

DynaScope 7000 Series

Bedside Monitor

# DS-7100 System

Ver.11

Operation Manual



- Before using this device, read this operation manual thoroughly.
- Keep this manual near the device for future reference.



This operation manual is for the DS-7100 Series Version 11.



**FEDERAL LAW RESTRICTS THIS DEVICE TO SALE BY OR ON  
THE ORDER OF A PHYSICIAN.**

**CAUTION:**

- The company and product names used in this manual are trademarks or registered trademarks.
- If this manual has pages missing or out of order, contact Fukuda Denshi for replacement.
- Only physician or persons instructed by physicians are allowed to use the equipment.
- The information contained in this document is subject to change without notice due to improvement in the equipment.

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# Preface

Thank you for purchasing this product.

Before using this product, read the following precautions to make sure the product is used correctly and safely.

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## Safety Precautions

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- Read the “Safety Precautions” thoroughly before use to ensure correct and safe use of the product.
- Be sure to follow the precautions indicated below, as these are important messages related to safety.

 DANGER	Failure to follow this message may cause immediate threat of death or serious injury, or complete failure of the equipment.
 WARNING	Failure to follow this message may result in death or serious injury, or complete failure of the equipment.
 CAUTION	Failure to follow this message may cause injury or failure to the equipment.
NOTE	A note is not related to product safety, but provides information about the correct use and operating procedures to prevent incorrect operation and malfunction of the equipment.

## Labels Attached to the Unit

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Make sure to read the warning labels attached to the unit and comply with these requirements while operating the unit.

 CAUTION	Do not damage or erase the warning labels attached to the unit. These warning labels contain descriptions important for handling and operating the unit properly and safely. A damaged label may compromise safe operation.
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**DANGER**

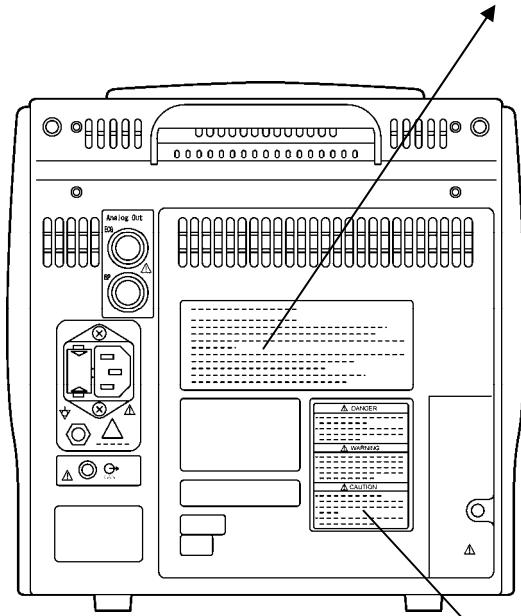
Risk of explosion if used in the presence of flammable anesthetics.

**CAUTION**

Before connecting, read instruction manual.

**CAUTION**

To reduce the risk of electric shock, do not remove the cover.  
Refer servicing to qualified service personnel.



**DANGER**

- Use only the batteries specified for this device.
- Do not disassemble or modify the battery. The battery incorporates protection circuitry for safety purposes.

**WARNING**

- Installation of the battery should be performed only by our service representative, to avoid any risk of electric shock to the operator or malfunction of the device.

**CAUTION**

- The life cycle of the battery is 1 year.
- The battery charges when the power cord is connected to a hospital-grade outlet.
- It takes approximately 2.5 hours to fully charge an empty battery.

## Measurement Unit for Each Parameter

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The measurement units for this equipment are as follows.

Detail	Parameter	Display	Unit	Default
Heart Rate / Pulse Rate *1	ECG	HR	bpm (beats per minute)	
	Invasive Blood Pressure	PR_BP	bpm (beats per minute)	
	SpO <sub>2</sub>	PR_SpO <sub>2</sub>	bpm (beats per minute)	
ST Level	ECG	ST	mm, mv	mv
VPC	ECG	VPC	beats / minute	
Respiration Rate *2	Impedance Respiration	RR_IMP	Bpm (breaths per minute)	
	CO <sub>2</sub>	RR_CO <sub>2</sub>	Bpm (breaths per minute)	
Apnea	Impedance Respiration	APNEA	s (second)	
	CO <sub>2</sub>	APNEA	s (second)	
Invasive Blood Pressure	Invasive Blood Pressure	BP	mmHg, kpa	mmHg
Non-Invasive Blood Pressure	Non-Invasive Blood Pressure	NIBP	mmHg, kPa	mmHg
Arterial Oxygen Saturation	SpO <sub>2</sub>	SpO <sub>2</sub>	%	
Temperature	Temperature	TEMP	°C / °F	°C
End-Tidal CO <sub>2</sub> Concentration	CO <sub>2</sub>	EtCO <sub>2</sub>	mmHg, kPa, %	mmHg
Inspiratory CO <sub>2</sub> Concentration	CO <sub>2</sub>	InspCO <sub>2</sub>	mmHg, kPa, %	mmHg

\*1 HR/PR will be displayed in the color selected for ECG/HR.

\*2 RR will be displayed in the color selected for RESP.

## Graphic Symbols

Refer following for the meaning of the symbols indicated on the equipment.

### Symbols indicated on the equipment

Symbol	Description
	Caution; refer to accompanying documents Indicates the need to refer to related accompanying documents before operation.
	Equipotential Terminal Indicates the terminal to equalize the potential difference when interconnecting the devices.
	Protective Earth Indicates the protective earth inside the equipment.
	Alternating Current (Main Power Input Indicator)
	Direct Current
	"OFF" for a Part of an Equipment Indicates the "OFF" condition for a part of an equipment.
	"ON" for a Part of an Equipment Indicates the "ON" condition for a part of an equipment.
	Electrostatic Sensitive Part Directly touching this connector part with hands should be avoided.
	Type CF Applied Part with Defibrillation-Proof Indicates the degree of protection against electric shock is Type CF Applied Part with defibrillation-proof.
	Type BF Applied Part with Defibrillation-Proof Indicates the degree of protection against electric shock is Type BF Applied Part with defibrillation-proof.
	Type BF Applied Part Indicates the degree of protection against electric shock is Type BF Applied Part.
	Signal Output Part
	GAS Output Part
	Signal Input Part
	Manufactured Date
	TCP/IP Network Connector Connects to TCP/IP network.

<b>Symbol</b>	<b>Description</b>
	RS-232C Connector Connects the related device.
	Eject Indicates the switch to remove the recorder paper cassette.

#### Symbols displayed on the screen

<b>Symbol</b>	<b>Description</b>
	Battery Mark Indicates battery capacity and remaining volume during battery operation.
	Alarm OFF Indicates the alarm is OFF.
	Heart Rate Synchronization Mark This mark flashes synchronizing to the heartbeat.
	Respiration Synchronization Mark This mark flashes synchronizing to the inspiration.
	Event Key Mark Displayed when an alarm generates. ON/OFF of the display can be selected on the ward setup.
	Message Mark Displayed in the parameter key when an alarm message is present for that parameter.
	Record Start/Stop Starts/stops the recording.
	TCON Antenna Mark Indicates the receiving condition of the Bidirectional Wireless Communication Module (HTC-702).
	SEC Alarm Display Indicates the SEC alarm status.
	Scroll Keys These keys will allow to scroll the screen.

## Precautions for Safe Operation of Medical Electrical Equipment

<b>⚠ CAUTION</b>	<p>Read the following precautions thoroughly to correctly operate the device.</p> <ul style="list-style-type: none"><li>● Users should have a thorough knowledge of the operation before using this system.</li><li>● Pay attention to the following when installing and storing the equipment.<ul style="list-style-type: none"><li>• Do not install or store in an area where the equipment will be subject to splashing water.</li><li>• Do not install or store in an area where the environmental conditions, such as atmospheric pressure, temperature, humidity, ventilation, sunlight, dust, sodium, sulfur, will adversely affect the system.</li><li>• Place the equipment on a stable surface where there is no inclination, vibration, or shock (including during transportation).</li><li>• Do not install or store in an area where there are chemical or gasses stored.</li><li>• Verify the power frequency, voltage and allowable current (or power consumption).</li><li>• Ensure the grounding is proper by connecting the accompanying power cable to the hospital grade outlet.</li><li>• Do not install the equipment in a location where it is difficult to unplug the power cable.</li></ul></li><li>● Before operating the system, verify the following items<ul style="list-style-type: none"><li>• Verify the power voltage.</li><li>• Check the cable connection and polarity to ensure proper operation of the equipment.</li><li>• Make sure the power system has adequate earth ground.</li><li>• Ensure that all cables are firmly and safely connected.</li><li>• Pay special attention when the device is used in conjunction with other equipment as it may cause erroneous judgment and danger.</li><li>• Ensure all patient connections are proper and secure.</li></ul></li><li>● During operation of the system, verify the following items.<ul style="list-style-type: none"><li>• Always observe the system and patient to ensure safe operation of the equipment.</li><li>• If any abnormality is found on the equipment or patient, take appropriate measures such as ceasing operation of the equipment in the safest way for the patient.</li><li>• Do not allow the patient to come in contact with the device.</li></ul></li><li>● After using the system, verify the following items.<ul style="list-style-type: none"><li>• Unplug all the cables from the patient before turning off the power.</li><li>• When unplugging the cables, do not apply excessive force by pulling on the cord. Pull by the connector part of the cable.</li><li>• Clean the accessories and cables, and keep them together in one place.</li><li>• Keep the unit clean to ensure proper operation of the next use.</li></ul></li><li>● If the equipment is damaged and in need of repair, user should not attempt service. Label the unit "OUT OF ORDER" and contact Fukuda Denshi.</li><li>● Do not remodel the equipment.</li><li>● Maintenance Check<ul style="list-style-type: none"><li>• Make sure to periodically check the equipment, accessories and cables.</li><li>• Before reusing the device that has been left unused for a while, make sure that the device works normally and safely.</li></ul></li><li>● When using the electrosurgical knives or defibrillator with this equipment, verify proper attachment of patient ground plate, ECG electrode type for the electrosurgical knives, and paste volume, output energy for the defibrillator. Also, verify that proper ground is selected.</li></ul>
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## **Precautions for Safe Operation of Medical Telemetry (DS-7141, DS-7141M, DS-7101LT, DS-7101LTM)**

<b>⚠ CAUTION</b>	<p>Precautions for Safe Operation of Medical Telemetry</p> <p>To operate the device correctly, read the following precautions carefully.</p> <ul style="list-style-type: none"><li>● The medical institution (hereinafter referred as "Institution") must decide the telemetry installation plan for the medical institution in order to prevent interference and interference between transmitters (telemetry based on destination country's radio law).</li><li>● When using telemetry which requires zone location, the institution is to set up the zones as an operation unit for each transmitter to prevent electronic interference between telemetry throughout the medical institution.</li><li>● When using telemetry which requires zone location, display and identify each prepared zone in the equipment.</li><li>● When laying receiver antenna for each transmitter, the institution has to be examined so as not to generate electronic interference.</li><li>● Based on the above examination result, the institution places each receiver antenna as required.</li></ul> <p>In managing, be sure to follow the precautions below.</p> <ul style="list-style-type: none"><li>● The institution appoints a person to manage the wireless channels for the whole medical institution. And when using telemetry which requires zone location, the institution nominates a person to manage the wireless channels in each zone (a "Zone Manager"). However, when using such telemetry in a local medical institution, one person can perform both functions.</li><li>● Select a telemetry manager who understands the characteristics and functionality of telemetry systems, and is skilled in operating telemetry.</li><li>● When installing telemetry, the Overall Manager and the Zone Manager have to understand the precautions for use of the telemetry in advance.</li><li>● The Overall Manager takes responsibility of wireless channel management and transmitter storage for the whole medical institution by giving proper instruction.</li><li>● The Overall Manager creates a management log, list of wireless channels, management status for the whole medical institution (hereinafter referred to as the "management log"). When changing a wireless channel, register it in the log and give proper instructions to the zone manager or to the user.</li><li>● The Zone Manager assumes responsibility for managing the wireless channels, storing, and managing telemetry.</li><li>● The Zone Manager assigns the transmitter to the user, and provides enough education for use inside the zone.</li><li>● The telemetry user verifies operation of the transmitter/receiver before use.</li><li>● The telemetry user, if using the telemetry in a zone location, follows the instructions of the zone manager for the zone and gives instructions to the patient if required.</li><li>● When interference or breakdown occurs in telemetry communication, the user is required to inform the zone manager and the overall manager of the problems. The zone manager and overall manager are to deal with the problem properly and/or contact their nearest Fukuda Denshi representative for service.</li></ul>
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## Precautions about the Maintenance

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### Safety Inspection and Maintenance

For safe operation of the equipment, regular inspection and maintenance is required. Once a year, check all cables, devices, and accessories for damage, earth impedance, earth and leakage currents, and all alarm functions. Also, ensure that all safety labels are legible. Maintain a record of these safety inspections.

Immediate maintenance has to be carried out if ;

- the equipment was subjected to extreme mechanical stress, e.g. after a heavy fall.
- the equipment was subjected to liquid spill.
- the monitoring function is interrupted or disturbed.
- parts of the equipment enclosure are cracked, removed, or lost.
- any connector or cable shows signs of deterioration.



Refer to "10. Maintenance" for details.



**WARNING** Never open the housing while the equipment is in operation or connected to hospital grade outlet as it may result in electric shock.

### Maintenance, Modifications, and Repairs

Fukuda Denshi is liable for the safety, reliability, and performance of its equipment only if;

- Maintenance, modifications, and repairs are carried out by authorized personnel.
- Components are used in accordance with Fukuda Denshi operating instructions.

A full technical description of the DS-7100 system is available from your local Fukuda Denshi representative.

## Precautions about the Pacemaker

 <b>WARNING</b>	<ul style="list-style-type: none"><li>Minute ventilation rate-adaptive implantable pacemakers can occasionally interact with certain cardiac monitoring and diagnostic equipment, causing the pacemakers to pace at their maximum programmed rate. The cardiac monitoring and diagnostic equipment may possibly send wrong information. If such event occurs, please disconnect the cardiac monitoring and diagnostic equipment, or follow the procedures described in the operation manual of the pacemaker. (For more details, contact FUKUDA DENSHI personnel, your institution's professionals, or your pacemaker distributors.)</li></ul> <p>● Reference</p> <p>“Minute Ventilation Rate-Adaptive Pacemakers” FDA alerts health professionals that minute ventilation rate-adaptive implantable pacemakers can occasionally interact with certain cardiac monitoring and diagnostic equipment, causing pacemakers to pace at their maximum programmed rate. [Based on a safety bulletin issued by FDA Center for Devices and Radiological Health on October 14, 1998]</p> <ul style="list-style-type: none"><li>Rate meters may continue to count the pacemaker rate during occurrences of cardiac arrest or some arrhythmias. Do not rely entirely upon rate meter alarms. Keep pacemaker patients under close surveillance. See “11 Technical Information” for disclosure of the pacemaker pulse rejection capability of this equipment.</li></ul>
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## Non-Explosion Proof

 <b>DANGER</b>	Never operate the equipment in the presence of flammable anesthetics, high concentration of oxygen, or inside hyperbaric chamber. Also, do not operate the equipment in an environment in which there is a risk of explosion.  Explosion or fire may result.
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## Defibrillation Safety

 <b>WARNING</b>	<ul style="list-style-type: none"><li>When using the defibrillator, keep away from the electrodes or medicament applied to the patient chest. If this is not possible, remove the electrodes or medicament before using it. If the defibrillator paddles are directly in contact with the electrodes or medicament, electrical shock may result by the discharged energy.</li><li>When using the defibrillator, make sure that the electrodes, sensor cables, or relay cables are firmly connected to the device. Contacting the metal part of the disconnected cable may result in electrical shock by the discharged energy.</li><li>When using the defibrillator, do not touch the patient and the metal part of the device or cables. Electric shock may result by the discharged energy.</li><li>This equipment will return to standard operating mode within 10 seconds. The stored data will not be affected. The measurement accuracy will temporarily decrease during defibrillation, but it will not compromise the safety of patient and the equipment.</li></ul>
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## Electrosurgery Safety

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 <b>WARNING</b>	<p>The monitoring system contains protection against interference generated by electrosurgical instruments. However, operating conditions, surgery site with respect to the location of ECG electrodes, or the type of instrument used, may cause noise on the ECG. The noise is generated at the tip of an electrical knife and is difficult to completely eliminate because of the frequency components of the ECG. To reduce electrosurgical interference, take the following precautions:</p> <p><u>Location</u> Locate the electrosurgical unit as far as possible from this unit and the patient cable. This will help reduce interference on the ECG through the monitor or cables.</p> <p><u>Power Supply</u> Connect the electrosurgical unit to a power supply that is different from that of the monitor. This will help prevent interference through the power cable.</p> <p><u>Electrode Placement</u> The amount of interference is considerably different depending on the electrode position and surgery site. Place the ECG electrodes as far away as possible from the surgery site and the ground plate. Do not place electrodes in the path between the surgery site and the ground plate. If the electrodes are placed in this path, the amount of interference will be quite large. Position (+) and (-) electrodes as close as possible to each other.</p> <p><u>Ground Plate</u> When using electrosurgical instruments, make sure the contact between the patient and the ground plate is secure. If the connection is incomplete, the patient may suffer a burn at the electrode site.</p>
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## Precautions about Magnetic Resonance Imaging

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 <b>WARNING</b>	<ul style="list-style-type: none"><li>● Do not operate this equipment in magnetic resonance imaging (MRI) environments.</li><li>● When conducting MRI test, remove the electrodes and sensors connected to the patient (test subject).</li></ul> <p>The local heating caused by the induced electromotive force may cause burn injury to the patient (subject). For details, refer to the operation manual for the MRI testing device.</p>
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## Precautions about Connections to Peripheral Devices

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In the interest of safe and sufficient performance of this equipment, the connection of other manufacturers' equipment to the monitor is not authorized, unless the connection is explicitly approved by Fukuda Denshi. It is the user's responsibility to contact Fukuda Denshi to determine the compatibility and warranty status of any connection made to another manufacturer's equipment.

 <b>WARNING</b>	For the connector with  mark, only the peripheral devices specified by Fukuda Denshi should be connected with the given procedure. Use of an unspecified device may cause electric shock to the patient and/or operator due to excessive leakage current.
 <b>CAUTION</b>	All the peripheral device connectors on the DS-7100 system are isolated from the power supply, but the peripheral devices are not isolated. To prevent danger of electric shock, always position the peripheral devices away from the patient.

When connecting peripheral devices to DS-7100 system, it is the user's responsibility to verify that the overall system complies with IEC 60601-1-1, "Collateral Standard: Safety Requirements for Medical Electrical Systems".

## Precautions about the Fuse

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 <b>DANGER</b>	If the fuse blows, contact Fukuda Denshi Service Representative. Do not continue using it as internal damage to the equipment may be considered.
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## Accessories and Optional Accessories

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 <b>WARNING</b>	Use only the cables specified by Fukuda Denshi. Use of other cables may result in increase in emission or decrease in immunity.
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## Precautions about the DS-7100 System

 <b>DANGER</b>	When connecting to other device, contact Fukuda Denshi service representative. Danger such as electric shock may result to the patient and operator.
 <b>WARNING</b>	<ul style="list-style-type: none"><li>● Do not connect unit or cable not authorized by Fukuda Denshi to any I/O connector. If done so by mistake, the DS-7100 system cannot deliver its maximum performance and the connected units may be damaged, resulting in a safety hazard.</li><li>● The equipment should be installed by a professional person. Otherwise, it may result in damage to the equipment and safety cannot be ensured.</li><li>● Use only the accompanying 3-way AC power cable. Use of other cables may result in electric shock to the patient and the operator.</li><li>● The power cable must be connected to hospital grade outlet.</li><li>● When using multiple ME equipment simultaneously, perform equipotential grounding to prevent potential difference between the equipment. Even a small potential difference may result in electric shock to the patient and the operator.</li><li>● The patient type selection influences the precision of the QRS detection and NIBP measurement. Make sure the correct selection is made.</li><li>● The pacemaker selection influences the precision of the QRS detection and arrhythmia analysis. Make sure the correct selection is made.</li><li>● When a ventilator is connected to the DS-7100, verify that "Vent. Online" message is displayed for the connection status. The DS-7100 will not detect the ventilator alarm unless the "Vent. Online" condition is achieved.</li><li>● If the QRS pace mask function is set to [OFF], [10ms], or [20ms], a decrease in heart rate may not generate HR or ASYSTOLE alarms due to erroneously detected QRS. Select [OFF], [10ms], or [20ms] only if you are sure that pacing failure will not occur, or when the patient can be constantly monitored.</li><li>● Be cautious when setting the "SpO<sub>2</sub> Averaging" duration as the SpO<sub>2</sub> alarm is based on the displayed SpO<sub>2</sub> value which is averaged from the duration set in "SpO<sub>2</sub> Averaging". The alarm occurrence time will be affected or may not occur for the transient value of SpO<sub>2</sub> depending on the set duration. (For Masimo® SpO<sub>2</sub> unit)</li><li>● When measuring the SpO<sub>2</sub> of patient with high fever or peripheral circulatory insufficiency, check the sensor attachment periodically and change the attachment site. The temperature of attachment site will rise 2 to 3°C due to the sensor heat which may result in compression necrosis and burn injury.</li><li>● For the following case, accurate SpO<sub>2</sub> measurement may not be possible.<ul style="list-style-type: none"><li>• Patient with excessive abnormal hemoglobin (COHb, MetHb)</li><li>• Patient with the pigment injected to the blood</li><li>• Patient receiving CPR treatment</li><li>• When measuring at site with venous pulse</li><li>• Patient with body motion</li><li>• Patient with small pulse</li></ul></li><li>● Before the NIBP measurement, make sure the patient type ([Adult]/[Child]/[Neonate]) is properly selected. Otherwise, correct measurement cannot be performed, and congestion or other injury may result.</li><li>● Pay attention when measuring the NIBP of patient with bleeding disorders or hypercoagulation. The cuff inflation may cause petechia or circulatory failure by blood clot.</li><li>● Use the specified sampling tube and nasal prong manufactured by Oridion.</li><li>● Always consider the circumference of the intubation tube when using the airway adapter. If inappropriate airway adapter is used for a patient with low ventilation, CO<sub>2</sub> may mix in to the inspired air resulting in incorrect measurement, or apnea detection may become difficult.</li></ul>

 <b>WARNING</b>	<ul style="list-style-type: none"> <li>● When performing expectoration treatment to the patient with ventilator connected, make sure to suspend the CO<sub>2</sub> measurement before the treatment. Otherwise, water may enter into the pump causing the equipment to be damaged.</li> <li>● The HR/PR alarm will not be generated unless the parameter key corresponded to the selected HR/PR source is displayed. Be sure to display the parameter key for the HR/PR source.</li> <li>● The alarm for the parameter not selected for the “HR/PR Alarm Source” (ECG/SpO<sub>2</sub>/BP) will be set to OFF on the DS-7600 Central Monitor.             <ul style="list-style-type: none"> <li>• The “HR/PR Alarm Source” setting will synchronize between the bedside monitor and the central monitor.</li> <li>• For example, if PR is set as the HR/PR alarm source on the DS-7100, HR alarm will be set to OFF on the central monitor.</li> </ul> </li> <li>● The RR/APNEA alarm will not be generated unless the parameter key corresponded to the selected RR/APNEA source is displayed. Be sure to display the parameter key for the RR/APNEA source.</li> <li>● When performing expectoration treatment to the patient with a ventilator connected, make sure to suspend the CO<sub>2</sub> measurement before the treatment. Otherwise, water may enter into the pump causing the equipment to be damaged.</li> <li>● When the system alarm is suspended, all the alarm will be suspended even if the parameter alarm is set to ON. Also, the alarm event will not be stored as recall.</li> <li>● If the upper/lower alarm limit of the parameter is set to OFF, or arrhythmia alarm is set to OFF, alarm will not function even if the system alarm is set to ON. Pay attention when setting them OFF.</li> <li>● When a parameter is in a connector-off condition, the alarm will be generated only on the bedside monitor and not on the central monitor. Make sure that the connector is securely connected. If the waveform/numeric data is not displayed for a monitored parameter, check the patient's condition and pay attention not to miss the connector-off condition.</li> <li>● If the QRS pace mask function is turned OFF, a decrease in heart rate may not generate HR or ASYSTOLE alarms due to erroneously detected QRS. Turn this function OFF only if you are sure that pacing failure will not occur, or when the patient can be constantly monitored.</li> <li>● Objective and constant arrhythmia detection is possible through the fixed algorithm incorporated in this monitor. However, excessive waveform morphology change, motion artifact, or the inability to determine the waveform pattern may cause an error, or fail to make adequate detection. Therefore, physicians should make final decisions using manual recording, alarm recording and recall waveform for evaluation.</li> </ul>
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 <b>CAUTION</b>	<ul style="list-style-type: none"> <li>● Systems             <ul style="list-style-type: none"> <li>• This equipment is intended to be used for only one patient.</li> <li>• The monitor should be kept apart at least 20cm from the head of patient or operator.</li> <li>• Use only the accessories specified for this device. Otherwise, proper function cannot be executed.</li> <li>• For quality improvement, specifications are subject to change without prior notice.</li> <li>• The battery deteriorates with repeated use, which shortens the usable time. When the DS-7100 system is operated by battery, and if empty mark is displayed for the battery condition, IC card format, read/write process cannot be performed.</li> <li>• The arrhythmia detection level corresponds with the displayed waveform size. Select an appropriate size for monitoring.</li> <li>• The touch panel utilizes exclusive fluorescent light for the backlight. Since this fluorescent light deteriorates by the life cycle, the display may become dark, scintillate, or may not light by the long term use. In such case, contact your nearest service representative.</li> <li>• Do not use the touch panel with the film attached. Malfunction of the touch panel or damage may result.</li> <li>• As the touch panel is made of glass, a strong impact may cause damage. Pay attention not to hit or drop the touch panel.</li> </ul> </li> </ul>
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 CAUTION	<ul style="list-style-type: none"> <li>● Systems (Continued)           <ul style="list-style-type: none"> <li>• Always operate the touch panel with fingers or a touch panel pen. Do not touch with a pen-point or other hard-edged instruments. It may cause malfunction or damage the touch panel.</li> <li>• Do not press the touch panel with strength or twist your finger on the panel. It may cause malfunction or damage the touch panel.</li> <li>• Due to its material characteristic, the touch panel expands/contracts depending on the temperature/humidity. When the touch panel is left unused for a while, or when the ambient temperature is low, the surface film of the touch panel may expand, but this is not an abnormal condition. This expansion will be reduced in few hours or half a day after the power is turned ON.</li> </ul> </li> <li>● ECG Monitoring           <ul style="list-style-type: none"> <li>• The indication for continuous use of the electrode is about one day.</li> <li>• Replace the electrode if the skin contact gets loosen due to perspiring, etc.</li> <li>• When an electrode is attached at the same location for a long time, some patients may develop a skin irritation. Check the patient's skin condition periodically and change the electrode site as required.</li> <li>• If different types of electrodes are used at the same time, the difference between the polarization potential from each electrode may interfere monitoring. Make sure to use electrodes of the same type.</li> <li>• The threshold level for arrhythmia detection changes with ECG waveform size. Set a proper waveform size for monitoring. When the waveform size is <math>\times 1/4</math>, <math>\times 1/2</math>, or <math>\times 1</math>, the detection threshold is 250µV. When the waveform size is <math>\times 2</math> or <math>\times 4</math>, the detection threshold is 150µV.</li> <li>• Automatic size/position of the ECG is effective only at the time the <b>AUTO</b> key is pressed. This does not continually adjust size and position.</li> <li>• There are some cases when pacemaker pulse can not be detected depending on the pacemaker type, pulse voltage, pulse width, electrode lead type (unipolar, bipolar), or electrode placement which causes the pacemaker pulse amplitude to decrease and disables pacemaker pulse detection.</li> <li>• If signals similar to a pacemaker pulse are present, such as electric blanket noise or excessive AC frequency noise, these may be erroneously detected and displayed as a pacemaker pulse.</li> <li>• When automatic QRS and pacemaker pulse overlap (ex. fusion beat, etc.), QRS detection cannot be performed properly. In this case, the heart rate is degraded.</li> <li>• When continuously detecting AC noise artifact as pacemaker pulses, QRS detection stops and heart rate is extremely degraded. Also arrhythmia cannot be detected.</li> </ul> </li> <li>● Respiration Monitoring           <ul style="list-style-type: none"> <li>• When the following relay cables are used, respiration cannot be measured.               <ul style="list-style-type: none"> <li>▪ Relay Cable CI-700E-3 (FA) (defibrillation and electrosurgery-proof, 3-electrode)</li> <li>▪ Relay Cable CI-700E-4 (FA) (defibrillation and electrosurgery-proof, 4-electrode)</li> <li>▪ Relay Cable CI-700E-5 (FA) (defibrillation and electrosurgery-proof, 5-electrode)</li> </ul> </li> <li>• When a defibrillator is used during respiration monitoring, a large offset voltage will be placed on the ECG electrodes, which may cause interruption of monitoring for a few seconds.</li> </ul> </li> <li>● SpO<sub>2</sub> Monitoring           <ul style="list-style-type: none"> <li>• If the sensor site is too thick, thin, deeply pigmented, or deeply colored (ex. nail polish, dye, or pigmented cream), it may lead to inaccurate measurements. In such case, reposition the sensor or choose an alternate sensor for use on a different site.</li> <li>• If irritation such as skin reddening or skin fit appears with the sensor use, change the attachment site or stop using the sensor.</li> </ul> </li> </ul>
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 CAUTION

- SpO<sub>2</sub> Monitoring (Continued)
  - When fixing the sensor with a tape, do not wind the tape too tight. At the same time, check the blood flow constantly so that congestion is not generated at the peripheral.
  - Even a short duration of attachment may inhibit the blood flow and generate compression necrosis and burn injury.
  - Change the sensor attachment site at regular time intervals (about 4 hours). The temperature of attachment site will rise 2 to 3°C due to the sensor heat which may result in compression necrosis and burn injury.
  - As skin for neonate / low birth weight infant is immature, change the sensor attachment site more frequently depending on the condition.
  - Excessive light may cause inaccurate measurements. In such cases, cover the sensor with opaque material.
  - When not performing the measurement, unplug the relay cable and sensor from the SpO<sub>2</sub> connector. Otherwise, the measurement data may be erroneously displayed by the ambient light.
  - Precautions for Reusable Type Sensors
    - The light-emitting part of the sensor should be over the root of the fingernail. Do not insert the finger too far into the sensor as it may hurt the patient.
    - The DS-100A is intended for use on finger of adults weighing over 40 kg (approximate). Do not use them on children or neonates. Also do not apply them on the thumb or toe.
    - The DS-100A must be moved to a new site at least every 4 hours. Because individual skin condition affects the ability of the skin to tolerate sensor placement, it may be necessary to change the sensor site more frequently with some patients. If skin integrity changes, move the sensor to another site.
  - Precautions for Single-Patient-Use Type Sensors
    - Do not wind the tape too strong. It may obstruct the blood flow.
    - The sensor is contraindicated for use on patients who exhibit allergic reactions to the adhesive tape.
    - The Nellcor® sensor OxiMax®, MAX-FAST can be reused on the same patient as long as the adhesive tape attaches without slippage. But do not reuse it on other patients. It is intended for single patient use only.
    - The Masimo® LNOP sensor can be reused on the same patient as long as the light emitting and receiving part is clean, and if it is still adhesive to the skin. But do not reuse it on other patients. It is intended for single patient use only.
    - For the Nellcor® single patient use type sensors, the site must be inspected every 8 hours (MAX-FAST: 12 hours) to ensure adhesion, skin integrity, and correct optical alignment. If skin integrity changes, move the sensor to another site.
    - Do not reuse the sensor by resterilizing it.
    - Dispose the sensor after use. In the event of damage to the sterile packaging, do not use it.
  - For Masimo® sensor, change the sensor attachment site every 4 hours for the reusable sensor, and every 8 hours for the disposable sensor. Exercise extreme caution with poorly perfused patients; skin erosion and pressure necrosis can be caused when the sensor is not frequently moved. Assess site at least every 2 hours with poorly perfused patients.
  - The SpO<sub>2</sub> patient cables (PC04, PC08, PC12) are intended for Masimo® SpO<sub>2</sub> unit only. When connecting these cables to the DS-7100 system, make sure that MASIMO™ label is present on the DS-7100 system SpO<sub>2</sub> connector. If connected to the unit without MASIMO™ label, it will not function properly.
  - For Masimo® SpO<sub>2</sub> unit, if **High** is selected for "Pulse Sens.", sensor-off detection will become somewhat inaccurate.
  - For Masimo® SpO<sub>2</sub> unit, if **OFF** is selected for "PI Display" under the SpO<sub>2</sub> configuration setup, "SpO<sub>2</sub> Low Perfusion" alarm will be indicated by message display only. The alarm sound will not be generated.
  - For additional warnings, cautions or contraindications when using the SpO<sub>2</sub> sensors, refer to each SpO<sub>2</sub> sensor instruction manual.

<b>⚠ CAUTION</b>	<ul style="list-style-type: none"> <li>● NIBP Monitoring           <ul style="list-style-type: none"> <li>• Select the appropriate cuff size which best fits the arm circumference. If the cuff size is inappropriate, it may cause measurement error.</li> <li>• Do not use a cuff which is worn out. The cuff may burst during inflation.</li> <li>• If there is any air leakage, correct NIBP measurement cannot be performed. Make sure that the connection is secure.</li> <li>• Correct NIBP measurement cannot be performed if artificial heart lung machine is used or if the pulse is difficult to detect.</li> <li>• Pay attention when measuring the NIBP of patient with bleeding disorders or hypercoagulation. The cuff inflation may cause petechia or circulatory failure by blood clot.</li> <li>• Do not apply the cuff to the arm or thigh where vein is secured. The blood may backflow causing the chemical injection to cease.</li> <li>• Check the condition of cuff-applied part on the patient during measurement so that the blood circulation will not be blocked over long period of time by the squashed or bent cuff hose.</li> <li>• If the air hose is twisted, or weighed down, the cuff air cannot be exhausted. Properly arrange the cuff and air hose.</li> <li>• Check the patient's condition constantly while measuring over long period of time with interval of 2.5 minutes or less. Also, periodically check the blood circulation while performing periodic measurement over long period of time. Congestion may occur at the measuring site.</li> <li>• The following factors may affect the NIBP value.               <ul style="list-style-type: none"> <li>• Body motion, arrhythmia, convulsion</li> <li>• Continuous noise such as cardiac massage</li> <li>• Periodic electromagnetic noise</li> </ul> </li> <li>• For the following situation, measurements will be terminated.               <ul style="list-style-type: none"> <li>When the measurement time has exceeded 120 seconds for adult, 90 seconds for child, 60 seconds for neonate.</li> <li>When the inflation value has exceeded 300mmHg for adult, 200mmHg for child, 150mmHg for neonate.</li> </ul> </li> </ul> </li> <li>● If used with the incorrect patient type, it will not only cause erroneous measurement, but the inflating level for the adult may be applied to child or neonate causing dangerous situation to the patient.</li> <li>● The 1-minute interval measurement will always start from 00 second. Pressing the <b>1min start</b> key will start the measurement from the next 00 second.</li> <li>● The 1-minute interval measurement will automatically stop after 10 minutes and returns to the previous interval mode setup.</li> <li>● The alarm function will be ineffective for the BP value measured by Quick SYS regardless of the ON/OFF selection of NIBP alarm.</li> <li>● BP Monitoring           <ul style="list-style-type: none"> <li>• If the SYS value is abnormally high, or DIA is abnormally low, a resonance may be the cause. If the resonance can not be eliminated by adjusting the blood pressure filter, check the BP line and use a thick, short, or hard catheter.</li> <li>• When the main power is turned ON, the BP value will not be displayed until zero balance is performed. Make sure to perform the zero balance.</li> <li>• During IABP treatment, the displayed BP value may differ from actual value.</li> <li>• Each time the blood pressure transducer or tubing is replaced, the zero balance procedure is required to ensure accurate measurements.</li> <li>• The zero balance procedure is required for the following case.               <ul style="list-style-type: none"> <li>• When starting the measurement.</li> <li>• When the position of the heart has changed due to body movement.</li> <li>• When the position of the transducer has changed.</li> <li>• When measuring for a long period of time and there is a possibility of measurement error due to change in ambient temperature, etc.</li> <li>• When the connector is connected / disconnected, or transducer is replaced.</li> <li>• When the power has been turned OFF for more than 5 minutes.</li> </ul> </li> </ul> </li> </ul>
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**⚠ CAUTION**

- BP Monitoring (Continued)
  - If the mean BP display is set to OFF, the mean BP alarm will not be generated. Also, the mean BP will not be displayed on the tabular trend. Be cautious when setting the mean BP display OFF.
  - For telemetry transmission, BP waveform with a scale above the programmed scale can not be properly transmitted. Set the appropriate scale.
  - The alarm for any BP not displayed will not be generated. Also, any BP not selected for the display type will not be added to the trending list function. Select the appropriate display type according to the monitoring purpose.
  - When the BP label is CVP, the display type is fixed as **[M]**, and cannot be changed.
- CO<sub>2</sub> Monitoring
  - Perform calibration 20 minutes after the patient monitor was turned ON.
  - Do not disconnect the sampling tube during calibration. Calibration will cease when the sampling tube is disconnected.
  - Conduct CO<sub>2</sub> calibration for the following case. If the CO<sub>2</sub> gas calibration is not performed at a specified interval, CO<sub>2</sub> measurement accuracy may be affected and also subsequent gas calibration may not be possible.
    - When 1 year has elapsed from the last calibration.
    - When EtCO<sub>2</sub> measurement is not stable or accuracy is degraded compared with other measuring device.
    - When the patient monitor was not used for a while, or when EtCO<sub>2</sub> was not measured for a while.
  - CO<sub>2</sub> monitoring will cease when the ventilation connector is covered.
  - Use only the specified sampling tube for CO<sub>2</sub> monitoring.
  - When the measurement is suspended, the alarm generation and trend input will be also suspended.
- Temperature Monitoring
  - Do not reuse the probe cover. It is intended for single patient use only.
- Alarm
  - A faint sound will be generated when setting a minimum volume for the alarm sound, but be cautious not to miss any alarm. Adjust the volume to a recognizable level.
  - Alarm messages will be displayed according to the priority. (Level 1 → Level 2 → Level 3 → Level 4)
  - For the same alarm level, the alarm message for the newer alarm will be displayed.
  - The alarm message for the arrhythmia alarm will continue to be displayed for 30 seconds after the alarm is resolved.
  - While the “LEAD OFF” message is displayed, HR alarm and arrhythmia alarm will not function. Leaving this condition unresolved may result in missing a sudden change of the patient. Promptly check the electrodes when this message is displayed.
  - The settings for the “HR Low Limit for VT” and “HR Low Limit for RUN” will be compared with the average HR of continuous VPC. Therefore, the displayed HR value at alarm generation may be lower than the settings if it is just after the VT detection, or if RUN with few continuous VPC is detected.
  - If the alarm with the higher priority occurs during alarm recording, the recording in process will cease and the alarm recording with the higher priority will start.
  - For the SpO<sub>2</sub> measurement, whether to use the SEC alarm function and its threshold selection should be based on the patient's clinical indication portent and medical evaluation. (For Nellcor® SpO<sub>2</sub> unit)
  - If the SpO<sub>2</sub> alarm and SEC alarm setup is set to OFF, the SEC alarm integral value will be set to 0. (For Nellcor® SpO<sub>2</sub> unit)
  - The alarm ON/OFF setup will remain effective even when the power is turned OFF. Be cautious not to miss any important alarm by leaving the alarm silenced.

**⚠ CAUTION**

- System Configuration
  - If the time/date is not correctly set, or changed during monitoring, erroneous condition may occur to NIBP measurement, periodic recording, trend and NIBP list data.
  - If the time/date is changed during monitoring, patient's age will not be recalculated.
  - When waveform and numeric data display is set to OFF, the alarm generation and tabular/graphic trend data input will also cease.
  - If BP display is set to OFF, pulse rate will not be displayed if HR/PR source is set to BP1.
  - If SpO<sub>2</sub> display is set to OFF, pulse rate will not be displayed if HR/PR source is set to SpO<sub>2</sub>.
  - If CO<sub>2</sub> display is set to OFF, RR will not be displayed if RR source is set to CO<sub>2</sub>.
  - Do not set the same remote control bed ID to more than one monitors on the same floor. Otherwise, it may cause to remote control more than one monitors at the same time.
  - After the remote control setup, check that the remote control unit is properly operating.
- Patient Admit / Discharge
  - If you start monitoring a new patient without performing a discharge procedure for the previous patient, new data will be added to the previous data which will result in inaccuracy.
  - The setup for the alarm mode and display mode remains stored even when the power is turned off or when discharging procedure is performed. Before monitoring, make sure the current monitoring mode is suitable for the patient's condition.
  - Resuming monitoring will resume the alarm in suspension.
  - After the information for a new patient is acquired by searching the patient data server, make sure to perform the admit process by pressing the **[Admit as new patient.]** key.
- Arrhythmia Analysis
  - For proper arrhythmia detection and ECG monitoring, verify proper electrode placement, lead selection, and ECG waveform size. If necessary, turn ON the AC filter. Improper electrode placement, lead selection, and ECG waveform size can cause errors in detection.
- IC Card
  - Use only the specified IC card.
  - Use the IC card formatted with this device.
  - Do not transfer the setup data from the newer to older software version device. The operation of the device may become unstable and proper monitoring may not be possible.
  - When the DS-7100 system is operated by battery, and if empty mark is displayed for the battery condition, IC card format, read/write process cannot be performed.
  - Restart the system after reading the setup data from the IC card. The setup data will become effective after the system is restarted.
  - Before reading the patient data from the IC card, all the patient data stored in the patient monitor will be erased.
- Maintenance
  - If stains cannot be removed from the touch panel surface, wipe softly with a dry or ethanol dampened cleaning cloth. Never use strong acidic solution. Neither is it recommended that mild acidic or alkaline cleaning solution to be used.
  - A special coating is applied to the surface of the touch panel. Do not wipe the surface with a cloth or gauze with coarse texture. Wipe the surface with the soft cleaning cloth provided as optional accessory or with an eyeglass cleaning cloth.
  - Clean the equipment frequently so stains can be removed easily.
  - To prevent injury, it is recommended to wear gloves when cleaning the equipment.

**⚠ CAUTION**

- Maintenance (Continued)
  - Do not allow liquids such as alcohol or cleaning solution enter the monitor or connectors.
  - Do not use organic solvents, thinner, toluene and benzene to avoid damaging the resin case.
  - Do not polish the housing with abrasive or chemical cleaner.
  - When sterilizing the entire room using a spray solution, pay close attention not to have liquids get into the monitor or connectors.
  - Use only neutral detergent to clean the housing. Do not use chemical cloth, scrub brush, abrasive, polishing powder, hot water, volatile solvent and chemicals (cleanser, thinner, toluene, benzine, benzol, and synthetic detergent for house and furniture), or sharp-edged tools. The surface resin coating may be damaged, resulting in discoloration, scratches, and other problems.
  - Do not open the housing.
  - Replace the components periodically as specified.
- Synchronized Signal
  - As the synchronous detection is performed after filtering the input signal, the synchronized signal is delayed from the actual synchronization. If HR is selected for "Signal to output", and ECG is selected as HR source, the delay time is 100 to 132ms (standard approx. 100ms) for adult.

