	0.8 m	TL-274T		P203D
	1.6 m	TL-274T3		P203H
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 packages	P260
Attachment tape for TL-220T/ 251T/252T/253T/630T/631T			3 × 30 packages	P263
Probe fastener		YS-093P2	30	P267

Transmission Frequencies

Channel: 9002 to 9478

Transmission frequency (MHz)	Channel No.	Transmission frequency (MHz)	Channel No.	Transmission frequency (MHz)	Channel No.
608.0250	9002	608.4375	9035	608.8500	9068
608.0375	9003	608.4500	9036	608.8625	9069
608.0500	9004	608.4625	9037	608.8750	9070
608.0625	9005	608.4750	9038	608.8875	9071
608.0750	9006	608.4875	9039	608.9000	9072
608.0875	9007	608.5000	9040	608.9125	9073
608.1000	9008	608.5125	9041	608.9250	9074
608.1125	9009	608.5250	9042	608.9375	9075
608.1250	9010	608.5375	9043	608.9500	9076
608.1375	9011	608.5500	9044	608.9625	9077
608.1500	9012	608.5625	9045	608.9750	9078
608.1625	9013	608.5750	9046	608.9875	9079
608.1750	9014	608.5875	9047	609.0000	9080
608.1875	9015	608.6000	9048	609.0125	9081
608.2000	9016	608.6125	9049	609.0250	9082
608.2125	9017	608.6250	9050	609.0375	9083
608.2250	9018	608.6375	9051	609.0500	9084
608.2375	9019	608.6500	9052	609.0625	9085
608.2500	9020	608.6625	9053	609.0750	9086
608.2625	9021	608.6750	9054	609.0875	9087
608.2750	9022	608.6875	9055	609.1000	9088
608.2875	9023	608.7000	9056	609.1125	9089
608.3000	9024	608.7125	9057	609.1250	9090
608.3125	9025	608.7250	9058	609.1375	9091
608.3250	9026	608.7375	9059	609.1500	9092
608.3375	9027	608.7500	9060	609.1625	9093
608.3500	9028	608.7625	9061	609.1750	9094
608.3625	9029	608.7750	9062	609.1875	9095
608.3750	9030	608.7875	9063	609.2000	9096
608.3875	9031	608.8000	9064	609.2125	9097
608.4000	9032	608.8125	9065	609.2250	9098
608.4125	9033	608.8250	9066	609.2375	9099
608.4250	9034	608.8375	9067	609.2500	9100

Transmission frequency (MHz)	Channel No.	Transmission frequency (MHz)	Channel No.	Transmission frequency (MHz)	Channel No.
609.2625	9101	609.7125	9137	610.1625	9173
609.2750	9102	609.7250	9138	610.1750	9174
609.2875	9103	609.7375	9139	610.1875	9175
609.3000	9104	609.7500	9140	610.2000	9176
609.3125	9105	609.7625	9141	610.2125	9177
609.3250	9106	609.7750	9142	610.2250	9178
609.3375	9107	609.7875	9143	610.2375	9179
609.3500	9108	609.8000	9144	610.2500	9180
609.3625	9109	609.8125	9145	610.2625	9181
609.3750	9110	609.8250	9146	610.2750	9182
609.3875	9111	609.8375	9147	610.2875	9183
609.4000	9112	609.8500	9148	610.3000	9184
609.4125	9113	609.8625	9149	610.3125	9185
609.4250	9114	609.8750	9150	610.3250	9186
609.4375	9115	609.8875	9151	610.3375	9187
609.4500	9116	609.9000	9152	610.3500	9188
609.4625	9117	609.9125	9153	610.3625	9189
609.4750	9118	609.9250	9154	610.3750	9190
609.4875	9119	609.9375	9155	610.3875	9191
609.5000	9120	609.9500	9156	610.4000	9192
609.5125	9121	609.9625	9157	610.4125	9193
609.5250	9122	609.9750	9158	610.4250	9194
609.5375	9123	609.9875	9159	610.4375	9195
609.5500	9124	610.0000	9160	610.4500	9196
609.5625	9125	610.0125	9161	610.4625	9197
609.5750	9126	610.0250	9162	610.4750	9198
609.5875	9127	610.0375	9163	610.4875	9199
609.6000	9128	610.0500	9164	610.5000	9200
609.6125	9129	610.0625	9165	610.5125	9201
609.6250	9130	610.0750	9166	610.5250	9202
609.6375	9131	610.0875	9167	610.5375	9203
609.6500	9132	610.1000	9168	610.5500	9204
609.6625	9133	610.1125	9169	610.5625	9205
609.6750	9134	610.1250	9170	610.5750	9206
609.6875	9135	610.1375	9171	610.5875	9207

Transmission frequency (MHz)	Channel No.	Transmission frequency (MHz)	Channel No.	Transmission frequency (MHz)	Channel No.
609.7000	9136	610.1500	9172	610.6000	9208
610.6125	9209	611.0625	9245	611.5125	9281
610.6250	9210	611.0750	9246	611.5250	9282
610.6375	9211	611.0875	9247	611.5375	9283
610.6500	9212	611.1000	9248	611.5500	9284
610.6625	9213	611.1125	9249	611.5625	9285
610.6750	9214	611.1250	9250	611.5750	9286
610.6875	9215	611.1375	9251	611.5875	9287
610.7000	9216	611.1500	9252	611.6000	9288
610.7125	9217	611.1625	9253	611.6125	9289
610.7250	9218	611.1750	9254	611.6250	9290
610.7375	9219	611.1875	9255	611.6375	9291
610.7500	9220	611.2000	9256	611.6500	9292
610.7625	9221	611.2125	9257	611.6625	9293
610.7750	9222	611.2250	9258	611.6750	9294
610.7875	9223	611.2375	9259	611.6875	9295
610.8000	9224	611.2500	9260	611.7000	9296
610.8125	9225	611.2625	9261	611.7125	9297
610.8250	9226	611.2750	9262	611.7250	9298
610.8375	9227	611.2875	9263	611.7375	9299
610.8500	9228	611.3000	9264	611.7500	9300
610.8625	9229	611.3125	9265	611.7625	9301
610.8750	9230	611.3250	9266	611.7750	9302
610.8875	9231	611.3375	9267	611.7875	9303
610.9000	9232	611.3500	9268	611.8000	9304
610.9125	9233	611.3625	9269	611.8125	9305
610.9250	9234	611.3750	9270	611.8250	9306
610.9375	9235	611.3875	9271	611.8375	9307
610.9500	9236	611.4000	9272	611.8500	9308
610.9625	9237	611.4125	9273	611.8625	9309
610.9750	9238	611.4250	9274	611.8750	9310
610.9875	9239	611.4375	9275	611.8875	9311
611.0000	9240	611.4500	9276	611.9000	9312
611.0125	9241	611.4625	9277	611.9125	9313
611.0250	9242	611.4750	9278	611.9250	9314
611.0375	9243	611.4875	9279	611.9375	9315

Transmission frequency (MHz)	Channel No.	Transmission frequency (MHz)	Channel No.	Transmission frequency (MHz)	Channel No.
611.0500	9244	611.5000	9280	611.9500	9316
611.9625	9317	612.4125	9353	612.8625	9389
611.9750	9318	612.4250	9354	612.8750	9390
611.9875	9319	612.4375	9355	612.8875	9391
612.0000	9320	612.4500	9356	612.9000	9392
612.0125	9321	612.4625	9357	612.9125	9393
612.0250	9322	612.4750	9358	612.9250	9394
612.0375	9323	612.4875	9359	612.9375	9395
612.0500	9324	612.5000	9360	612.9500	9396
612.0625	9325	612.5125	9361	612.9625	9397
612.0750	9326	612.5250	9362	612.9750	9398
612.0875	9327	612.5375	9363	612.9875	9399
612.1000	9328	612.5500	9364	613.0000	9400
612.1125	9329	612.5625	9365	613.0125	9401
612.1250	9330	612.5750	9366	613.0250	9402
612.1375	9331	612.5875	9367	613.0375	9403
612.1500	9332	612.6000	9368	613.0500	9404
612.1625	9333	612.6125	9369	613.0625	9405
612.1750	9334	612.6250	9370	613.0750	9406
612.1875	9335	612.6375	9371	613.0875	9407
612.2000	9336	612.6500	9372	613.1000	9408
612.2125	9337	612.6625	9373	613.1125	9409
612.2250	9338	612.6750	9374	613.1250	9410
612.2375	9339	612.6875	9375	613.1375	9411
612.2500	9340	612.7000	9376	613.1500	9412
612.2625	9341	612.7125	9377	613.1625	9413
612.2750	9342	612.7250	9378	613.1750	9414
612.2875	9343	612.7375	9379	613.1875	9415
612.3000	9344	612.7500	9380	613.2000	9416
612.3125	9345	612.7625	9381	613.2125	9417
612.3250	9346	612.7750	9382	613.2250	9418
612.3375	9347	612.7875	9383	613.2375	9419
612.3500	9348	612.8000	9384	613.2500	9420
612.3625	9349	612.8125	9385	613.2625	9421
612.3750	9350	612.8250	9386	613.2750	9422
612.3875	9351	612.8375	9387	613.2875	9423