## Precautions about the Wired Network System (DS-LANII/DS-LANIII)

<b>⚠ WARNING</b>	<ul style="list-style-type: none"><li>● Do not connect unspecified device to a wired network.</li><li>● Do not mix devices with DS-LANII and DS-LANIII setting in the same wired network. The network may cease and proper monitoring may not be possible.</li><li>● Before setting the bed ID, make sure that the DS-LAN (DS-LANII/DS-LANIII) is correctly set on the Monitor Setup menu. If not correctly set, the network may cease which may lead to accidents such as not transmitting life threatening alarms to the central monitor.</li></ul>
<b>⚠ CAUTION</b>	<ul style="list-style-type: none"><li>● When connecting to the DS-LAN network, perform "DS-LAN Setup" in the Monitor Setup menu and restart the system before connecting the LAN cable.</li><li>● If performing wired network transmission, configure the display so that the numeric data corresponded to the waveform is displayed. If not, the displayed waveform or numeric data may not be transmitted.</li><li>● The Bed ID is factory set to 000. If connected to the wired network with the ID unchanged, monitoring on the central monitor will not be possible.</li><li>● When connecting to the wired network, verify that the Bed ID does not duplicate with other bedside monitors. Otherwise, monitoring on the central monitor for both bedside monitors will not be possible.</li><li>● Make sure to set the bed ID in the following range.<ul style="list-style-type: none"><li>• For DS-LANII network: 001 to 048</li><li>• For DS-LANIII network: 001 to 100</li></ul></li><li>● When connected to a wired network, time/date will be the same with the central monitor. Even if the time/date is changed on the DS-7100 system, it will be corrected to the time/date of the central monitor.</li><li>● On some central monitors depending on the model type or software version, the setups for "HR Low Limit for VT" and "HR Low Limit for Run" cannot be performed.</li><li>● For the alarm generation on the bedside monitor, maximum of 2.5 seconds delay will occur for the alarm generation on the central monitor.</li><li>● In case of DS-LANII network, if <b>BP1</b> is selected for "HR/PR source" (Or, if <b>Auto</b> selects BP1 for HR/PR source), ECG waveform will not be transmitted on the network. On the central monitor, PR_BP value will be displayed instead of HR. However, on some central monitor depending on the model type, the HR value from ECG will be displayed on ST measurement list, etc. Refer to the operation manual for the respective central monitor. In case of DS-LANIII network, refer to the operation manual for the central monitor.</li><li>● There are following restrictions when connecting the DS-7100 system to the DS-LANII network.<ul style="list-style-type: none"><li>• When DS-5800N/NX/NX<sup>MB</sup> is used as a central monitor, recall, graphic trend, and tabular trend will not be displayed.</li><li>• On the ST display of the DS-5800N/NX/NX<sup>MB</sup>, the overlap waveform will not be displayed until 15 minutes have elapsed after the reference waveform has been set on the DS-7100.</li><li>• The DS-7100 system will not communicate to the AU-5500N 8-channel recorder. The data for the DS-7100 system cannot be recorded on the AU-5500N.</li><li>• If the measurement unit for BP (mmHg/kPa) is different between the bedside monitor and the central monitor, the corresponding waveform and numeric data will not be displayed on the central monitor.</li><li>• When the temperature unit is °F, the temperature data will not be transmitted. It will be treated as not measured data, and will not be displayed on the central monitor. Also, alarm limit setup on the central monitor cannot be performed.</li><li>• Arrhythmia alarm of TACHY, BRADY, COUPLET, PAUSE, TRIGEMINY will not be transmitted.</li></ul></li></ul>

 CAUTION	<ul style="list-style-type: none"> <li>• “SLOW_VT” will be transmitted as “VT”.</li> <li>• For numeric data displayed as “xxx”, maximum or minimum value of measurable range will be transmitted.</li> <li>• The numeric data displayed as “—” will be treated as not measured data.</li> <li>• For QRS classification, the “S” (Supraventricular Extrasystole) printed on the built-in recorder will be printed as “N” (Normal QRS beat) on the HR-500 Recorder.</li> <li>• Some central monitors cannot set the periodic recording interval time to 1min, 2min, or 3min.</li> <li>• When DS-5800N/NX/NX<sup>MB</sup> or DS-5700 is used as a central monitor, ST measurement cannot be recorded.</li> <li>• If <input type="checkbox"/> BP1 is selected for “HR/PR source” (Or, if <input type="checkbox"/> Auto selects BP1 for HR/PR source), ECG will not be printed on the central recorder. PR_BP value will be printed instead of HR.</li> <li>• If the “RR source” is other than impedance respiration (Or, if <input type="checkbox"/> Auto selects the RR source other than impedance respiration), respiration waveform will not be transmitted on a wired network and will not be recorded on the central recorder.</li> <li>• If the “RR source” is other than CO<sub>2</sub> (Or, if <input type="checkbox"/> Auto selects the RR source other than CO<sub>2</sub>), the CO<sub>2</sub> waveform will not be transmitted on a wired network, and will not be recorded on the central recorder.</li> <li>• If the SpO<sub>2</sub> (PR_SpO<sub>2</sub>) lower alarm limit is set, and “—” is displayed for the SpO<sub>2</sub> (PR_SpO<sub>2</sub>) value due to a cause such as SpO<sub>2</sub> sensor off, etc. on the DS-7100, it will be notified as SpO<sub>2</sub> (PR_SpO<sub>2</sub>) lower alarm on some central monitors even if the alarm is not generated on the DS-7100.</li> <li>• If using a HUB for the DS-LANII network construction, make sure to use a repeater HUB recommended by Fukuda Denshi.</li> <li>● There are following restrictions when connecting the DS-7100 system to the DS-LANIII network.       <ul style="list-style-type: none"> <li>• In order to connect to the DS-LANIII network, a special LAN board needs to be mounted on the DS-7100. The software version also needs to be the version which supports the DS-LANIII. For details, refer to our service representative.</li> <li>• If the measurement unit for BP (mmHg/kPa) and temperature (°C/°F) is different between the bedside monitor and the central monitor, the corresponding waveform and numeric data will not be displayed on the central monitor.</li> <li>• If using a HUB for the DS-LANIII network construction, make sure to use a switching HUB recommended by Fukuda Denshi.</li> <li>• If the same lead is set for ECG1 and ECG2, it will function as follows.           <ul style="list-style-type: none"> <li>- The waveform size setting for ECG1 will be transmitted.</li> <li>- ST alarm setting for only ECG1 will be transmitted. Therefore ST2 alarm will not generate.</li> </ul> </li> <li>• For numeric data displayed as “xxx”, maximum or minimum value of measurable range will be transmitted.</li> <li>• For QRS classification, the “S” (Supraventricular Extrasystole) printed on the built-in recorder will be printed as “N” (Normal QRS beat) on the HR-500 Recorder.</li> <li>• Some central monitors cannot set the periodic recording interval time to 1min, 2min, or 3min.</li> <li>• If <input type="checkbox"/> Center is selected for the recorder and recording is started on the DS-7100, the central monitor recorder will print patient ID of only up to 10 digits. If the recording is started on the central monitor, all 20 digits can be printed.</li> </ul> </li> </ul>
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## Precautions about the Wireless Network System

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 <b>DANGER</b>	When monitoring a patient with wireless telemetry, make sure the patient data is properly received at the central monitor. Pay special attention when channel ID at the bedside monitor is changed.
 <b>WARNING</b>	<ul style="list-style-type: none"><li>● Some wireless combinations of telemetry transmitters may generate interference with other devices.</li><li>● Before selecting the channel, verify it will not interfere with other channels.</li><li>● Make sure the telemetry manager of your system is aware of any changes to the telemetry channels.</li><li>● If transmitters are used in a neighboring medical facility, your facility and neighboring facility must make agreements on the setting of telemetry channels to prevent telemetry interference.</li></ul>
 <b>CAUTION</b>	<ul style="list-style-type: none"><li>● Telemetry Transmission<ul style="list-style-type: none"><li>• When performing telemetry transmission, the numeric data corresponding to the waveform should be selected for display. Otherwise, the displayed waveform or numeric data may not be transmitted.</li><li>• The setup of channel ID and group ID should be performed only by our service representative. Users should not perform this procedure as malfunction to the equipment may occur.</li><li>• If the measurement unit is “°F” and “kPa” on the DS-7100 system, it will be converted to “°C” and “mmHg” respectively when transmitted to the central monitor. If the measurement unit “°F” and “kPa” are set on the central monitor, it will be reconverted to the value in “°F” and “kPa” after transmitted to the central monitor.</li><li>• BP waveform with a scale above the programmed scale can not be properly transmitted. When transmitting the BP waveform, check the displayed BP waveform scale.</li></ul></li></ul>

## Precautions for Use of the Bidirectional Wireless Communications (TCON)

### CAUTION

- When using the TCON system, pay attention to the following.
  - The medical institution (hereinafter referred to as "Institution") must execute investigation required to prevent interference including types of radio waves, frequencies, and antenna power if wireless equipment is already installed and being used in the facility.
  - Even if this device is installed within the range of radio communication, the communication may not be possible due to noise or multi-path phasing etc. Always consider this thoroughly before use.
  - Do not install this device in an area where it will be subject to splashing water. Water entering the equipment may cause the equipment to malfunction or be damaged.
- In managing the TCON system, make sure to follow the precautions below.
  - The Institution should appoint a person (hereinafter referred as the "Overall Manager") to manage the wireless devices for the whole facility.
  - When installing the TCON, the Overall Manager has to receive an explanation of the precautions for use of the TCON from the manufacturer or sales representative.
  - The Overall Manager is responsible for the maintenance and storage of the equipment.
  - The Overall Manager should create a management log (hereinafter referred to as the "log"), which contains a list of the management status of the wireless channels for the whole facility. When assigning or changing wireless channels, register it in the log, and give proper instructions to the TCON user.
  - The user needs to verify the transmitting/receiving operation before use.
  - If interference or breakdown occurs in the communication, the TCON user is required to stop using the TCON and to inform the Overall Manager of the problem. The Overall Manager is to deal with the problem properly and/or contacts the nearest Fukuda Denshi representative for service.
- Precautions for operations

The Bidirectional Wireless Communications Module (TCON) uses radio waves to transmit data. Therefore, necessary precautions need to be taken for the characteristics and difficulties of using the device that emits radio waves. The TCON user should fully understand these precautions beforehand, and use the TCON device safely.

Furthermore, situations in which interference may occur are outlined below. In such cases, pay special attention to the condition of the patient connected to the bedside monitor, and eliminate the cause of interference.

  1. When the patient's data may become mixed with a different patient's data due to interference.
    - When there are multiple TCON communication devices set to the same TCON ID and channel (group).
  2. When symptoms such as being unable to communicate, unstable communication, or poor reception may occur.
    - When the radio communication is bad because there are metal, concrete, or other such obstacles between the Bidirectional Wireless Communications Modules (TCON).
    - When a different wireless device is using the same frequency (channel).
    - When there are other TCON devices nearby using different channels (groups).
    - When a cell telephone or other wireless device is being used nearby.
    - When citizens broadcast bands such as amateur radio or truck radios are used in the vicinity of the TCON operating area.

 CAUTION	<ul style="list-style-type: none"> <li>• When a computer or word processor, or electrical device that has an internal computer, is used near the TCON device antenna.</li> <li>• When the TCON device is installed or moved to a location that is outside the radio communication range.</li> <li>• If a nearby different TCON group is set with a TCON channel frequency that is too close to the channel frequency set for the current TCON group.</li> <li>● Follow the instructions of the Overall Manager for the wireless channel when setting the TCON ID or channel (group) to prevent interference within the same institution.</li> <li>● For the TCON ON/OFF setup, if the “OFF” is selected, the message such as “Check TCON Comm.” will not be displayed.</li> <li>● There are following restrictions when connecting the DS-7100 system to the TCON Network.           <ul style="list-style-type: none"> <li>• If the measurement unit for temperature is “°F”, the central monitor can not receive the measurement data for temperature. In addition, the alarm settings for temperature can not be operated from the central monitor.</li> <li>• If the measurement unit for BP is “kPa”, the central monitor can not receive the measurement data for NIBP, BP1, and BP2. In addition, the alarm settings for NIBP, BP1, and BP2 can not be operated from the central monitor.</li> </ul> </li> <li>● The NIBP measurement cannot be started from the central monitor via TCON system if the NIBP measurement interval is set to <span style="border: 1px solid black; padding: 2px;">2 min</span> / <span style="border: 1px solid black; padding: 2px;">2.5 min</span> / <span style="border: 1px solid black; padding: 2px;">3 min</span> / <span style="border: 1px solid black; padding: 2px;">5 min</span> or during the 1-minute measurement/Quick SYS measurement. However, it can be stopped.</li> </ul>
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## Precautions about Ventilator Monitoring

 <b>WARNING</b>	<ul style="list-style-type: none"><li>● The ventilator alarm on this monitor should be used as supplementary function. Check the patient's condition, ventilator alarm sound and message occasionally.</li><li>● When connecting a ventilator to the monitor, using them under adverse environmental condition will not only disallow the devices to deliver their maximum performance, but also the devices may be damaged and safety cannot be ensured.</li><li>● When transmitting the ventilator information to the central monitor using the medical telemetry, read the "Precautions for Safe Operation of Medical Telemetry" in the Preface.</li><li>● When monitoring the ventilator information on the central monitor, use the DS-7600 system or DS-5700 Central Monitor. Do not use the DS-5800N/NX/NX<sup>MB</sup> Central Monitor. For use of other central monitors, contact our service representative.</li><li>● For the SV-300, Servo-i, Servo-s, the ventilator alarm factor can be transmitted and displayed on the central monitor. However, depending on the central monitor type and software version, the ventilator alarm factor may not be displayed. For details, refer to our service representative.</li><li>● The ventilator alarm sound is set to OFF at factory default setting. The alarm sound can be turned ON on the volume setup menu.</li><li>● When a ventilator is connected to the DS-7100, verify that "Vent. Online" message is displayed for the connection status. The DS-7100 will not detect the ventilator alarm unless the "Vent. Online" condition is achieved.</li><li>● If the DS-7100 system does not generate an alarm even though the ventilator is generating an alarm, or if any other malfunction occurs, immediately check the ventilator, DS-7100 system, cable, and replace the cable if necessary. If the malfunction persists, stop using the device.</li><li>● The alarm generation on the DS-7100 system is not assured if the alarm other than specified generates at the ventilator (SV-900, SV-300, Servo-i/s, PB).<ul style="list-style-type: none"><li>● See For details of the specified alarms, refer to  <b>WARNING</b> on P9-17 "9. Installation Ventilator Alarm Input".</li></ul></li><li>● Precautions about Evita 2 dura / Evita 4 / Evita XL / Savina<ul style="list-style-type: none"><li>● The Evita 2 dura / Evita 4 / Evita XL / Savina acquires alarm information from the serial port. The ventilator alarm that cannot be acquired from the serial port is not guaranteed. For corresponding alarm, refer to the service representative of the ventilator manufacturer.</li><li>● The DS-7100 system will not correspond to the following alarms generated on the Evita 2 dura / Evita 4 / Evita XL. O<sub>2</sub> monitoring disabled alarm, CO<sub>2</sub> alarm disabled alarm, Oximeter alarm disabled alarm, Neo. volume measurement inoperable alarm, Minute volume alarm disabled alarm, Minute volume alarm low off alarm, Tidal volume alarm high off alarm, Apnea alarm off alarm, Nebulizer active alarm</li><li>● The DS-7100 system will not correspond to the following alarms generated on the Savina. O<sub>2</sub> monitoring disabled alarm, Minute volume alarm disabled alarm, Minute volume alarm low off alarm, Tidal volume alarm high off alarm, Apnea alarm off alarm, Nebulizer active alarm</li></ul></li></ul>
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<b>⚠ CAUTION</b>	<ul style="list-style-type: none"> <li>● The ventilator should be operated by well-trained, approved person.</li> <li>● Use only the specified cable for connecting the DS-7100 and ventilator.</li> <li>● Verify that the DS-7100 and the ventilator are securely connected.</li> <li>● Verify that the power of the DS-7100 and the ventilator is turned OFF when connecting the cable.</li> <li>● When connecting the PURITAN-BENNETT ventilator, follow the precautions below.           <ul style="list-style-type: none"> <li>• The serial port (RS-232C) of the ventilator should be set as follows. Refer to the service representative of the ventilator manufacturer.               <table border="0" style="width: 100%;"> <tr><td>Baud Rate</td><td>:</td><td>9600bps</td></tr> <tr><td>Data Bit</td><td>:</td><td>8bit</td></tr> <tr><td>Parity Bit</td><td>:</td><td>none</td></tr> </table> </li> <li>• The DS-7100 system detects the “ventilator alarm” when the nurse call port on the ventilator outputs the alarm signal. For details of ventilator setup and alarm signal output condition from the nurse call port, refer to the service representative of the ventilator manufacturer.</li> </ul> </li> <li>● When connecting the Evita 2 dura / Evita 4 / Evita XL / Savina, the serial port (RS-232C) setup of the ventilator should be as follows. Refer to the service representative of the ventilator manufacturer.           <table border="0" style="width: 100%;"> <tr><td>For Evita 2 dura / Evita 4 / Evita XL</td><td></td></tr> <tr><td>Protocol</td><td>:</td><td>Medibus</td></tr> <tr><td>Baud Rate</td><td>:</td><td>19200bps</td></tr> <tr><td>Data Bit</td><td>:</td><td>8bit</td></tr> <tr><td>Parity Bit</td><td>:</td><td>Even</td></tr> <tr><td>Stop Bit</td><td>:</td><td>1bit</td></tr> <tr><td>For Savina</td><td></td></tr> <tr><td>Protocol</td><td>:</td><td>Medibus</td></tr> <tr><td>Baud Rate</td><td>:</td><td>9600bps</td></tr> <tr><td>Data Bit</td><td>:</td><td>8bit</td></tr> <tr><td>Parity Bit</td><td>:</td><td>None</td></tr> <tr><td>Stop Bit</td><td>:</td><td>1bit</td></tr> </table> </li> </ul>	Baud Rate	:	9600bps	Data Bit	:	8bit	Parity Bit	:	none	For Evita 2 dura / Evita 4 / Evita XL		Protocol	:	Medibus	Baud Rate	:	19200bps	Data Bit	:	8bit	Parity Bit	:	Even	Stop Bit	:	1bit	For Savina		Protocol	:	Medibus	Baud Rate	:	9600bps	Data Bit	:	8bit	Parity Bit	:	None	Stop Bit	:	1bit
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## Precautions for Use of SpO<sub>2</sub> Sensor

 DANGER	<p>Burn Risk in Using SpO<sub>2</sub> Sensor</p> <p>In SpO<sub>2</sub> monitoring, always use the sensor/relay cable specified by Fukuda Denshi. If any other sensor/relay cable is used, a high temperature rise of the sensor may place the patient in danger of burns.</p> <p>If there are any questions regarding the sensor/relay cable use for SpO<sub>2</sub> measurements of this device, please contact Fukuda Denshi service representative.</p>
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## Precautions for Masimo® SpO<sub>2</sub> Unit

 CAUTION	<p>No Implied License</p> <p>Possession or purchase of this device does not convey any express or implied license to use the device with unauthorized sensors or cables which would, alone, or in combination with this device, fall within the scope of one or more of the patents relating to this device.</p>
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## Precautions for Use of NIBP Cuff

 CAUTION	<p>This product contains natural rubber latex which may cause allergic reactions. (FDA: Medical Alert on Latex Products, "Allergic Reactions to Latex-Containing Medical Devices", Food &amp; Drug Administration, 9200 Corporate Blvd., Rockville, MD 20850, 1991.)</p>
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## Disposing of Equipment, Accessories, or Components

 CAUTION	When disposing of the equipment, accessories, or components, use an industrial waste distributor. Do not dispose of as ordinary waste.
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## Precautions about Transportation

For transporting the DS-7100 system, pack with specified packing materials.



Refer to "11. Technical Information Specification / Performance" for environmental condition during transportation.

## Precautions about RTC or Data Backup

 CAUTION	<ul style="list-style-type: none"><li>The DS-7100 system is equipped with a built-in clock. When the power of the DS-7100 system is turned off, this clock is backed up by a lithium primary battery. If incorrect time is displayed when turning on the power, a low battery may be the cause. In such case, contact Fukuda Denshi service representative for replacing the battery.</li><li>To protect the data during voltage dip, short interruptions and voltage variations on power supply input lines or during short duration of power turned OFF, this monitor performs 5-minute (approx.) data backup using the secondary battery. The data may not be protected if the power is turned off within 30 minutes from power on.</li></ul>
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## Precautions for Use of Lithium-Ion Battery Pack

The lithium-ion battery pack (Li-ion) is a rechargeable battery (secondary battery). To effectively use these limited resources, your cooperation in recycling the battery will be appreciated. (When replacing the battery pack, contact our service representative.)

- When recycling the lithium-ion battery pack, do not include other batteries such as dry battery, button battery, etc.
- When recycling the lithium-ion battery pack, attach insulating tape to the connector terminal to prevent short-circuit, which may result in leakage, heating, fuming, ignition, and explosion.

 DANGER	<ul style="list-style-type: none"><li>● Use only the specified battery pack for the DS-7100 system.</li><li>● When a new battery pack is installed to the device, charge the battery and verify that the charge LED lights green.</li><li>● This battery pack is intended for exclusive use with the DS-7100 system (or other specified equipment). Do not use with other equipment. Otherwise, the performance and life cycle of the battery pack deteriorates, and may cause leakage, heating, fuming, ignition, and explosion of the battery.</li><li>● Do not disassemble or remodel the battery pack. If the security apparatus or protector inside the battery pack gets damaged, it may cause leakage, heating, fuming, ignition, and explosion of the battery.</li><li>● Do not use the battery pack if leaked or transformed. If the security apparatus inside the battery pack is damaged, it may cause leakage, heating, fuming, ignition, and explosion of the battery.</li><li>● When installing the battery to the device, ensure the connector direction is correct. If installed in opposite direction, it may cause leakage, heating, fuming, ignition, and explosion.</li><li>● If the leaked solution of the battery gets into the eyes, do not rub the eyes. Wash thoroughly with clean water and immediately receive medical treatment from the doctor. If not treated soon, it may cause serious injury.</li></ul>
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 WARNING	<ul style="list-style-type: none"><li>● If the leaked solution of the battery gets on to the skin or clothes, immediately wash down with rinse water. If not treated soon, it may cause serious injury.</li><li>● Do not throw the battery pack into fire or apply heat. The insulator may melt, gas exhaust vent or security apparatus may get damaged, or electrolyte may ignite causing leakage, heating, fuming, ignition, and explosion of the battery.</li><li>● Do not connect the (+) and (-) terminals of the battery with a wire or any other metal. Also, do not carry or store the battery with any metal such as necklace, hairpins, etc. The battery may short causing excessive current flow which may result in leakage, heating, fuming, ignition, and explosion of the battery, or heating of the metal (wire, necklace, hairpin, etc.)</li><li>● Do not directly solder on to the battery pack. The heat may melt the insulator or damage the security apparatus which may result in leakage, heating, fuming, ignition, and explosion of the battery.</li><li>● Do not put the battery pack in microwave oven or a pressure cooker. If heated suddenly or if sealed condition breaks, it may result in leakage, heating, fuming, ignition, and explosion of the battery.</li><li>● Do not drive a nail in, hit with a hammer, step on the battery pack, or peel off or scratch the exterior tube. The battery may explode and transform causing short-circuit which may result in leakage, heating, fuming, ignition, and explosion of the battery.</li><li>● Do not apply strong impact or throw the battery pack. This may result in leakage, heating, fuming, breakage, ignition, and explosion of the battery. Also, if the security apparatus incorporated in the battery gets damaged, the battery charges with abnormal current and voltage, which results in leakage, heating, fuming, ignition, and explosion.</li><li>● Do not get the battery pack wet with water, sea water or chemicals. If the security apparatus incorporated in the battery gets damaged, it may result in leakage, heating, fuming, ignition, and explosion of the battery pack.</li></ul>
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 <b>WARNING</b>	<ul style="list-style-type: none"> <li>● Do not connect the battery pack directly to power outlet or cigarette heater socket in a car. A high voltage application will cause excessive current flow and abnormal chemical reaction inside the battery. This may result in leakage, heating, fuming, ignition, and explosion of the battery.</li> <li>● Do not use or leave the battery in a high temperature (80 °C or over) such as near the fire or heater. If the resin separator gets damaged by heat, the battery pack may become unusable, or may short causing leakage, heating, fuming, ignition, and explosion.</li> <li>● If the battery is leaking or generating an abnormal odor, immediately remove the battery away from the fire. The leaked electrolyte may cause heating, fuming, ignition, and explosion.</li> </ul>
 <b>CAUTION</b>	<ul style="list-style-type: none"> <li>● Do not use or leave the battery in high temperature. It may result in leakage or deterioration of the performance / life cycle of the battery.</li> <li>● Immediately stop using the battery if any abnormality is found during use.</li> <li>● Do not use / store the battery in reach of infants.</li> <li>● If not using the device for a long period of time, charge the battery every 2 to 3 months.</li> </ul>
<b>NOTE</b>	<p>Users should not attempt to install or replace the battery pack. For installation and replacement of the battery pack, contact our service representative. When a new battery pack is installed to the device, charge the battery and verify that the charge LED lights green.</p>

## To Prepare for Emergency Use

### 1. Battery Pack

- (1) The battery self-discharges even when not in use. If there is any possibility to use the battery in emergency, the power cable should be always connected to the power receptacle. To fully charge the empty battery, it takes approximately 2.5 hours when the monitor is not operating, and approximately 13 hours when the monitor is operating.



Refer to "2. Basic Operation To Use with the Battery Pack"

- (2) The performance of the battery deteriorates with repeated use. To maintain the initial performance, replace the battery at least once a year. It is recommended to indicate the start usage date on the battery so that the replacing date can be easily recognized.

### 2. Accessories / Optional Accessories

- (1) The ECG electrodes are consumables. Always prepare extra supplies of electrodes.
- (2) Check if any wire break on the patient cables once a week.

## Electromagnetic Compatibility

The performance of this device under electromagnetic environment complies with IEC60601-1-2 (2001+A1: 2004).

## Precautions for Safe Operation under Electromagnetic Influence

 CAUTION	<p>If any sorts of electromagnetic wave, magnetic field, or static electricity exist around the device, noise interference or malfunction of the device may occur. If any unintended malfunction or noise occurs during monitoring, check the magnetic influence and take appropriate countermeasures.</p> <p>The following are examples of the common cause and countermeasures.</p> <ul style="list-style-type: none"><li>● Cellular Phone<ul style="list-style-type: none"><li>The radio wave may cause malfunction to the device. Cellular phones and radio sets should be turned off in the room (building) where medical device is located.</li></ul></li><li>● Static Electricity<ul style="list-style-type: none"><li>In a dry environment (room), static electricity is likely to occur. Take the following countermeasures.<ul style="list-style-type: none"><li>• Both operator and patient should remove any static electricity before entering the room.</li><li>• Humidify the room.</li></ul></li></ul></li><li>● Lightning<ul style="list-style-type: none"><li>• A lightning nearby may induce excessive voltage to the equipment. If any danger is suspected, use the uninterruptible power supply system.</li></ul></li><li>● High frequency noise interference from other device through the power outlet<ul style="list-style-type: none"><li>• Check where the noise is originated and remove it using filtering device, etc.</li><li>• Stop using the device that is originating the noise.</li><li>• Use other power outlet.</li></ul></li></ul>
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## EMC Guidance

This equipment complies with IEC60601-1-2 (2001+A1: 2004). However, if portable transmitter or wireless LAN equipment is used extremely nearby, the electromagnetic influence may largely exceed the compliance level and may cause unexpected phenomenon such as noise interference on the waveform, etc.

Therefore, this equipment should be used in a location specified by each medical institution.

If any unexpected noise interference on the waveform or failure to the peripheral device occurs, stop using the equipment and follow the instruction of the technician.

The following is the information relating to EMC (Electromagnetic Compatibility).  
(When using this equipment, verify that it is used within the environment specified below.)

## ●Compliance to the Electromagnetic Emissions

The DS-7100 system is intended for use in the electromagnetic environment specified below. The customer or the user of the DS-7100 system should assure that it is used in such an environment.

<b>Emissions Test</b>	<b>Compliance</b>	<b>Electromagnetic Environment - Guidance</b>
RF Emissions CISPR 11	Group 1	The DS-7100 system 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 A	This DS-7100 system is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Not applicable	
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Not applicable	

## ●Compliance to the Electromagnetic Immunity (1)

The DS-7100 system is intended for use in the electromagnetic environment specified below. The customer or the user of the DS-7100 system should assure that it is used in such an environment.

<b>Immunity Test</b>	<b>IEC60601-1-2 Test Level</b>	<b>Compliance Level</b>	<b>Electromagnetic Environment - Guidance</b>
Electrostatic Discharge (ESD) IEC 61000-4-2	±6kV contact ±8kV air	±6kV contact ±8kV 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	±2kV for power supply lines ±1kV for input/output lines	±2kV for power supply lines ±1kV input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1kV: differential mode ±2kV: common mode	±1kV: differential mode ±2kV: common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines. IEC 61000-4-11	<5% U <sub>T</sub> (>95% dip in U <sub>T</sub> ) for 0.5 cycle  40% U <sub>T</sub> (60% dip in U <sub>T</sub> ) for 5 cycles  70% U <sub>T</sub> (30% dip in U <sub>T</sub> ) for 25 cycles  <5% U <sub>T</sub> (>95% dip in U <sub>T</sub> ) for 5sec.	<5% U <sub>T</sub> (>95% dip in U <sub>T</sub> ) for 0.5 cycle  40% U <sub>T</sub> (60% dip in U <sub>T</sub> ) for 5 cycles  70% U <sub>T</sub> (30% dip in U <sub>T</sub> ) for 25 cycles  <5% U <sub>T</sub> (>95% dip in U <sub>T</sub> ) for 5sec.	Mains power quality should be that of a typical commercial or hospital environment. If the user of the DS-7100 system requires continued operation during power mains interruptions, it is recommended that the DS-7100 system is equipped with an internal battery (option) or is powered from an uninterruptible power supply.
Power Frequency (50/60Hz) Magnetic Field IEC 61000-4-8	3A/m	3A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

Note: U<sub>T</sub> is the AC mains voltage prior to application of the test level.

## ●Compliance to the Electromagnetic Immunity (2)

The DS-7100 system is intended for use in the electromagnetic environment specified below. The customer or the user of the DS-7100 system should assure that it is used in such an environment.

<b>Immunity Test</b>	<b>IEC60601-1-2 Test Level</b>	<b>Compliance Level</b>	<b>Electromagnetic Environment - Guidance</b>
Conducted RF IEC61000-4-6	3Vrms 150kHz to 80MHz	3Vrms	<p>Portable and mobile RF communications equipment should be used no closer to any part of the DS-7100 system, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.</p> <p>Recommended Separation Distance  <math>d = 1.2\sqrt{P}</math></p>
Radiated RF IEC61000-4-3	3V/m 80MHz to 2.5GHz	3V/m	<p><math>d = 1.2\sqrt{P}</math> 80MHz to 800MHz  <math>d = 2.3\sqrt{P}</math> 800MHz to 2.5GHz</p> <p>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).</p> <p>Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey<sup>a)</sup>, should be less than the compliance level in each frequency range<sup>b)</sup>.</p> <p>Interference may occur in the vicinity of equipment marked with the following symbol:</p> 

Note 1 : At 80MHz and 800MHz, 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.

<sup>a</sup> 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 DS-7100 system is used exceeds the applicable RF compliance level above, the DS-7100 system should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the DS-7100 system.

<sup>b</sup> Over the frequency range 150kHz to 80MHz, field strength should be less than 3V/m.

## ●Recommended Separation Distances between Portable and Mobile RF Communications Equipment and the DS-7100 System

The DS-7100 system is intended for use in an environment in which radiated RF disturbances are controlled. The customer or the user of the DS-7100 system can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) an

Rated Maximum Output Power of Transmitter (W)	Separation Distance according to Frequency of Transmitter (m)		
	150kHz to 80MHz $d = 1.2\sqrt{P}$	80MHz to 800MHz $d = 1.2\sqrt{P}$	800MHz to 2.5GHz $d = 2.3\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

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

Note 1 : At 80MHz and 800MHz, 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.

## FCC Radiation Exposure Statement

 <b>WARNING</b>	This equipment with a built-in telemeter complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body (excluding extremities: hands, wrists, and feet) and must not be co-located or operated with any other antenna or transmitter.
 <b>WARNING</b>	Operation of this equipment requires the prior coordination with a frequency coordinator designated by the FCC for the Wireless Medical Telemetry Service.

# Contents

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1. General Description	Describes the outline of this equipment.
2. Basic Operation	Describes the basic operation for monitoring.
3. Vital Application	Describes the procedure for vital application, etc.
4. Monitoring Setup	Describes the procedures to set the monitor according to the monitoring purpose.
5. Admit / Discharge of a Patient	Describes the procedure to admit or discharge a patient.
6. Parameter Setup	Describes the procedure to set the measurement condition, size, scale, etc. for each parameter.
7. Function	Describes about the functions such as arrhythmia analysis, trend, recall, etc.
8. System Configuration	Describes about the system configuration such as night mode, alarm mode, display mode, etc.
9. Installation	Describes about the environment for use, wireless system, etc.
10. Maintenance	Describes about the maintenance, troubleshooting of this equipment.
11. Technical Information	Lists the specification, default settings, pin assignments of external connector, etc.
12. Accessories	Lists the accessories and optional accessories for this equipment.

## Preface

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## Chapter 1 General Description

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## Chapter 1

# General Description

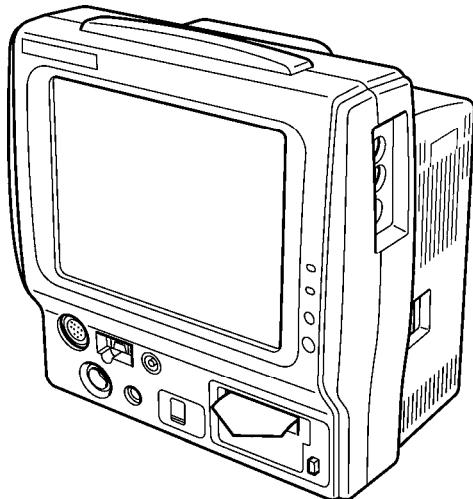
This chapter explains the general description of this equipment.

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## General Description

The DS-7100 system utilizes 8.4-inch color LCD display for monitoring ECG, RESP, SpO<sub>2</sub>, BP, NIBP, TEMP measurements. Depending on the model type, CO<sub>2</sub> measurement, telemetry transmission, and Ethernet LAN connection are also possible.

The SpO<sub>2</sub> measurement device can be selected from NELLCOR® or MASIMO®.



<DS-7141>

Model Type	Function					
	Basic Measurement	CO <sub>2</sub> Measurement	BP	SpO <sub>2</sub>	Telemetry Transmission	Ethernet LAN
DS-7141	Yes	Yes	2 channels	NELLCOR®	Yes	Yes
DS-7101LT	Yes	No	2 channels	NELLCOR®	Yes	Yes
DS-7101L	Yes	No	2 channels	NELLCOR®	No	Yes
DS-7141M	Yes	Yes	2 channels	MASIMO®	Yes	Yes
DS-7101LTM	Yes	No	2 channels	MASIMO®	Yes	Yes
DS-7101LM	Yes	No	2 channels	MASIMO®	No	Yes

**NOTE**

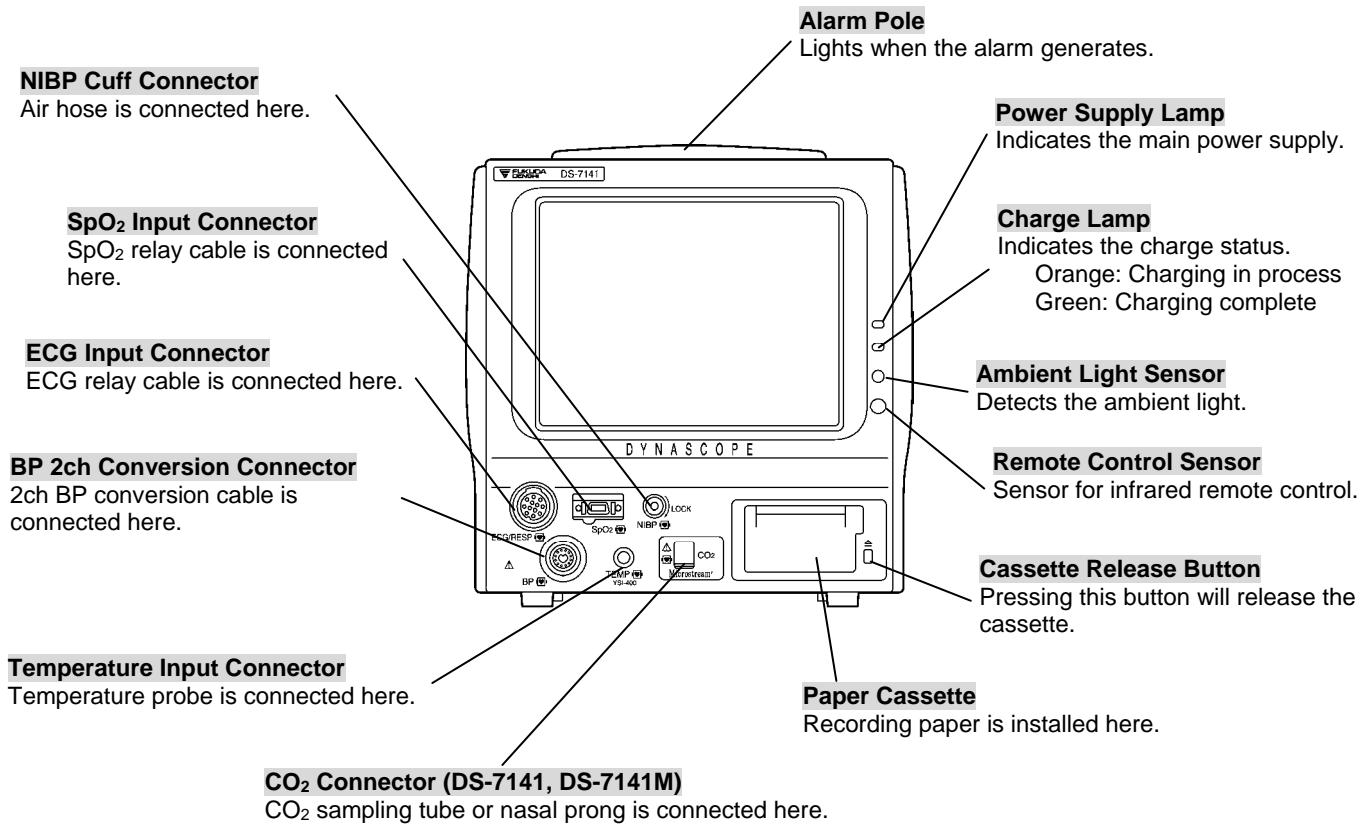
The display illustration on this operation manual includes CO<sub>2</sub> measurement, but note that CO<sub>2</sub> measurement function is not supported for the DS-7101L, DS-7101LT, DS-7101LM, and DS-7101LTM.

## Features

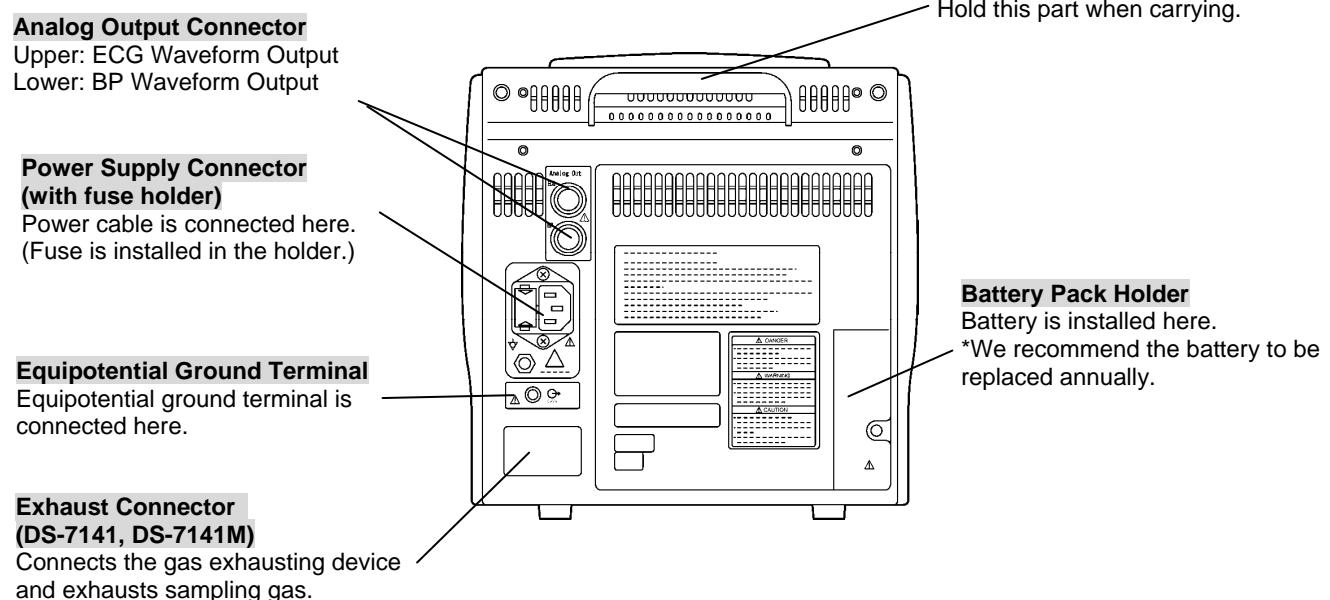
- Completely self-contained, the monitor includes display part, recording part, measuring part in a compact and lightweight package. A battery pack (optional) operation is also possible which allows the monitor to be used as a portable monitor.
- On the 8.4-inch color LCD display, up to 6 waveforms can be displayed. Also, the numeric data display can be enlarged for easier view.
- The monitor is equipped with an alarm pole which the flash pattern can be set corresponding to each alarm level.
- All the operations are performed through the touch screen controls, and up to 4 frequently used keys can be programmed as user key.
- For the CO<sub>2</sub> measurement, a microstream method is adopted which is less influenced by the anesthetic gas. (DS-7141, DS-7141M)
- Wireless network is possible via the telemetry transmission. (DS-7141, DS-7141M, DS-7101LT, DS-7141LTM)
- Wired network (DS-LANII/DS-LANIII) is possible via the Ethernet LAN cable. (DS-7100 system)  
DS-LANII is a network based on 10BASE-T with transmission speed of 10Mbps and maximum transmission distance of 100m.  
DS-LANIII is a network based on 100BASE-TX with transmission speed of 100Mbps and maximum transmission distance of 100m.
- No cooling fan is used, ensuring clean and quiet monitoring.
- The SpO<sub>2</sub> measurement device can be selected from NELLCOR® or MASIMO®.

# Names of Parts and Their Functions

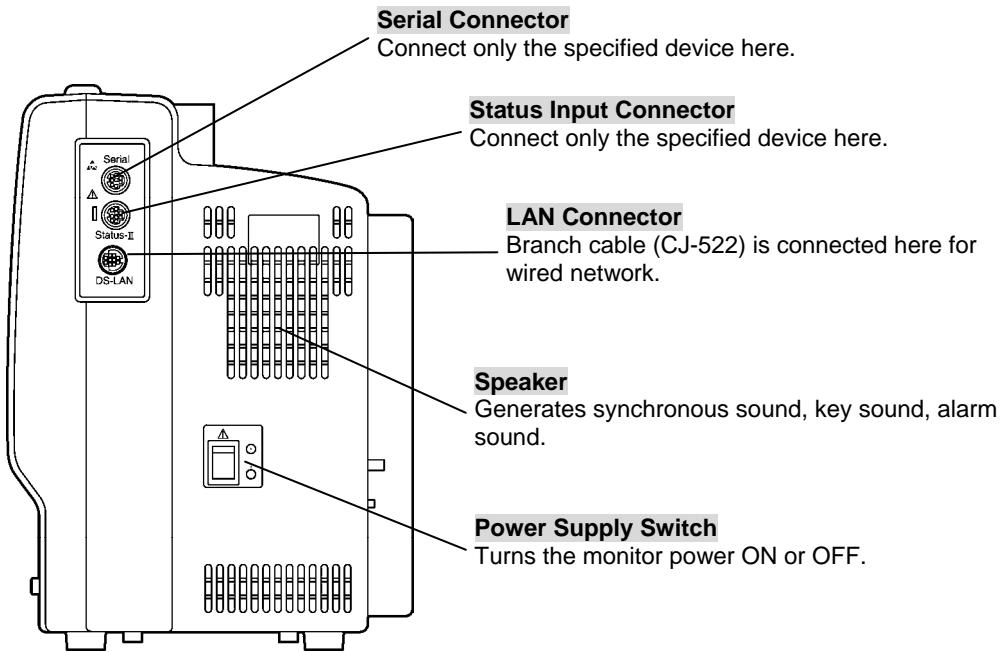
## 【Front Side】



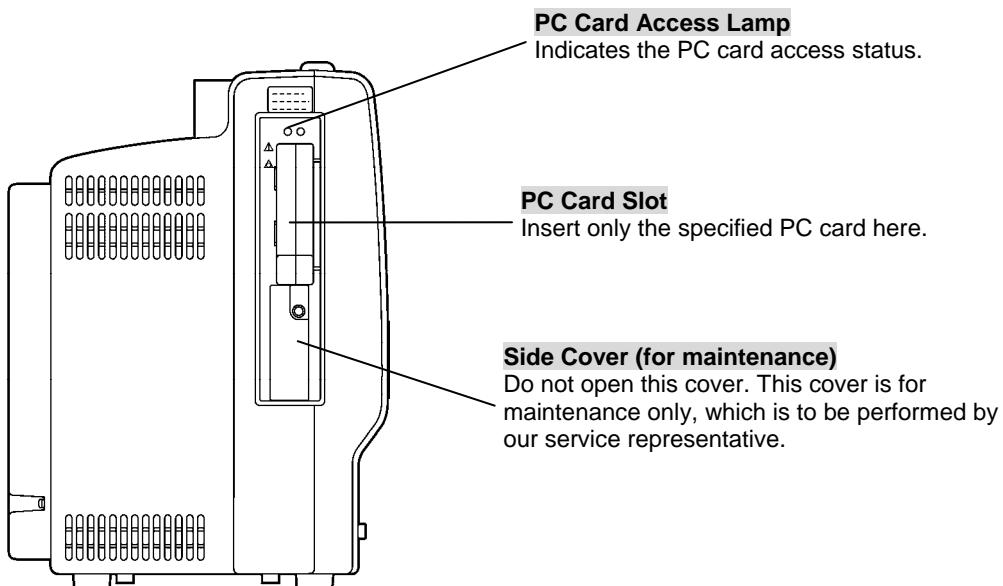
## 【Rear Side】



## 【Right Side】



## 【Left Side】



### WARNING

Do not connect unit or cable not authorized by Fukuda Denshi to any I/O connector. If done so by mistake, the device cannot deliver its maximum performance and the connected units may be damaged, resulting in a safety hazard.