Transmission frequency (MHz)	Channel No.	Transmission frequency (MHz)	Channel No.	Transmission frequency (MHz)	Channel No.
612.4000	9352	612.8500	9388	613.3000	9424
613.3125	9425	613.5375	9443	613.7625	9461
613.3250	9426	613.5500	9444	613.7750	9462
613.3375	9427	613.5625	9445	613.7875	9463
613.3500	9428	613.5750	9446	613.8000	9464
613.3625	9429	613.5875	9447	613.8125	9465
613.3750	9430	613.6000	9448	613.8250	9466
613.3875	9431	613.6125	9449	613.8375	9467
613.4000	9432	613.6250	9450	613.8500	9468
613.4125	9433	613.6375	9451	613.8625	9469
613.4250	9434	613.6500	9452	613.8750	9470
613.4375	9435	613.6625	9453	613.8875	9471
613.4500	9436	613.6750	9454	613.9000	9472
613.4625	9437	613.6875	9455	613.9125	9473
613.4750	9438	613.7000	9456	613.9250	9474
613.4875	9439	613.7125	9457	613.9375	9475
613.5000	9440	613.7250	9458	613.9500	9476
613.5125	9441	613.7375	9459	613.9625	9477
613.5250	9442	613.7500	9460	613.9750	9478

Channel: E002 to E398

Transmission frequency (MHz)	Channel No.	Transmission frequency (MHz)	Channel No.	Transmission frequency (MHz)	Channel No.
1395.0250	E002	1395.4625	E037	1395.9000	E072
1395.0375	E003	1395.4750	E038	1395.9125	E073
1395.0500	E004	1395.4875	E039	1395.9250	E074
1395.0625	E005	1395.5000	E040	1395.9375	E075
1395.0750	E006	1395.5125	E041	1395.9500	E076
1395.0875	E007	1395.5250	E042	1395.9625	E077
1395.1000	E008	1395.5375	E043	1395.9750	E078
1395.1125	E009	1395.5500	E044	1395.9875	E079
1395.1250	E010	1395.5625	E045	1396.0000	E080
1395.1375	E011	1395.5750	E046	1396.0125	E081
1395.1500	E012	1395.5875	E047	1396.0250	E082
1395.1625	E013	1395.6000	E048	1396.0375	E083
1395.1750	E014	1395.6125	E049	1396.0500	E084
1395.1875	E015	1395.6250	E050	1396.0625	E085
1395.2000	E016	1395.6375	E051	1396.0750	E086
1395.2125	E017	1395.6500	E052	1396.0875	E087
1395.2250	E018	1395.6625	E053	1396.1000	E088
1395.2375	E019	1395.6750	E054	1396.1125	E089
1395.2500	E020	1395.6875	E055	1396.1250	E090
1395.2625	E021	1395.7000	E056	1396.1375	E091
1395.2750	E022	1395.7125	E057	1396.1500	E092
1395.2875	E023	1395.7250	E058	1396.1625	E093
1395.3000	E024	1395.7375	E059	1396.1750	E094
1395.3125	E025	1395.7500	E060	1396.1875	E095
1395.3250	E026	1395.7625	E061	1396.2000	E096
1395.3375	E027	1395.7750	E062	1396.2125	E097
1395.3500	E028	1395.7875	E063	1396.2250	E098
1395.3625	E029	1395.8000	E064	1396.2375	E099
1395.3750	E030	1395.8125	E065	1396.2500	E100
1395.3875	E031	1395.8250	E066	1396.2625	E101
1395.4000	E032	1395.8375	E067	1396.2750	E102
1395.4125	E033	1395.8500	E068	1396.2875	E103
1395.4250	E034	1395.8625	E069	1396.3000	E104
1395.4375	E035	1395.8750	E070	1396.3125	E105
1395.4500	E036	1395.8875	E071	1396.3250	E106

Transmission frequency (MHz)	Channel No.	Transmission frequency (MHz)	Channel No.	Transmission frequency (MHz)	Channel No.
1396.3375	E107	1396.7875	E143	1397.2375	E179
1396.3500	E108	1396.8000	E144	1397.2500	E180
1396.3625	E109	1396.8125	E145	1397.2625	E181
1396.3750	E110	1396.8250	E146	1397.2750	E182
1396.3875	E111	1396.8375	E147	1397.2875	E183
1396.4000	E112	1396.8500	E148	1397.3000	E184
1396.4125	E113	1396.8625	E149	1397.3125	E185
1396.4250	E114	1396.8750	E150	1397.3250	E186
1396.4375	E115	1396.8875	E151	1397.3375	E187
1396.4500	E116	1396.9000	E152	1397.3500	E188
1396.4625	E117	1396.9125	E153	1397.3625	E189
1396.4750	E118	1396.9250	E154	1397.3750	E190
1396.4875	E119	1396.9375	E155	1397.3875	E191
1396.5000	E120	1396.9500	E156	1397.4000	E192
1396.5125	E121	1396.9625	E157	1397.4125	E193
1396.5250	E122	1396.9750	E158	1397.4250	E194
1396.5375	E123	1396.9875	E159	1397.4375	E195
1396.5500	E124	1397.0000	E160	1397.4500	E196
1396.5625	E125	1397.0125	E161	1397.4625	E197
1396.5750	E126	1397.0250	E162	1397.4750	E198
1396.5875	E127	1397.0375	E163	1397.4875	E199
1396.6000	E128	1397.0500	E164	1397.5000	E200
1396.6125	E129	1397.0625	E165	1397.5125	E201
1396.6250	E130	1397.0750	E166	1397.5250	E202
1396.6375	E131	1397.0875	E167	1397.5375	E203
1396.6500	E132	1397.1000	E168	1397.5500	E204
1396.6625	E133	1397.1125	E169	1397.5625	E205
1396.6750	E134	1397.1250	E170	1397.5750	E206
1396.6875	E135	1397.1375	E171	1397.5875	E207
1396.7000	E136	1397.1500	E172	1397.6000	E208
1396.7125	E137	1397.1625	E173	1397.6125	E209
1396.7250	E138	1397.1750	E174	1397.6250	E210
1396.7375	E139	1397.1875	E175	1397.6375	E211
1396.7500	E140	1397.2000	E176	1397.6500	E212
1396.7625	E141	1397.2125	E177	1397.6625	E213
1396.7750	E142	1397.2250	E178	1397.6750	E214

Transmission frequency (MHz)	Channel No.	Transmission frequency (MHz)	Channel No.	Transmission frequency (MHz)	Channel No.
1397.6875	E215	1398.1375	E251	1398.5875	E287
1397.7000	E216	1398.1500	E252	1398.6000	E288
1397.7125	E217	1398.1625	E253	1398.6125	E289
1397.7250	E218	1398.1750	E254	1398.6250	E290
1397.7375	E219	1398.1875	E255	1398.6375	E291
1397.7500	E220	1398.2000	E256	1398.6500	E292
1397.7625	E221	1398.2125	E257	1398.6625	E293
1397.7750	E222	1398.2250	E258	1398.6750	E294
1397.7875	E223	1398.2375	E259	1398.6875	E295
1397.8000	E224	1398.2500	E260	1398.7000	E296
1397.8125	E225	1398.2625	E261	1398.7125	E297
1397.8250	E226	1398.2750	E262	1398.7250	E298
1397.8375	E227	1398.2875	E263	1398.7375	E299
1397.8500	E228	1398.3000	E264	1398.7500	E300
1397.8625	E229	1398.3125	E265	1398.7625	E301
1397.8750	E230	1398.3250	E266	1398.7750	E302
1397.8875	E231	1398.3375	E267	1398.7875	E303
1397.9000	E232	1398.3500	E268	1398.8000	E304
1397.9125	E233	1398.3625	E269	1398.8125	E305
1397.9250	E234	1398.3750	E270	1398.8250	E306
1397.9375	E235	1398.3875	E271	1398.8375	E307
1397.9500	E236	1398.4000	E272	1398.8500	E308
1397.9625	E237	1398.4125	E273	1398.8625	E309
1397.9750	E238	1398.4250	E274	1398.8750	E310
1397.9875	E239	1398.4375	E275	1398.8875	E311
1398.0000	E240	1398.4500	E276	1398.9000	E312
1398.0125	E241	1398.4625	E277	1398.9125	E313
1398.0250	E242	1398.4750	E278	1398.9250	E314
1398.0375	E243	1398.4875	E279	1398.9375	E315
1398.0500	E244	1398.5000	E280	1398.9500	E316
1398.0625	E245	1398.5125	E281	1398.9625	E317
1398.0750	E246	1398.5250	E282	1398.9750	E318
1398.0875	E247	1398.5375	E283	1398.9875	E319
1398.1000	E248	1398.5500	E284	1399.0000	E320
1398.1125	E249	1398.5625	E285	1399.0125	E321
1398.1250	E250	1398.5750	E286	1399.0250	E322