### NOTE

The display panel utilizes exclusive fluorescent light for the backlight. Since this fluorescent light deteriorates with its life cycle, the display may become dark, scintillate, or may not light in long term use. In such case, contact your nearest service representative.

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## Chapter 2

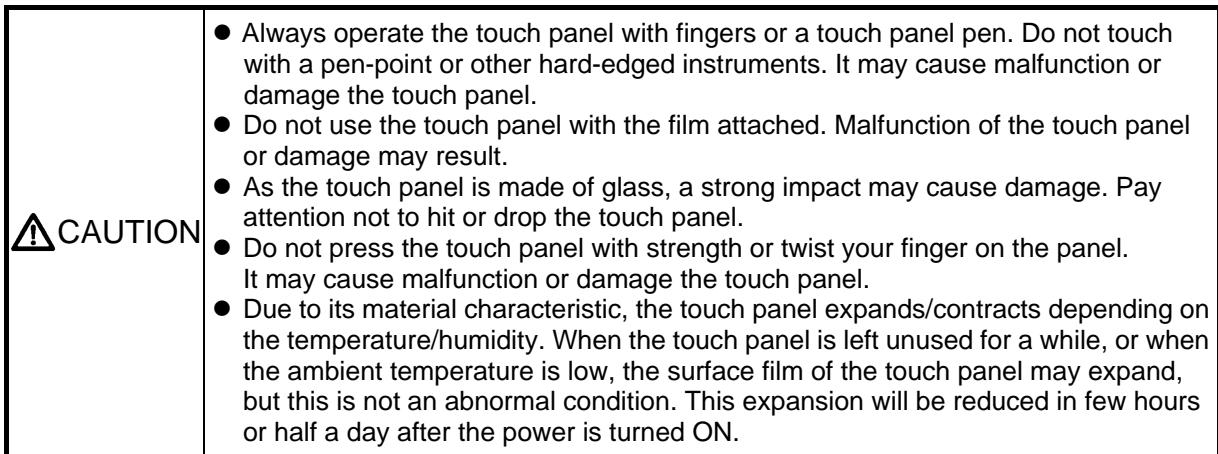
# Basic Operation

This chapter describes the basic operation for monitoring.

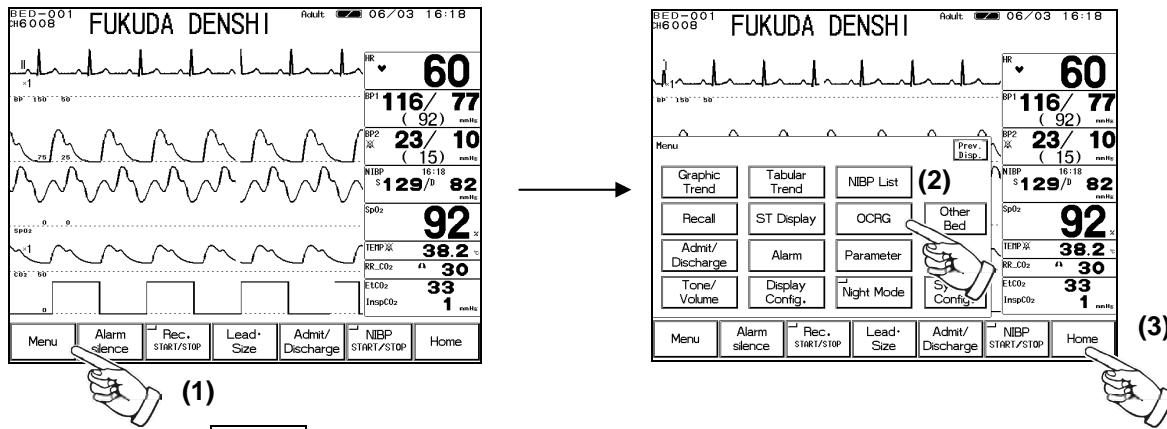
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## Touch Keys

All the operation is performed using the touch keys on the screen.

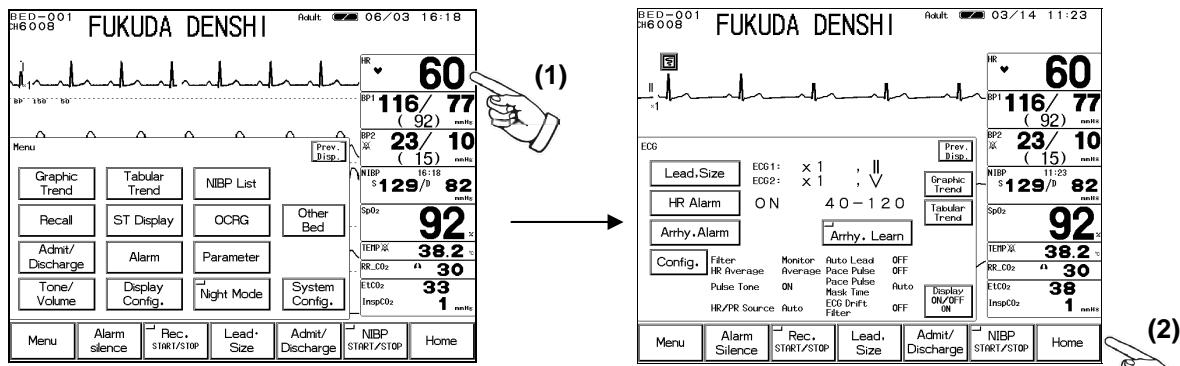


### General Key Control



- (1) Pressing the **Menu** key will switch the display with a pip sound.
- (2) The touch key will respond by pressing any part of the key.
- (3) Pressing the **Home** key at any time will return the display to the home display.

### Key Control for Each Parameter



- (1) The touch key will respond by pressing any part of the numeric display frame (parameter key).
- (2) Pressing the **Home** key at any time will return the display to the home display.



Up to 4 frequently used keys can be set as user key.  
Refer to "4. Monitoring Setup To Set the User Keys" for details.

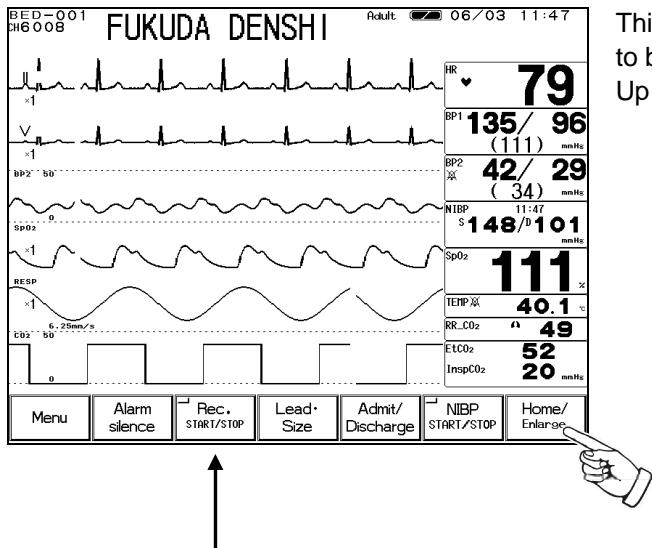
## About the Home Display

- The home display appears immediately after the power is turned ON.
- The waveforms and numeric data are displayed on the home display.
- There are 2 modes of home display, "Standard Display (Home)" and "Numeric Data Enlarged Display", which can be switched by pressing the **Home / Enlarge** key.



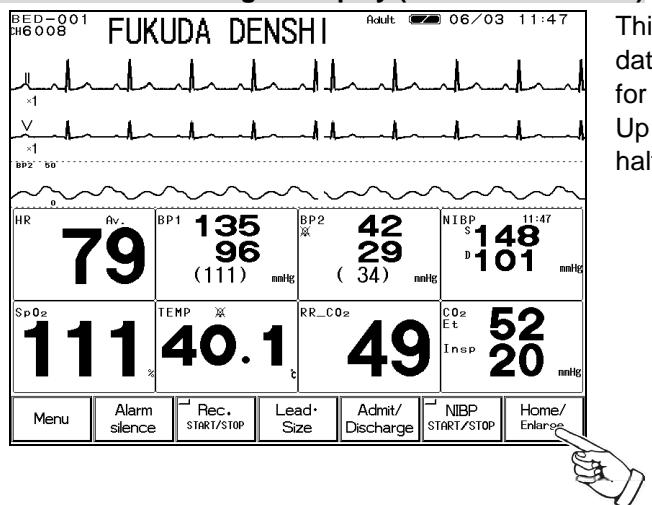
The home key function can be selected from **Home / Enlarge** or **Home** on the hospital setup menu. The default setting is **Home**. Refer to "8. System Configuration Hospital Setup" for details.

### Standard Display (max. 6 waveforms)



This display is focused on number of waveforms to be displayed.  
Up to 6 waveforms can be displayed.

### Numeric Data Enlarged Display (max. 3 waveforms)



This display is focused on the visibility of numeric data. Each numeric data will be displayed large for easier view.  
Up to 3 waveforms will be displayed on the upper half of the display.

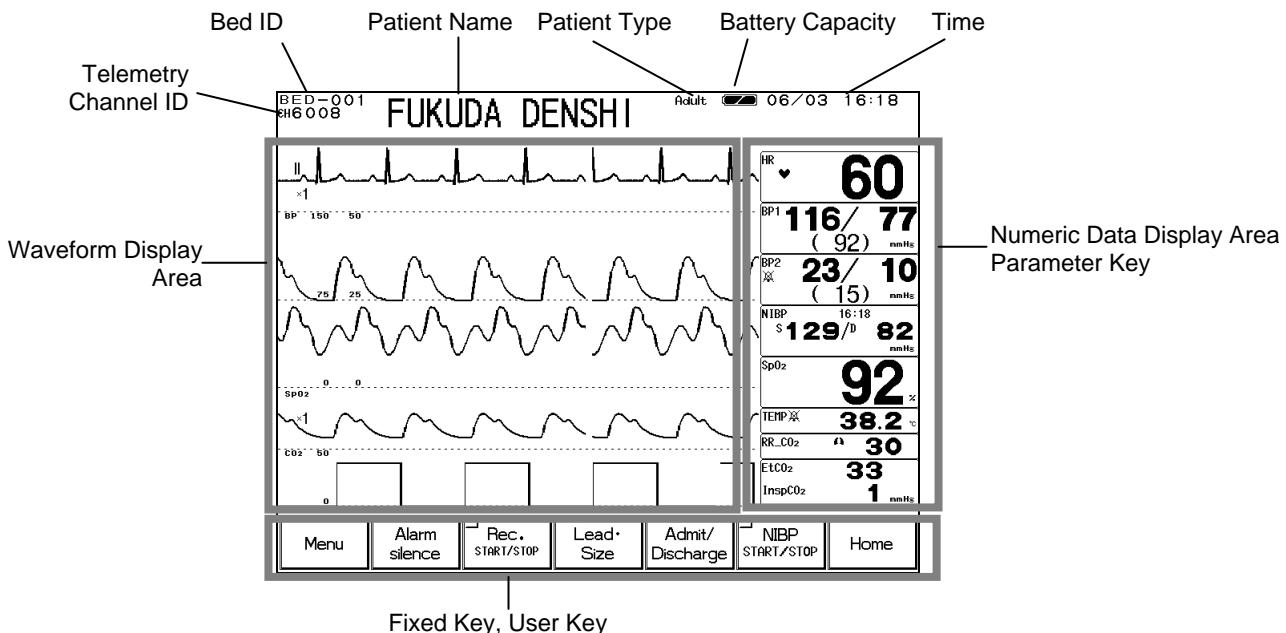


The displayed waveforms and numeric data can be selected as desired, and the configured display can be programmed.  
Refer to "4. Monitoring Setup To Configure the Display" for details.

## The Description of the Display

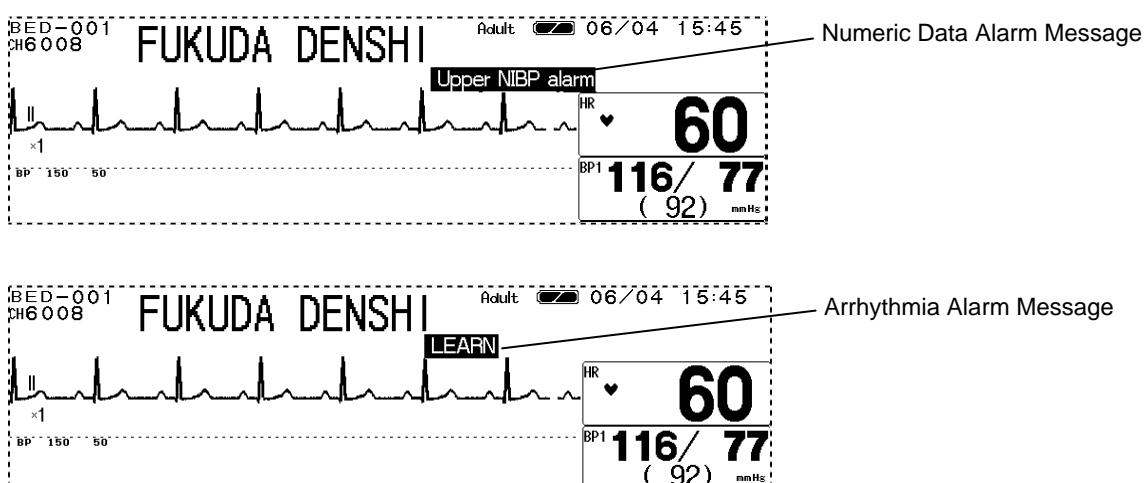
Other than waveforms and numeric data, patient name, alarm message, status message, etc. will be displayed on the screen.

### ● Numeric Data, Waveform, Patient Name, etc.



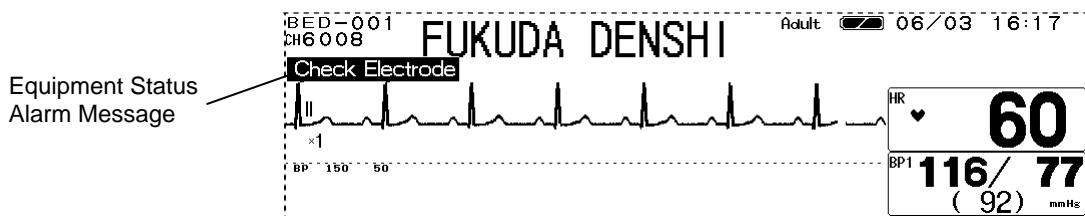
### ● Alarm Message for Numeric Data / Arrhythmia

There are 2 types of alarm messages, numeric data alarm message and arrhythmia alarm message. If both alarms occur at the same time, the numeric alarm message and arrhythmia alarm message will be displayed alternately in 2-seconds intervals.



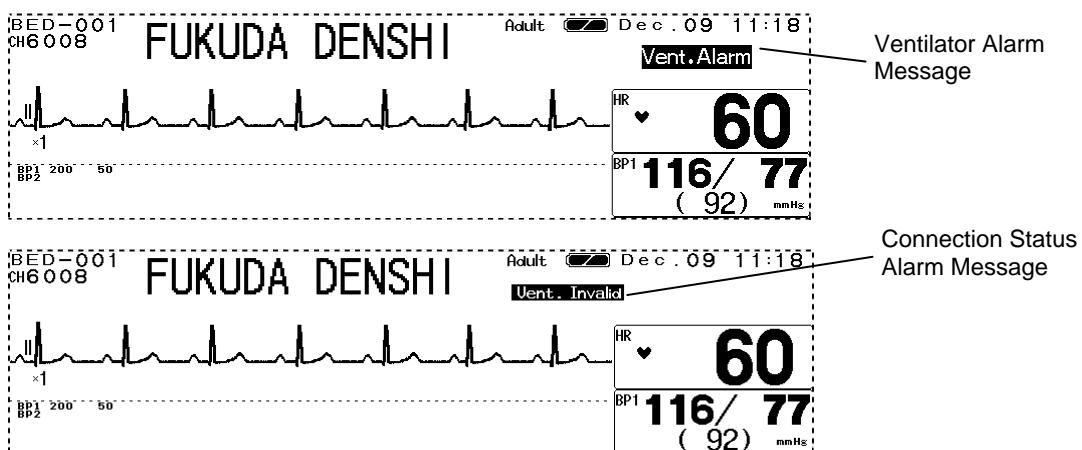
## ● Equipment Status Alarm Message

The equipment status alarm message will be displayed when proper monitoring cannot be performed.



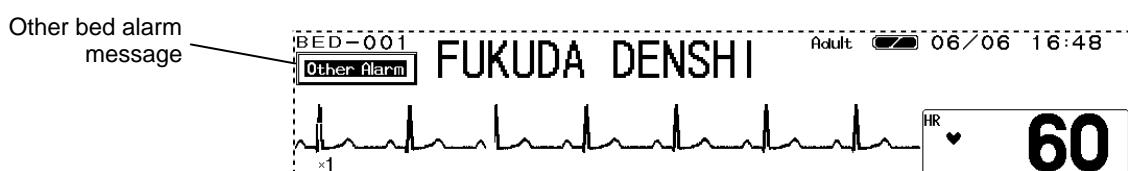
## ● Ventilator Alarm Message

The ventilator alarm message and connection status alarm message will be displayed when ventilator is connected.

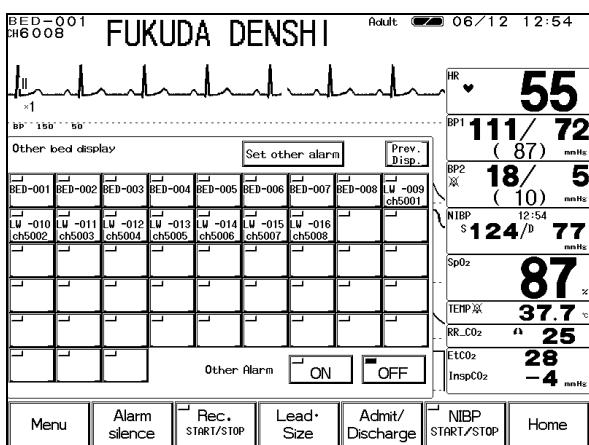


## ● Other Bed Alarm Message

When the monitor is connected to the network, and other bed alarm is turned ON, the alarm occurring at the other bedside monitors will be notified.



The other bed alarm message will function as a control key. By pressing the message display, the window to select the alarm generating bed will appear. Pressing the key will display the numeric data and waveforms for that bed.



By pressing the Room/Bed ID key for the alarm generating bed, the numeric data and waveforms will be displayed.

The Room/Bed ID key for the alarm generating bed will be indicated in red.

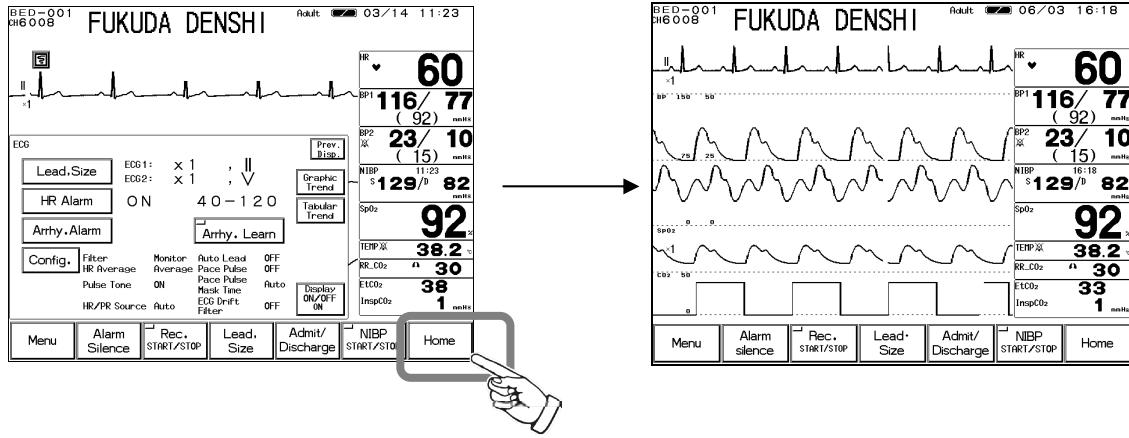
Reference

Refer to "7. Function Other Bed Display"

## To Switch the Display

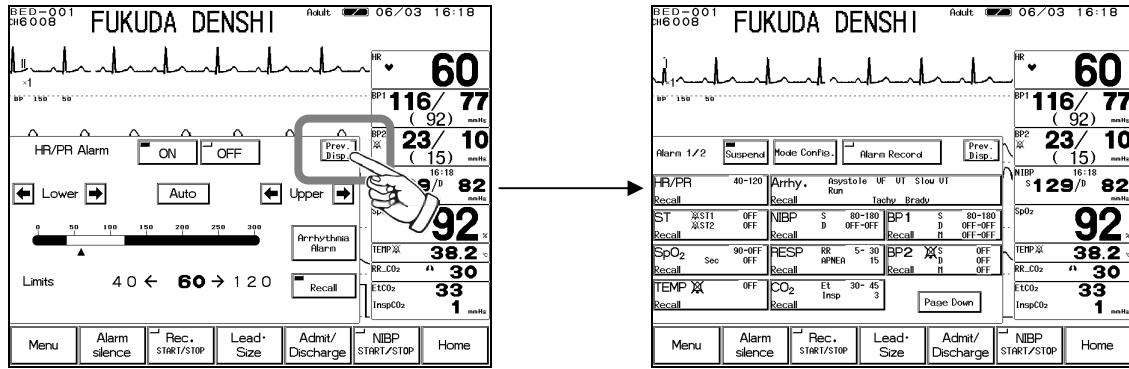
### [To Return to the Home Display]

By pressing the **Home** key, the display will return to the home display.



### [To Return to the Previous Display]

By pressing the **Prev. Disp.** key which will be displayed on each setup window, the previous display will appear.

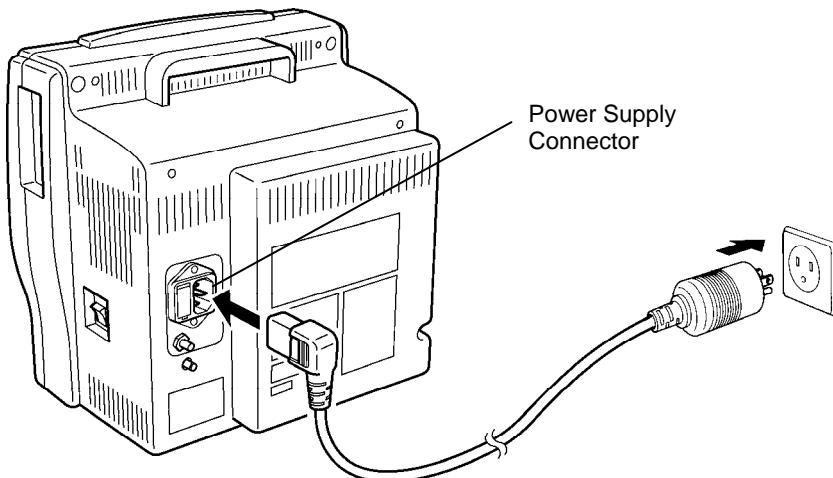


## Preparation for Monitoring

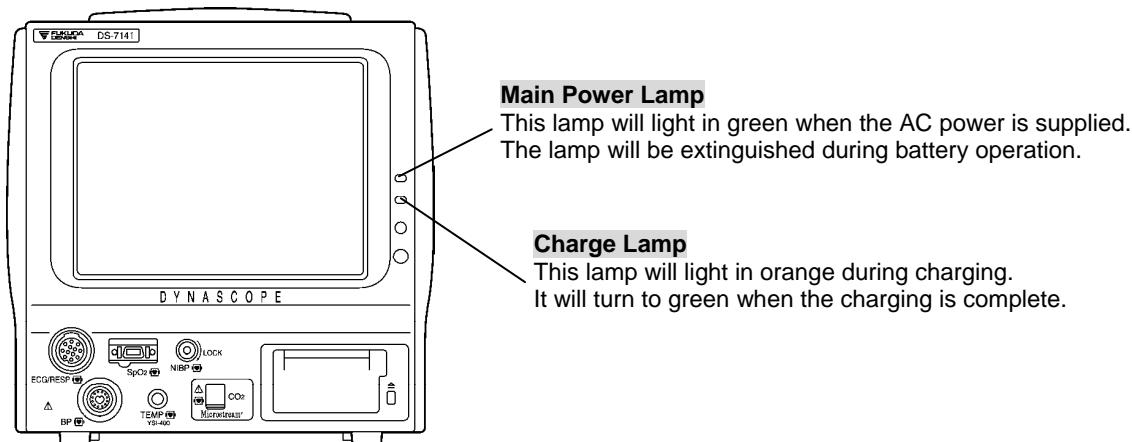
### To Turn On the Power

#### Connecting the Power Cable

Connect the accompanying AC power cable (CS-34) to the monitor and to the 3-way grounded outlet.



When the AC power is supplied to the monitor, the main power lamp will light in green.



When the battery pack (optional) is installed, the charge lamp will light and charging will start.

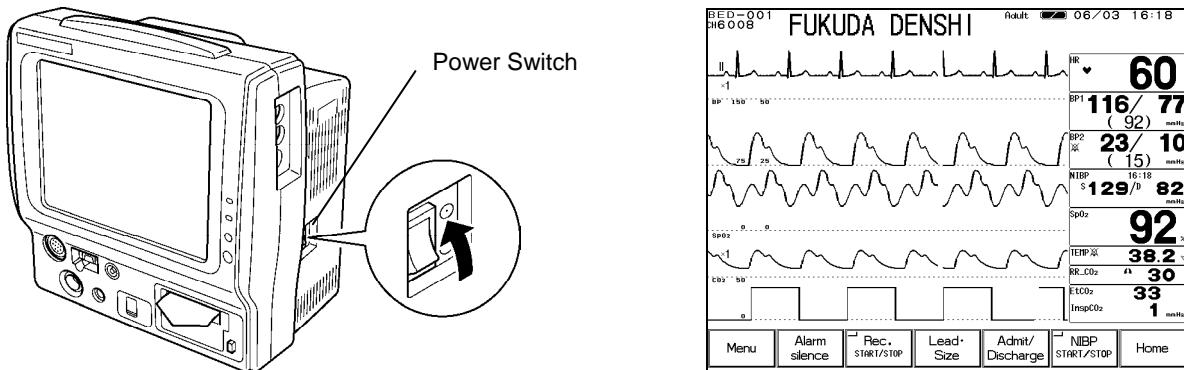
#### WARNING

- Use only the accompanying 3-way AC power cable. Use of other cables may result in electric shock to the patient and the operator.
- The power cable must be connected to hospital grade outlet.
- When using multiple ME equipment simultaneously, perform equipotential grounding to prevent potential difference between the equipment. Even a small potential difference may result in electric shock to the patient and the operator.

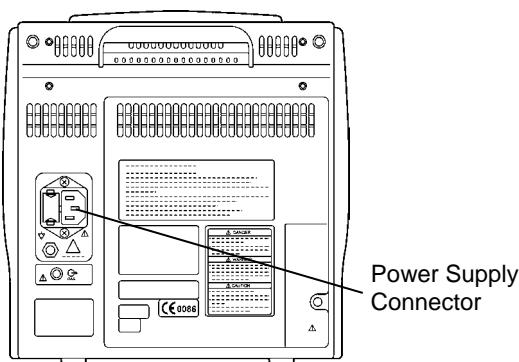
<b>NOTE</b>	<p><b>Equipotential Grounding</b></p> <p>When connecting multiple devices, electrical potential difference may be generated between the devices. This may result in electric shock to the patient connected to these devices. Pay special attention for use in the operating room, ICU, CCU, Cardiac Catheter Laboratory, and Cardiovascular X-ray room. To avoid such electrical potential difference, use the accessory ground cable to connect each device's equipotential terminal to the same ground terminal. This is called equipotential grounding.</p>
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## To Turn On the Power Switch

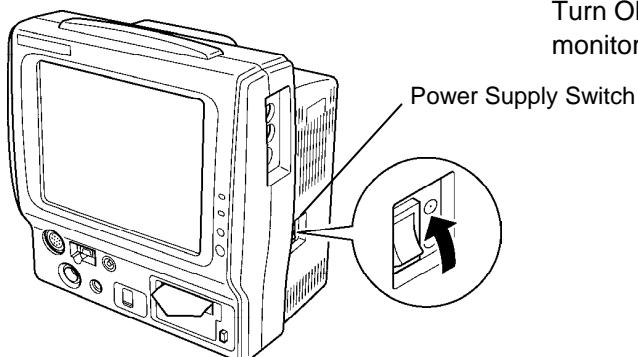
By turning the power switch ON, the display will appear and monitoring will start.



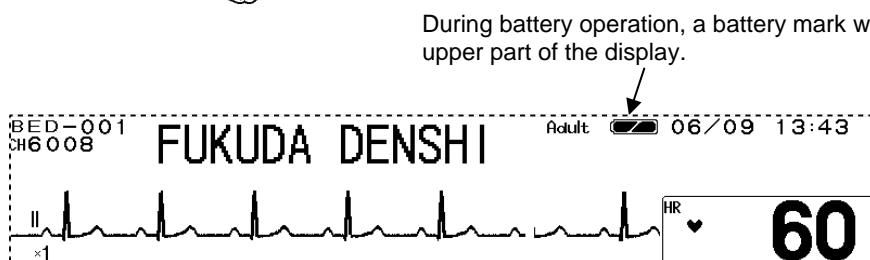
## To Use with the Battery Pack



Unplug the power cable from the power supply connector located at the rear side of the monitor. If the power cable is unplugged with the power turned ON, the monitor will also automatically change to battery operation mode.



Turn ON the power switch located at the right side of the monitor.



During battery operation, a battery mark will be displayed on the upper part of the display.

Battery Mark	Battery Condition	Indication of Operation Time	
		Standard Mode	Power Saving Mode
	Full	3 hours to 2 hours 20 min.	3 hours 30 min. to 2 hours 40 min.
	The remaining battery is less than half.	2 hours to 10 min.	2 hours 40 min. to 10 min.
	The battery is almost empty. Connect to the AC power source immediately.	About 10 min. or less	About 10 min. or less



Refer to "8. System Configuration Monitor Setup" for power saving mode.

<b>Indication of Charging Time (Empty condition to fully charged condition)</b>	
When the power cable is connected and the power is turned OFF	About 2.5 hours
When the power cable is connected and the power is turned ON	About 13 hours

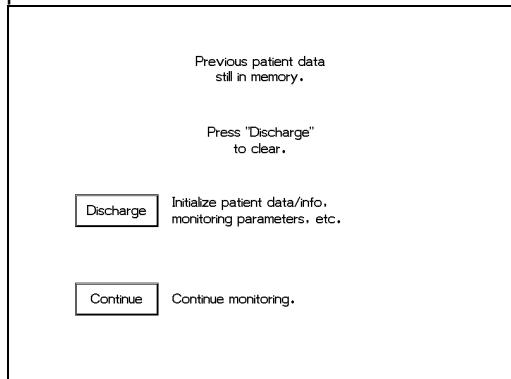
**⚠ CAUTION**

- The above operation time indicates the time with a new battery pack performing ECG measurement, NIBP periodic measurement (5-minute interval). Note that the battery pack degrades with continuous use and shortens the usable time.
- When the DS-7100 system is operated by battery, and if empty mark is displayed for the battery condition, IC card format, read/write process cannot be performed.

## To Start Monitoring

### Discharge Confirmation at Power ON

The monitor retains the trend and NIBP list data even when the power is turned OFF. If starting to monitor a new patient, discharge procedure on the patient admit / discharge menu should be performed.



To start monitoring a new patient, press the **Discharge** key. The data before turning ON the power will be erased and starts monitoring. Pressing the **Continue** key will retain the data before turning ON the power and starts monitoring.

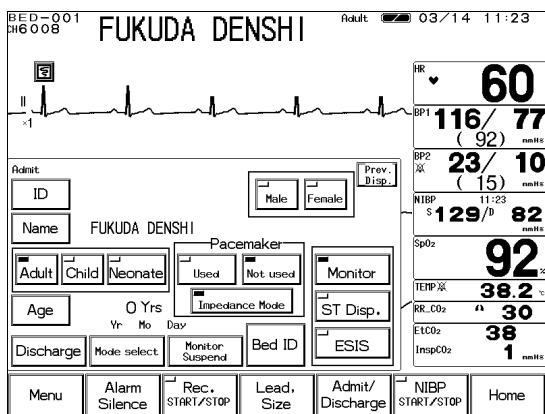


ON/OFF of this confirmation display can be selected.  
Refer to "8. System Configuration Monitor Setup" for details.

## To Admit a Patient

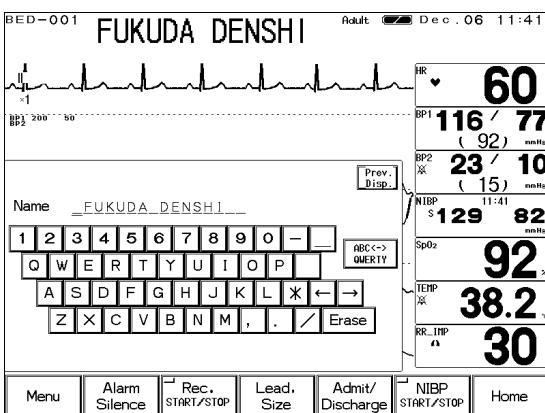
Enter the patient information on the patient admit / discharge menu.

### 1 Open the patient admit / discharge menu.

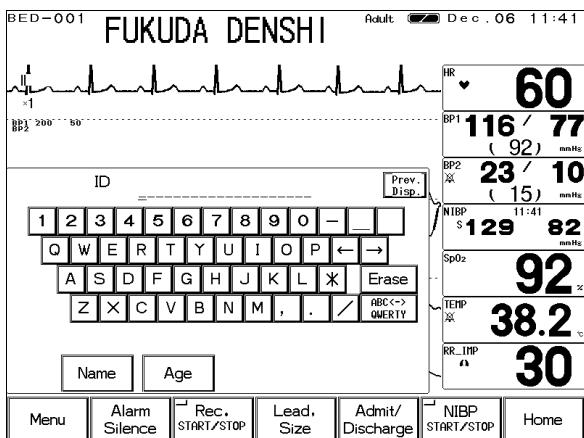


Press the **Menu** → **Admit / Discharge** key.  
The patient admit / discharge menu will be displayed.

### 2 Enter the patient name and ID.

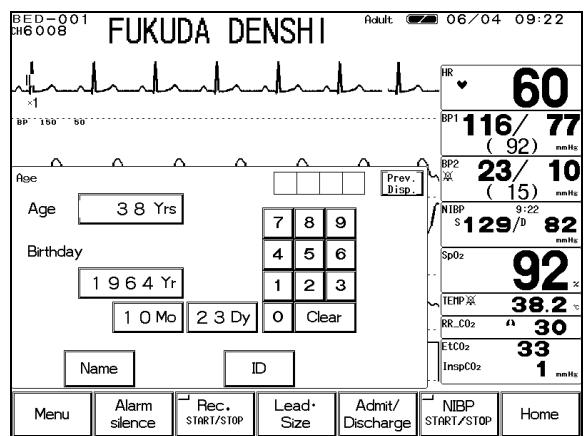


Press the **Name** key.  
Enter the name using the numeric keypad.  
The entered name will be displayed large on the upper part of the display.



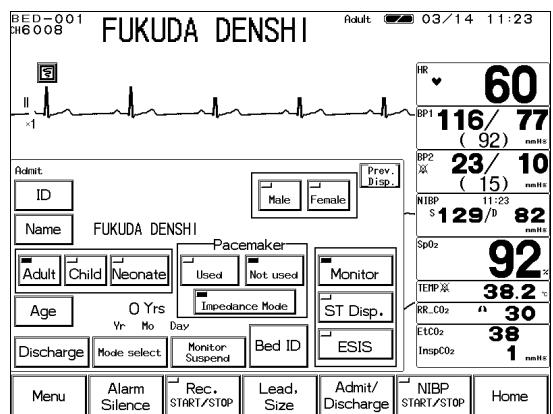
Press the **ID** key.  
Enter the ID number using the numeric keypad.

### 3 Enter the patient's birth date.



Press the **Age** key.  
Enter the birth date using the numeric keypad.

### 4 Select the patient type, and **Used** / **Not used** for pacemaker use.



Select the patient type from **Adult**, **Child**, and **Neonate**.

Select the pacemaker use from **Used**, **Not used**.



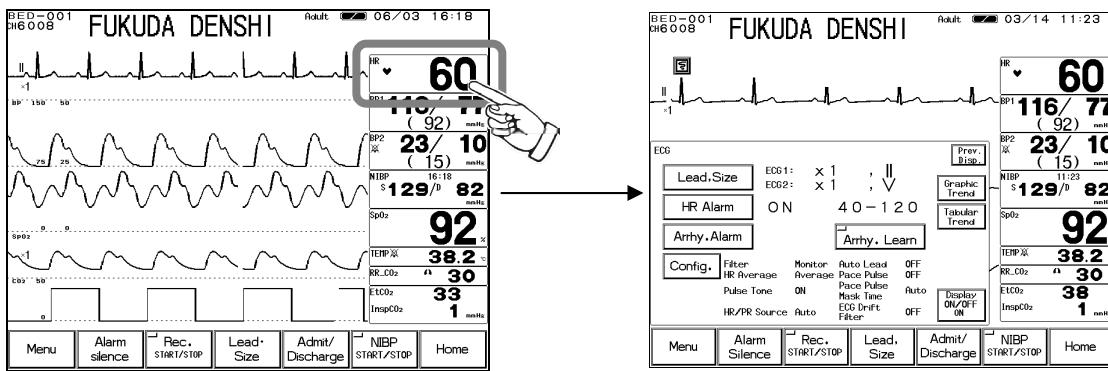
The patient type and pacemaker use must be selected. The patient type selection influences the precision of the QRS detection and NIBP measurement. Also, incorrect selection may cause blood congestion or other injuries during NIBP measurement. Make sure the correct selection is made.

## Basic Operation

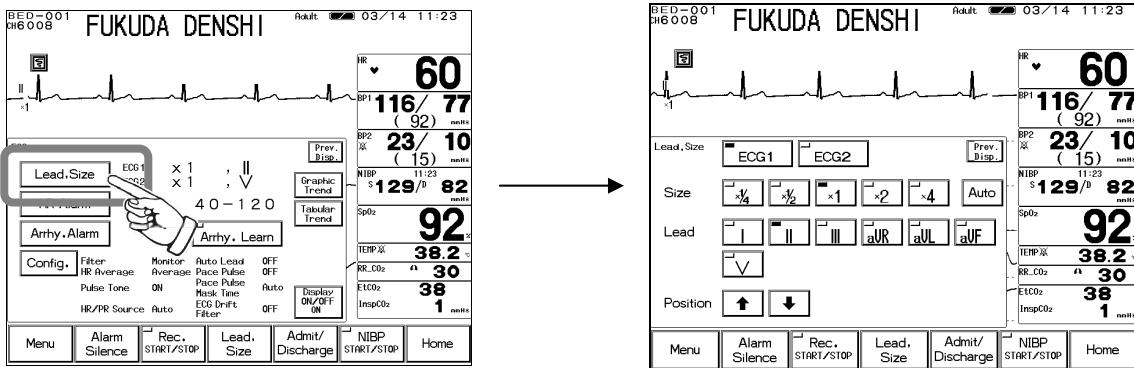
### Scale, Lead, Baseline Position Setup (Parameter Key)

#### 1 Select the parameter to set the scale / lead / baseline position. (Ex.: ECG)

Press the parameter key where heart rate is displayed.

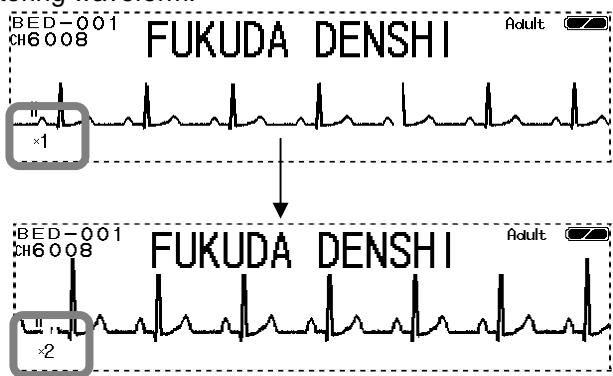
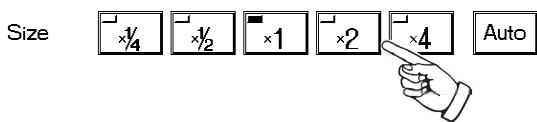


#### 2 Press the **Lead · Size** key. The menu to adjust size / lead / baseline position will be displayed.



#### 3 Adjust the waveform size.

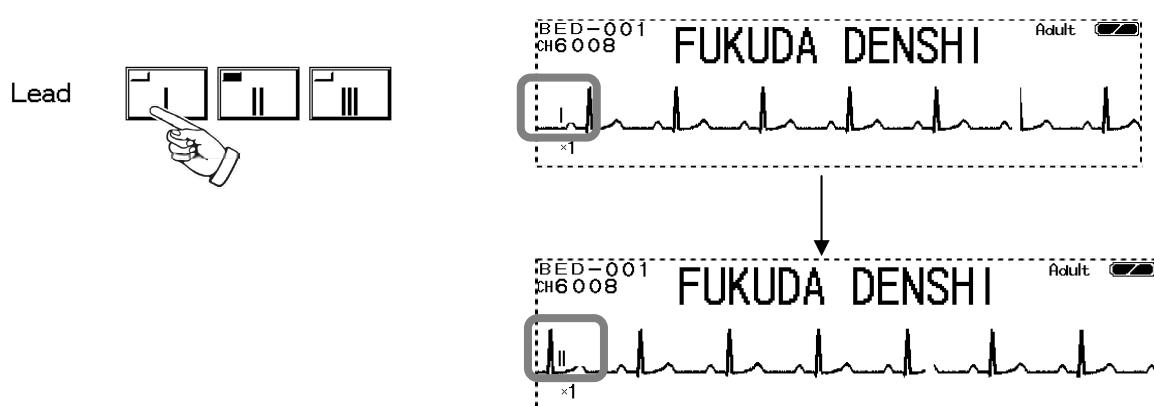
Select an appropriate waveform size for the monitoring waveform.



The arrhythmia detection level corresponds with the displayed waveform size.  
Select an appropriate size for monitoring.

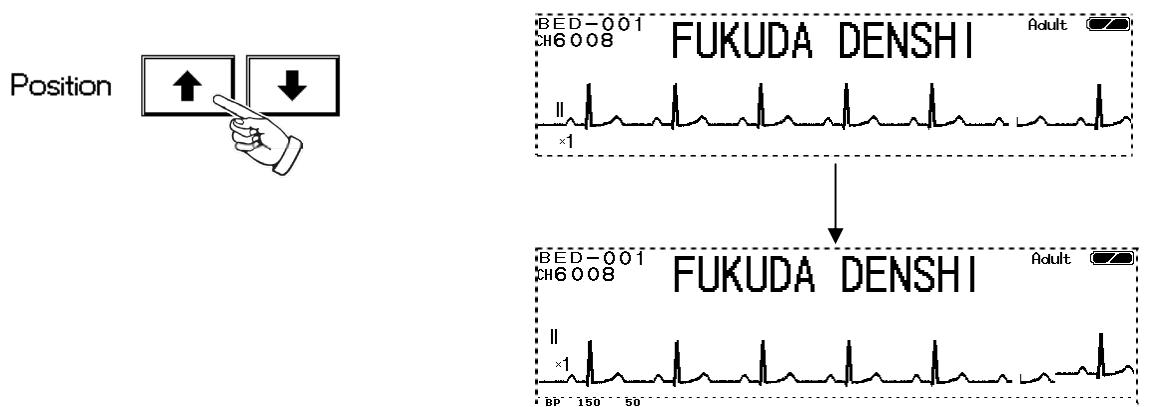
#### 4 Select the lead.