Transmission frequency (MHz)	Channel No.	Transmission frequency (MHz)	Channel No.	Transmission frequency (MHz)	Channel No.
1399.0375	E323	1399.4625	E357	1399.8875	E391
1399.0500	E324	1399.4750	E358	1399.9000	E392
1399.0625	E325	1399.4875	E359	1399.9125	E393
1399.0750	E326	1399.5000	E360	1399.9250	E394
1399.0875	E327	1399.5125	E361	1399.9375	E395
1399.1000	E328	1399.5250	E362	1399.9500	E396
1399.1125	E329	1399.5375	E363	1399.9625	E397
1399.1250	E330	1399.5500	E364	1399.9750	E398
1399.1375	E331	1399.5625	E365		
1399.1500	E332	1399.5750	E366		
1399.1625	E333	1399.5875	E367		
1399.1750	E334	1399.6000	E368		
1399.1875	E335	1399.6125	E369		
1399.2000	E336	1399.6250	E370		
1399.2125	E337	1399.6375	E371		
1399.2250	E338	1399.6500	E372		
1399.2375	E339	1399.6625	E373		
1399.2500	E340	1399.6750	E374		
1399.2625	E341	1399.6875	E375		
1399.2750	E342	1399.7000	E376		
1399.2875	E343	1399.7125	E377		
1399.3000	E344	1399.7250	E378		
1399.3125	E345	1399.7375	E379		
1399.3250	E346	1399.7500	E380		
1399.3375	E347	1399.7625	E381		
1399.3500	E348	1399.7750	E382		
1399.3625	E349	1399.7875	E383		
1399.3750	E350	1399.8000	E384		
1399.3875	E351	1399.8125	E385		
1399.4000	E352	1399.8250	E386		
1399.4125	E353	1399.8375	E387		
1399.4250	E354	1399.8500	E388		
1399.4375	E355	1399.8625	E389		
1399.4500	E356	1399.8750	E390		