Select an appropriate lead according to the monitoring purpose.



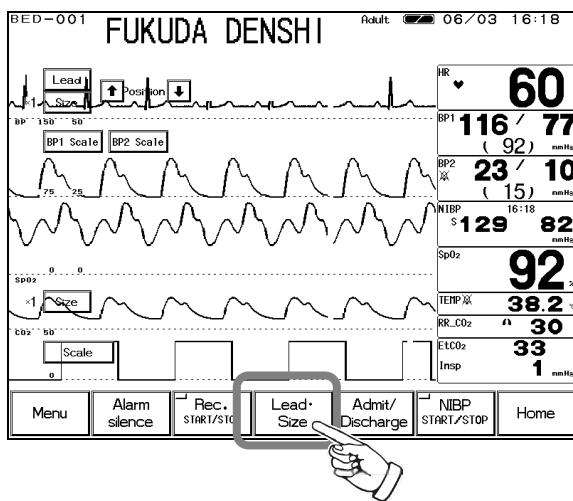
#### 5 Adjust the baseline position.

Use the keys to adjust the waveform baseline position.



Use the same procedure for each parameter.  
Refer to section for each parameter in "6. Parameter Setup".

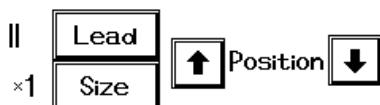
## Scale, Lead, Baseline Position Setup (User Key)



Pressing the **Lead · Size** key will display the arrow keys on the home display to adjust waveform size, scale, lead, baseline position.

### 1 Select the waveform size, lead, baseline position for ECG waveform.

Adjust the waveform suitable for monitoring.



Pressing the **Lead** key will sequentially change the lead.

3-electrode: I→II→III→I

4-electrode: I→II→III→aVR→aVL→aVF→I

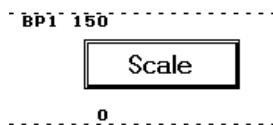
5-electrode: I→II→III→aVR→aVL→aVF→V→I

Pressing the **Size** key will sequentially change the size.

$\times 1/4 \rightarrow \times 1/2 \rightarrow \times 1 \rightarrow \times 2 \rightarrow \times 4 \rightarrow \times 1/4$

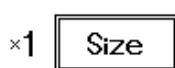
Use the **↑**, **↓** keys to adjust the baseline position up or down.

### 2 Select the scale for BP, CO<sub>2</sub> waveform.



Pressing the **Scale** key will sequentially switch the scale.

### 3 Select the waveform size for impedance respiration waveform, SpO<sub>2</sub> waveform.



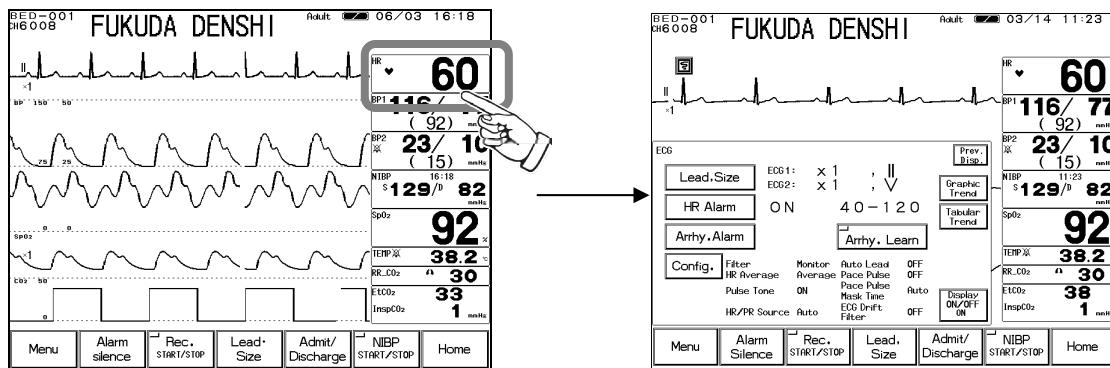
Pressing the **Size** key will sequentially change the size.

$\times 1/4 \rightarrow \times 1/2 \rightarrow \times 1 \rightarrow \times 2 \rightarrow \times 4 \rightarrow \times 1/4$

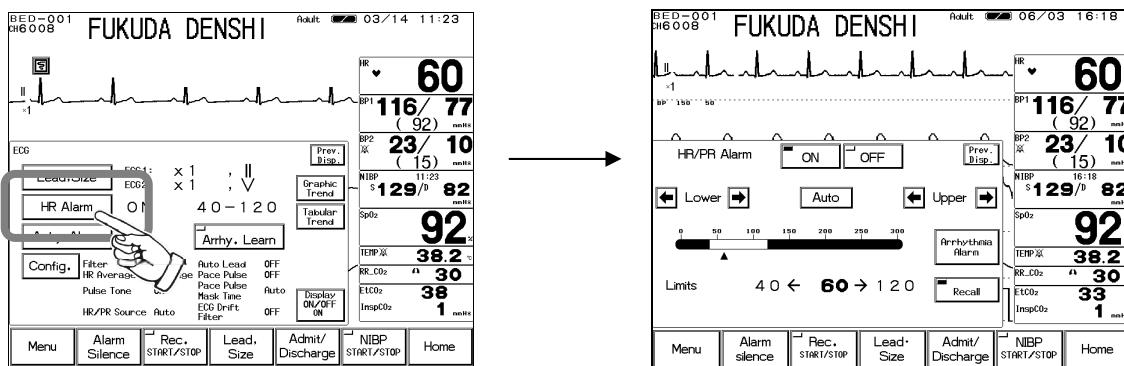
## Alarm Setup for Each Parameter

The alarm can be set for each parameter. By pressing the selected parameter key, upper and lower alarm limit and ON/OFF of alarm can be set.

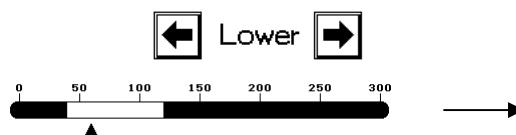
### 1 Select the parameter to set the alarm. (Ex.: HR alarm)



### 2 Press the [HR Alarm] key. The menu to adjust the alarm limit will be displayed.



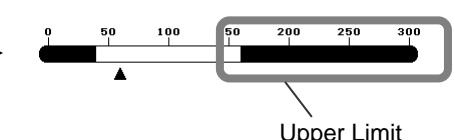
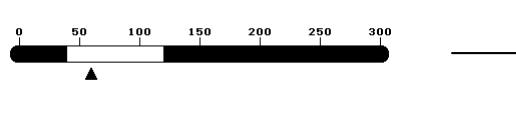
### 3 Set the upper and lower alarm limit.



Use the **[←]**, **[→]** keys to adjust the lower limit.



Use the **[←]**, **[→]** keys to adjust the upper limit.



The adjustment is also possible by directly pressing the bar display.



Use the same procedure for the setup of each parameter.  
Refer to section for each alarm in "6. Parameter Setup"

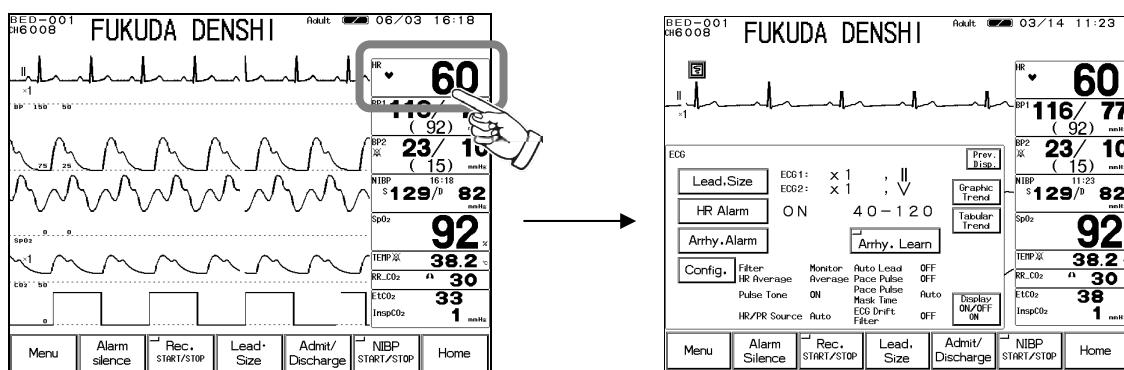
## ON/OFF of Parameter Display

## Waveform/Numeric Data Display

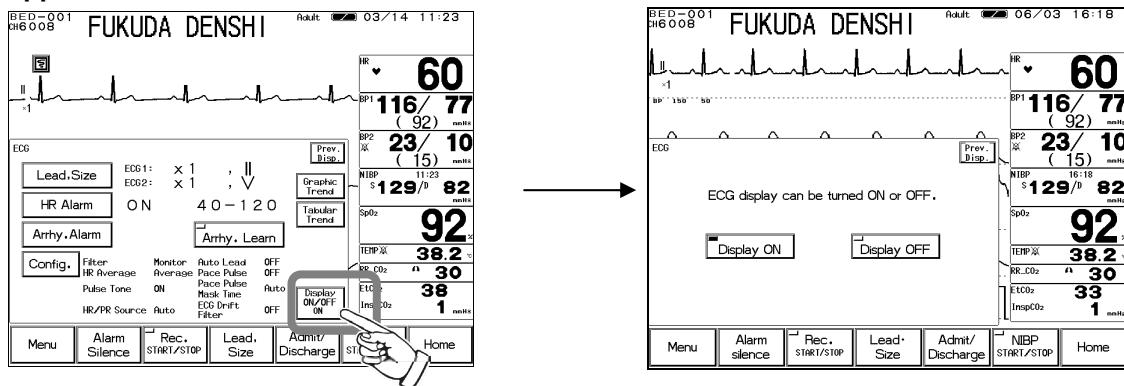
The waveform and numeric data display for each parameter can be turned ON or OFF without changing the display configuration. If not performing the ECG or SpO<sub>2</sub> measurement while the ECG cable or SpO<sub>2</sub> sensor is connected to the monitor, the equipment status alarm such as "Lead Off" will generate. Removing ECG or SpO<sub>2</sub> from the display configuration will not generate such alarm, but this function may be more useful as it allows to turn off the measurement without changing the display configuration.

This function is not available for NIBP monitoring.

### 1 Select the parameter to turn off the display. (Ex.: ECG)



### 2 Press the **Display ON/OFF** key. The confirmation display for ON/OFF of ECG display will appear.



### 3 Select **Display ON** or **Display OFF**.



Pressing the **Display ON** key will display the waveform and numeric data.

Pressing the **Display OFF** key will not display the waveform and numeric data.



The Display OFF message will be displayed inside the parameter key.

### 4 Automatic reset

For ECG, impedance RESP, SpO<sub>2</sub>, CO<sub>2</sub>, properly connecting the sensor will automatically set the display ON/OFF function to "Display ON".



For automatic reset condition, refer to Display ON/OFF section for each parameter in "6. Parameter Setup".

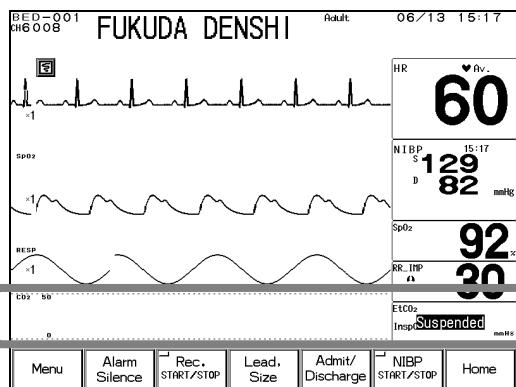
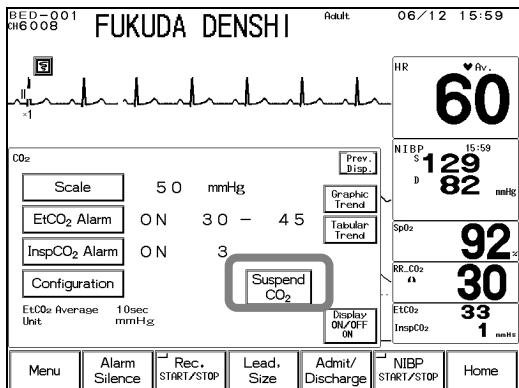
## Suspending CO<sub>2</sub> Measurement

The CO<sub>2</sub> measurement can be temporarily suspended by stopping the CO<sub>2</sub> pump operation.

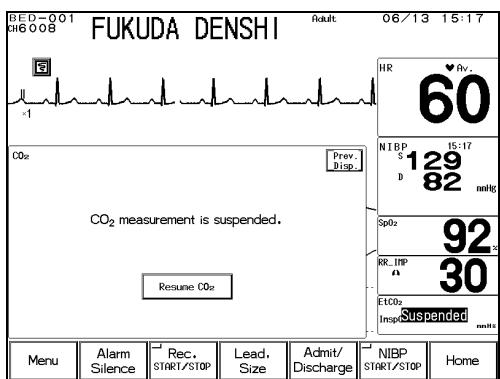
### ⚠ WARNING

When performing expectoration treatment to the patient with ventilator connected, make sure to suspend the CO<sub>2</sub> measurement before the treatment. Otherwise, water may enter into the pump causing the equipment to be damaged.

- 1 Press the **Suspend CO<sub>2</sub>** key on the CO<sub>2</sub> display.



- 2 If the CO<sub>2</sub> numeric data box (or RR\_CO<sub>2</sub> numeric data box) is pressed when the CO<sub>2</sub> measurement is suspended, the following display will appear.



The pump operation will stop, CO<sub>2</sub> waveform and numeric data display will disappear, and "Suspended" will be displayed inside the CO<sub>2</sub>, RR\_CO<sub>2</sub> numeric data box.

Press the **Resume CO<sub>2</sub>** key to resume the CO<sub>2</sub> measurement.

For the following case, CO<sub>2</sub> measurement will automatically resume.

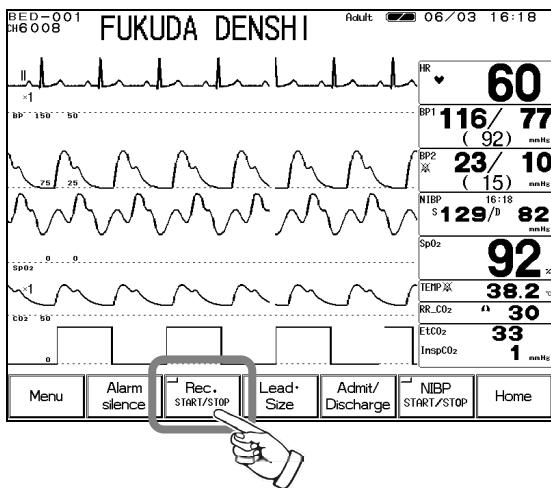
- When 15 minutes has elapsed since the measurement was suspended.
- When the patient is discharged.
- When the power was turned OFF for 5 minutes or more and turned ON again.

### ⚠ CAUTION

- When the CO<sub>2</sub> measurement is suspended, the CO<sub>2</sub> alarm generation and CO<sub>2</sub> data input to the tabular/graphic trend will cease.
- If CO<sub>2</sub> is selected as the RR source, RR value will not be displayed when the CO<sub>2</sub> measurement is suspended.

# Recording

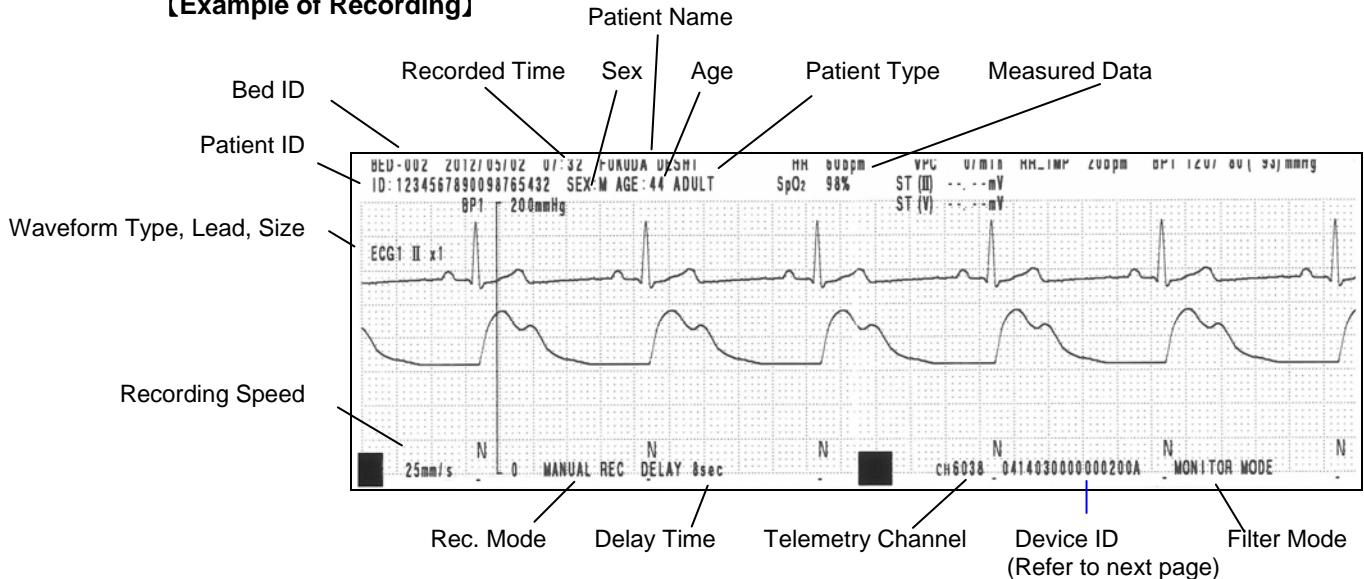
## ● Start / Stop of Waveform Recording



Pressing the **Rec. START/STOP** key on the home display will start the waveform recording. Up to 3 waveforms can be recorded.

Ventilator Alarm  
Message

## 【Example of Recording】



For the manual recording, number of recording waveforms and recording duration can be set.  
Refer to "4. Monitoring Setup Manual Recording" for details.

For the alarm recording, number of recording waveforms, recording duration, alarm factor can be set.

Refer to "4. Monitoring Setup Alarm Recording" for details

For the periodic recording, number of recording waveforms, recording duration, recording intervals can be set.

Refer to "4. Monitoring Setup Periodic Recording" for details.

The monitoring data of the patient such as graphic trend and tabular trend can be recorded.

Refer to sections on graphic trend and tabular trend in "7. Function".



### 【Device ID】

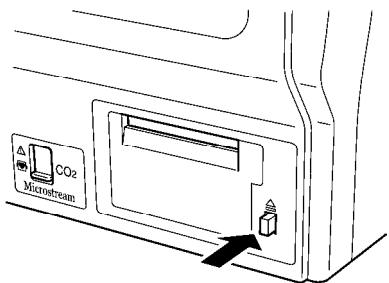
The 17-digit value printed at the bottom of the recording paper indicates the monitor setup codes, which are described as follows.

<u>0</u>	<u>4</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>1</u>	<u>0</u>	<u>1</u>	<u>6</u>						
(1)	(2)	(3)	(4)	(5)	(6)	(7)								

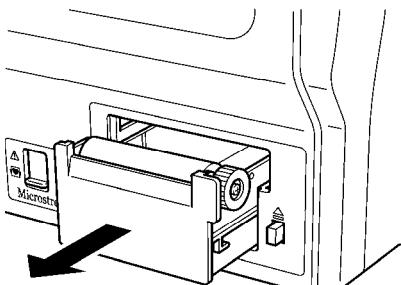
	<i>Digits</i>	<i>Description</i>				
(1)	1 to 4	DS-7100 serial number in 4 digits.				
(2)	5 to 6	Indicates the ECG lead type. '00' : not connected '01' : 3-electrode '02' : 4-electrode '03' : 5-electrode '81' : 3-electrode (defibrillation and electrosurgery-proof) '82' : 4-electrode (defibrillation and electrosurgery-proof) '83' : 5-electrode (defibrillation and electrosurgery-proof)				
(3)	7 to 9	Indicates ECG lead condition (lead-off) in hexadecimal form. 0: Normal 1: Lead-Off				
		Bit	3-electrode	4-electrode	5-electrode	
		B0	F	F	F	
		B1	R	R	R	
		B2	L	L	L	
		B3	—	—	C	
		B4	—	—	—	
		B5	—	—	—	
		B6	—	—	—	
		B7	—	—	—	
		B8	—	—	—	
		B9	—	N	N	
		B10 to B11	—	—	—	
(4)	10 to 12	Indicates ECG lead condition (attachment) in hexadecimal form. The bit definition is the same as ECG lead-off condition.				
(5)	13 to 14	Indicates ECG setup in hexadecimal form. B3 : ECG drift filter (1: ON, 0: OFF) B0, B2, B4 to B15: 0 (Reserved)				
(6)	15	Indicates the setup information relating to arrhythmia analysis in hexadecimal form. B1: Suspend Arrhy. Analysis during Noise Interference (1: ON, 0: OFF) B0, B2 to B7: 0 (Reserved)				
(7)	16 to 17	Indicates model type of DS-7100 in codes.				

## To Install the Paper

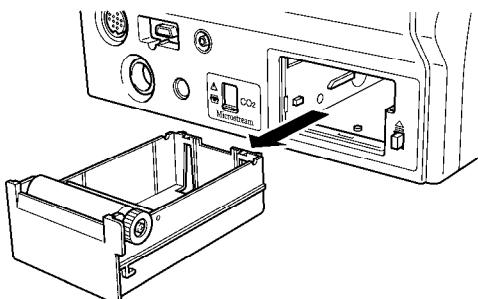
- 1** Press the button located at the right side of the recorder paper cassette.



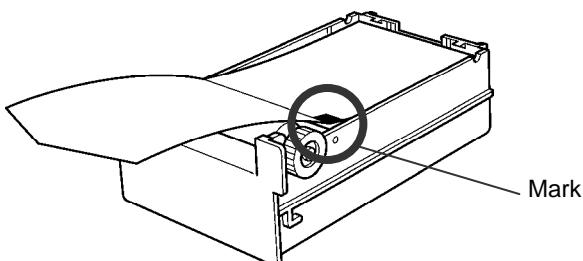
- 2** The paper cassette will come out.



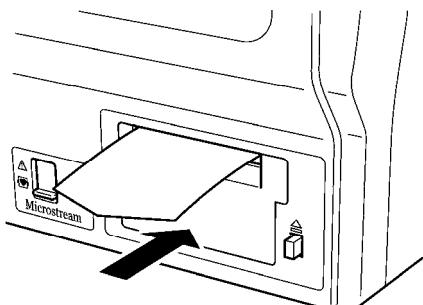
- 3** Pull out the paper cassette from the monitor.



- 4** Set the recording paper so that the mark printed on each paper comes to the right.



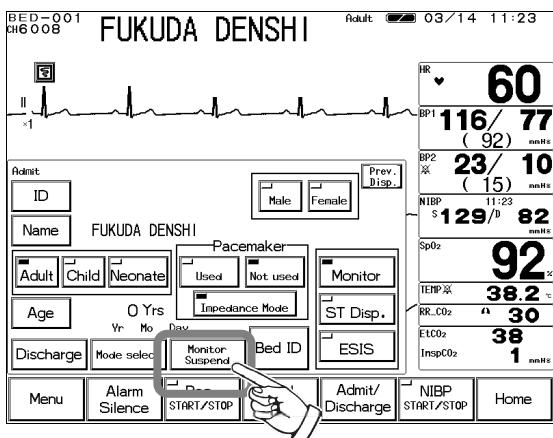
- 5** Place the paper cassette back into the monitor. Push in until it locks into place with a click sound.



## To Suspend Monitoring

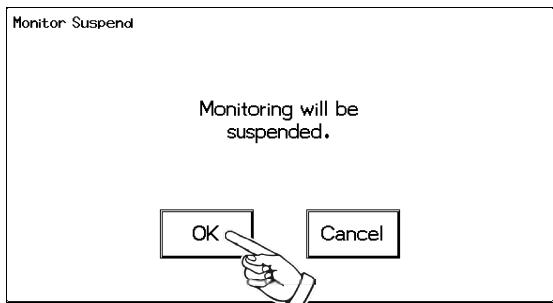
When not monitoring for a while, turning OFF the power will erase the recall data, ST measurement, OCRG data. However, using the suspend monitoring function allows suspension of data measurement, alarm generation, automatic measurement, automatic recording without erasing the data or setup details.

- 1 Press the **Monitor Suspend** key on the admit / discharge menu.



Press the **Menu** → **Admit / Discharge** → **Monitor Suspend** key.

- 2 Suspend monitoring.



Pressing the **OK** key on the confirmation display will suspend monitoring.

Pressing the **Cancel** key will return to the previous display.

- 3 Verify that the monitoring is suspended.



The **Resume** key will be displayed on the home display. On the home display, numeric data and waveform display will be ceased, and all the key operation except the **Resume** key will become ineffective.

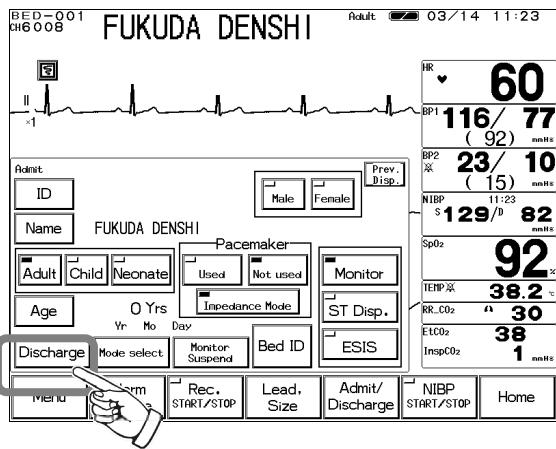
### NOTE

The telemetry transmission will cease when monitoring is suspended.  
(for DS-7141, DS-7141M, DS-7101LT, DS-7101LTM)  
Note that the square wave will be displayed on the central monitor indicating the too far condition of the telemetry.

## Discharging Procedure

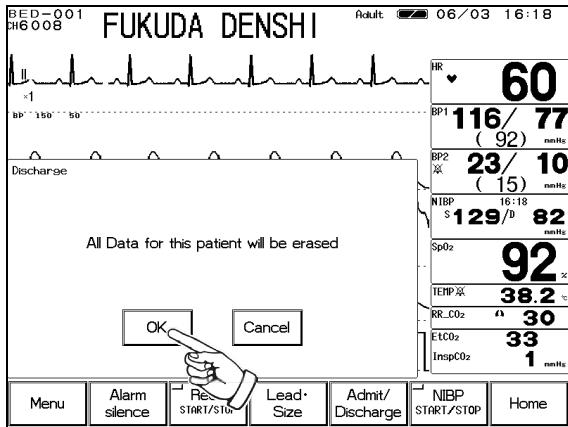
This procedure will erase the past data, such as patient name, ID, age, tabular / graphic trend, and recall.

- Press the **Discharge** key on the admit / discharge menu.



Press the **Menu** → **Admit / Discharge** → **Discharge** key.

- Perform discharge procedure.



Pressing the **OK** key on the confirmation display will discharge the patient.  
Pressing the **Cancel** key will return to the previous display.

When connecting a ventilator, the DS-7100 is capable to notify the ventilator alarm to the central monitor via telemetry or wired network.

<b>⚠ WARNING</b>	<ul style="list-style-type: none"><li>The ventilator alarm on this monitor should be used as supplementary function. Check the patient's condition, ventilator alarm sound and message occasionally.</li><li>When connecting the ventilator to the monitor, using them under adverse environmental condition will not only disallow the devices to deliver their maximum performance, but also the devices may be damaged and safety cannot be ensured.</li><li>When transmitting the ventilator information to the central monitor using the medical telemetry, read the "Precautions for Safe Operation of Medical Telemetry" in the Preface.</li><li>When monitoring the ventilator information on the central monitor, use the DS-7600 system or DS-5700 Central Monitor. Do not use the DS-5800N/NX/NX<sup>MB</sup> Central Monitor. For use of other central monitors, contact our service representative.</li><li>For the SV-300, Servo-i, Servo-s, the ventilator alarm factor can be transmitted and displayed on the central monitor. However, depending on the central monitor type and software version, the ventilator alarm factor may not be displayed. For details, refer to our service representative.</li></ul>
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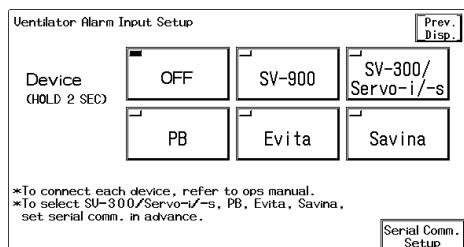
Refer to "9. Installation Ventilator Alarm Input" for details.

### ● Ventilator Selection

Select the ventilator for alarm input setup.

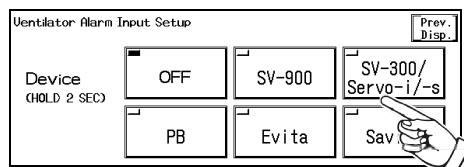
This setup should be performed before connecting the ventilator to the DS-7100 system.

- 1 Press the **Menu** → **System Config.** → **Pre-Set** → **Monitor Setup** → **Vent. Alarm Input Setup** keys.



<Ventilator Alarm Input Setup Menu>

- 2 Select the ventilator to be connected.



Select from **SV-900** / **SV-300/Servo-i/-s** / **PB** / **Evita** / **Savina**.

Press the key for more than 2 seconds.

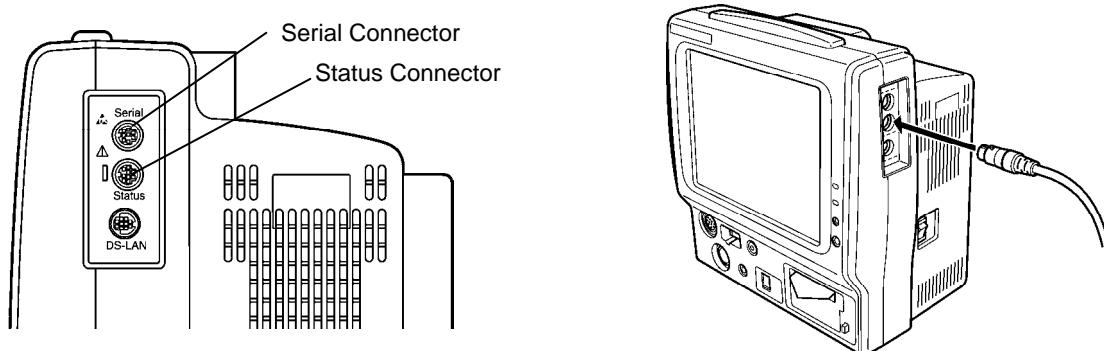
<b>NOTE</b>	<ul style="list-style-type: none"><li>To select SV-300, Servo-i/s, PURITAN-BENNETT, Evita, Savina, it is necessary to validate the corresponded ventilator on the serial communication setup of the ward setup menu.</li><li>If the ventilator is connected, the Ventilator Alarm Input setup cannot be changed.</li></ul>
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Refer to "8. System Configuration Ward Setup" for serial communication setup.

## ● Ventilator Cable Connection

Connect the ventilator cable (optional accessory) to the Serial connector or Status connector on the right side of the DS-7100 and to the ventilator.



The output signal of the Serial connector and Status connector, and the cable that can be used differs according to the device serial number. It can be distinguished by the notation, "Status" or "Status II" on the connector part.

<b>Ventilator</b>	<b>Ventilator Cable</b>	
	<b>Serial Connector</b>	<b>Status II Connector</b>
Servo Ventilator 900C/900D/900E	CJ-500*	CJ-400RI-70SV9
Servo Ventilator 300/300A	CJ-501	CJ-401RI-70SV3*
Servo Ventilator Servo-i/s	CJ-502	CJ-402RI-70SVI*
PURITAN-BENNETT Ventilator 740 / 760 / 840	CJ-504*	CJ-403RI-70PB*
Dräger Medical® Ventilator Evita 4 / Evita XL / Evita 2 dura / Savina	CJ-502	(connection not possible)

<b>Ventilator</b>	<b>Ventilator Cable</b>	
	<b>Serial Connector</b>	<b>Status Connector</b>
Servo Ventilator 900C/900D/900E	(connection not possible)*	CJ-400RI-70SV9
Servo Ventilator 300/300A	CJ-501	(connection not possible)*
Servo Ventilator Servo-i/s	CJ-502	(connection not possible)*
PURITAN-BENNETT Ventilator 740 / 760 / 840	(connection not possible)*	(connection not possible)*
Dräger Medical® Ventilator Evita 4 / Evita XL / Evita 2 dura / Savina	CJ-502	(connection not possible)*

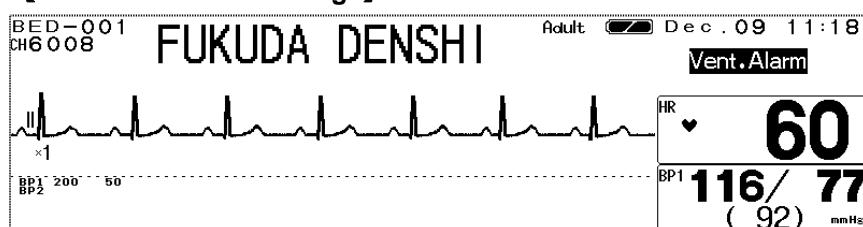
<b>NOTE</b>	<ul style="list-style-type: none"> <li>● *The device with "Status" notation cannot connect CJ-500, CJ-504, CJ-401RI-70SV3, CJ-402RI-70SVI, and CJ-403RI-70PB. The device with "Status II" notation is capable to connect all cables.</li> <li>● Only one ventilator can be connected for each DS-7100 system.</li> </ul>
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## ● Ventilator Alarm Message

Ventilator alarm and ventilator connection status alarm will be generated.

When a wired or wireless network is constructed, the ventilator alarm information can be transmitted to the central monitor. For the SV-300, Servo-i, Servo-s, the ventilator alarm factor can be also transmitted.

### 【Ventilator Alarm Message】



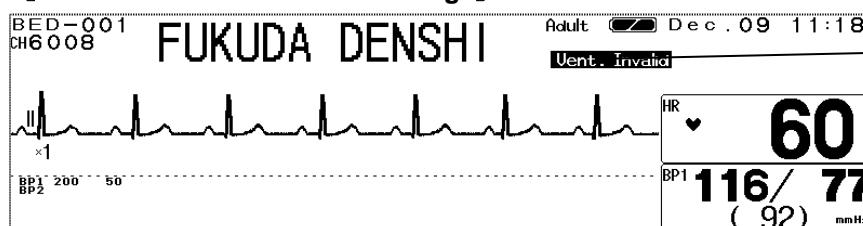
### Life Threatening Alarm (Alarm Level 1)

Device	Message
Ventilator	"Vent. Alarm"



The ventilator alarm sound is set to OFF at factory default setting.  
For procedure to turn ON the alarm sound, refer to "4. Monitoring Setup Volume Setup".

### 【Connection Status Alarm Message】



Connection Status  
Alarm Message  
between DS-7100  
and ventilator

### Life Threatening Alarm (Alarm Level 1)

Device	Message
Ventilator	"Vent. Invalid"

### Notification Alarm (Alarm Level 4)

Device	Message
Ventilator	"Vent. Disable"
	"Vent. Online"



When a ventilator is connected to the DS-7100, verify that "Vent. Online" message is displayed for the connection status. The DS-7100 will not detect the ventilator alarm unless the "Vent. Online" condition is achieved.

### 【Ventilator Alarm Factor】

For the SV-300, Servo-i, Servo-s, ventilator alarm factor can be transmitted to the central monitor.

<b>Transmitted Alarm Message</b>	<b>Description</b>
VENT AWP	Airway pressure alarm
VENT MV	Minute ventilation alarm
VENT APNEA	Apnea alarm
VENT CONT. HP	Continuous high pressure alarm
Upper VENT FiO <sub>2</sub>	FiO <sub>2</sub> upper limit alarm
Lower VENT FiO <sub>2</sub>	FiO <sub>2</sub> lower limit alarm
Upper VENT CO <sub>2</sub>	CO <sub>2</sub> upper limit alarm
Lower VENT CO <sub>2</sub>	CO <sub>2</sub> lower limit alarm
Upper VENT RR	RR upper limit alarm
Lower VENT RR	RR lower limit alarm
VENT PEEP	PEEP low alarm
VENT COMM	Power OFF, cable disconnected, standby condition, etc.
VENT URGENT	Other high level alarm
VENT	Other ventilator alarm



- For the SV-900, PB, Evita, Savina ventilator, ventilator alarm factor cannot be transmitted to the central monitor.
- Depending on the central monitor type and software version, ventilator alarm factor may not be displayed. For details, refer to our service representative.
- The ventilator alarm factors listed above are only displayed on the central monitor. These will not be displayed on the bedside monitor.

### ●Check External Alarm

A confirmation display will appear when ventilator cable is disconnected or when ventilator power is turned OFF.

Check external alarm	
Ventilator Alarm	<input checked="" type="checkbox"/> ON <input type="checkbox"/> Suspend (2 min) <input type="checkbox"/> OFF
Ventilator is in power off or standby condition. Check ventilator. Or, check if cable is properly connected to DS-7100 and ventilator.	
Device	not connected

ON will continue communication with the ventilator during ventilator alarm condition. Check the ventilator power and cable connection.

Suspend (2 min) will suspend the ventilator alarm for 2 minutes. If the ventilator alarm condition remains after 2 minutes, the alarm will resume.

OFF will invalidate the ventilator alarm until ventilator connection condition returns to normal condition.

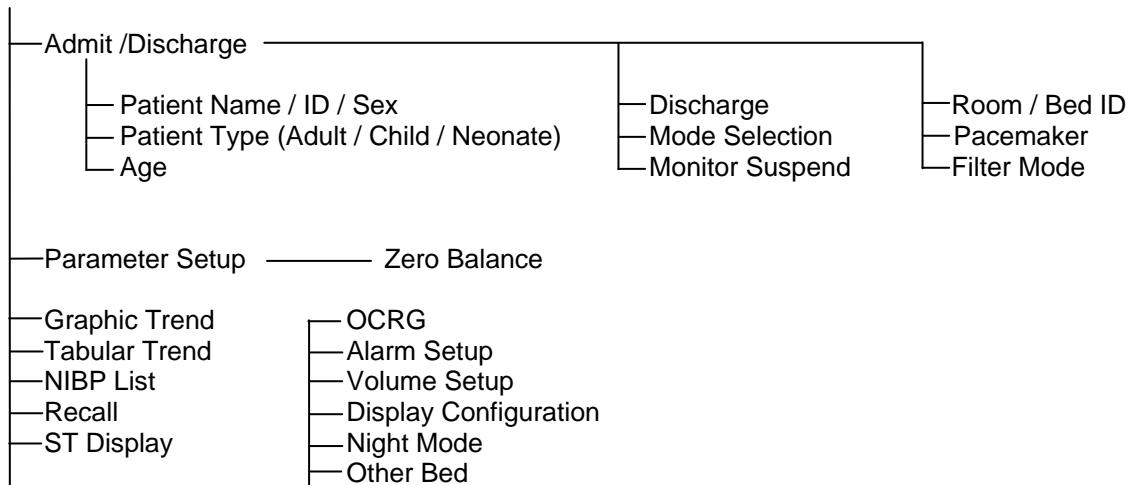


- Check occasionally the communication status of the DS-7100 and the ventilator.
- Verify that the ventilator alarm is not generated, and the “Vent. Online” message is displayed.
- The confirmation display will be displayed until the proper communication with the ventilator is resumed. When the communication is resumed, the screen will automatically return to the home display.
- When disconnecting the ventilator and the DS-7100, make sure to select  OFF on the “Check external alarm” display which appears when the power of the ventilator is turned OFF, or when the cable is disconnected.

# Operation Flow

The operation flow of this system is as follows.

## 【Menu】



## 【System Configuration】

- Night Mode Setup
- Record Setup
- Sweep Speed
- Brightness Setup
- IC Card
- Color Setup
- Telemetry Waveform Setup

## 【Preset】

- Alarm Mode Setup
- Hospital Setup
- Ward Setup
- Monitor Setup
- Display Mode Setup
- Test Menu

## Chapter 3

# Vital Application

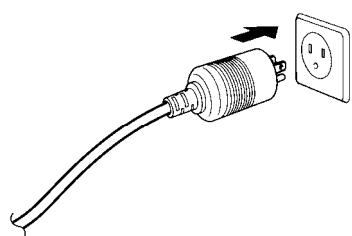
This chapter describes the procedure for vital application, etc.

<b>To Acquire ECG Waveform .....</b>	<b>3-2</b>
Before Attaching the Electrodes.....	3-2
Electrode Placement.....	3-3
Connection to the Patient Monitor.....	3-4
About the Arrhythmia Analysis .....	3-5
●QRS Classification .....	3-5
●Arrhythmia Type .....	3-5
Filter Selection .....	3-6
●Filter Mode Setup .....	3-6
●Procedure for Filter Mode Selection .....	3-7
●AC Filter.....	3-7
Lead Cable Types.....	3-7
<b>Respiration (Impedance Measurement).....</b>	<b>3-8</b>
<b>To Measure the SpO<sub>2</sub> (Nellcor® SpO<sub>2</sub> Unit; DS-7141, DS-7101LT, DS-7101L) .....</b>	<b>3-9</b>
●Functional and Fractional Saturation .....	3-13
●Measured Versus Calculated Saturation.....	3-13
<b>To Measure the SpO<sub>2</sub> (Masimo® SpO<sub>2</sub> Unit; DS-7141M, DS-7101LTM, DS-7101LM).....</b>	<b>3-14</b>
<b>To Measure the NIBP .....</b>	<b>3-19</b>
Procedure for Periodic Measurement.....	3-21
<b>To Measure the BP .....</b>	<b>3-22</b>
<b>To Measure the CO<sub>2</sub> Concentration (DS-7141, DS-7141M) .....</b>	<b>3-26</b>
Patient Application and Display.....	3-26
Procedure for Calibration .....	3-27
<b>To Measure the Temperature.....</b>	<b>3-29</b>

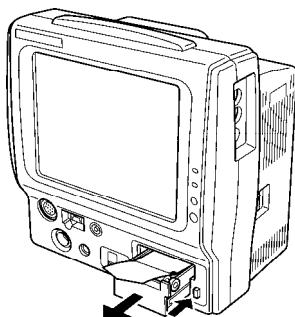
## To Acquire ECG Waveform

### Before turning ON the power

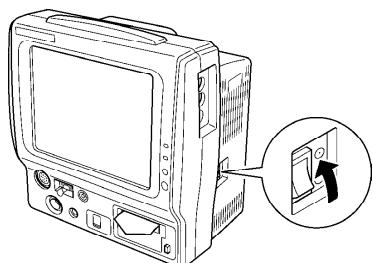
1. Check the grounding.



2. Check the recording paper.



3. Turn ON the power.



Properly use the 3-way AC plug to ground the monitor.  
The grounding is required to prevent AC noise.

The cassette will be released by pressing the cassette release button.

Open the recorder cassette, and check that there is enough amount of paper installed.

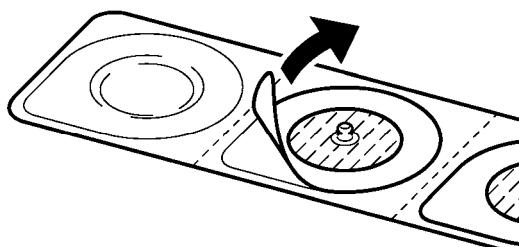
Turn ON the power and check for appropriate display.

## Before Attaching the Electrodes

1 Clean the electrode sites with an alcohol swab or other skin preparation. If necessary, shave the electrode sites to remove excessive hair.



2 Peel off the backing of disposable electrode.



Pay attention not to touch the electrode jelly.

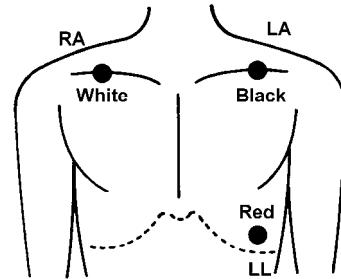
## Electrode Placement

There are 3-electrode, 4-electrode, 5-electrode application depending on the cable type.  
Using the 4-electrode or 5-electrode application allows simultaneous monitoring of 2 ECG waveforms, and high accuracy of arrhythmia analysis can be attained.  
Also, the displayed lead type can be changed.