Channel: E502 to E898

Transmission frequency (MHz)	Channel No.	Transmission frequency (MHz)	Channel No.	Transmission frequency (MHz)	Channel No.
1427.0250	E502	1427.4500	E536	1427.8750	E570
1427.0375	E503	1427.4625	E537	1427.8875	E571
1427.0500	E504	1427.4750	E538	1427.9000	E572
1427.0625	E505	1427.4875	E539	1427.9125	E573
1427.0750	E506	1427.5000	E540	1427.9250	E574
1427.0875	E507	1427.5125	E541	1427.9375	E575
1427.1000	E508	1427.5250	E542	1427.9500	E576
1427.1125	E509	1427.5375	E543	1427.9625	E577
1427.1250	E510	1427.5500	E544	1427.9750	E578
1427.1375	E511	1427.5625	E545	1427.9875	E579
1427.1500	E512	1427.5750	E546	1428.0000	E580
1427.1625	E513	1427.5875	E547	1428.0125	E581
1427.1750	E514	1427.6000	E548	1428.0250	E582
1427.1875	E515	1427.6125	E549	1428.0375	E583
1427.2000	E516	1427.6250	E550	1428.0500	E584
1427.2125	E517	1427.6375	E551	1428.0625	E585
1427.2250	E518	1427.6500	E552	1428.0750	E586
1427.2375	E519	1427.6625	E553	1428.0875	E587
1427.2500	E520	1427.6750	E554	1428.1000	E588
1427.2625	E521	1427.6875	E555	1428.1125	E589
1427.2750	E522	1427.7000	E556	1428.1250	E590
1427.2875	E523	1427.7125	E557	1428.1375	E591
1427.3000	E524	1427.7250	E558	1428.1500	E592
1427.3125	E525	1427.7375	E559	1428.1625	E593
1427.3250	E526	1427.7500	E560	1428.1750	E594
1427.3375	E527	1427.7625	E561	1428.1875	E595
1427.3500	E528	1427.7750	E562	1428.2000	E596
1427.3625	E529	1427.7875	E563	1428.2125	E597
1427.3750	E530	1427.8000	E564	1428.2250	E598
1427.3875	E531	1427.8125	E565	1428.2375	E599
1427.4000	E532	1427.8250	E566	1428.2500	E600
1427.4125	E533	1427.8375	E567	1428.2625	E601
1427.4250	E534	1427.8500	E568	1428.2750	E602
1427.4375	E535	1427.8625	E569	1428.2875	E603

Transmission frequency (MHz)	Channel No.	Transmission frequency (MHz)	Channel No.	Transmission frequency (MHz)	Channel No.
1428.3000	E604	1428.7500	E640	1429.2000	E676
1428.3125	E605	1428.7625	E641	1429.2125	E677
1428.3250	E606	1428.7750	E642	1429.2250	E678
1428.3375	E607	1428.7875	E643	1429.2375	E679
1428.3500	E608	1428.8000	E644	1429.2500	E680
1428.3625	E609	1428.8125	E645	1429.2625	E681
1428.3750	E610	1428.8250	E646	1429.2750	E682
1428.3875	E611	1428.8375	E647	1429.2875	E683
1428.4000	E612	1428.8500	E648	1429.3000	E684
1428.4125	E613	1428.8625	E649	1429.3125	E685
1428.4250	E614	1428.8750	E650	1429.3250	E686
1428.4375	E615	1428.8875	E651	1429.3375	E687
1428.4500	E616	1428.9000	E652	1429.3500	E688
1428.4625	E617	1428.9125	E653	1429.3625	E689
1428.4750	E618	1428.9250	E654	1429.3750	E690
1428.4875	E619	1428.9375	E655	1429.3875	E691
1428.5000	E620	1428.9500	E656	1429.4000	E692
1428.5125	E621	1428.9625	E657	1429.4125	E693
1428.5250	E622	1428.9750	E658	1429.4250	E694
1428.5375	E623	1428.9875	E659	1429.4375	E695
1428.5500	E624	1429.0000	E660	1429.4500	E696
1428.5625	E625	1429.0125	E661	1429.4625	E697
1428.5750	E626	1429.0250	E662	1429.4750	E698
1428.5875	E627	1429.0375	E663	1429.4875	E699
1428.6000	E628	1429.0500	E664	1429.5000	E700
1428.6125	E629	1429.0625	E665	1429.5125	E701
1428.6250	E630	1429.0750	E666	1429.5250	E702
1428.6375	E631	1429.0875	E667	1429.5375	E703
1428.6500	E632	1429.1000	E668	1429.5500	E704
1428.6625	E633	1429.1125	E669	1429.5625	E705
1428.6750	E634	1429.1250	E670	1429.5750	E706
1428.6875	E635	1429.1375	E671	1429.5875	E707
1428.7000	E636	1429.1500	E672	1429.6000	E708
1428.7125	E637	1429.1625	E673	1429.6125	E709
1428.7250	E638	1429.1750	E674	1429.6250	E710
1428.7375	E639	1429.1875	E675	1429.6375	E711