### For 3-electrode lead (1 waveform monitoring)

Lead Type  I /  II /  III

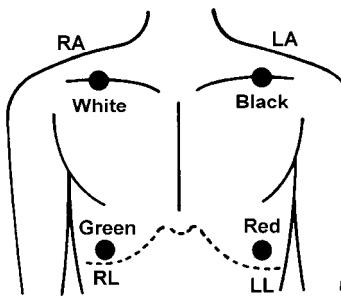
Symbol	Color	Electrode Site
RA	White	On the right infraclavicular fossa
LA	Black	On the left infraclavicular fossa
LL	Red	On the left midclavicular line, near the suprarectal line.



### For 4-electrode lead (Simultaneous 2 waveforms monitoring)

Lead Type  I /  II /  III /  aVR /  aVL /  aVF

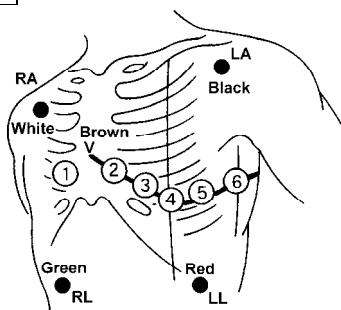
Symbol	Color	Electrode Site
RA	White	On the right infraclavicular fossa
LA	Black	On the left infraclavicular fossa
LL	Red	On the left midclavicular line, near the suprarectal line.
RL	Green	On the right midclavicular line at the same height as LL.



### For 5-electrode lead (Simultaneous 2 waveforms monitoring)

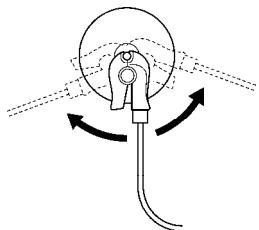
Lead Type  I /  II /  III /  aVR /  aVL /  aVF /  V

Symbol	Color	Electrode Site
RA	White	On the right infraclavicular fossa
LA	Black	On the left infraclavicular fossa
LL	Red	On the left midclavicular line, near the suprarectal line.
RL	Green	On the right midclavicular line at the same height as LL.
V	Brown	Chest Lead (V1 to V6)



## Connection to the Patient Monitor

### 1 Connect the lead cable to the electrode.

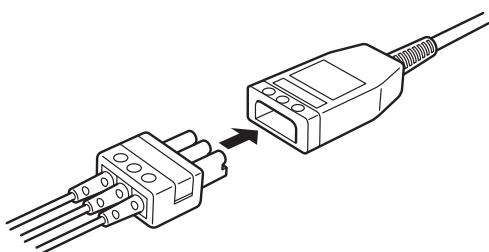


Clip on the lead cable end to the electrode convex part.

#### ⚠ CAUTION

- The indication for continuous use of the electrode is about one day.
- Replace the electrode if the skin contact gets loosen due to perspiring, etc.
- When an electrode is attached at the same location for a long time, some patients may develop a skin irritation. Check the patient's skin condition periodically and change the electrode site as required.
- If different types of electrodes are used at the same time, the difference between the polarization potential from each electrode may interfere monitoring. Make sure to use electrodes of the same type.

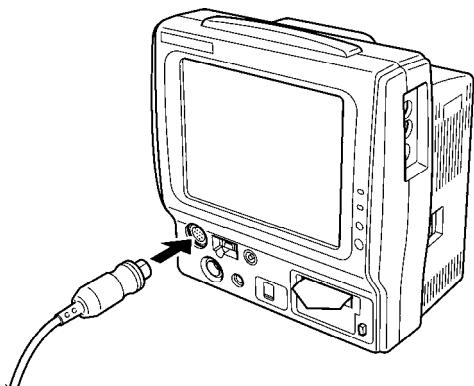
### 2 Connect the lead cable to the relay cable.



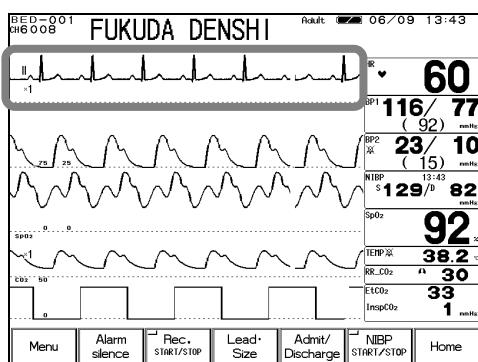
#### ⚠ CAUTION

Use only the ECG lead/relay cable specified by Fukuda Denshi.  
If the specified lead/relay cable is not used when using a defibrillator, performance degradation or damage of the equipment may be caused.

### 3 Plug in the relay cable to the ECG input connector (green) of the patient monitor.



### 4 Verify that the ECG waveform is displayed on the monitor.



Adjust the waveform size and position.  
The monitoring lead can be also changed.



Refer to "6. Parameter Setup ECG" for size / lead setup.

## About the Arrhythmia Analysis

### Arrhythmia Analysis Flow



The arrhythmia detection algorithm learns the normal waveform of the patient and compares the waveform (QRS pattern) and RR interval for each heartbeat to determine the VPC. It compares the parameters such as QRS amplitude, QRS width, QRS polarity, RR interval, and selects abnormal QRS. Then the QRS with suspected VPC is pattern matched to distinguish the noise and VPC. This will finally determine the VPC and generate the arrhythmia alarm.

### ●QRS Classification

Each heartbeat will be classified to the following patterns according to the QRS judgment.

N (Normal)	Normal QRS beat
V (VPC)	Ventricular Extrasystole
S (SVPC)	Supraventricular Extrasystole
P (Pacing Beat)	Pacing beat
F (Fusion Beat)	Fusion beat of pacing and spontaneous beat
? (Undetermined Beat)	Learning arrhythmia, or beat not matching the pattern

### ●Arrhythmia Type

With the above QRS judgment, the following 12 types of arrhythmia alarm can be generated.

Type	Meaning	Detection Criteria
ASYSTOLE	Cardiac Arrest	Cardiac arrest is detected for more than preprogrammed time.
VF	Ventricular Fibrillation	A random, rapid electrical activity of the heart is detected.
VT	Ventricular Tachycardia	HR is same or above the preprogrammed value (140bpm or 120bpm), and 9 or more continuous ventricular beats are detected.
SLOW_VT		9 or more continuous ventricular beats are detected. (HR: below 140bpm / 120bpm)
TACHY	Tachycardia	HR is over the upper alarm limit.
BRADY	Bradycardia	HR is below the lower alarm limit.
RUN	Consecutive VPC	HR is same or above the preprogrammed value (0 to 100bpm) and continuous VPC exceeding the preprogrammed value (2 to 8beats) is detected.
COUPLET	Couplet Ventricular Extrasystole	2 continuous beats of VPC is detected.
PAUSE		Cardiac arrest exceeding the preprogrammed duration is detected.
BIGEMINY	Ventricular Bigeminy	3 or more continuous QRS pattern of V-N is detected.
TRIGEMINY	Ventricular Trigeminy	3 or more continuous QRS pattern of V-N-N is detected.
FREQUENT	Frequent VPC	VPC exceeding the preprogrammed value is detected within 1 minute.

# Filter Selection

## ● Filter Mode Setup

The waveform frequency characteristic can be selected from Monitor Mode, ESIS Mode, or ST Display Mode according to the monitoring purpose.

**1. Monitor Mode** Frequency Characteristic Adult / Pediatric: 0.5 to 40Hz Neonate: 1.6 to 40Hz

This is the standard mode for ECG monitoring. The upper frequency is set to 40Hz to reduce artifact caused by EMG, etc.

**2. ESIS Mode** Frequency Characteristic Adult / Pediatric: 1.6 to 15Hz Neonate: 1.6 to 15Hz

By selecting this mode when using electrosurgical instrument, electrical noise can be largely reduced. Do not select this mode unless using electrosurgical instrument.

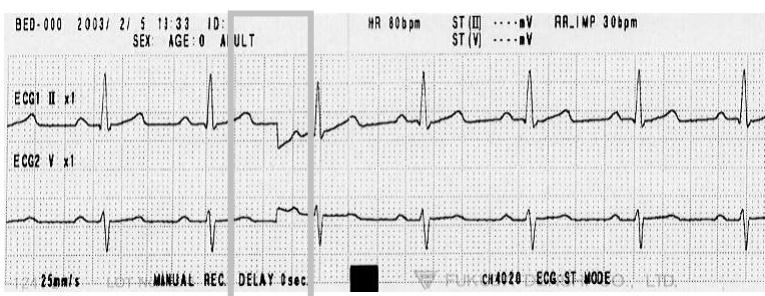
**3. ST Display Mode** Frequency Characteristic Adult / Pediatric: 0.05 to 40Hz

Select this mode if ST measurement is the main purpose of ECG monitoring.

NOTE	If "Neonate" is selected as patient type, ST display mode cannot be selected.
------	---

NOTE	When the filter setup is changed, a notch will appear on the ECG waveform due to the change in frequency characteristic.
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When the filter setup is changed, a notch will appear on the ECG waveform due to the change in frequency characteristic.

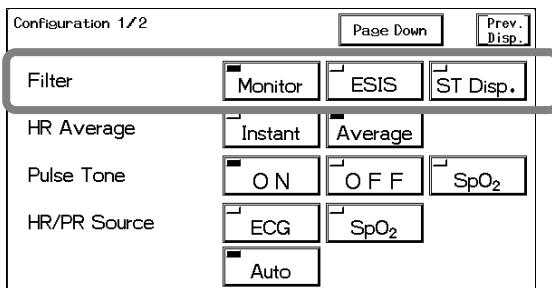


Reference

Refer to "6. Parameter Setup ECG" for details of filter mode.

## ●Procedure for Filter Mode Selection

- 1 Press the ECG parameter key and display the ECG setup menu.
- 2 Press the **Config.** key.



- 3 Select the filter mode from 3 selections.

## ●AC Filter

If the ECG waveform is interfered with AC noise, the AC filter cuts off the frequency component (50Hz or 60Hz).

The AC filter is always set to ON.



Refer to "8. System Configuration Hospital Setup AC Filter" for AC filter setup (50Hz or 60Hz).

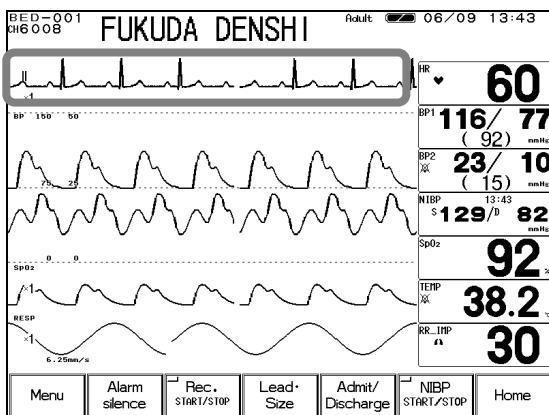
## Lead Cable Types

There are various combinations of lead cable connecting type and electrode material. Contact our service representative for details and select the appropriate electrode.

[for 3-electrode]	ECG Relay Cable (defibrillation-proof)	CI-700D-3 (FA)
	ECG Relay Cable (defibrillation and electrosurgery-proof)	CI-700E-3 (FA)
	ECG Lead Cable	3380.0648.13
[for 4-electrode]	ECG Relay Cable (defibrillation-proof)	CI-700D-4 (FA)
	ECG Relay Cable (defibrillation and electrosurgery-proof)	CI-700E-4 (FA)
	ECG Lead Cable	500398800
[for 5-electrode]	ECG Relay Cable (defibrillation-proof)	CI-700D-5 (FA)
	ECG Relay Cable (defibrillation and electrosurgery-proof)	CI-700E-5 (FA)
	ECG Lead Cable	3380.0661.13 (60cm)
	ECG Lead Cable	3380.0661.15 (90/150cm)

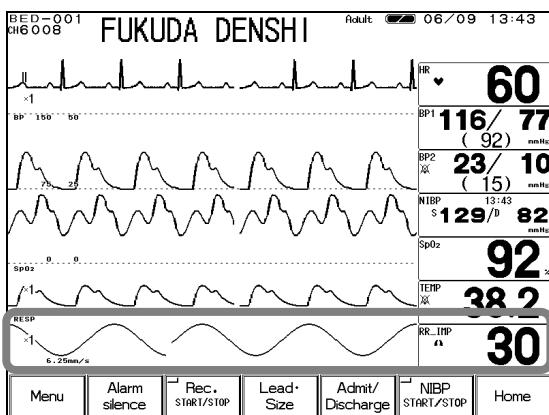
## Respiration (Impedance Measurement)

### 1 Verify that the ECG waveform is properly acquired.



The respiration waveform is detected from lead II of ECG mentioned in the previous section. Therefore if stable ECG is acquired, the respiration waveform can be acquired at the same time.

### 2 Verify that the respiration waveform and respiration rate is displayed on the home display.



Adjust the waveform size, baseline position and sweep speed.



Refer to "6. Parameter Setup Respiration" for scale / baseline setup.  
Refer to "8. System Configuration Sweep Speed" for sweep speed setup.

## To Measure the SpO<sub>2</sub>

(Nellcor® SpO<sub>2</sub> Unit; DS-7141, DS-7101LT, DS-7101L)

### 1 Prepare an appropriate probe or sensor for the patient.

#### Sensor Types

##### Reusable Type

(Probe type, for adult finger)

##### Durasensor® DS-100A

For adult with weight of 40kg and over.

This is for temporary use. When continuously using for long period of time, use the following single patient use type.



##### Single-Patient-Use Type

##### OxiMax® MAX-N (for neonate toe/adult finger)

For neonate with weight of less than 3kg or adult with weight of 40kg and over.



##### OxiMax® MAX-I (for infant toe)

For infant with weight of 3 to 20kg



##### OxiMax® MAX-P (for pediatric finger)

For pediatric or adult with weight of 10 to 50kg



##### OxiMax® MAX-A (for adult finger)

For adult with weight of 30kg and over.



##### OxiMax® MAX FAST (for adult/pediatric forehead)

For adult with weight of 10kg and over.

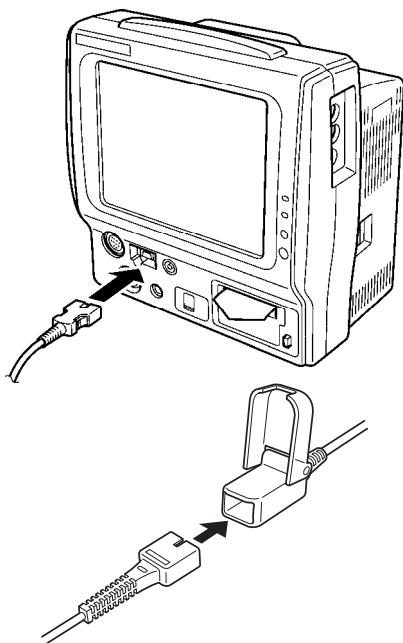
With the use of new technology of NELLCOR®, OxiMax®, stable monitoring during body motion / low perfusion is possible.



3

To Measure the SpO<sub>2</sub> (Nellcor® SpO<sub>2</sub> Unit; DS-7141, DS-7101LT, DS-7101L)

## 2 Connect the sensor to the patient monitor.



- (1) Connect the SpO<sub>2</sub> relay cable (DOC-10) to the SpO<sub>2</sub> connector on the patient monitor.

- (2) Insert the sensor into the SpO<sub>2</sub> relay cable connector, and lock with the transparent part.

### ⚠ CAUTION

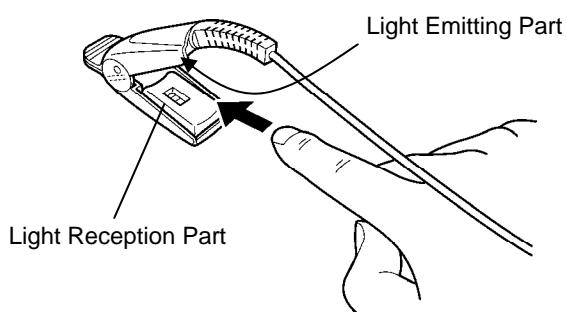
The SpO<sub>2</sub> patient cables (PC04, PC08, PC12) are intended for Masimo® SpO<sub>2</sub> unit only. Do not connect them to Nellcor® SpO<sub>2</sub> unit. If connected, the unit will not function properly.

## 3 Attach the sensor to the patient.

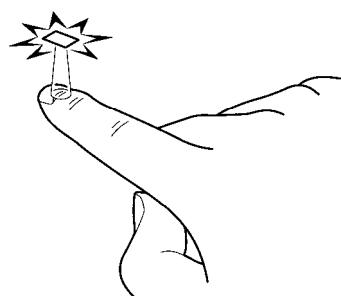
### ⚠ CAUTION

If the sensor site is too thick, thin, deeply pigmented, or deeply colored (ex. nail polish, dye, or pigmented cream), it may lead to inaccurate measurements. In such case, reposition the sensor or choose an alternate sensor for use on a different site.

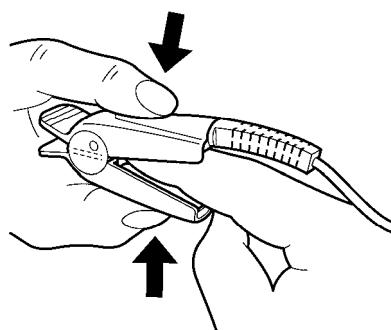
### 【Probe Type Sensor】



- (1) Attach the probe as shown on left.  
The probe cable should be on the nail side.



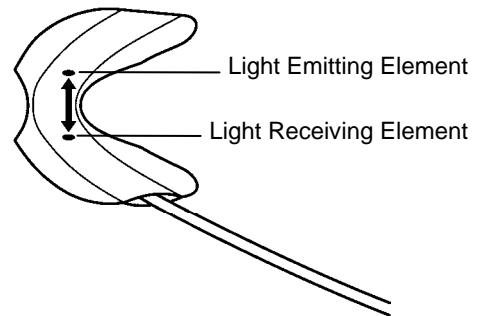
- (2) Adjust the sensor so that the light-emitting part (on cable side) touches the root of the nail, and close the probe.



- (3) Press the probe lightly so that the finger and the rubber cover are appressed.  
This is to stabilize the probe, and to avoid ambient light.

### 【Single-Patient-Use Type】

- (1) Clean the attachment site with alcohol, etc.
- (2) Align the light emitting element and light receiving element of the sensor with the measuring site in between when attaching the sensor to patient.



- (3) Fix the cable with surgical tape so that the sensor does not come off when the cable is pulled.

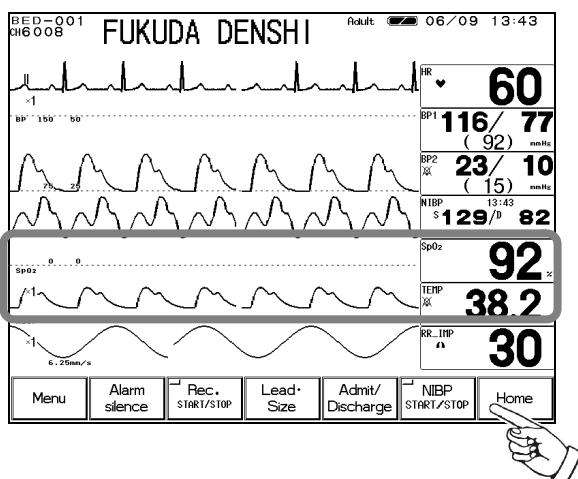


Attachment to the toe



Attachment to the finger

### 4 Verify that the SpO<sub>2</sub> is displayed.



Press the **Home** key on the lower part of the display.  
Verify that the SpO<sub>2</sub> measurement and SpO<sub>2</sub> waveform are displayed on the home display.

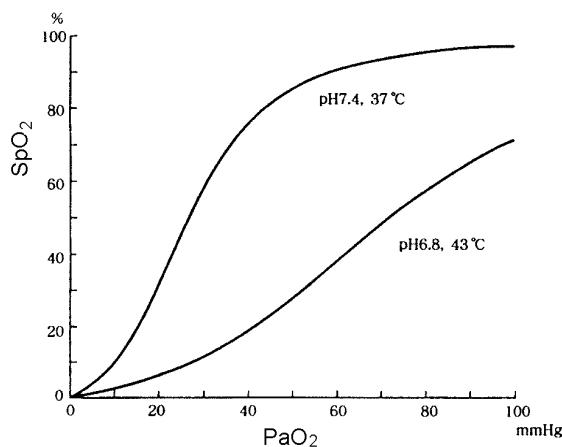
 <b>WARNING</b>	<ul style="list-style-type: none"> <li>● When measuring the SpO<sub>2</sub> of patient with high fever or peripheral circulatory insufficiency, check the sensor attachment periodically and change the attachment site. The temperature of attachment site will rise 2 to 3°C due to the sensor heat which may result in compression necrosis and burn injury.</li> <li>● For the following case, accurate measurement may not be possible.           <ul style="list-style-type: none"> <li>• Patient with excessive abnormal hemoglobin (COHb, MetHb)</li> <li>• Patient with the pigment injected to the blood</li> <li>• Patient receiving CPR treatment</li> <li>• When a sensor is applied to a limb with NIBP cuff, arterial catheter, or intracatheter</li> <li>• When measuring at site with venous pulse</li> <li>• Patient with body motion</li> <li>• Patient with small pulse</li> </ul> </li> </ul>
 <b>CAUTION</b>	<ul style="list-style-type: none"> <li>● If irritation such as skin reddening or skin fit appears with the sensor use, change the attachment site or stop using the sensor.</li> <li>● When fixating the sensor with a tape, do not wind the tape too strong. At the same time, check the blood flow constantly so that congestion is not generated at the peripheral.</li> <li>● Even a short duration of attachment may inhibit the blood flow and generate compression necrosis and burn injury.</li> <li>● As the skin of neonate / low birth weight infant is immature, change the sensor attachment site more frequently depending on the condition.</li> <li>● Excessive light may cause inaccurate measurements. In such cases, cover the sensor with opaque material.</li> <li>● When not performing the measurement, unplug the relay cable and sensor from the SpO<sub>2</sub> connector. Otherwise, the measurement data may be erroneously displayed by the ambient light.</li> </ul>
 <b>CAUTION</b>	<ul style="list-style-type: none"> <li>● Precautions for Reusable Type Sensor (DS-100A)           <ul style="list-style-type: none"> <li>• The DS-100A is intended for use on finger of adults weighing over 40 kg (approximate). Do not use them on children or neonates. Also do not apply them on the thumb or toe.</li> <li>• The light-emitting part of the sensor should be over the root of the fingernail. Do not insert the finger too far into the sensor as it may hurt the patient.</li> <li>• The DS-100A must be moved to a new site at least every 4 hours. Because individual skin condition affects the ability of the skin to tolerate sensor placement, it may be necessary to change the sensor site more frequently with some patients. If skin integrity changes, move the sensor to another site.</li> </ul> </li> <li>● Precautions for Single-Patient-Use Type Sensors           <ul style="list-style-type: none"> <li>• Do not wind the tape too strong. It may obstruct the blood flow.</li> <li>• The sensor is contraindicated for use on patients who exhibit allergic reactions to the adhesive tape.</li> <li>• The sensor can be reused on the same patient as long as the adhesive tape attaches without slippage. But do not reuse it on other patients. It is intended for single patient use only.</li> <li>• For the single patient use type sensors, the site must be inspected every 8 hours (MAX-FAST: 12 hours) to ensure adhesion, skin integrity, and correct optical alignment. If skin integrity changes, move the sensor to another site.</li> <li>• Do not reuse the sensor by resterilizing it.</li> <li>• Dispose the sensor after use. In the event of damage to the sterile packaging, do not use it.</li> </ul> </li> <li>● For additional warnings, cautions or contraindications when using the SpO<sub>2</sub> sensors, refer to each SpO<sub>2</sub> sensor instruction manual.</li> </ul>

## ●Functional and Fractional Saturation

The DS-7100 measures functional SpO<sub>2</sub> and may therefore produce measurements that differ from devices measuring fractional SpO<sub>2</sub>. "Functional" SpO<sub>2</sub> is the amount of oxygenated hemoglobin expressed as a percentage of the total amount of hemoglobin capable of transporting oxygen. By utilizing the light of two different wavelengths, the DS-7100 can analyze for both oxygenated and deoxygenated hemoglobin, and consequently, can determine the functional SpO<sub>2</sub>. The DS-7100 does not detect the presence of abnormal hemoglobin, such as carboxyhemoglobin or methemoglobin.

## ●Measured Versus Calculated Saturation

When SpO<sub>2</sub> is calculated from a blood gas measurement of the partial pressure of arterial oxygen (PaO<sub>2</sub>), the calculated value may differ from the DS-7100 SpO<sub>2</sub> measurement. This is because the calculated SpO<sub>2</sub> may not have been corrected for the effects of variables that shift the relationship between PaO<sub>2</sub> and SpO<sub>2</sub>: temperature, pH, the partial pressure of carbon dioxide(PaCO<sub>2</sub>), and the concentrations of 2, 3-DPG and fetal hemoglobin.



## To Measure the SpO<sub>2</sub>

(Masimo® SpO<sub>2</sub> Unit; DS-7141M, DS-7101LTM, DS-7101LM)

### 1 Prepare an appropriate probe or sensor for the patient.

#### Sensor Types

##### Reusable Sensor

This is intended for temporary use. Change the sensor attachment site every 4 hours.  
If continually using for long hours, use the single patient use type sensor.



##### LNOP® DCI

For adult and pediatric weighing more than 30kg.  
Attach to ring or middle finger of non-dominant hand.

##### Single-Patient-Use Type Sensor

Change the sensor attachment site every 8 hours.



##### LNOP® NeoPt

For premature infant weighing less than 1 kg.  
Attach across the foot or alternatively across the palm & back of hand.



##### LNOP® NeoPt-L

For premature infant weighing less than 1 kg.  
Attach across the foot or alternatively across the palm & back of hand.



##### LNOP® Inf-L

For infant weighing 3 to 10kg.  
Attach to great toe or thumb.



##### LNOP® Neo

For neonates and infants weighing less than 10kg.  
For neonates weighing under 3 kg: Attach across the foot or alternatively across the palm & back of hand.  
For infants weighing over 3kg: Attach to the thumb or the great toe.



##### LNOP® Neo-L

For neonates and infants weighing less than 10kg.  
Attach across the foot or alternatively across the palm & back of hand.



##### LNOP® Pdt

For child or adult weighing 10 to 50kg.  
Attach to ring or middle finger of non-dominant hand.



##### LNOP® Adt

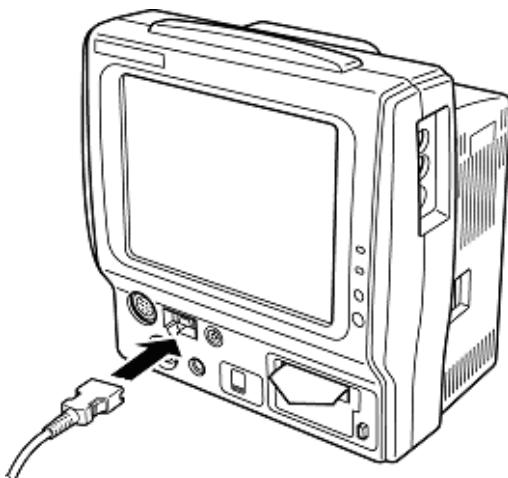
For adult and child weighing more than 30kg.  
Attach to ring or middle finger of non-dominant hand.



##### LNOP® Adt Long

For adult and child weighing more than 30kg.  
Attach to ring or middle finger of non-dominant hand.

## 2 Connect the sensor to the patient monitor.



- (1) Connect the SpO<sub>2</sub> relay cable to the SpO<sub>2</sub> connector on the patient monitor.

### **CAUTION**

The SpO<sub>2</sub> patient cables (PC04, PC08, PC12) are intended for Masimo® SpO<sub>2</sub> unit only. When connecting these cables to the DS-7100 system, make sure that MASIMO® label is present on the DS-7100 system SpO<sub>2</sub> connector. If connected to the unit without MASIMO® label, it will not function properly.

## 3 Select the sensor attachment site.

- Select a site with good perfusion, and where it will not obstruct the patient's movement. If possible, select a non-dominant hand.
- Verify the light receiving part of the sensor is completely covered by finger.
- Before attaching the sensor, clean the attachment site.

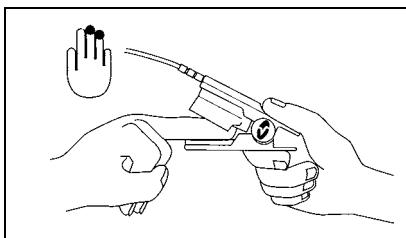
## 4 Attach the sensor to the patient.

The attachment procedure is different for each sensor.

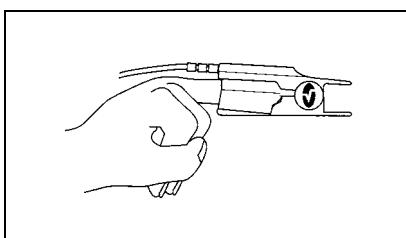
### **CAUTION**

If the sensor site is too thick, thin, deeply pigmented, or deeply colored (ex. nail polish, dye, or pigmented cream), it may lead to inaccurate measurements. In such case, reposition the sensor or choose an alternate sensor for use on a different site.

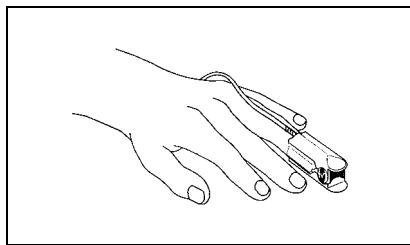
### [For Reusable Type: LNOP® DCI]



- (1) Press the hinge and open the sensor. Place the selected finger inside the opening of LNOP® DCI sensor. Fleshed part of the finger should cover the detecting element located at the lower part of the sensor. The upper half of the sensor connects to the cable. The fingertip should touch the finger stop (arched part) inside the sensor. If the nail is long, it may go beyond the finger stop.



- (2) Press the hinge and adjust so that the sensor force is equally applied to entire part of the finger. To acquire correct data, the detecting element should be completely covered.

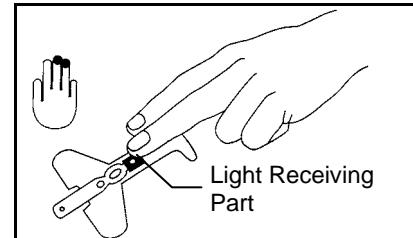


(3) Pass the sensor cable over the back of hand.

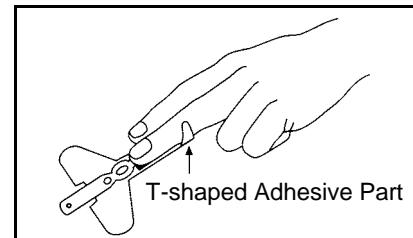
#### 【For Single-Patient-Use Type: LNOP® Adt】

- (1) Take out the sensor from the bag, and face the yellow-brown printed-side downward.
- (2) Bend the sensor backward and peel off the adhesive backing.

- (3) Position the sensor so that the light receiving part touches the finger.

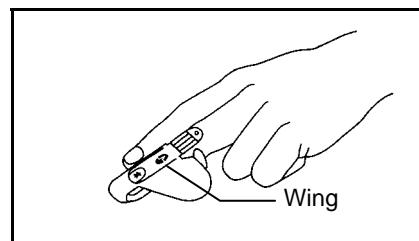


- (4) Place the light receiving part to the fleshed part of the fingertip.

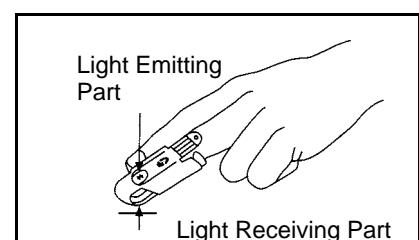


- (5) Press the T-shaped adhesive part to the finger.

- (6) Wrap the light emitting part and finger-printed part around the nail.



- (7) Fold the wing (adhesive) one at a time, and fixate around the finger.



- (8) The light emitting part and light receiving part of the sensor should be aligned.

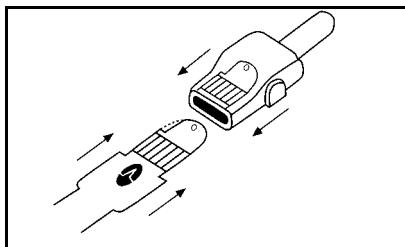


Attachment to the toe



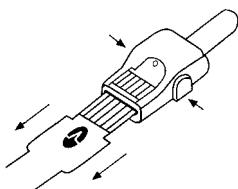
Attachment to the finger

## 5 Connect the patient cable and the sensor.



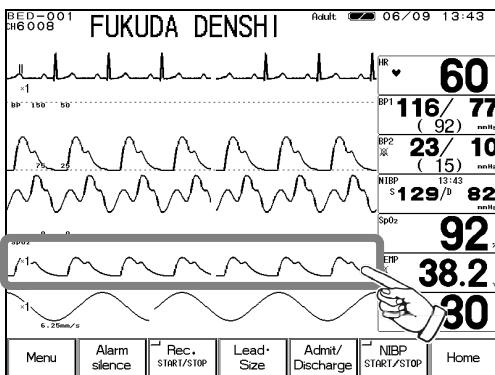
Face the metallic side of the sensor upward and align the logo with that of patient cable.  
Insert the sensor connector to the patient cable until a click sound is heard.

Pull the connector slowly to ensure it is securely connected.  
If necessary, fixate the cable to the patient.



When disconnecting the patient cable and sensor, pull slowly while pressing the lock part on the patient cable.

## 6 Verify that the SpO<sub>2</sub> is displayed.



Press the **Home** key on the lower part of the display.

Verify that the SpO<sub>2</sub> measurement and SpO<sub>2</sub> waveform are displayed on the home display.

### ⚠ WARNING

- Be cautious when setting the "SpO<sub>2</sub> Averaging" duration as the SpO<sub>2</sub> alarm is based on the displayed SpO<sub>2</sub> value which is averaged from the duration set in "SpO<sub>2</sub> Averaging". The alarm occurrence time will be affected or may not occur for the transient value of SpO<sub>2</sub> depending on the set duration.
- When measuring the SpO<sub>2</sub> of patient with high fever or peripheral circulatory insufficiency, check the sensor attachment periodically and change the attachment site. The temperature of attachment site will rise 2 to 3°C due to the sensor heat which may result in compression necrosis and burn injury.
- For the following case, accurate measurement may not be possible.
  - Patient with excessive abnormal hemoglobin (COHb, MetHb)
  - Patient with the pigment injected to the blood
  - Patient receiving CPR treatment
  - When a sensor is applied to a limb with NIBP cuff, arterial catheter, or intracatheter
  - When measuring at site with venous pulse
  - Patient with body motion
  - Patient with small pulse

 CAUTION	<ul style="list-style-type: none"> <li>● If irritation such as skin reddening or skin fit appears with the sensor use, change the attachment site or stop using the sensor.</li> <li>● When fixating the sensor with a tape, do not wind the tape too strong. At the same time, check the blood flow constantly so that congestion is not generated at the peripheral.</li> <li>● Even a short duration of attachment may inhibit the blood flow and generate compression necrosis and burn injury.</li> <li>● Change the sensor attachment site every 4 hours for the reusable sensor, and every 8 hours for the single patient use type sensor. Exercise extreme caution with poorly perfused patients; skin erosion and pressure necrosis can be caused when the sensor is not frequently moved. Assess site at least every 2 hours with poorly perfused patients.</li> <li>● As the skin of neonate / low birth weight infant is immature, change the sensor attachment site more frequently depending on the condition.</li> <li>● Excessive light may cause inaccurate measurements. In such cases, cover the sensor with opaque material.</li> <li>● When not performing the measurement, unplug the relay cable and sensor from the SpO<sub>2</sub> connector. Otherwise, the measurement data may be erroneously displayed by the ambient light.</li> <li>● Precautions for Reusable Type Sensor (LNOP® DCI)           <ul style="list-style-type: none"> <li>• The light-emitting part of the sensor should be over the root of the fingernail. Do not insert the finger too far into the sensor as it may hurt the patient.</li> </ul> </li> <li>● Precautions for Single-Patient-Use Type Sensors           <ul style="list-style-type: none"> <li>• Do not wind the tape too strong. It may obstruct the blood flow.</li> <li>• The sensor is contraindicated for use on patients who exhibit allergic reactions to the adhesive tape.</li> <li>• The Masimo ®LNOP sensor can be reused on the same patient as long as the light emitting and receiving part is clean, and if it is still adhesive to the skin. But do not reuse it on other patients. It is intended for single patient use only.</li> <li>• For the single patient use type sensors, the site must be inspected every 8 hours to ensure adhesion, skin integrity, and correct optical alignment. If skin integrity changes, move the sensor to another site.</li> <li>• Do not reuse the sensor by resterilizing it.</li> <li>• Dispose the sensor after use. In the event of damage to the sterile packaging, do not use it.</li> </ul> </li> <li>● For additional warnings, cautions or contraindications when using the SpO<sub>2</sub> sensors, refer to each SpO<sub>2</sub> sensor instruction manual.</li> </ul>
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NOTE	<ul style="list-style-type: none"> <li>● The measurable pulse rate range is 25 to 240bpm. "xxx" will be displayed if 25bpm and below or 240bpm and above is measured.</li> <li>● The pulse wave will be displayed with approximately 600msec delay from the actual pulse.</li> </ul>
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## To Measure the NIBP

### 1 Select the appropriate cuff type for the patient.

According to the AHA (American Heart Association) guideline, the appropriate cuff width is 40% of the arm circumference. Select the appropriate cuff from the following selections.



Infant Cuff  
CUF-7105  
Width 8.5cm



Pediatric Cuff  
CUF-7104  
Width 10.5cm



Adult Cuff (small)  
CUF-7103  
Width 11cm

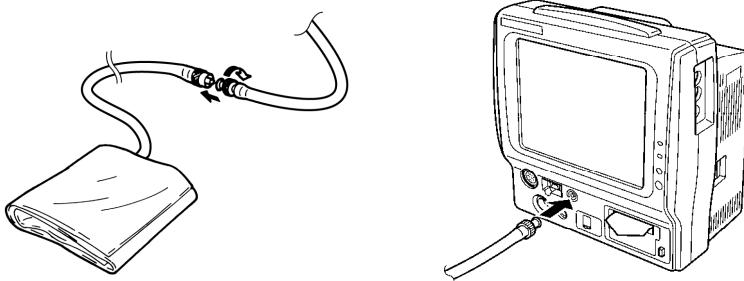


Adult Cuff (medium)  
CUF-7102A  
Width 14.5cm



Adult Cuff (large)  
CUF-7101  
Width 17cm

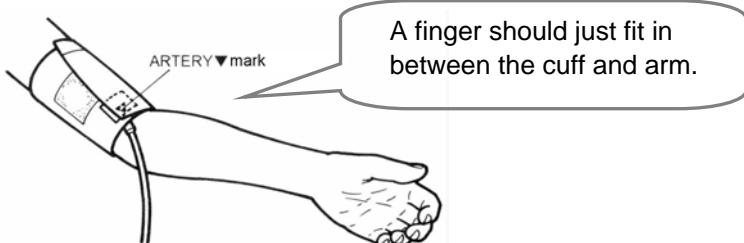
### 2 Connect the cuff to the air hose, and then connect the air hose to the cuff connection connector on the monitor.

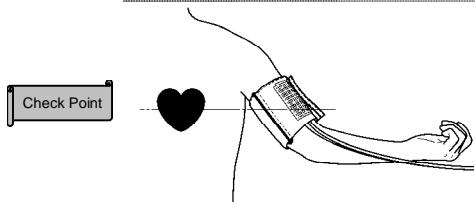


If there is any air leakage, correct NIBP measurement cannot be performed. Make sure that the connection is secure.

### 3 Apply cuff to the patient.

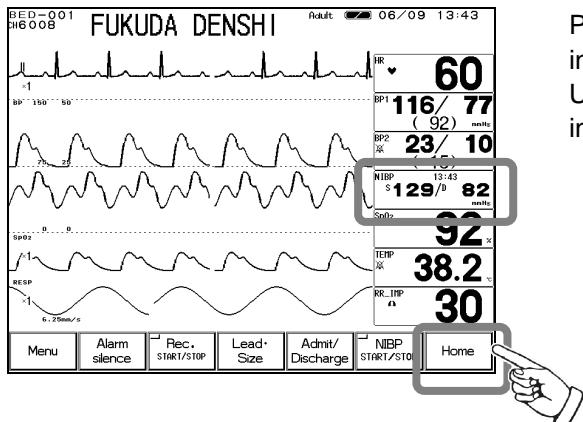
Position the ARTERY▼mark over the artery on the patient's arm and wrap the cuff around.





Align the cuff height and heart position to eliminate an error caused by the blood weight.  
It is most appropriate to measure with the patient lying down and arms naturally extended.

## 5 Start the measurement.



Pressing the **NIBP START/STOP** key will start inflating the cuff and starts the measurement. Upon completion, the measured value will be displayed inside the NIBP parameter key.

When using the DS-LANIII network or TCON system, the NIBP measurement can be started or stopped on the central monitor.

### ⚠ WARNING

Before the measurement, make sure the patient type (**Adult** / **Child** / **Neonate**) is properly selected. Otherwise, correct measurement cannot be performed, and congestion or other injury may result.

### ⚠ CAUTION

- Select the appropriate cuff size which best fits the arm circumference. If the cuff size is inappropriate, it may cause measurement error.
- Do not use a cuff which is worn out. The cuff may burst during inflation.
- Correct NIBP measurement cannot be performed if artificial heart lung machine is used or if the pulse is difficult to detect.
- Pay attention when measuring the NIBP of patient with bleeding disorders or hypercoagulation. The cuff inflation may cause petechia or circulatory failure by blood clot.
- Do not apply the cuff to the arm or thigh where vein is secured. The blood may backflow causing the chemical injection to cease.
- If the air hose is twisted, or weighed down, the cuff air cannot be exhausted. Properly arrange the cuff and air hose.
- Check the condition of cuff-applied part on the patient during measurement so that the blood circulation will not be blocked over long period of time by the squashed or bent cuff hose.
- Check the patient's condition constantly while measuring over long period of time with interval of 2.5 minutes or less. Also, periodically check the blood circulation while performing periodic measurement over long period of time. Congestion may occur at the measuring site.
- The following factors may affect the NIBP value.
  - Body motion, arrhythmia, convulsion
  - Continuous noise such as cardiac massage
  - Periodic electromagnetic noise

### NOTE

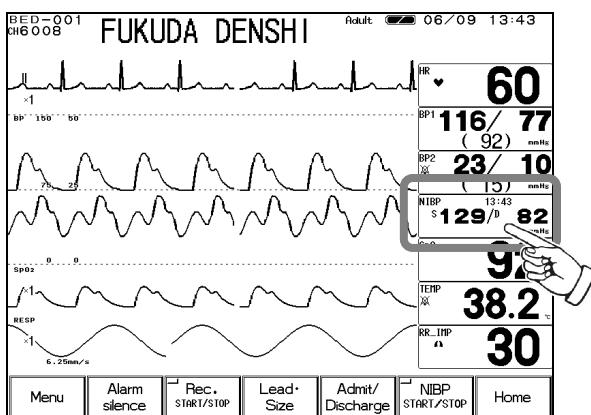
When the cuff is not applied to the patient, pay attention not to leave the cuff unattended. If periodic or continuous measurement is set, the cuff will automatically inflate and may cause the rubber bag inside the cuff to burst. When not performing the NIBP measurement, set the NIBP measurement interval OFF and disconnect the air hose from the NIBP connector.



Whether or not to generate an alarm when the NIBP measurement fails can be set. (ON/OFF of "Alarm Occurrence at NIBP Failure") For details, refer to "4. Monitoring Setup Alarm Setup Alarm Occurrence at NIBP Failure".

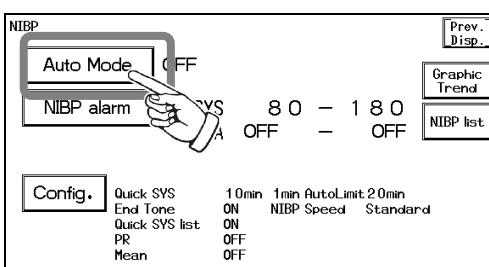
## Procedure for Periodic Measurement

### 1 Press the NIBP parameter key on the home display.



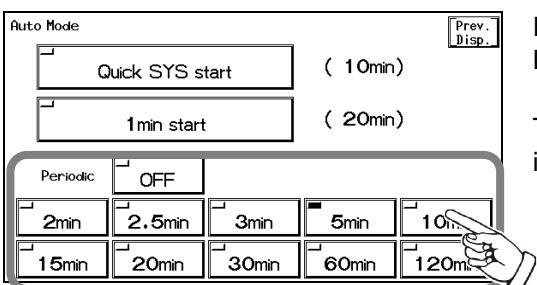
The NIBP setup menu will be displayed.

### 2 Press the **Auto Mode** key on the NIBP setup menu.



The interval time setup menu will be displayed.

### 3 Select an interval time.



Press the key for the desired interval. Check that the key LED is lighted for the selected interval.

The measurement will automatically start at the selected interval.

The measurement time will be integral multiple of the selected interval time starting from 0 minute.  
Ex.) If the present time is 13:14, the measurement time will be as follows for each interval time.

- 2 min. : 13:16, 13:18, 13:20, ...
- 2.5 min. : 13:15, 13:17:30, 13:20, ...
- 3 min. : 13:15, 13:18, 13:21, ....
- 5 min. : 13:15, 13:20, 13:25, ...

When using the DS-LANIII network or TCON system, measurement interval for NIBP periodic measurement can be changed on the central monitor.

#### NOTE

If "Timer" is set for NIBP measurement on the central monitor, "Auto Mode" will be set to OFF on the DS-7100, but the measurement will start according to the central monitor setting.

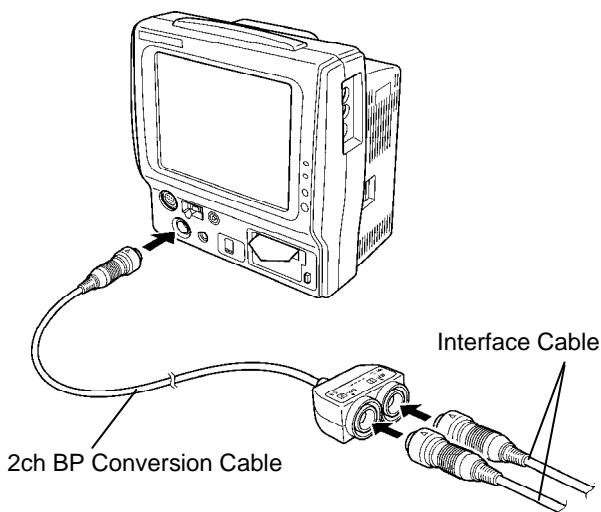
3

To Measure the NIBP

## To Measure the BP

### 1 Connect the 2ch BP conversion cable to the monitor and interface cable.

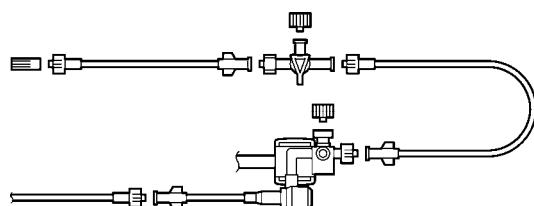
2 channels of BP can be measured on this monitor.



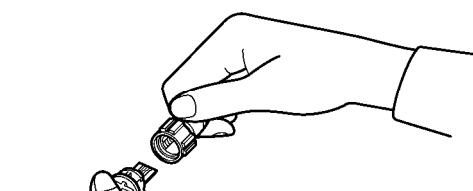
Connect the monitor and the interface cable via 2ch BP conversion cable.

### 2 Assemble the BP measurement device.

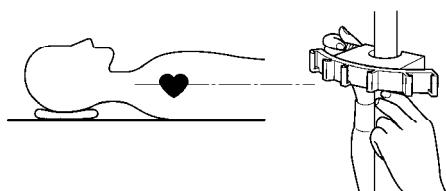
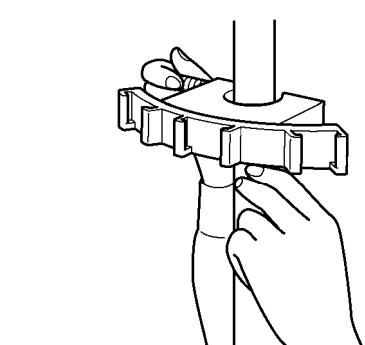
The following procedure explains the case when BP transducer (CDX Press) is used. If using other transducers, refer to the operation manual for the corresponded transducer.

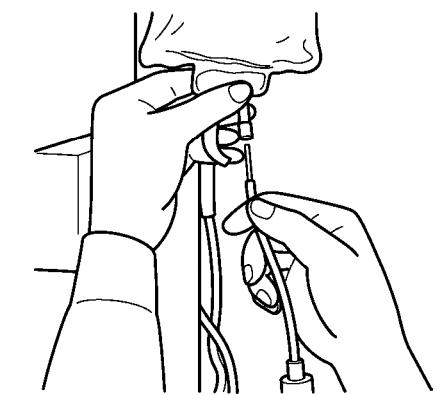


(1) Inspect transducer packaging for damage prior to opening.  
Verify that each connector is securely connected.

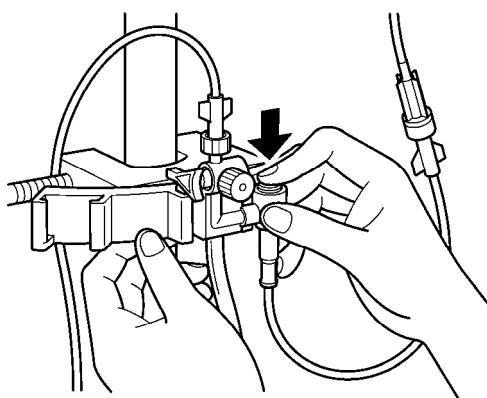


(2) Align the bracket to patient's heart position (about 1/2 of the chest depth).

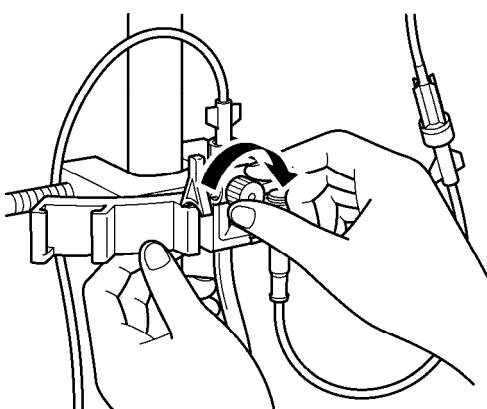




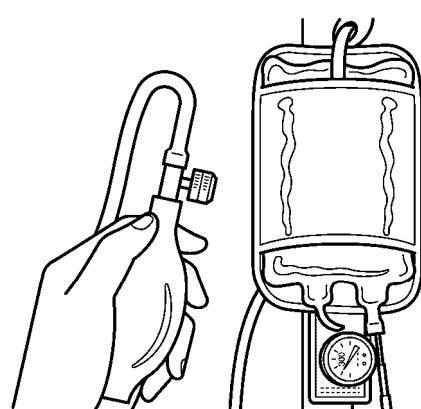
(3) Inject 1000 units of heparin into the saline bag, mix thoroughly and puncture the infusion line through the same hole. Set the saline bag inside a pressure bag, and hang from the infusion device. Fill saline to about 1/3 of the drip.



(4) After loosening the zero-port plug, push the flash button to perform priming to remove air bubbles.



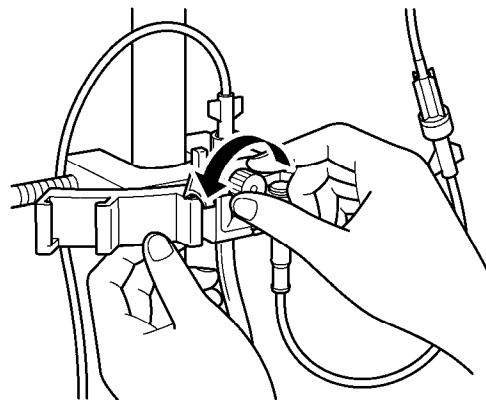
(5) Verify that all air bubbles are removed, and tighten the zero-port plug.  
Turn on the zero-port plug side of the open-air three-way cock.



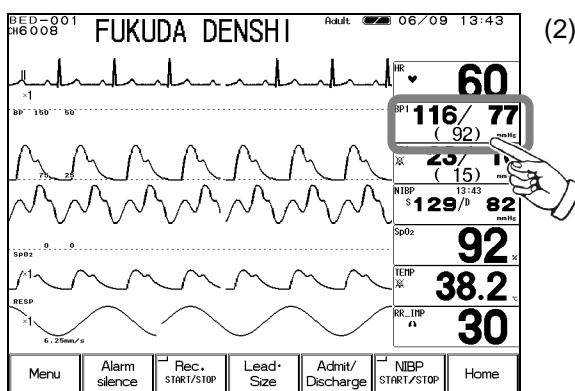
(6) Inflate the pressure bag to 300mmHg.

(7) Perform the zero balance process.

### 3 Perform zero balance.



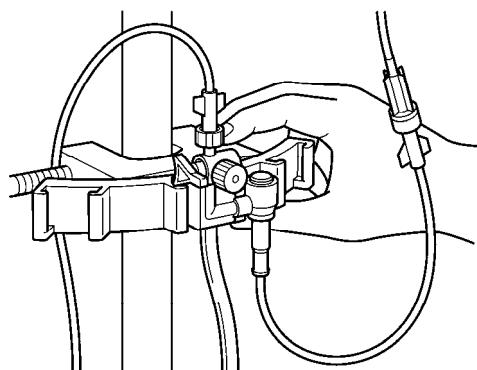
- (1) Loosen the zero-port plug on open-air three-way cock one-half turn.



- (2) Press the BP parameter key on the home display.  
The display will proceed to BP setup menu.

BP 1	Scale 0 - 150 mmHg	Prev Disp.
BP alarm	ON SYS 80 - 180	Graphic Trend
	DIA OFF - OFF	Tabular Trend
BP zero	MEAN OFF - OFF	
Configuration	P zero drift 12Hz ECG Scale Auto	Display ON/OFF ON

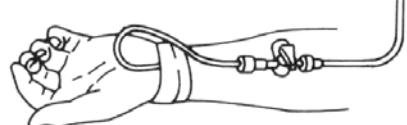
- (3) Press the **BP Zero** key on the BP setup menu.  
Zero balance will start.



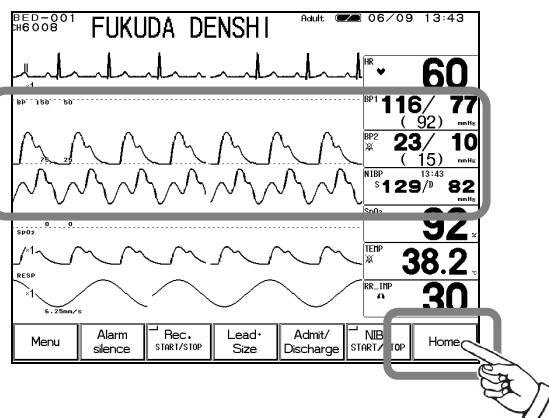
- (4) Turn off the zero-port plug side of the open-air three-way cock.



- (5) Connect the catheter to the end of monitoring line.  
The preparation for measurement is complete.



#### 4 Start the BP monitoring.



Start the BP measurement.

Press the **Home** key. Verify that the BP waveform and each measurement value is displayed on the home display.

##### **⚠ CAUTION**

If the SYS value is abnormally high, or DIA is abnormally low, a resonance may be the cause. If the resonance cannot be eliminated by adjusting the blood pressure filter, check the BP line and use a thick, short, or hard catheter.

##### **⚠ CAUTION**

The zero balance procedure is required for the following case.

- When starting a measurement.
- When the heart position has changed due to body movement.
- When the transducer position has changed.
- When measuring for a long period of time and there is a possibility of measurement error due to change in ambient temperature, etc.
- When a connector is connected / disconnected, or a transducer is replaced.
- When the power has been turned OFF for more than 5 minutes.

# To Measure the CO<sub>2</sub> Concentration

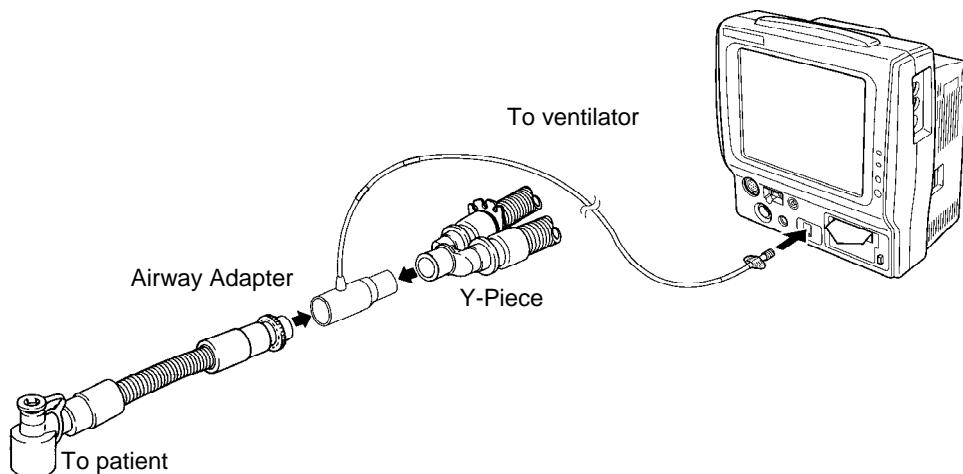
(DS-7141, DS-7141M)

The DS-7141, DS-7141M measures the CO<sub>2</sub> using the Microstream® technology developed by Oridion Medical 1987 Ltd.

## Patient Application and Display

### 1 For intubated patient

- (1) Attach the airway adapter to respiration circuit.
- (2) Remove the protective cap on the airway adapter, and connect to the sampling tube. Connect the other end of the sampling tube to the patient monitor. Verify that all the tubes are properly connected.

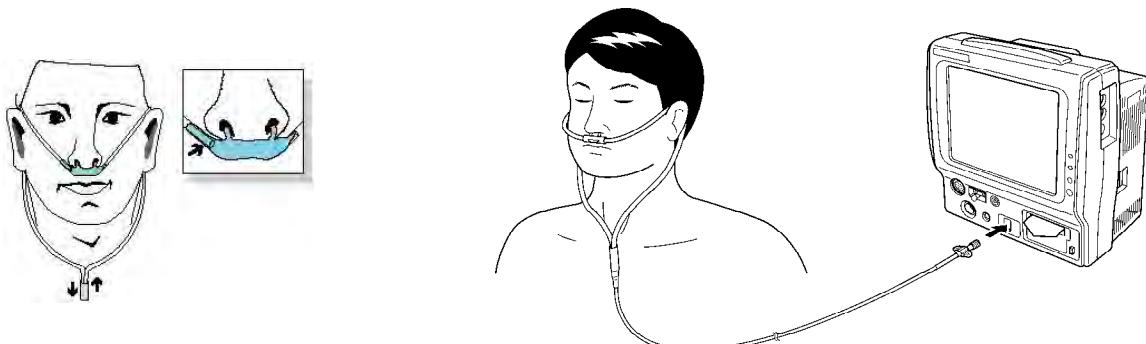


#### WARNING

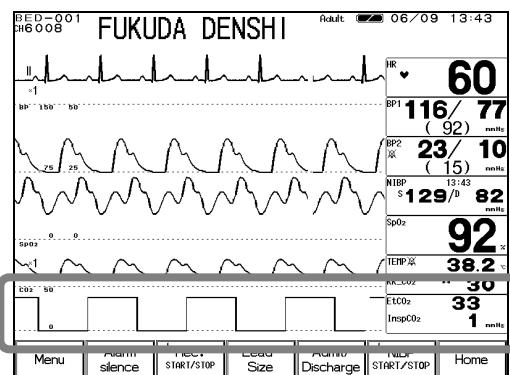
- Use only specified breath sampling products manufactured by "Oridion Medical 1987 Ltd.". Refer to "12. Optional Accessories" (P12-5), for list of specified "Oridion Medical 1987 Ltd." FilterLine® sampling products. These accessories may be purchased from Fukuda Denshi or any authorized "Oridion Medical 1987 Ltd." distributor.
- All FilterLine® sampling products are for single patient use only.
- Always consider the circumference of the intubation tube when using the airway adapter. If inappropriate airway adapter is used for a patient with low ventilation, CO<sub>2</sub> may mix in to the inspired air resulting in incorrect measurement, or apnea detection may become difficult.

### 2 For patient using the nasal prong

- (1) Attach the nasal prong to the patient.
- (2) Connect the nasal prong to the patient monitor. Verify that it is properly connected.



### 3 Start the CO<sub>2</sub> measurement.



Press the **Home** key.

Verify that the CO<sub>2</sub> waveform and EtCO<sub>2</sub> numeric data are displayed on the monitor.

Stable measurement can be achieved after about 20 minutes from power ON.

#### NOTE

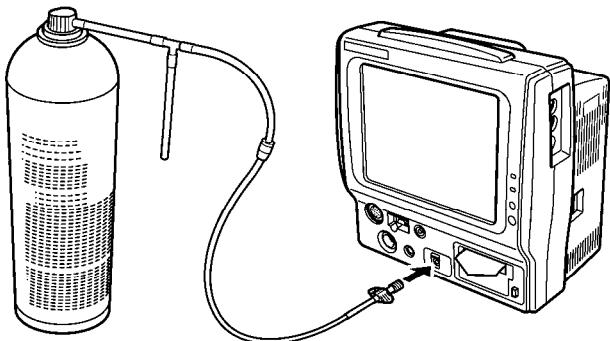
Connecting a sampling tube or nasal prong to the patient monitor will automatically start the sampling pump. To prevent the pump from deteriorating, disconnect the sampling tube and nasal prong from the patient monitor when not measuring the CO<sub>2</sub> concentration.

### Procedure for Calibration

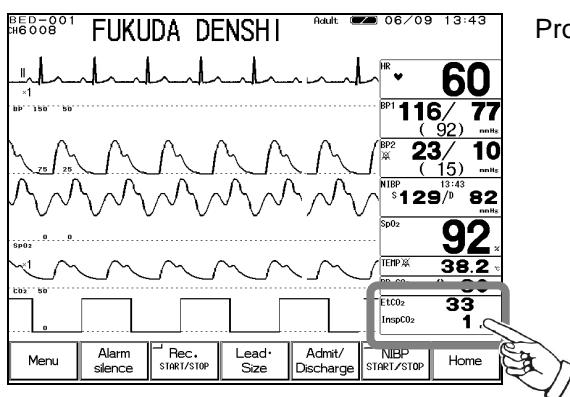
#### **CAUTION**

- Perform calibration 20 minutes after the patient monitor was turned ON.
- Do not disconnect the sampling tube during calibration. Calibration will cease when the sampling tube is disconnected.

#### 1 Connect the calibration gas cylinder to the patient monitor.

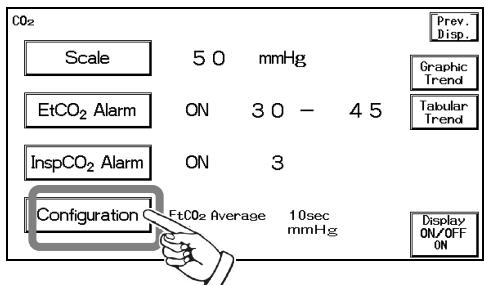


#### 2 Press the CO<sub>2</sub> parameter key on the home display.



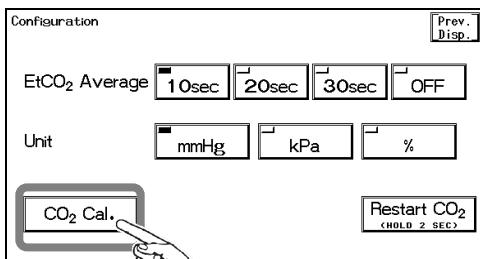
Proceed to the CO<sub>2</sub> setup menu.

**3 Press the **Configuration** key on the CO<sub>2</sub> setup menu.**

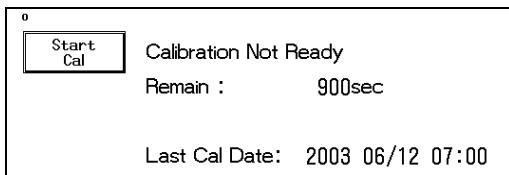


Proceed to the CO<sub>2</sub> configuration menu.

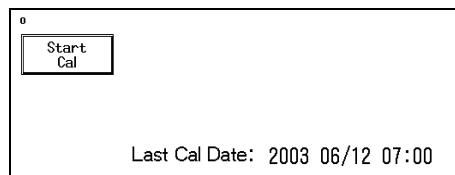
**4 Press the **CO<sub>2</sub> Cal.** key on the CO<sub>2</sub> configuration menu to display calibration menu.**



Due to precision chatter, CO<sub>2</sub> calibration can not be started before 20 minutes has elapsed once the power is turned ON. During this time, **Start Cal** key will be displayed in gray which indicates that the key is ineffective. The message, "Calibration not ready" and the remaining time for preparation will be displayed.



<Preparing for calibration>



<Start calibration>

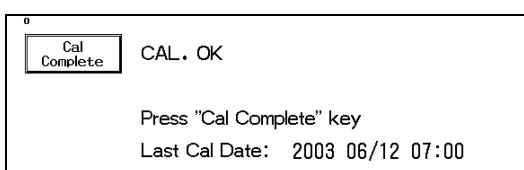
**5 Press the **Start Cal** key and conduct calibration according to the displayed messages.**

**6 The message, "Feed CAL. GAS" will be displayed. Press the injection button to inject the calibration gas.**

**7 The message, "Calc. Gas can be removed" will be displayed. Stop pressing the injection button to cease the injection.**

**8 The message, "CAL. OK" will be displayed. "Last Cal. Date" will be updated to the current date.**

If any of the following messages is displayed, start the procedure again from step 2.  
"CAL. error", "CAL GAS error", "Auto Zero fail", "No stable gas flow", "CAL. failure"



**9 Press the **Cal Complete** key to end the calibration.**

<b>⚠ CAUTION</b>	<p>Conduct CO<sub>2</sub> calibration for the following case. If the CO<sub>2</sub> gas calibration is not performed at a specified interval, CO<sub>2</sub> measurement accuracy may be affected and also subsequent gas calibration may not be possible.</p> <ul style="list-style-type: none"> <li>• When 1 year has elapsed from the last calibration.</li> <li>• When EtCO<sub>2</sub> measurement is not stable or accuracy is degraded compared with other measuring device.</li> <li>• When the patient monitor was not used for a while, or when EtCO<sub>2</sub> was not measured for a while.</li> </ul>
------------------	---

## To Measure the Temperature

- 1 Select an appropriate type of probe for the patient.

### Probe Type

#### Reusable Type



Rectal Probe (adult) 401J



Rectal Probe (pediatric) 402J



Body Surface Probe 409J

#### Probe Cover (Single-Use Type)



Probe Cover for 401J (10 covers)



**CAUTION** Do not reuse the probe cover. It is intended for single patient use only.

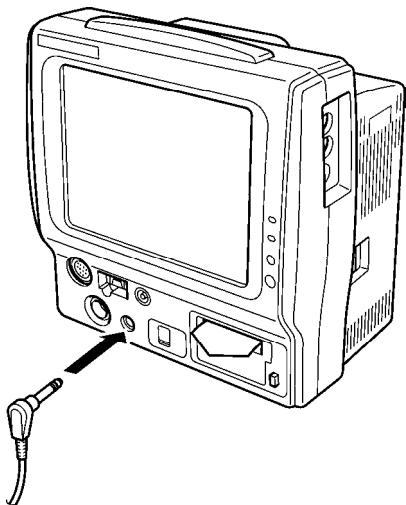
#### NOTE

For the DS-7100 system, the YSI-700 series temperature probe cannot be used.

3

To Measure the Temperature

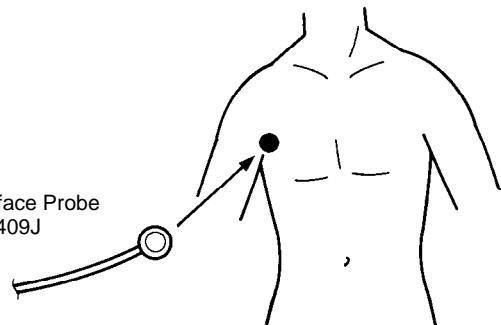
**2 Connect the probe to the patient monitor.**



**3 Attach the probe to the patient.**

●**Body Surface**

Body Surface Probe  
409J



Attach the probe to the location shown on illustration, and secure with surgical tape.

**NOTE**

The probe location shown above is an example. Adjust the probe location according to the patient's condition.

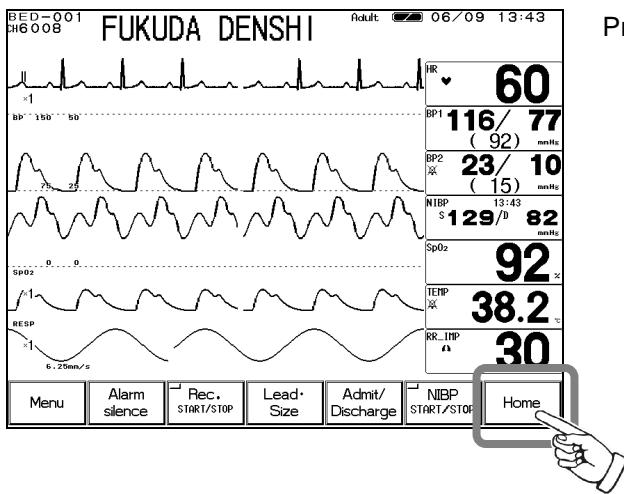
●**Rectum**

Rectum Probe

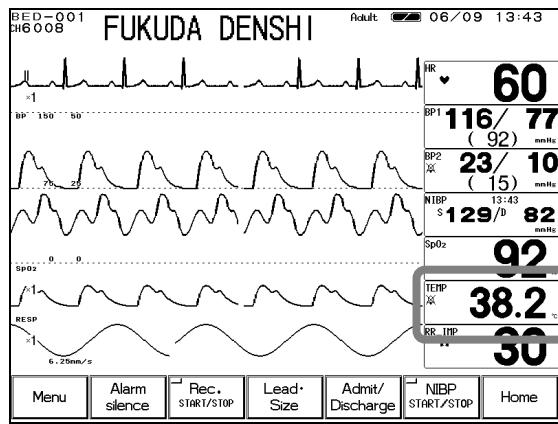
401J, 402J

- (1) Attach the probe cover to the probe end.
- (2) Insert the probe into the rectum about 3 to 7 cm.
- (3) Secure the probe to inner thigh with surgical tape.

#### 4 Check that the temperature is displayed.



Press the **Home** key.



Check that the temperature measurement is displayed on the home display.

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# Chapter 4

# Monitoring Setup

Describes the procedures to set the monitor according to the monitoring purpose.

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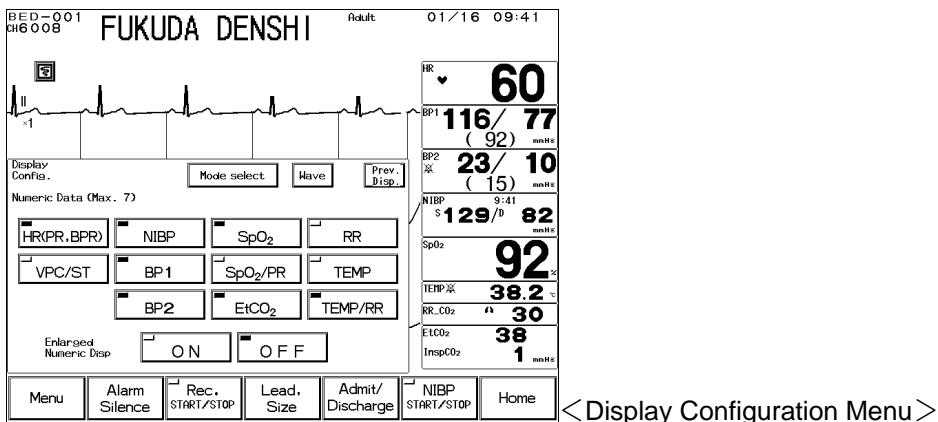
# Display Configuration

For Easier View

The waveform and numeric data display can be configured according to the monitoring purpose.

## To Configure the Display

The display can be configured by selecting the waveforms and numeric data to be displayed. Also, the numeric data display can be enlarged, or graphic trend data can be displayed with the waveform and numeric data.



<Display Configuration Menu>

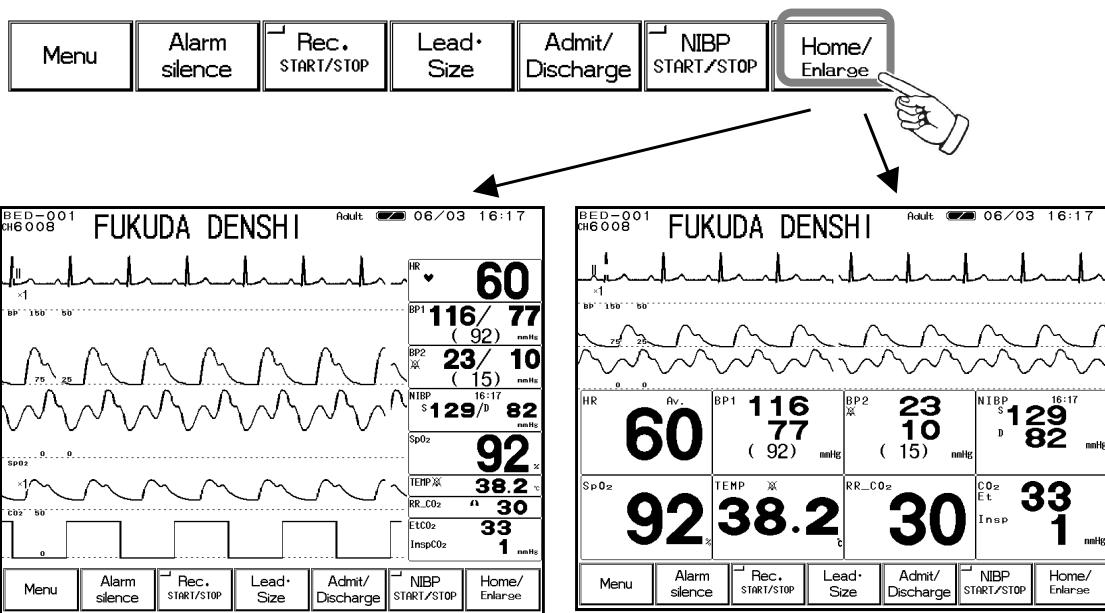
### ●To Enlarge the Numeric Data

The numeric data can be enlarged for easier view.

Pressing the **Home / Enlarge** key of the menu key will switch the display between standard display and enlarged numeric data display.



The home key function can be selected from **Home / Enlarge** or **Home** on the hospital setup menu. The default setting is **Home**. Refer to "8. System Configuration Hospital Setup" for details.



Standard Display

Enlarged Numeric Display

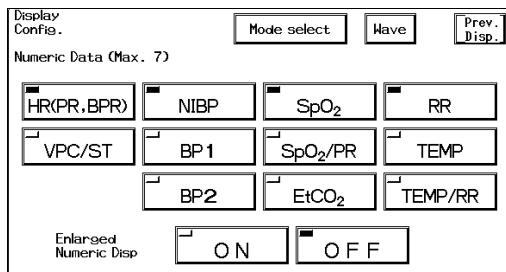
## ● To Configure the Display

The waveforms and numeric data to be displayed can be selected as desired.

### ⚠ CAUTION

When performing telemetry transmission, the numeric data corresponding to the waveform should be selected for display. Otherwise, the displayed waveform or numeric data may not be transmitted.

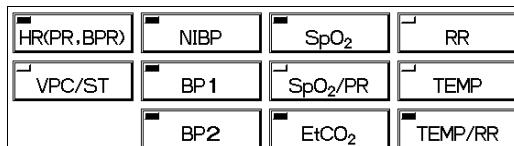
- 1 Press the [Menu] → [Display Config.] keys.**



The display configuration menu will be displayed.

<Display Config. / Numeric Data Selection>

- 2 Select the parameters for numeric data display.**



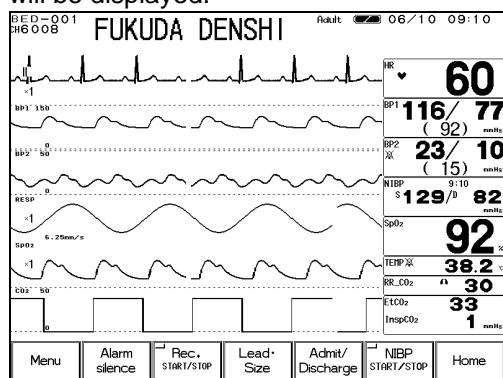
Up to 7 parameters can be selected. The displaying order cannot be selected.

It will be automatically positioned in the order of [HR (PR, BPR)], [VPC/ST], [BP1], [BP2], [NIBP], [SpO2/PR], [SpO2], [TEMP], [RR], [TEMP/RR], [EtCO2] from the top.

The displayed size of each parameter will be determined by the number of selected parameters.

If HR display is not selected, [VPC/ST] will be displayed at the bottom row.

[SpO2/PR] and [SpO2] cannot be displayed simultaneously. If both are selected, [SpO2/PR] will be displayed.



Selecting [TEMP/RR] will display TEMP and RR numeric data in half size inside one parameter box which allows to display up to 8 numeric data.

To display 8 numeric data, select [TEMP/RR] and 6 other parameters.

<8 Numeric Data Display>

- 3 Select [ON] or [OFF] to enlarge the numeric data display or not.**

Enlarged Numeric Disp



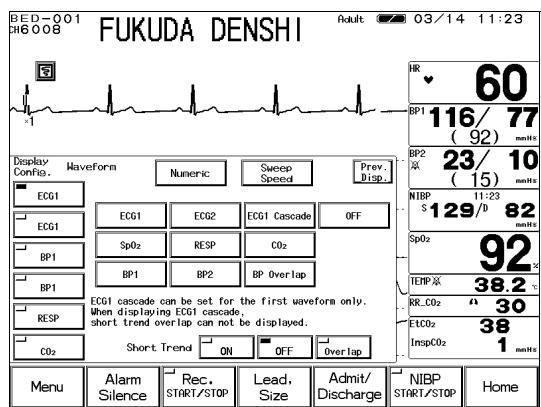
Select [ON] to have the numeric display enlarged on the first display when the power is turned ON.

Selecting [OFF] will display the numeric data in a standard size.

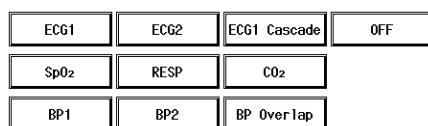
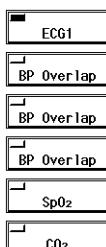
- 4 Select the waveforms and positions for display.**



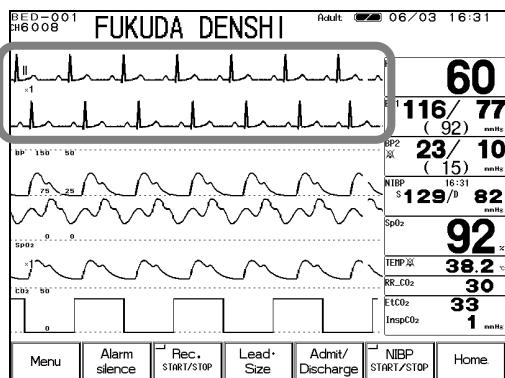
Press the [Wave] key to display waveform selection menu.



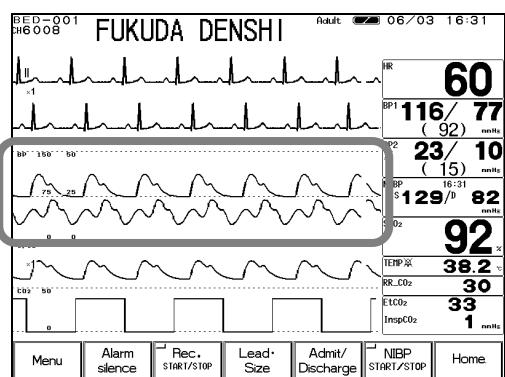
<Waveform Selection Menu>



First, select the position to display the waveform. By selecting the same waveform successively, the waveform display area can be enlarged.



**ECG1 Cascade** displays the ECG in long duration.



**BP Overlap** overlaps the BP1 and BP2 waveforms display.

By selecting **BP Overlap** successively, the BP waveform display area can be enlarged.

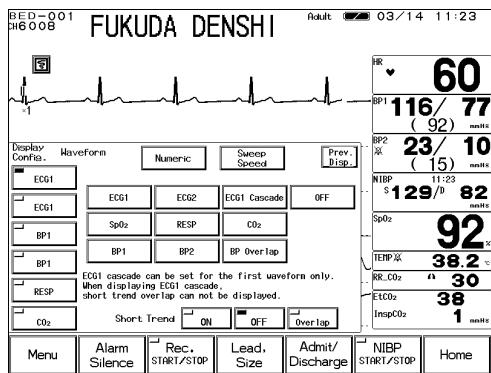
**NOTE**

After configuring the display, press the **Home** or **Home / Enlarge** key and verify the programmed display configuration.

## ●To Display the Short Trend

The short trend data can be displayed with the waveform and numeric data.

- 1 Press the **Menu** → **Display Config.** → **Wave** keys.



The waveform selection for the display configuration will be displayed.

<Display Configuration / Waveform Selection>

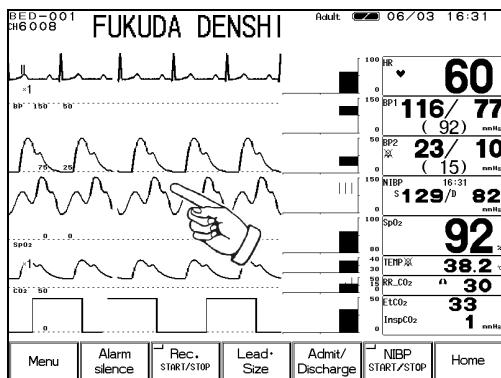
- 2 Select ON/OFF/Overlap for short trend display.



**ON** will display the short trend on the home display.

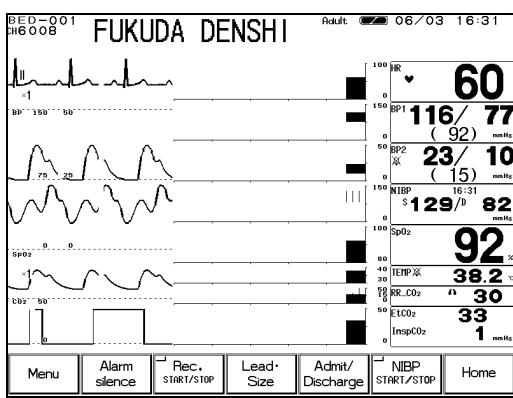
**OFF** will not display the short trend on the home display.

**Overlap** will display the waveform and short trend overlapped.



The home display with the short trend is shown on the left. The short trend can be displayed 5 to 30 min. in 5-minute increments.

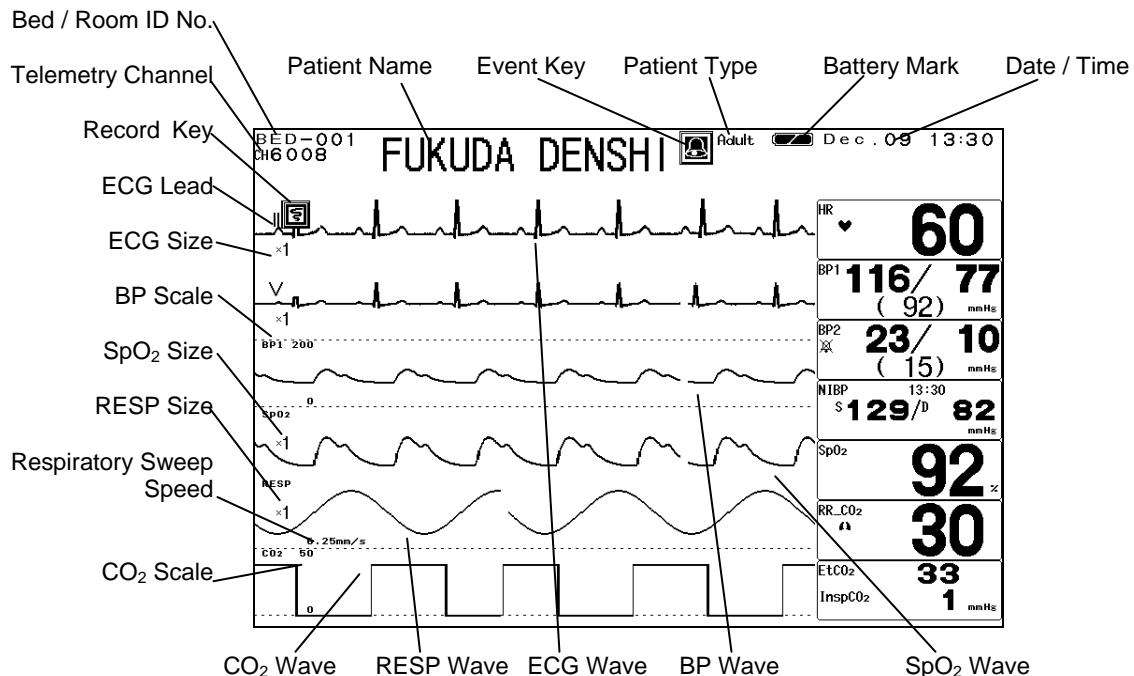
By pressing a point on the displayed waveform, the displayed time of short trend will change according to the pressed position.



## Description of the Display

This section explains the displayed item on the home display.

### ●ECG1, ECG2, BP, SpO<sub>2</sub>, Impedance RESP, CO<sub>2</sub> Waveform Display



#### Bed / Room ID No.

Displays the 4-digit Bed ID and 3-digit (000 to 999) Room ID.

#### Telemetry Channel (DS-7141, DS-7141M, DS-7101LT, DS-7101LTM)

Displays the telemetry channel ID.

#### Record Key

Starts the manual recording. When the key is pressed, the key will turn to red and starts recording. Pressing the key again will stop the recording.



Refer to "8. System Configuration Hospital Setup" for record key display.

#### Battery Mark

This mark will be displayed when the monitor is operated with the optional battery. It will be displayed in 3 levels (Full / Medium / Empty).

Battery Mark	Battery Condition	Indication of Operating Time	
		Standard Mode	Power Saving Mode
	Full	3 hours to 2 hours 20 min.	3 hours 30 min. to 2 hours 40 min.
	The remaining battery is less than half.	2 hours to 10 min.	2 hours 40min. to 10 min.
	The battery is almost empty. Connect to the AC power source immediately.	About 10 min. or less	About 10 min. or less



For power saving mode, refer to "8. System Configuration Monitor Setup"

 CAUTION	<ul style="list-style-type: none"><li>The above specification applies when measuring ECG and NIBP (5-min. interval) using a new battery pack. The battery pack will degrade with repeated use, which shortens the usable time.</li><li>When the remaining battery becomes less than 10 minutes, the CF card access will not be possible to protect the CF card data.</li></ul>
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**Date / Time**

Displays the current date (month, day) and time (hour, minute).

**Patient Name / Patient Type**

Displays the patient name and patient type (adult / child / neonate) selected on the admit menu.

**Respiratory Sweep Speed**

Indicates the displaying sweep speed for impedance respiration waveform and CO<sub>2</sub> waveform.

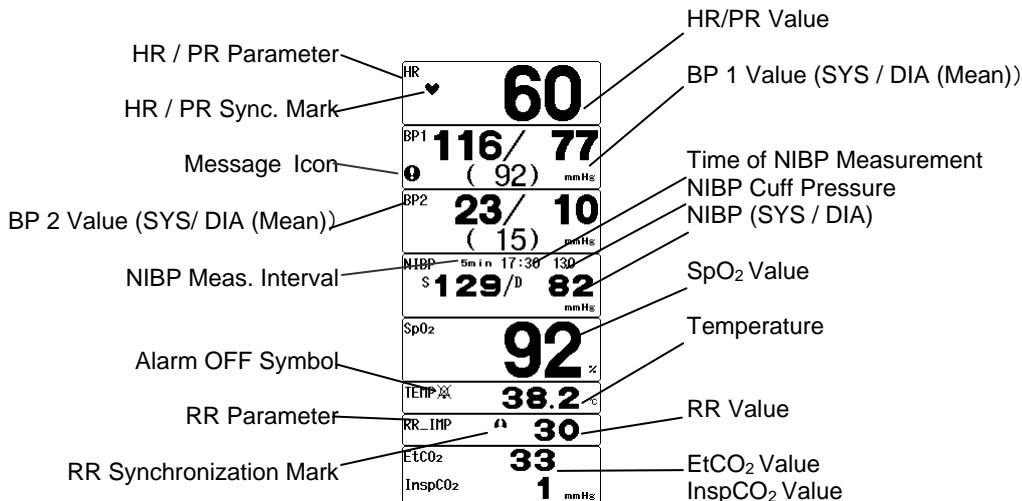
**Event Key**

This touch key will be displayed at alarm occurrence. Even when the alarm is resolved, this key will be remained to be displayed until it is pressed. Pressing this key will silence the alarm and display the recall display. The event key display can be selected ON or OFF.