Transmission frequency (MHz)	Channel No.	Transmission frequency (MHz)	Channel No.	Transmission frequency (MHz)	Channel No.
1429.6500	E712	1430.1000	E748	1430.5500	E784
1429.6625	E713	1430.1125	E749	1430.5625	E785
1429.6750	E714	1430.1250	E750	1430.5750	E786
1429.6875	E715	1430.1375	E751	1430.5875	E787
1429.7000	E716	1430.1500	E752	1430.6000	E788
1429.7125	E717	1430.1625	E753	1430.6125	E789
1429.7250	E718	1430.1750	E754	1430.6250	E790
1429.7375	E719	1430.1875	E755	1430.6375	E791
1429.7500	E720	1430.2000	E756	1430.6500	E792
1429.7625	E721	1430.2125	E757	1430.6625	E793
1429.7750	E722	1430.2250	E758	1430.6750	E794
1429.7875	E723	1430.2375	E759	1430.6875	E795
1429.8000	E724	1430.2500	E760	1430.7000	E796
1429.8125	E725	1430.2625	E761	1430.7125	E797
1429.8250	E726	1430.2750	E762	1430.7250	E798
1429.8375	E727	1430.2875	E763	1430.7375	E799
1429.8500	E728	1430.3000	E764	1430.7500	E800
1429.8625	E729	1430.3125	E765	1430.7625	E801
1429.8750	E730	1430.3250	E766	1430.7750	E802
1429.8875	E731	1430.3375	E767	1430.7875	E803
1429.9000	E732	1430.3500	E768	1430.8000	E804
1429.9125	E733	1430.3625	E769	1430.8125	E805
1429.9250	E734	1430.3750	E770	1430.8250	E806
1429.9375	E735	1430.3875	E771	1430.8375	E807
1429.9500	E736	1430.4000	E772	1430.8500	E808
1429.9625	E737	1430.4125	E773	1430.8625	E809
1429.9750	E738	1430.4250	E774	1430.8750	E810
1429.9875	E739	1430.4375	E775	1430.8875	E811
1430.0000	E740	1430.4500	E776	1430.9000	E812
1430.0125	E741	1430.4625	E777	1430.9125	E813
1430.0250	E742	1430.4750	E778	1430.9250	E814
1430.0375	E743	1430.4875	E779	1430.9375	E815
1430.0500	E744	1430.5000	E780	1430.9500	E816
1430.0625	E745	1430.5125	E781	1430.9625	E817
1430.0750	E746	1430.5250	E782	1430.9750	E818
1430.0875	E747	1430.5375	E783	1430.9875	E819

Transmission frequency (MHz)	Channel No.	Transmission frequency (MHz)	Channel No.	Transmission frequency (MHz)	Channel No.
1431.0000	E820	1431.4375	E855	1431.8750	E890
1431.0125	E821	1431.4500	E856	1431.8875	E891
1431.0250	E822	1431.4625	E857	1431.9000	E892
1431.0375	E823	1431.4750	E858	1431.9125	E893
1431.0500	E824	1431.4875	E859	1431.9250	E894
1431.0625	E825	1431.5000	E860	1431.9375	E895
1431.0750	E826	1431.5125	E861	1431.9500	E896
1431.0875	E827	1431.5250	E862	1431.9625	E897
1431.1000	E828	1431.5375	E863	1431.9750	E898
1431.1125	E829	1431.5500	E864		
1431.1250	E830	1431.5625	E865		
1431.1375	E831	1431.5750	E866		
1431.1500	E832	1431.5875	E867		
1431.1625	E833	1431.6000	E868		
1431.1750	E834	1431.6125	E869		
1431.1875	E835	1431.6250	E870		
1431.2000	E836	1431.6375	E871		
1431.2125	E837	1431.6500	E872		
1431.2250	E838	1431.6625	E873		
1431.2375	E839	1431.6750	E874		
1431.2500	E840	1431.6875	E875		
1431.2625	E841	1431.7000	E876		
1431.2750	E842	1431.7125	E877		
1431.2875	E843	1431.7250	E878		
1431.3000	E844	1431.7375	E879		
1431.3125	E845	1431.7500	E880		
1431.3250	E846	1431.7625	E881		
1431.3375	E847	1431.7750	E882		
1431.3500	E848	1431.7875	E883		
1431.3625	E849	1431.8000	E884		
1431.3750	E850	1431.8125	E885		
1431.3875	E851	1431.8250	E886		
1431.4000	E852	1431.8375	E887		
1431.4125	E853	1431.8500	E888		
1431.4250	E854	1431.8625	E889		