For ON/OFF of event key, refer to "8. System Configuration Ward Setup"

## ●HR, BP, VPC/ST, BP1, BP2, NIBP, SpO<sub>2</sub>, TEMP, RR, CO<sub>2</sub> Numeric Display



### HR / PR Parameter

Displays the parameter measuring the HR/ PR.

By switching the HR synchronization source, selection from heart rate (HR), SpO<sub>2</sub> pulse rate (PR\_SpO<sub>2</sub>), BP pulse rate (PR\_BP) can be made.

### HR / PR Synchronization Mark

Displays the synchronization mark corresponding to the HR / PR parameter.

### Message Icon

When the parameter box size is too small to display the message inside, a message icon will be displayed instead to indicate that message is present.



For procedure to select ON/OFF of message icon display, refer to "8. System Configuration Monitor Setup ●Message Icon".

### NIBP Measurement Interval

Displays the periodic measurement interval of NIBP. If the periodic measurement is set to OFF, this area will be left blank.

### Alarm OFF Symbol

This symbol will be displayed when the alarm is set OFF.

### HR / PR Value

Displays the HR / PR measurement value corresponded to the HR synchronization source selection. When the measurable range is exceeded, "xxx" will be displayed.

### HR Average (Instant/Average)



If the HR numeric data box size is larger than one-box, HR averaging method will be displayed. ("HR Average" setting under ECG configuration menu)

### BP1, BP2

Displays the BP measurement value (Systolic / Diastolic / Mean).

The mean BP display can be set to ON or OFF on the BP configuration menu. When the measurable range is exceeded, "xxx" will be displayed. When the transducer is disconnected or when BP zero balance is not performed, "— — —" will be displayed.

### Time of NIBP Measurement

Displays the starting time of NIBP measurement.

### NIBP Cuff Pressure

Displays the cuff pressure during NIBP measurement.

### NIBP Value

Displays the NIBP measurement value (Systolic / Diastolic / Mean).

The mean NIBP display can be set to ON or OFF on the NIBP configuration menu. The value will be displayed as “- - -” when the preprogrammed NIBP erase time has elapsed.

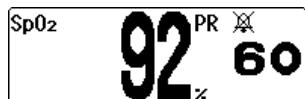
### **SpO<sub>2</sub> Value**

Displays the arterial oxygen saturation measurement value.

### **SpO<sub>2</sub> and PR Value**

By selecting **SpO<sub>2</sub>/PR** on the display configuration setup, SpO<sub>2</sub> and PR can be displayed inside the same numeric data box.

If measurement is not possible due to cause such as sensor off, etc., “- - -” will be displayed.



### **PI Value (For Masimo® SpO<sub>2</sub> Unit only: DS-7141M, 7101LTM, DS-7101LM)**

Perfusion Index will be displayed if PI display is set to ON.



### **Temperature Value**

Displays the temperature measurement value. The YSI-400 temperature sensor can be used. When the measurable range is exceeded, “xxx” will be displayed. When the YSI-700 is used, “- - -” will be displayed for the measurement value.

### **RR Value**

Displays the impedance RR / CO<sub>2</sub> RR measurement value corresponded to the respiration synchronization source. When the measurable range is exceeded, “xxx” will be displayed. When the ECG relay cable for electrosurgical knife is used, or when impedance measurement is set to OFF, impedance RR will not be displayed.

### **EtCO<sub>2</sub> / InspCO<sub>2</sub> Value**

Displays the end-tidal CO<sub>2</sub> concentration and inspiratory CO<sub>2</sub> concentration measurement value. The measurement unit can be selected from mmHg / kPa / % on the CO<sub>2</sub> configuration menu.

### **RR Parameter**

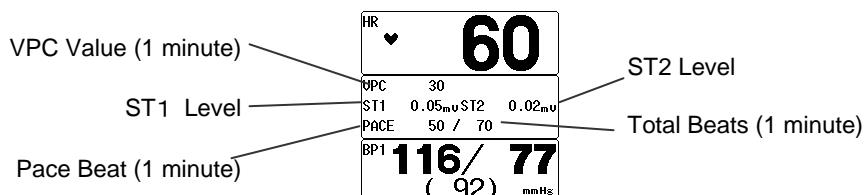
Displays the parameter measuring the RR.

By switching the RR synchronization source, selection from impedance respiration rate (RR\_IMP), CO<sub>2</sub> respiration rate (RR\_CO<sub>2</sub>) can be made.

During the zero calibration, “- - -” will be displayed.

### **RR Synchronization Mark**

Displays the synchronization mark corresponding to the RR parameter.



### **VPC Value (1 minute)**

Displays the VPC rate for the last 1 minute.

“- - -” will be displayed during arrhythmia learning.

### **ST1, ST2 Level**

ST levels for ECG1 and ECG2 will be displayed.

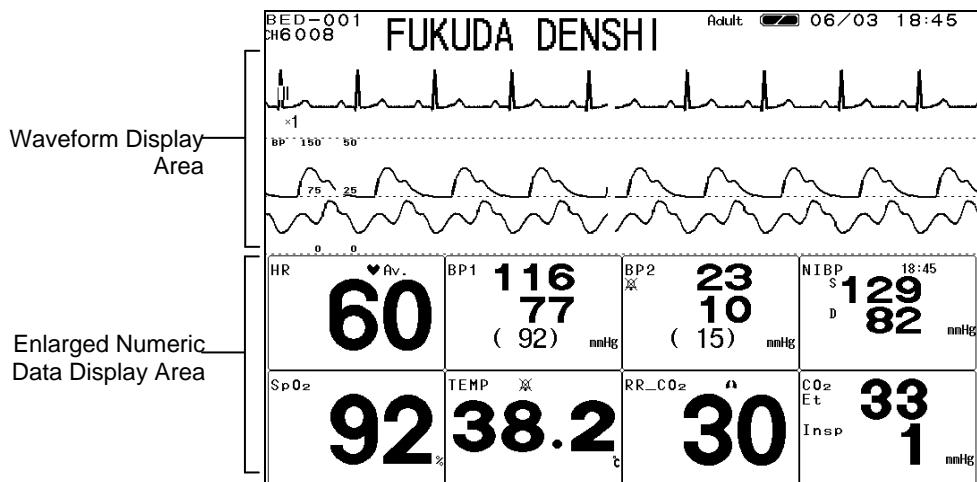
“- - -” will be displayed during arrhythmia learning, lead-off condition, and when reference waveform is not set for ST measurement. If the measurable range is exceeded, “xxx” will be displayed.

### **Pace Beats (1 minute) / Total Beats (1 minute)**

Pace beats and total beats for the last 1 minute will be displayed.

“- - -” will be displayed during arrhythmia learning.

## ●HR, BP, NIBP, SpO<sub>2</sub>, TEMP, RR, CO<sub>2</sub> Enlarged Numeric Data Display



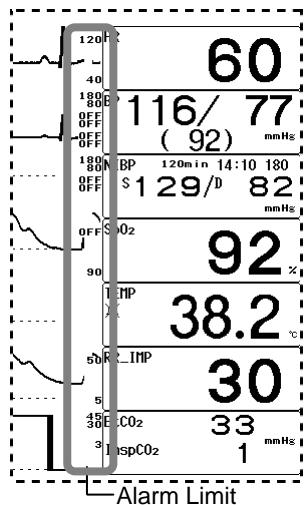
### Waveform Display Area

On the enlarged numeric data display, the top 3 waveforms selected on the display configuration will be displayed.

### Enlarged Numeric Data Display Area

On the enlarged numeric data display, the numeric data will be located automatically.

## ●HR, BP, NIBP, SpO<sub>2</sub>, TEMP, RR, CO<sub>2</sub> Alarm Limit Display



### Alarm Limit

The alarm limit will be displayed beside each numeric data. If the individual alarm setup is set to ON, alarm limit will be displayed. The upper and lower limit will be displayed at the upper and lower part respectively. For BP and NIBP, alarm limit will be displayed for SYS / DIA / mean blood pressure from the top. The alarm limit display can be set to ON or OFF.

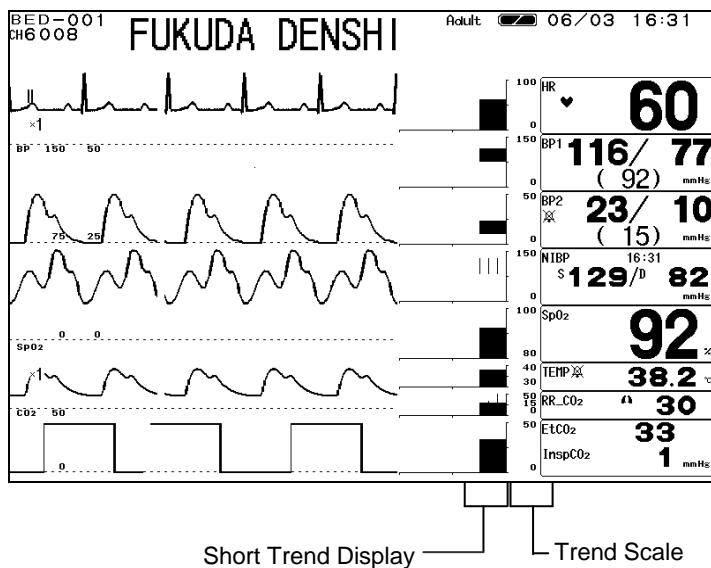


For ON/OFF of alarm limit display, refer to "4. Monitoring Setup Alarm Setup"

### NOTE

If the short trend display is set to **ON** or **Overlap**, alarm limit will not be displayed.

## ●HR, BP, NIBP, SpO<sub>2</sub>, TEMP, RR, CO<sub>2</sub> Short Trend Display



Short Trend Display      Trend Scale

### Short Trend Display

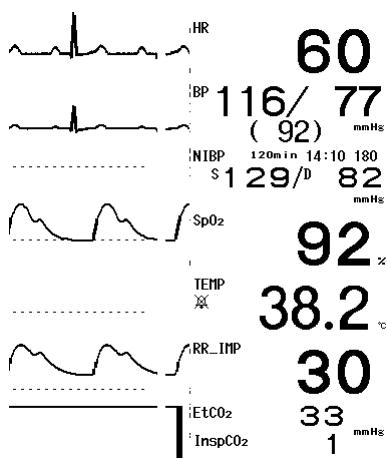
Displays the short trend beside each numeric data.

To change the time of displayed short trend, press a point on the waveform. The time of displayed short trend will change to the pressed point. The displayed time can be changed from 0 min. to 30 min. in 5-min. increments.

### Trend Scale

The short trend scale will be displayed between the short trend and numeric data. The scale selected on the trend menu will be displayed.

## Parameter Key Frame Display



Press the **Menu** → **System Config.** → **Pre-Set** → **Monitor** keys, and select ON/OFF for parameter key frame display.

Selecting **OFF** will erase the parameter key frame.

## Description of Alarm Message and Alarm Sound

This section explains about the message displayed on the home display.

There are vital alarm message and equipment status alarm message which will be displayed on the top of the home display.

The alarms are classified in level 1, level 2, level 3, level 4, and the alarm message will be displayed according to the priority of level 1 > level 2 > level 3 > level 4.

The color of the displayed messages are red for level 1, yellow for level 2, blue for level 3, and white for level 4.

The alarm tone will be different depending on the alarm system setting (IEC/FUKUDA DENSHI).



The alarm system setting (IEC/FUKUDA DENSHI) can be performed on the "Monitor Setup" menu. For procedure, refer to "8. System Configuration Monitor Setup ●Alarm System" (Default: FUKUDA DENSHI)

### [FUKUDA DENSHI]

Alarm Level	Description	Tone	Displayed Color
Level 1	Life Threatening Alarm	Continuous beep tone	Red
Level 2	Cautionary Alarm	Beep tone every 5 seconds	Yellow
Level 3	Treatment Needed Alarm	Single beep tone or Beep tone in 15 seconds interval (*)	Blue
Level 4	Notification Alarm	Display Only	White

### [IEC]

Alarm Level	Description	Tone	Displayed Color
Level 1	Life Threatening Alarm	Continuous beep tone	Red
Level 2	Cautionary Alarm	5 seconds interval beep tone	Yellow
Level 3	Treatment Needed Alarm	Single beep tone (different tone from FUKUDA DENSHI mode) or 15 seconds interval beep tone (*)	Blue
Level 4	Notification Alarm	Display Only	White

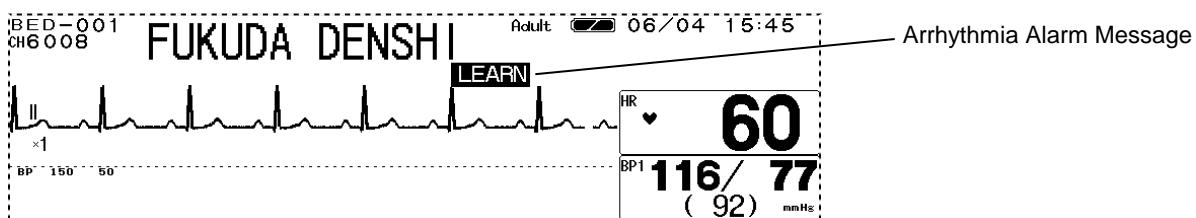
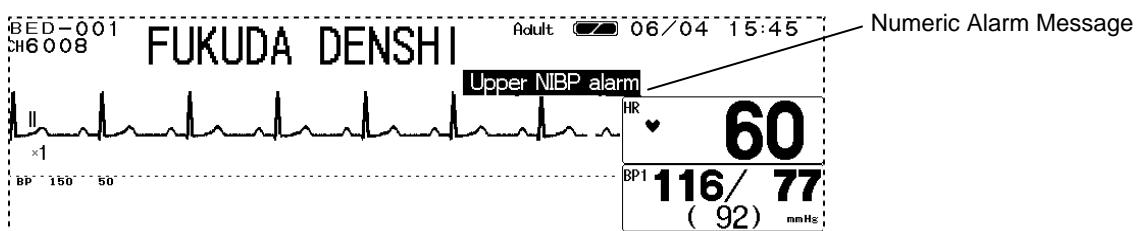


\* The time interval for Level 3 alarm sound can be set. The setting can be performed under the "Monitor Setup" menu. For procedure, refer to "8. System Configuration Monitor Setup ●Level 3 Alarm System Sound" (Default: One time)

<b>⚠ CAUTION</b>	<ul style="list-style-type: none"><li>The alarm priority is high for level 1 (life threatening alarm), medium for level 2 (cautionary alarm), and low for level 3 (treatment needed alarm).</li><li>Alarm messages will be displayed according to the priority. (Level 1 → Level 2 → Level 3 → Level 4)</li><li>For the same alarm level, the alarm message for the newer alarm will be displayed.</li></ul>
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## ●Vital Alarm Message

The vital alarm message is generated when a measurement exceeds the alarm limit, or when arrhythmia is detected.



There are 2 types of alarm messages, numeric alarm message and arrhythmia alarm message. If the 2 types of alarm generate at the same time, the numeric alarm message and arrhythmia alarm message will be alternately displayed for 2 seconds each. The message will be displayed according to the priority of the alarm level. If the alarms of the same level generate, the message with the newer alarm will be displayed.

<b>⚠ CAUTION</b>	The alarm message for the arrhythmia alarm will continue to be displayed for 30 seconds after the alarm is resolved.
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#### Life Threatening Alarm (Alarm Level 1)

Parameter	Message
HR	“Lower HR alarm”
	“Upper HR alarm”
PR (SpO <sub>2</sub> , BP)	“Lower PR alarm”
	“Upper PR alarm”
BP1/ART	“Lower BP1 alarm” or “Lower ART alarm”
	“Upper BP1 alarm” or “Upper ART alarm”
SpO <sub>2</sub>	“Lower SpO <sub>2</sub> alarm”
	“Upper SpO <sub>2</sub> alarm”
Respiration (Impedance, CO <sub>2</sub> )	“Apnea alarm”
	“Lower RR alarm”
	“Upper RR alarm”
NIBP	“Lower NIBP alarm”
	“Upper NIBP alarm”
CO <sub>2</sub>	“Upper EtCO <sub>2</sub> alarm”
	“Lower EtCO <sub>2</sub> alarm”
Arrhythmia	“ASYSTOLE”
	“VF”
	“VT”
	“SLOW VT”
	“TACHY”
	“BRADY”
	“RUN”

#### Cautionary Alarm (Alarm Level 2)

Parameter	Message
BP (other than BP1, ART)	“Lower BP2 alarm” or “Lower (label) alarm”
	“Upper BP2 alarm” or “Upper (label) alarm”
ST	“Lower ST alarm”
	“Upper ST alarm”
Temperature	“Upper TEMP alarm”
	“Lower TEMP alarm”
CO <sub>2</sub>	“Upper InspCO <sub>2</sub> alarm”
Arrhythmia	“PAUSE”
	“COUPLET”
	“BIGEMINY”
	“TRIGEMINY”
	“FREQUENT”

#### Treatment Needed Alarm (Alarm Level 3)

Parameter	Message
None	

#### Notification Alarm (Alarm Level 4)

Parameter	Message
All Alarm	“Alarm suspend (***sec)”
Arrhythmia	“LEARN”
	“ARRHY OFF”

## ⚠ CAUTION

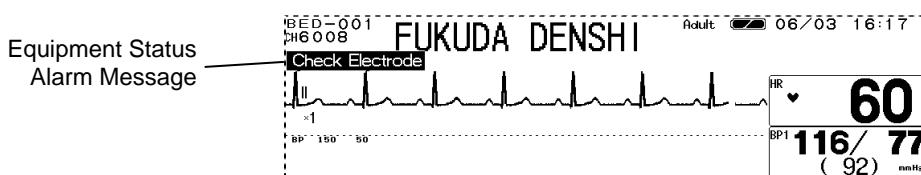
Even during "LEARN" status, alarm for HR, ASYSTOLE, VF, TACHY, BRADY will be generated.

## NOTE

- ( \* \* \* sec) of the "Alarm suspend ( \* \* \* sec)" message indicates the remaining time to suspend the alarm.
- The "ARRHY OFF" message will be displayed when the ASYSTOLE, VF, VT, SLOW\_VT, and HR alarm is OFF.

## ● Equipment Status Alarm Message

The equipment status alarm message will be displayed when proper monitoring cannot be performed. The alarm message will be displayed according to the priority of the alarm level. If more than one alarm with the same level is generated, the alarm message with the newer alarm will be displayed.



## Cautionary Alarm (Alarm Level 2)

Item	Message
Battery	"Charge battery"
ECG Impedance Respiration	"Check electrodes (*, *, *)" <sup>※1</sup>
Arrhythmia	"Cannot analyze" <sup>※2</sup>
SpO <sub>2</sub> (Nellcor® SpO <sub>2</sub> Unit)	"Check SpO <sub>2</sub> sensor" "SpO <sub>2</sub> sensor fault" "No pulse detect"
SpO <sub>2</sub> (Masimo® SpO <sub>2</sub> Unit)	"Check SpO <sub>2</sub> sensor" "SpO <sub>2</sub> sensor fault" "Pulse search" "SpO <sub>2</sub> Low Perfusion"
NIBP	"NIBP measurement failed."
CO <sub>2</sub>	"Check filter line" "CO <sub>2</sub> unit error"
Connector Off	"ECG not connected" "BP not connected" "SpO <sub>2</sub> not connected" "TEMP not connected" "CO <sub>2</sub> not connected"

<sup>※1</sup> (\*, \*, \*) indicates maximum of 3 detached electrodes (RA, LA, LL, RL, V).

<sup>※2</sup> This alarm will generate when analysis is suspended for more than 30 seconds, regardless of ON/OFF setting of "Suspend Arrhy. Analysis during Noise" under Ward Setup (Preset Menu). Refer to "10. Maintenance Troubleshooting ECG".

## ⚠ WARNING

When a parameter is in a connector-off condition, the alarm will be generated only on the bedside monitor and not on the central monitor. Make sure that the connector is securely connected. If the waveform/numeric data is not displayed for a monitored parameter, check the patient's condition and pay attention not to miss the connector-off condition.

## ⚠ CAUTION

- Even during "Cannot analyze" alarm generation, alarm for HR, ASYSTOLE, VF, TACHY, BRADY will be generated.
- If **OFF** is selected for "PI Display" under the SpO<sub>2</sub> configuration setup, "SpO<sub>2</sub> Low Perfusion" alarm will be indicated by message display only. The alarm sound will not be generated.

<b>NOTE</b>	The “Connector Off” alarm can be cancelled by pressing the <b>Alarm Silence</b> key. Before silencing the alarm, make sure that the disconnected connector is unnecessary.
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**Treatment Needed Alarm (Alarm Level 3)**

<b>Item</b>	<b>Message</b>
NIBP	“Check NIBP hose”
Impedance Respiration	“CVA detected”
SpO <sub>2</sub> (Masimo® SpO <sub>2</sub> Unit)	“SpO <sub>2</sub> Interference Detected”
	“SpO <sub>2</sub> Too Much Ambient Light”
	“SpO <sub>2</sub> Unrecognized Sensor”
	“SpO <sub>2</sub> Low Signal IQ”
ECG	“Pacing detect error”

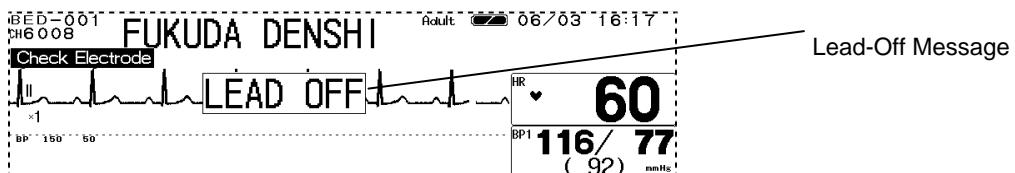
**Notification Alarm (Alarm Level 4)**

<b>Item</b>	<b>Message</b>
Operation	“Wave freeze”
	“Touch key OFF”
	“Night mode”
ECG	“ECG failed”
	“Artifact”
BP	“BP1 transducer OFF”
	“BP1 not zero balanced”
	“BP2 transducer OFF”
	“BP2 not zero balanced”
	“Incorr. BP cable”
Temperature	“Wrong temp probe”
	“TEMP auto check”
	“TEMP unit check”
SpO <sub>2</sub> (Nellcor® SpO <sub>2</sub> Unit)	“Motion artifact”
	“SpO <sub>2</sub> unit error”
SpO <sub>2</sub> (Masimo® SpO <sub>2</sub> Unit)	“SpO <sub>2</sub> unit error”
CO <sub>2</sub>	“CO <sub>2</sub> unit error”
ECG	“ECG unit error”
NIBP	“NIBP unit error”
Recorder	“Recorder error”
	“Paper out” *
	“Magazine open” *
	“Paper jammed”
	“Recorder busy”
All Alarm	“Alarm Mute”
ECG, Impedance Respiration	“Check electrode”
Telemetry	“Telemetry unit error”
TCON	“Check TCON Comm.”
	“Chk TCON Receive”
	“TCON Interference”
Main Unit	“Set Rotary SW0”

\* The message will not be displayed if **OFF** is selected for “Built-in Rec. Status Display” on the Monitor Setup of the preset menu.

## ●Lead-Off Message

If the ECG electrodes are detached, HR alarm and arrhythmia alarm will not be generated. If this condition is left unresolved, a sudden change of the patient may not be noticed. Take prompt action when the lead-off condition is detected.



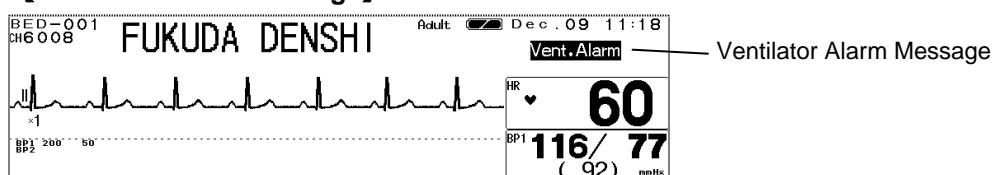
While the "LEAD OFF" message is displayed, HR alarm and arrhythmia alarm will not function. Leaving this condition unresolved may result in missing a sudden change of the patient. Promptly check the electrodes when this message is displayed.

## ●Ventilator Alarm Message

When a ventilator is connected to the DS-7100, ventilator alarm and the connection status alarm will be generated.

When a wired or wireless network is constructed, the ventilator alarm information can be transmitted to the central monitor. For the SV-300, Servo-i, Servo-s, a detailed ventilator alarm factor can be also transmitted.

### [Ventilator Alarm Message]



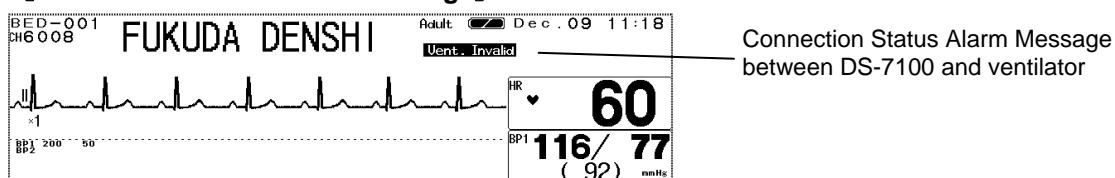
### Life Threatening Alarm (Alarm Level 1)

Device	Message
Ventilator	"Vent. Alarm"



The ventilator alarm sound is set to OFF at factory default setting. For procedure to turn ON the alarm sound, refer to "4. Monitoring Setup Volume Setup".

### [Connection Status Alarm Message]



### Life Threatening Alarm (Alarm Level 1)

Device	Message
Ventilator	"Vent. Invalid"

### Notification Alarm (Alarm Level 4)

Device	Message
Ventilator	"Vent. Disable"
	"Vent. Online"



When a ventilator is connected to the DS-7100, verify that "Vent. Online" message is displayed for the connection status. The DS-7100 will not detect the ventilator alarm unless the "Vent. Online" condition is achieved.

## ● Ventilator Alarm Factor

For the SV-300, Servo-i, Servo-s, ventilator alarm factor can be transmitted to the central monitor.

<b>Transmitted Alarm Message</b>	<b>Description</b>
VENT AWP	Airway pressure alarm
VENT MV	Minute ventilation alarm
VENT APNEA	Apnea alarm
VENT CONT. HP	Continuous high pressure alarm
Upper VENT FiO <sub>2</sub>	FiO <sub>2</sub> upper limit alarm
Lower VENT FiO <sub>2</sub>	FiO <sub>2</sub> lower limit alarm
Upper VENT CO <sub>2</sub>	CO <sub>2</sub> upper limit alarm
Lower VENT CO <sub>2</sub>	CO <sub>2</sub> lower limit alarm
Upper VENT RR	RR upper limit alarm
Lower VENT RR	RR lower limit alarm
VENT PEEP	PEEP low alarm
VENT COMM	Power OFF, cable disconnected, standby condition, etc.
VENT URGENT	Other high level alarm
VENT	Other ventilator alarm

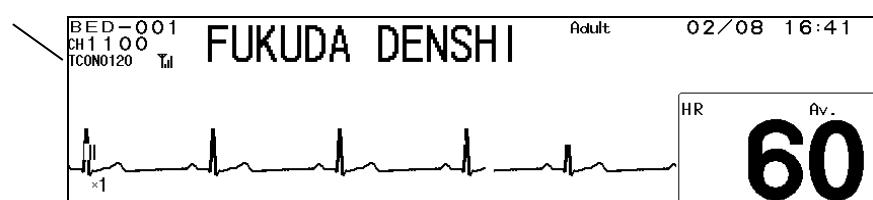


- For the SV-900, PB, Evita, Savina ventilator, ventilator alarm factor cannot be transmitted to the central monitor.
- Depending on the central monitor type and software version, ventilator alarm factor may not be displayed. For details, refer to our service representative.
- The ventilator alarm factors listed above are only displayed on the central monitor. These will not be displayed on the bedside monitor.

## Bidirectional Wireless Communications (TCON) Display

This section explains about the message displayed on the home display when performing the bidirectional wireless communications (TCON).

The communication condition of the bidirectional wireless communications



Ex.)

**TCON0120**

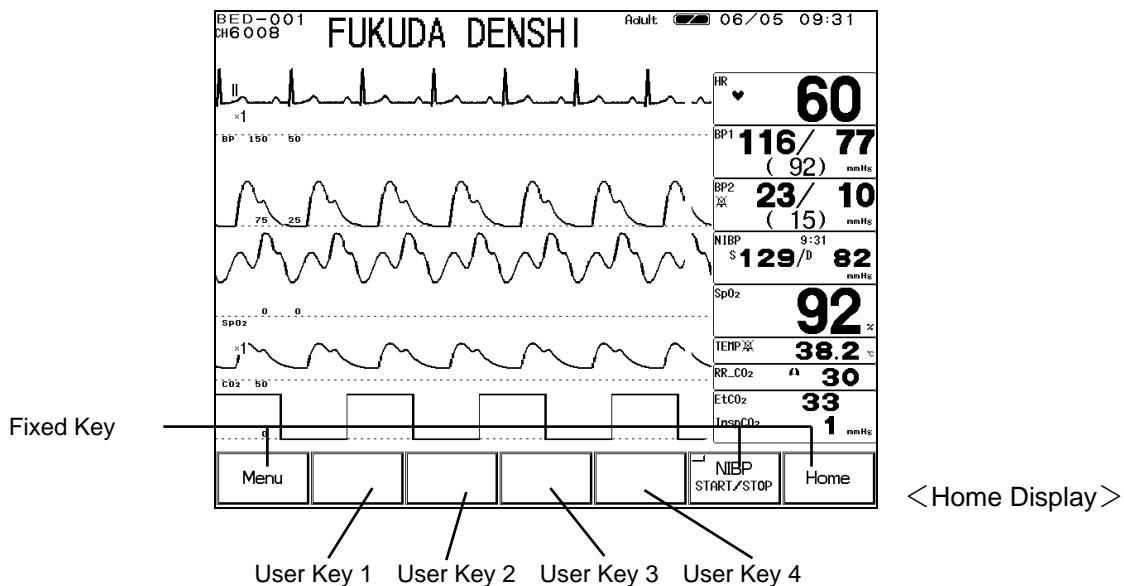
- “TCON” is displayed when performing bidirectional wireless communications.
- “01” indicates the TCON ID of this monitor. The TCON ID can be set from 01 to 16.
- “20” indicates the TCON channel (group) of this monitor. This will be the same as the TCON channel (1 to 60) of the TCON base station.
- indicates the current communication condition.

Indications				
Communication Condition	Good	Moderately Good	Bad	Cannot communicate

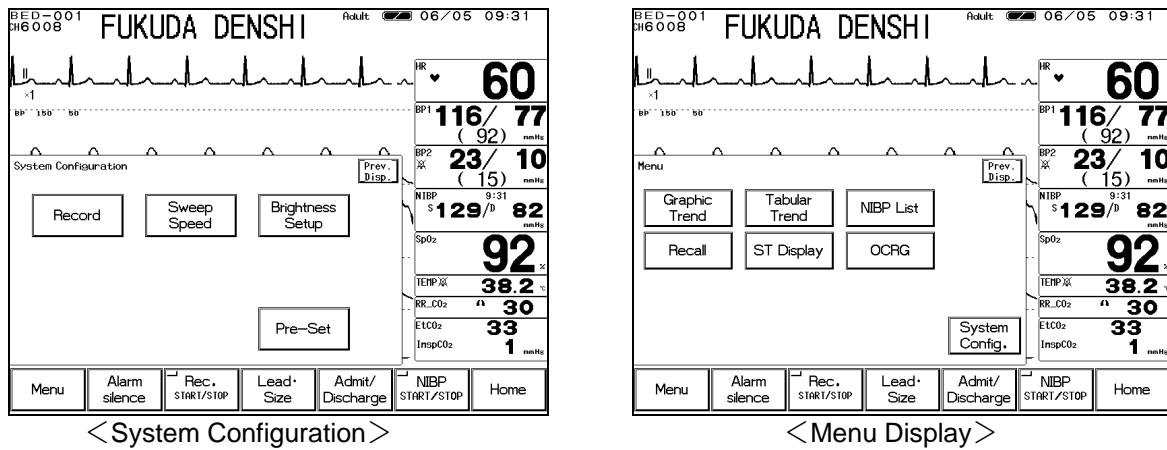
## Key Setup

## For Easier Use

The touch keys on the screen are the only operational keys for the DS-7100 system. The touch keys consist of fixed keys (Menu, Home / Enlarge, NIBP Start/Stop) and 4 user keys which can be programmed according to the monitoring purpose.



The unnecessary keys on the display can be erased.

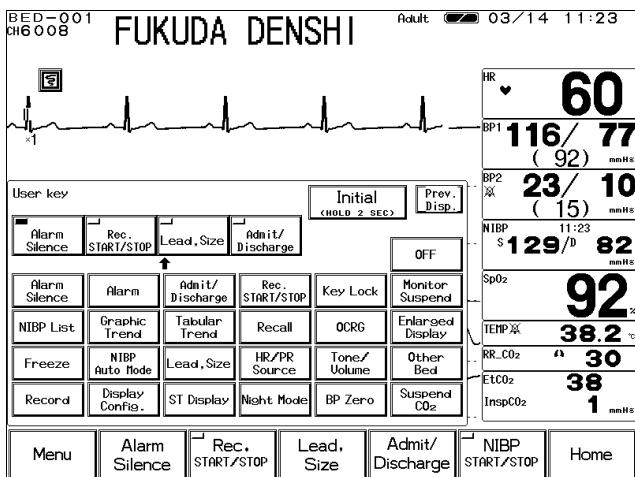


## To Set the User Keys

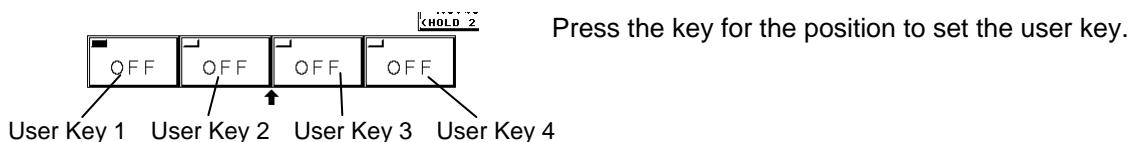
Program the key function to each user key.

- 1 Press the **Menu** → **System Config.** → **Pre-Set** → **Ward Setup** → **User Key** keys.

The user key setup menu will be displayed.

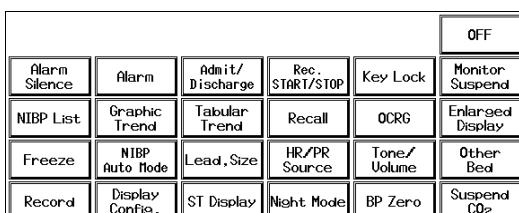


- 2 Select a position to set the user key.



Press the key for the position to set the user key.

- 3 Select a parameter for the user key.



Press the key for the parameter to be set as user key.

User Key	Function
Alarm Silence	Silences the alarm for fixed amount of time.
Alarm	Displays alarm setup menu.
Admit / Discharge	Displays admit/discharge menu.
Rec. START/STOP	Starts/stops manual recording.
Key Lock	Turns ON/OFF the touch key operation. This function can be used to make the touch key inoperative when cleaning the screen.
Monitor Suspend	Displays the confirmation display whether to suspend monitoring or not.
NIBP List	Displays NIBP list.
Graphic Trend	Displays graphic trend.
Tabular Trend	Displays tabular trend.
Recall	Displays recall.
OCRG	Displays OCRG.
Enlarged Display	Enlarges the numeric data display.

Freeze	Temporarily stops the waveform trace. By pressing the <b>Rec. START/STOP</b> key during freeze mode, the waveform in freeze mode can be recorded.
NIBP Auto Mode	Displays the NIBP measurement interval setup menu.
Lead • Size	Displays the keys to adjust the size, scale, baseline position of the displayed waveform.
HR Source	Sequentially selects the HR source in the order of ECG → SpO <sub>2</sub> → BP1 → Auto → ECG.
Tone/Volume	Displays the tone/volume setup menu.
Other Bed	Displays the other bed display menu.
Record	Displays the recording setup menu.
Display Config.	Displays the display configuration menu.
ST Display	Displays the ST measurement menu.
Night Mode	Turns ON / OFF the night mode.
BP Zero	Performs zero balance of BP1, BP2.
Suspend CO <sub>2</sub>	Suspends CO <sub>2</sub> measurement.
OFF	User key will not be set.

**4 Repeat the procedure 2, 3 and set the remaining user keys.**

**5 Initialize the user key setup.**



Pressing the **Initial** key for more than 2 seconds will initialize the user key setup to factory setting.

The factory setting is as follows.

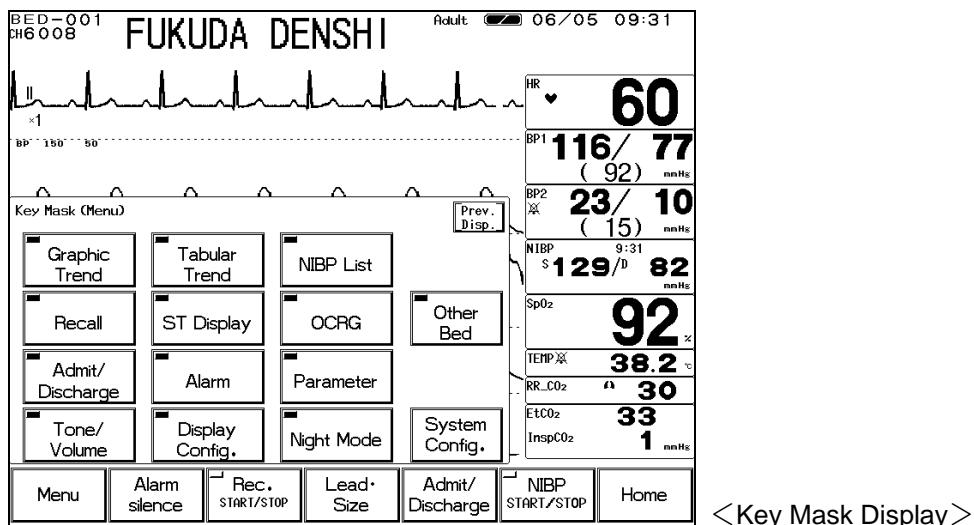
- User Key 1: Alarm Silence
- User Key 2: Rec. START/STOP
- User Key 3: Lead • Size
- User Key 4: Admit / Discharge

## To Set the Menu Keys

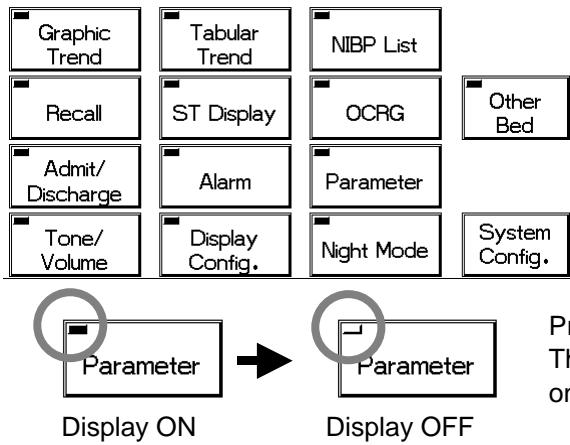
The key display can be erased from the menu display, configuration menu display and preset menu display.

- 1 Press the **Menu** → **System Config.** → **Pre-Set** → **Ward Setup** → **Key Mask** keys.

Display the key mask setup menu.

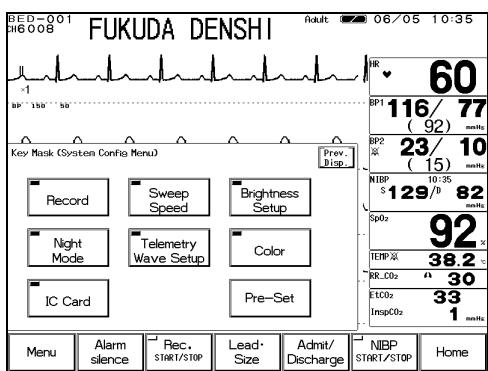


- 2 Select the key to erase.



Pressing the key will extinguish the LED.  
The key with the LED extinguished will not be displayed on the menu display.

- 3 Press the **System Config.** key.



Press the key to erase from the display.  
Pressing the **Pre-Set** key will also allow erasing the key from the preset menu display.

## Recording Setup

## To Record the Waveform/Numeric Data

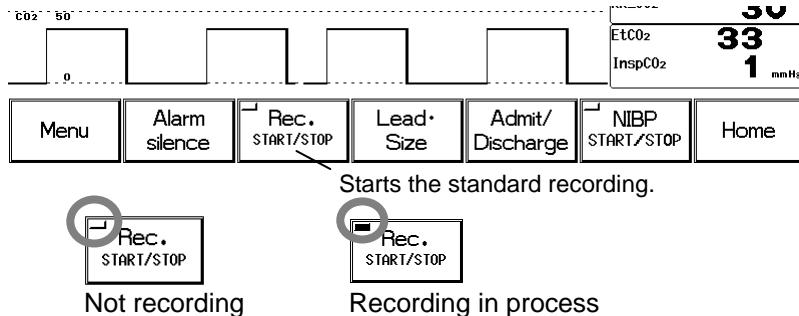
On the DS-7100 system, waveform can be recorded by manual recording, periodic recording, alarm recording, and freeze recording. Graphic recording of graphic trend and tabular trend is also possible. This section describes the procedure for the following recording.

- Manual Recording
- Periodic Recording
- Alarm Recording
- Freeze Recording
- Graphic Recording (Graphic Trend, Tabular Trend, Recall, NIBP List)

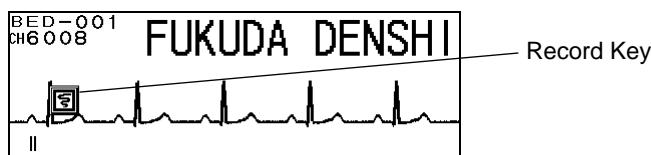
### Manual Recording

#### ● To Start / Stop the Recording

For manual recording (standard recording), pressing the **Rec. START/STOP** key will start / stop the recording. Pressing this key during periodic recording, alarm recording, or graphic recording will cease the recording in process.



The recording can be also started by pressing the record key  displayed on the home display. The record key will turn red when pressed and starts recording. Pressing the key again will stop the recording.



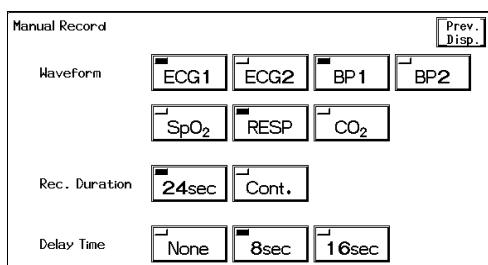
Refer to "8. System Configuration Ward Setup" for ON/OFF of record key display.

#### ● To Set the Manual Recording

The manual recording can be started from the time the key is pressed, or 8 sec. / 16 sec. prior to the time the key is pressed.

The recording can be set to automatically stop after 24 seconds or continue to record until the **Rec. START/STOP** key is pressed again.

1 Press the **Menu** → **System Config.** → **Record** → **Manual Record** keys.



The manual recording setup menu will be displayed.

## 2 Select the waveform for recording.



Up to 3 waveforms can be selected.  
The waveform position will be automatically adjusted when recording.

## 3 Select the duration for recording.



Select the duration from **24sec** or **Cont.**  
**24sec** will automatically stop the recording after 24 seconds.

## 4 Select the delay time for recording.

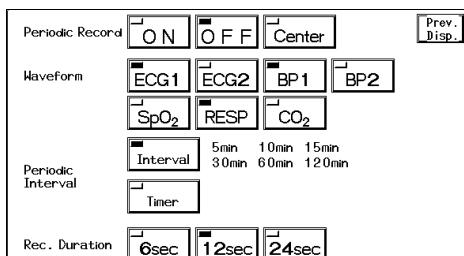


**None** will start the recording from the time the **Rec. START/STOP** key is pressed.  
**8sec**, **16sec** will start the recording 8 sec. / 16 sec. prior to the time the key is pressed.

# Periodic Recording

The recording will be automatically performed with the selected interval. Periodic recording can be performed on the central monitor connected on the wired network system.

## 1 Press the **Menu** → **System Config.** → **Record** → **Periodic Record** keys.



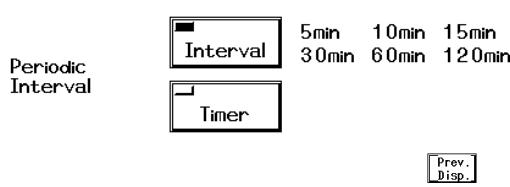
The periodic recording setup menu will be displayed.

## 2 Select the waveform for recording.

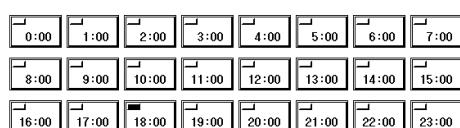


Up to 3 waveforms can be selected.  
The waveform position will be automatically adjusted when recording.

## 3 Select the periodic interval.



Timer recording will record at the selected time, and interval recording will record at the selected interval.



Press the **Timer** key.  
The recording will automatically start at the selected time.

### Periodic Interval(Interval)



Press the **Interval** key.  
The recording will automatically start at the selected interval.  
If 5min. is selected, the recording will start at real time on 10:00, 10:05, · · · , 10:25.  
If 60min. is selected, the recording will start at 10:00, 11:00, 12:00.



Some central monitors are not able to have the periodic recording interval time set to 1min, 2min, or 3min.

#### 4 Select the recording duration.

Rec. Duration

6sec	12sec	24sec
------	-------	-------

Select the recording duration from **6 sec**, **12 sec**, **24 sec**.

The recording will automatically stop after the selected time.

#### 5 Start the periodic recording.

Periodic Record

ON	OFF	Center
----	-----	--------

**ON** will activate the periodic recording with the selected interval. If periodic recording is not necessary, select **OFF**.

**Center** will start the alarm recording on the central monitor with the smallest monitor ID.

## Alarm Recording

The recording will automatically start at occurrence of numeric alarm or arrhythmia alarm.



- If the alarm with the higher priority occurs during alarm recording, the recording in process will cease and the alarm recording with the higher priority will start.
- If the alarm with the lower priority occurs during alarm recording, the recording for the lower priority alarm will not be performed.

#### 1 Press the **Menu** → **System Config.** → **Record** → **Alarm Record** keys.

Alarm Record	ON	OFF	Center	Prev. Disp.
Waveform	ECG1	ECG2	BP1	BP2
	SpO <sub>2</sub>	RESP	CO <sub>2</sub>	Alarm
Alarm Factor	HR	Other	Arrhy.	
Rec. Duration	12sec	24sec	Arrhythmia Record	

The alarm recording setup menu will be displayed.

#### 2 Select the waveform for recording.

Waveform	ECG1	ECG2	BP1	BP2
	SpO <sub>2</sub>	RESP	CO <sub>2</sub>	Alarm

Up to 3 waveforms can be selected.

The waveform position will be automatically adjusted when recording.

**Alarm** will record the waveform which generated the alarm.

#### 3 Select the recording factor.

Alarm Factor

HR	Other	Arrhy.
----	-------	--------

Select the recording factor for alarm recording.

**HR** will start the alarm recording when the HR or PR alarm is generated.

**Other** will start the alarm recording when the numeric alarm other than HR and PR alarm is generated.

**Arrhy.** will start the alarm recording when the arrhythmia alarm is generated.

#### 4 Select the recording duration.

Rec. Duration

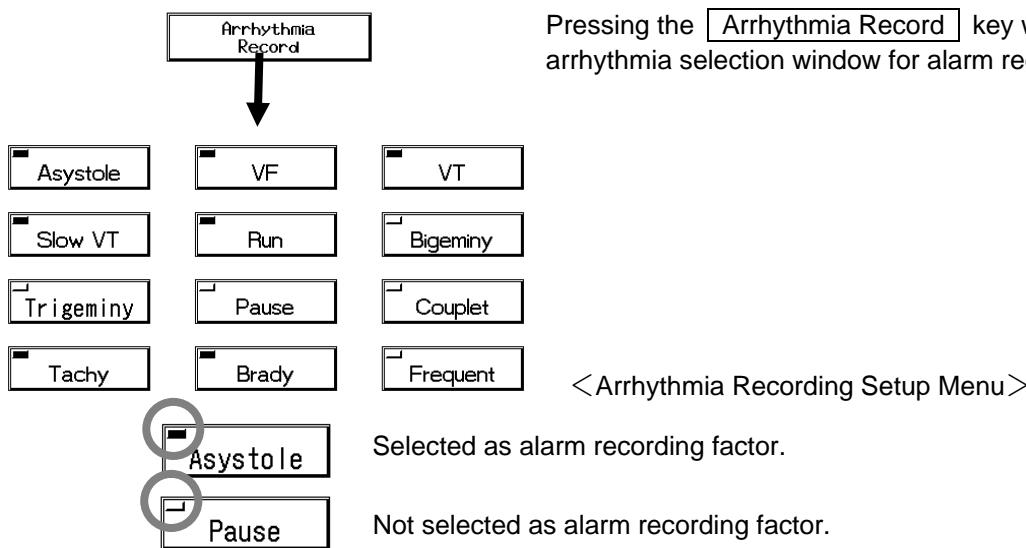
 12sec  24sec

Select the recording duration from **12sec**, **24sec**. The recording will automatically stop after the selected time.

NOTE	The delay time differs depending on the recording time.				
	Recording Time	Delay Time			
		Adult	Child	Neonate	
	12 sec.	12 sec.	12 sec.	8 sec.	12 sec.
	24 sec.	16 sec.	16 sec.	16 sec.	16 sec.

#### 5 Select the arrhythmia type.

If arrhythmia is selected for the recording factor, select the arrhythmia type.



#### 6 Start the alarm recording.

Alarm Record

 ON  OFF  Center

**ON** will automatically start the recording at alarm occurrence.

If alarm recording is not required, select **OFF**.

**Center** will start the alarm recording on the central monitor with the smallest monitor ID.



If the alarm factor is TACHY, BRADY, SLOW VT, COUPLET, PAUSE, or TRIGEMINY, the alarm factor will not be output on the central recorder.

NOTE

The recorded numeric data is the data at alarm occurrence time.

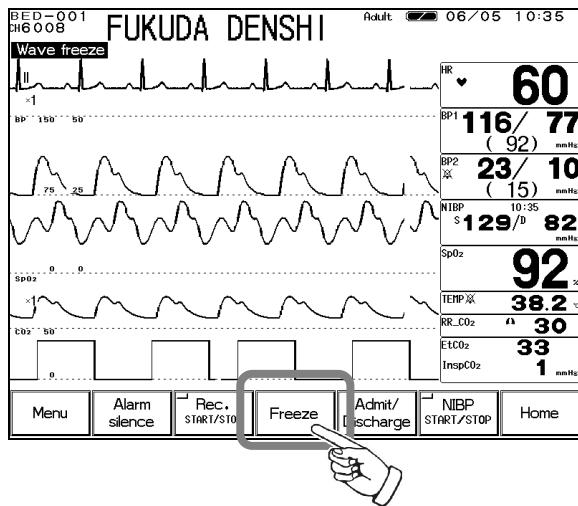
## Freeze Recording

The waveform display can be frozen and recorded from 6 seconds prior to the frozen point. The waveform to be recorded is the one selected for manual recording. The recording duration is fixed as 6 seconds.

To freeze the waveform display, the **Freeze** key needs to be assigned as user key.

### 1 Freeze the waveform display.

Press the **Freeze** key on the user key.



### 2 Start freeze recording.

Press the **Rec. START/STOP** key to record the displayed waveform.

## Graphic Recording (Graphic/Tabular Trend, etc.)

Graphic trend recording, tabular trend recording, NIBP list recording, and recall recording can be performed.



Refer to "7. Function Graphic Trend, Tabular Trend, Recall Data, NIBP List" for recording procedure.

### Graphic Trend

One parameter from the following can be selected for graphic recording.

Parameter	Description
HR	HR, PR (SpO <sub>2</sub> , BP)
ST	ST1, ST2
VPC	VPC beats
BP	BP (SYS / Mean / DIA)
NIBP	NIBP (SYS / Mean / DIA)
SpO <sub>2</sub>	SpO <sub>2</sub> value
PR	SpO <sub>2</sub> pulse rate
TEMP	Temperature
RR	Respiration Rate (Impedance, CO <sub>2</sub> )
APNEA	Apnea Time (Impedance, CO <sub>2</sub> )
CO <sub>2</sub>	EtCO <sub>2</sub> / InspCO <sub>2</sub>
EVENT1	ASYSTOLE, VF, VT, SLOW_VT, RUN, BIGEMINY
EVENT2	TRIGEMINY, PAUSE, COUPLET, TACHY, BRADY, FREQUENT

### Tabular Trend

12 parameters from the following can be displayed / recorded as tabular trend.

Parameter	Description
HR	HR, PR (SpO <sub>2</sub> , BP)
PR_SpO <sub>2</sub>	PR (SpO <sub>2</sub> )
VPC	VPC beat
ST1	ST level of ECG1
ST2	ST level of ECG2
RR	RR (Impedance, CO <sub>2</sub> )
APNEA	Apnea Time (Impedance, CO <sub>2</sub> )
SpO <sub>2</sub>	SpO <sub>2</sub> value
BP1	BP (SYS / Mean / DIA)
BP2	BP (SYS / Mean / DIA)
NIBP	NIBP (SYS / Mean / DIA)
TEMP	Temperature
EtCO <sub>2</sub>	EtCO <sub>2</sub> value
InspCO <sub>2</sub>	InspCO <sub>2</sub> value

### NIBP List

The numeric data for the following parameters can be recorded.

Parameter	Description
HR	HR, PR (SpO <sub>2</sub> , BP)
PR	PR (SpO <sub>2</sub> )
SpO <sub>2</sub>	SpO <sub>2</sub> value
NIBP	NIBP (SYS / Mean / DIA)

### Recall

The waveform and numeric data at alarm occurrence will be recorded with the following setup.

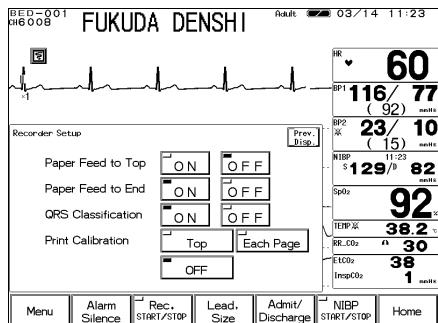
Parameter	Description
Waveform (Max. 2)	ECG1, ECG2, BP, SpO <sub>2</sub> , CO <sub>2</sub> , RESP
Numeric Data	HR, ST, RR, TEMP, NIBP, BP, ST1, ST2, SpO <sub>2</sub> , PR_SpO <sub>2</sub> , APNEA, CO <sub>2</sub>
Recording Duration	12 sec.

## Recorder Operation (QRS Symbol, etc.)

This menu allows the setup of paper feed operation and ON/OFF of QRS classification symbol recording

- 1 Press the **Menu** → **System Config.** → **Record** → **Setup** keys.

The recorder operation setup menu will be displayed.



- 2 Select ON/OFF of paper feed to top.

Paper Feed to Top  ON  OFF

ON will feed the paper to start recording from the next perforation.

OFF will not feed the paper and starts recording from the position where the previous recording ended.

- 3 Select ON/OFF of paper feed to end.

Paper Feed to End  ON  OFF

ON will feed the paper after recording to next perforation so that the paper can be easily cut off.

OFF will not feed the paper after recording.

- 4 Select ON/OFF of QRS classification symbol recording.

QRS Classification  ON  OFF

ON will record the QRS classification symbol on to the ECG waveform.

Symbol	Description
N (Normal)	Normal QRS beat
V (VPC)	Ventricular Extrasystole
S (SVPC)	Supraventricular Extrasystole
P (Pacing Beat)	Pacing beat
F (Fusion Beat)	Fusion beat of pacing and spontaneous beat.
? (Undetermined beat)	Learning arrhythmia, or beat not matching the pattern

NOTE	<ul style="list-style-type: none"><li>The QRS classification symbol cannot be recorded for the manual recording without delay time, and for the periodic recording. To record the QRS classification symbol, set the delay time to 8 seconds or 16 seconds for manual recording.</li></ul>
	<ul style="list-style-type: none"><li>For the freeze recording, the QRS classification symbol may not be recorded if the recording is started immediately after the waveform display is frozen. In such case, start the recording after about 10 seconds from the time the waveform is frozen.</li><li>The "S" (QRS symbol) will be printed as "N" on the central recorder.</li></ul>

- 5 Select whether or not to print the calibration waveform.

Print Calibration  Top  Each Page  
 OFF

Top will print the calibration only on the first page of the recording paper.

Each Page will print the calibration on each page.

OFF will not print the calibration waveform.

# Volume Setup

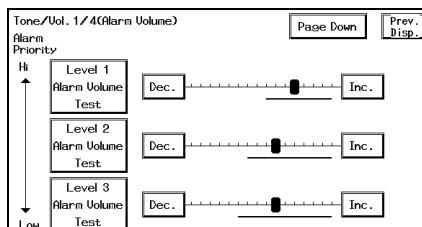
# Pulse Tone, Alarm Sound, etc.

This menu allows volume setup of the alarm sound, pulse tone, key sound and other bed alarm sound. The ON/OFF of ventilator alarm sound can be also selected.

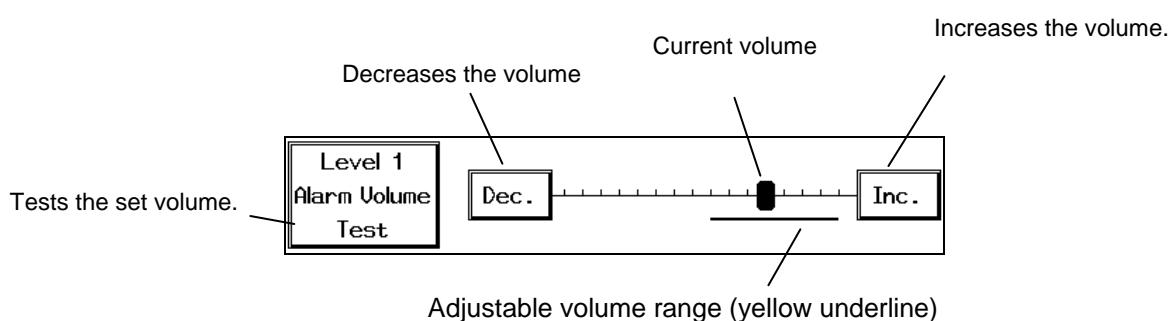
- 1 Press the **Menu** → **Tone / Volume** keys.

The volume setup menu will be displayed.

- 2 On the first page, set the volume for the alarm sound.



The volume can be set for each alarm level.



For the low limit for the alarm volume, refer to "8. System Configuration Monitor Setup"

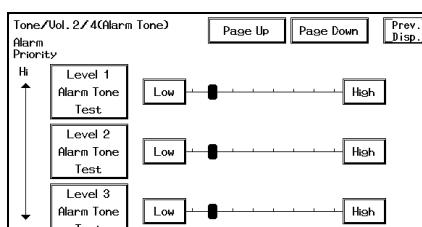


- The alarm priority is high for level 1 (life threatening alarm), medium for level 2 (cautionary alarm), and low for level 3 (treatment needed alarm).
- Pay attention not to set the alarm volume too low to avoid missing any important alarms.
- During the night mode, the volume set on the "Night Mode Setup" will be applied.



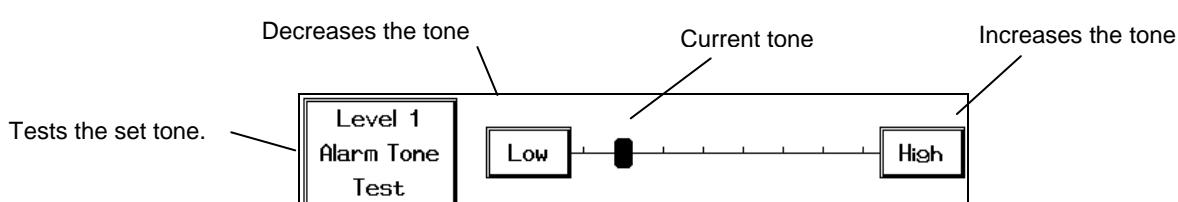
For the night mode setup, refer to "8. System Configuration Night Mode ●Night Mode Display Setup"

- 3 Press the **Page Down** key and display the second page.

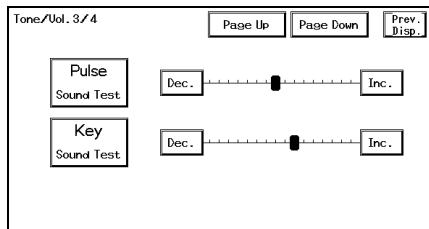


The tone can be set for each alarm level.

However, if **[IEC]** is selected for "Alarm System" under the "Monitor Setup" menu, tone for level 2 and level 3 cannot be set. The tone setting for level 1 will be applied.

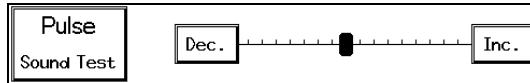


**4 Press the **Page Down** key and display the third page.**



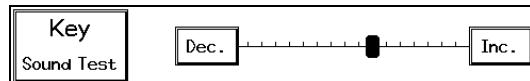
Adjust the volume of the pulse sound and key sound.

**Set the volume for the pulse sound.**



The volume for the HR synchronized sound, SpO2 synchronized sound, BP synchronized sound can be adjusted.

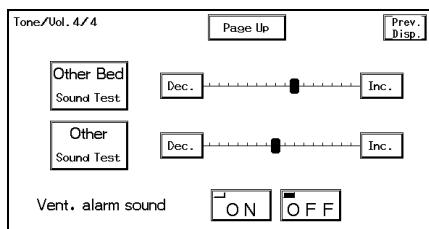
**Set the volume for the key sound.**



The volume for the key sound can be adjusted.

<b>NOTE</b>	The pulse sound and key sound will be silenced if set to the minimum volume.
-------------	--

**5 Press the **Page Down** key and display the fourth page.**



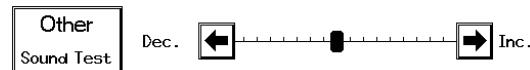
Adjust the volume of other bed alarm sound and other sound, and select ON/OFF of ventilator alarm sound.

**Set the volume for other bed alarm sound.**



The other bed alarm sound can be adjusted.

**Set the volume for other sound.**



The volume of the sound which notifies the completion of BP zero balance, NIBP measurement, etc. can be adjusted.

**Select ON/OFF of ventilator alarm sound.**



Selecting **ON** will generate the ventilator alarm with the same volume with other alarm sound.

The volume and tone setting for the alarm level 1 will be applied.

## Color / Brightness Setup

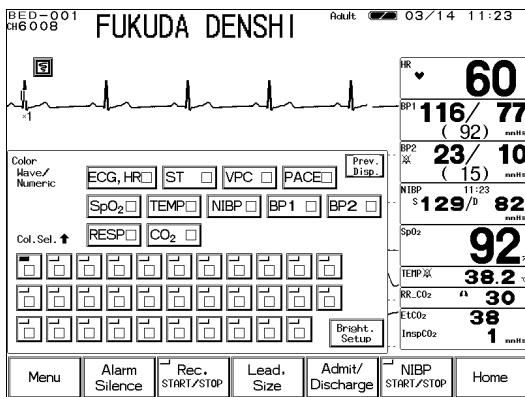
This menu allows the setup of the colors of numeric data / waveform and brightness of the display.

### Color Setup (Numeric Data, Waveform)

The displayed colors can be set for each parameter.

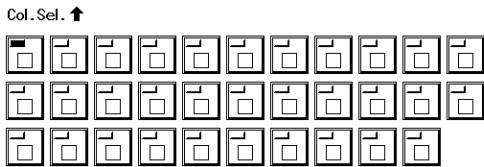
Assign the color from the 32-color palette to each parameter.

- 1 Press the **Menu** → **System Config.** → **Color** keys.



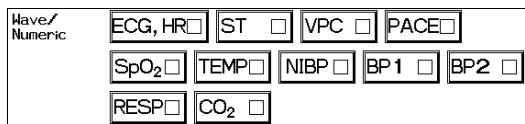
<Color Setup Menu>

- 2 Select the color from the 32-color palette.



Press the key of the desired color.

- 3 Assign the selected color to the parameter.

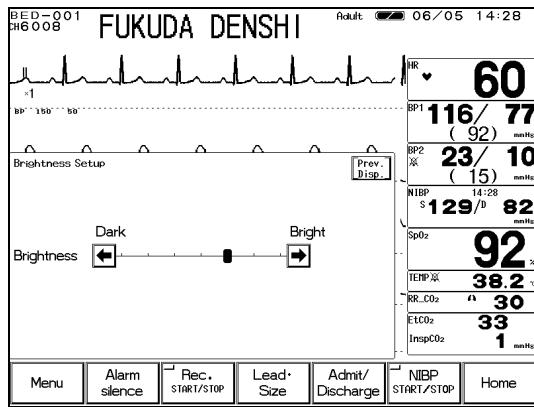


Press the parameter key to assign the selected color. The selected color for the parameter will be applied to the waveform, numeric data, graphic trend, and tabular trend.

## Brightness Setup

The brightness of the display can be adjusted.

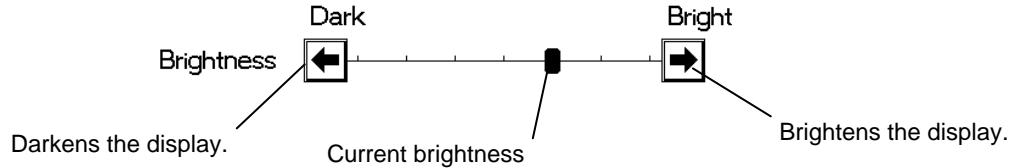
- 1 Press the **Menu** → **System Config.** → **Brightness Setup** keys.



<Brightness Setup Menu>

- 2 Adjust the brightness.

Use the **◀**, **▶** keys to adjust the brightness.



**NOTE**

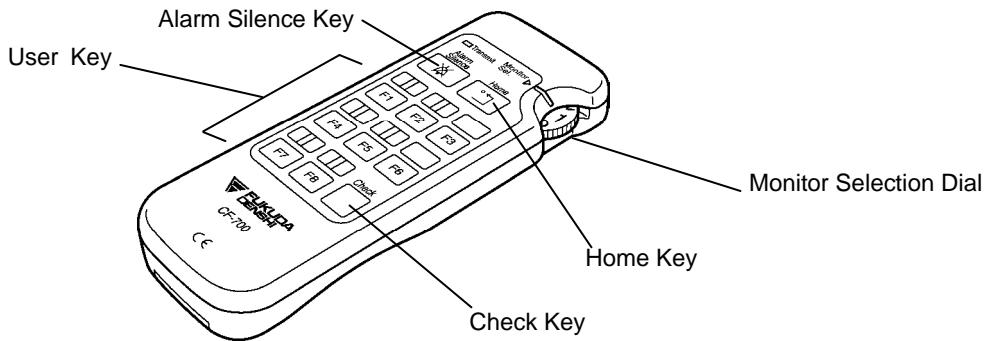
The display panel utilizes exclusive fluorescent light for the backlight. Since this fluorescent light deteriorates with its life cycle, the display may become dark, scintillate, or may not light in long term use. In such case, contact your nearest service representative.

## Remote Control Setup

This section explains the setup procedure to use the optional remote control unit, CF-700.

### About the Remote Control Unit

There are 11 keys on the remote control unit of which 8 keys are user keys.



#### Monitor Selection Dial

The remote control bed ID to control can be selected. The remote control bed ID should be preprogrammed on each bedside monitor. Maximum of 8 monitors can be controlled on one remote control unit.

#### Check Key

Displays the remote control bed ID on the bedside monitor. Also, pressing one of the function keys (ex. NIBP Measure key) will display a message on the monitor which will ask you to press this Check key.

#### Alarm Silence Key

This key functions the same as the **Alarm Silence** key on the bedside monitor.

#### Home Key

This key functions the same as the **Home** / **Home/Enlarge** key on the bedside monitor.

#### User Key (F1 to F8)

The function for each key can be assigned on the bedside monitor.

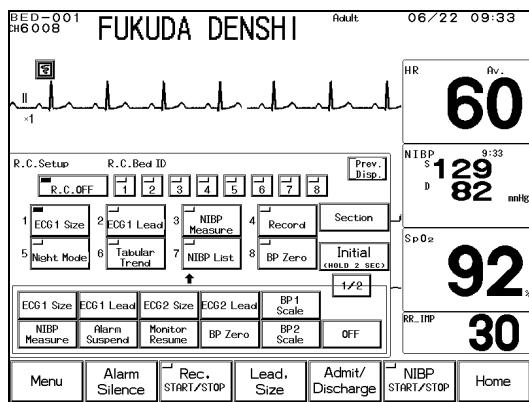
<b>Key</b>	<b>Default</b>	<b>Function</b>
F1	ECG1 Size	Switches the ECG1 size each time the key is pressed. ×1/4→×1/2→×1→×2→×4→×1/4
F2	ECG1 Lead	Switches the ECG1 lead each time the key is pressed. 3-electrode: I→II→III→I 4-electrode: I→II→III→aVR→aVL→aVF→I 5-electrode: I→II→III→aVR→aVL→aVF→V→I
F3	NIBP Measure	Starts/stops the NIBP measurement. Pressing this key will display a message on the monitor to press the "Check" key. When the "Check" key is pressed, the measurement will start. To cancel the process, press the "Home" key. Pressing this key during the measurement will stop the measurement.
F4	Record	Starts/stops the manual recording.
F5	Night Mode	Sets ON/OFF of the Night Mode.
F6	Tabular Trend	Displays list data.
F7	NIBP List	Displays NIBP list.
F8	BP Zero	Starts BP zeroing.

## Remote Control Setup

Assign function to 8 user keys on the remote control unit.

- 1 Press the **Menu** → **System Config.** → **Pre-Set** → **Ward Setup** → **R.C. Setup** keys.

The remote control unit setup menu will be displayed.



- 2 Set the remote control bed ID.

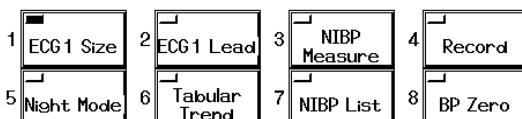
Set the bed ID which will respond to monitor selection dial on the remote control unit.



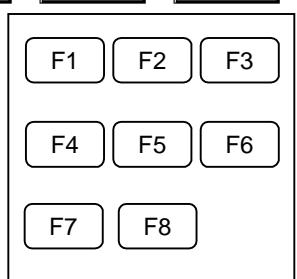
Select the bed ID from **1** to **8**.

Select **R.C. OFF** if not using the remote control function.

- 3 Select the key location.



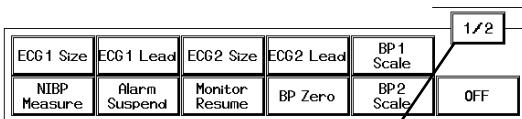
Select the key location of the remote control unit to change or assign a function.



The "F1" key on the remote control unit is the same key as the "1" key on the remote control setup menu.

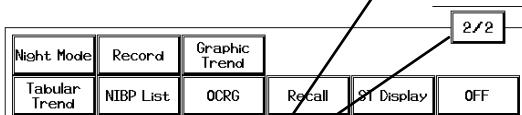
Key Location on the Remote Control Unit

- 4 Select the function.



Select the function to be assigned for the selected key location.

Pressing the function key will assign the function to the selected key location.



Use the **1/2**, **2/2** keys to switch the page for function selection.

Switch page

### Functions that can be assigned to the User Keys

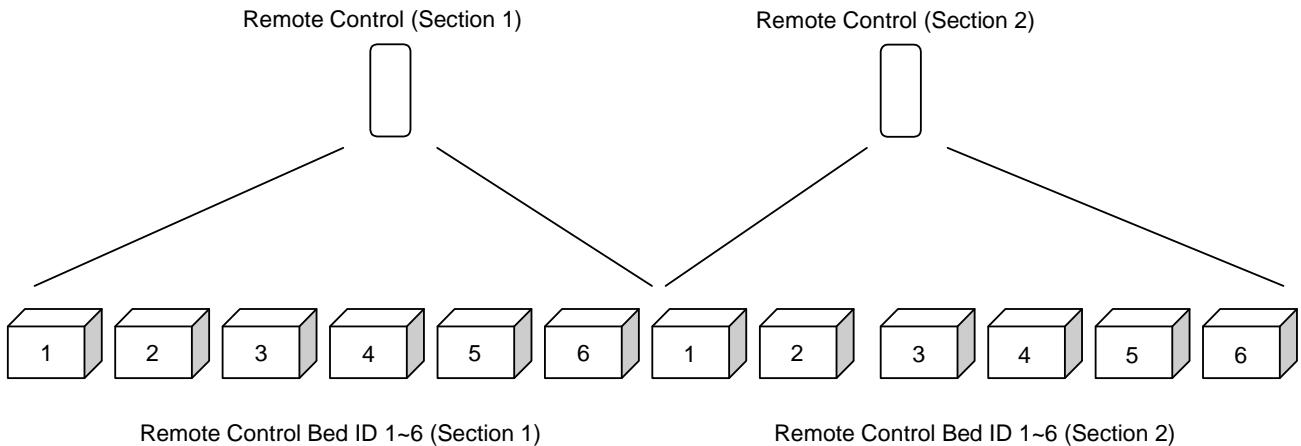
<b>Function</b>	<b>Description</b>
ECG1 Size	Switches the ECG1 size each time the key is pressed. ×1/4→×1/2→×1→×2→×4→×1/4
ECG1 Lead	Switches the ECG1 lead each time the key is pressed. 3-electrode: I→II→III→I 4-electrode: I→II→III→aVR→aVL→aVF→I 5-electrode: I→II→III→aVR→aVL→aVF→V→I
ECG2 Size	Switches the ECG2 size each time the key is pressed. ×1/4→×1/2→×1→×2→×4→×1/4
ECG2 Lead	Switches the ECG2 lead each time the key is pressed. 3-electrode: I→II→III→I 4-electrode: I→II→III→aVR→aVL→aVF→I 5-electrode: I→II→III→aVR→aVL→aVF→V→I
BP1 Scale	Switches the BP1 scale each time the key is pressed. 20→50→75→100→150→200→250→300→20 (mmHg) 4→8→12→16→20→24→32→40 (kPa)
BP2 Scale	Switches the BP2 scale each time the key is pressed. 20→50→75→100→150→200→250→300→20 (mmHg) 4→8→12→16→20→24→32→40 (kPa)
NIBP Measure	Starts/stops the NIBP measurement. Pressing this key will display a message on the monitor to press the "Check" key. When the "Check" key is pressed, the measurement will start. To cancel the process, press the "Home" key. Pressing this key during the measurement will stop the measurement.
Alarm Suspend	Suspends the alarm for fixed amount of time. When pressed during the alarm is suspended, the alarm function will resume.
Monitor Resume	Resumes monitoring when the monitoring is suspended.
BP Zero	Starts BP zeroing. (BP1 or BP1/BP2) It will not function if the transducer is not opened to air.
Night Mode	Turns ON/OFF the Night Mode.
Record	Starts/stops the manual recording. The recording duration set on the manual recording setup menu will be applied.
Graphic Trend	Displays the graphic trend.
Tabular Trend	Displays the tabular trend.
NIBP List	Displays the NIBP list.
OCRG	Displays the OCRG.
Recall	Displays the recall data.
ST Display	Displays the ST measurement display.
OFF	Turns OFF the key operation.

### 5 Check the setting.

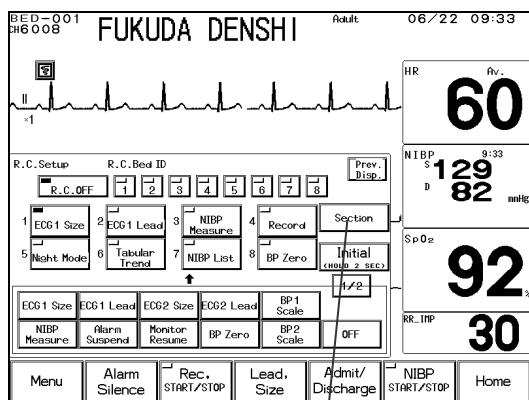
 CAUTION	<ul style="list-style-type: none"> <li>● Do not set the same remote control bed ID to more than one monitors on the same floor. Otherwise, it may cause to remote control more than one monitors at the same time.</li> <li>● After the remote control setup, check that the remote control unit is properly operating.</li> </ul>
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## Section Setup

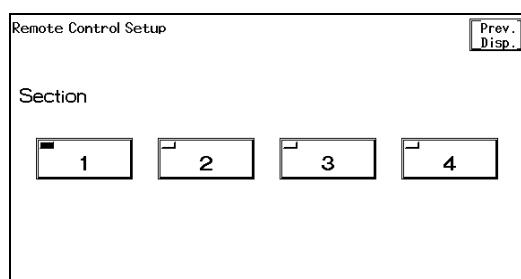
One remote control unit can control a maximum of 8 monitors. When controlling more than 8 monitors, it is necessary to set a section for remote control. If the section is not properly set, the remote control may unintentionally control 2 monitors at the same time. The set section number must be the same between the remote control unit and the monitor.



- 1 Press the **Menu** → **System Config.** → **Pre-Set** → **Ward Setup** → **R.C. Setup** keys.



Press the **Section** key.



Set the section number corresponding to the remote control unit from **1** to **4**.



For procedure to set the section on the remote control unit, refer to the operation manual of the remote control unit.

## Alarm Pole Setup

This monitor is equipped with an alarm pole.

The alarm generation can be indicated with the alarm pole flashing and can be seen from distance. The alarm pole can be also synchronized with HR.

The alarm pole function setup can be performed for (1) flashing at alarm generation, and for (2) flashing synchronized with HR.

When **IEC** is selected for "Alarm System" on the Monitor Setup menu, not all items can be set on the Alarm Pole Setup menu.

Setup	When <b>FUKUDA DENSHI</b> is set	When <b>IEC</b> is set
Sync. with Alarm	Setting is possible.	Setting is not possible. (Fixed to "ON")
Alarm Type		Setting is not possible. (Fixed to "Level 1, 2 and 3")
Ventilator Alarm		Setting is not possible. (Fixed to "ON")
Pattern Setup		Setting is not possible.
Sync. with HR		Setting is possible.



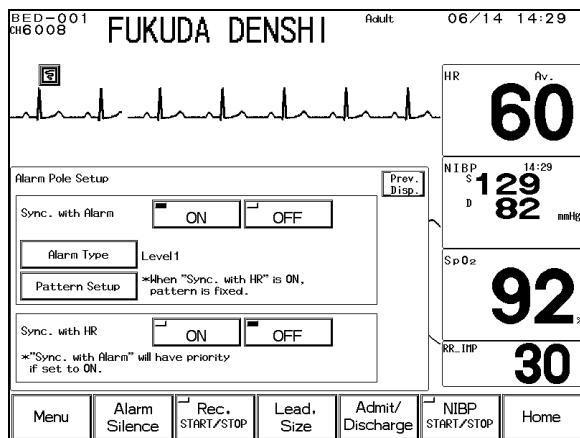
The alarm priority is high for level 1 (life threatening alarm), medium for level 2 (cautionary alarm), and low for level 3 (treatment needed alarm).

## Flashing the Alarm Pole at Alarm Generation

The alarm level to flash the alarm pole and the flash pattern for each alarm level can be set.

- 1 Press the **Menu** → **System Config.** → **Pre-Set** → **Ward Setup** → **Alarm Pole** keys.

The alarm pole setup menu will be displayed.



- 2 Select whether the alarm pole should flash at alarm generation.

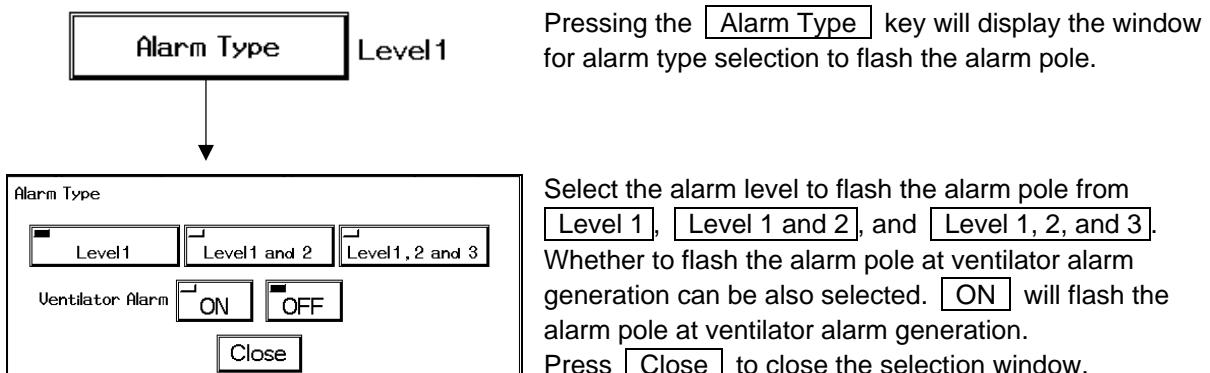
Sync. with Alarm

<input checked="" type="checkbox"/> ON	<input type="checkbox"/> OFF
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To flash at alarm generation, select **ON**.

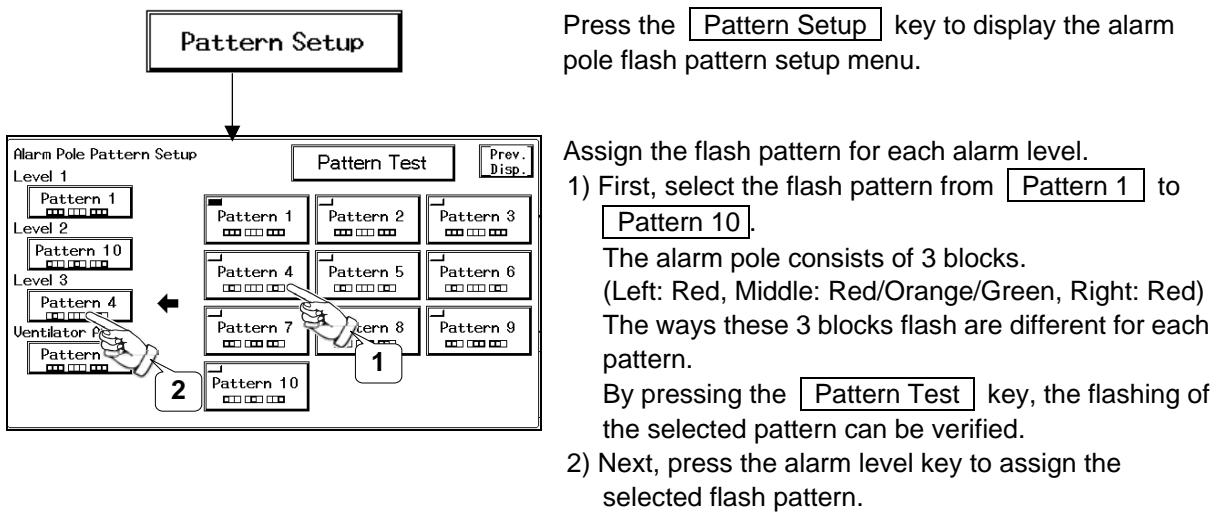
To not flash at alarm generation, select **OFF**.

### 3 Select the alarm type to flash the alarm pole.



For alarm description of Level 1, 2, 3, and ventilator alarm, refer to P4-12 "Description of Alarm Message and Alarm Sound".

### 4 Set the alarm pole flash pattern for each alarm level.



Assign the flash pattern for each alarm level.

- 1) First, select the flash pattern from **Pattern 1** to **Pattern 10**.

The alarm pole consists of 3 blocks.

(Left: Red, Middle: Red/Orange/Green, Right: Red)  
The ways these 3 blocks flash are different for each pattern.

By pressing the **Pattern Test** key, the flashing of the selected pattern can be verified.

- 2) Next, press the alarm level key to assign the selected flash pattern.

#### Alarm Pole Flash Pattern

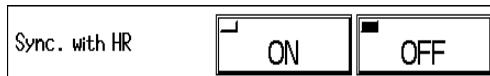
<b>Pattern No.</b>	<b>Flash Pattern</b>
Pattern 1	(Red, Red, Red)→( · · · )→(Red, Red, Red)→( · · · )→(Red, Red, Red)
Pattern 2	(Red, Orange, Red)→( · · · )→(Red, Orange, Red)→( · · · )→(Red, Orange, Red)
Pattern 3	(Red, Green, Red)→( · · · )→(Red, Green, Red)→( · · · )→(Red, Green, Red)
Pattern 4	( · Red · )→( · · · )→( · Red · )→( · · · )→( · Red · )
Pattern 5	( · Orange · )→( · · · )→( · Orange · )→( · · · )→( · Orange · )
Pattern 6	( · Green · )→( · · · )→( · Green · )→( · · · )→( · Green · )
Pattern 7	(Red, Red · )→( · · · )→( · Red, Red ) →( · · · )→(Red, Red · )
Pattern 8	(Red, Orange · )→( · · · )→( · Orange, Red)→( · · · )→(Red, Orange · )
Pattern 9	(Red, Green · )→( · · · )→( · Green, Red)→( · · · )→(Red, Green · )
Pattern 10	(Red · · )→( · · · )→( · Red · )→( · · · )→( · · Red)

<b>NOTE</b>	If "Sync. with Alarm" and "Sync. with HR" are both set to ON, the alarm pole flash pattern at alarm generation is fixed as follows. Level 1: Pattern 1    Level 2: Pattern 10    Level 3: Pattern 4 Ventilator Alarm: Pattern 1
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## Flashing the Alarm Pole Synchronized with HR

The alarm pole can be flashed synchronizing with HR.

### 1 Select whether to flash the alarm pole synchronizing to the heartbeat.



To synchronize with HR, select **ON**. The middle LED will flash in green synchronized with HR.

To not synchronize with HR, select **OFF**.

<b>NOTE</b>	<ul style="list-style-type: none"><li>● When asystole is generated, the green LED at middle part of the alarm pole will remain lighted. However, if “Sync. with Alarm” is set to ON, the fixed flash pattern for the asystole alarm (Level 1: Pattern 1) will have priority.</li><li>● If the parameter other than ECG is selected as “HR/PR Source” on ECG (SpO<sub>2</sub>, BP) setup menu, the alarm pole will not flash synchronizing with the pulse.</li></ul>
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## Alarm Setup

## To Set the Alarm Condition

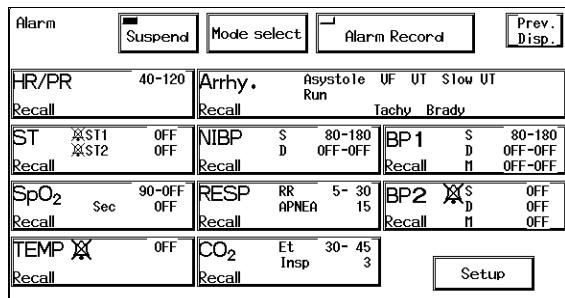
This section explains the setup of alarm suspension and upper / lower alarm limit. On the alarm setup menu, ON/suspend of system alarm, ON/OFF and upper / lower alarm limit of each parameter can be set.

## To Set the System Alarm

The system alarm can be set to ON or suspend, but it cannot be turned OFF.

<b>WARNING</b>	<ul style="list-style-type: none"><li>When the system alarm is suspended, all the alarm will be suspended even if the parameter alarm is set to ON. Also, the alarm event will not be stored as recall.</li><li>If the upper/lower alarm limit of the parameter is set to OFF, or arrhythmia alarm is set to OFF, alarm will not function even if the system alarm is set to ON. Pay attention when setting them OFF.</li></ul>
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### 1 Press the **Menu** → **Alarm** keys.



The alarm setup menu will be displayed.

### 2 Press the **Suspend** key on the alarm setup menu.

Pressing this key will sequentially switch the function to ON or suspend.

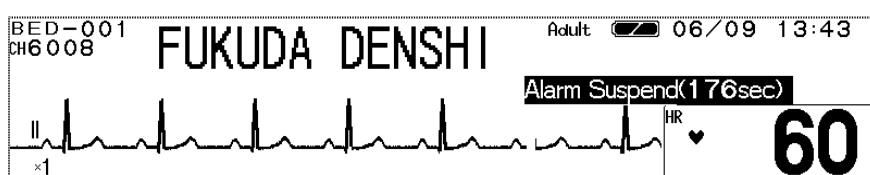


Alarm is suspended when the key LED is lighted.

Alarm is ON when the key LED is extinguished.

### 3 Check the message.

When the alarm is suspended, "Alarm Suspend (\* \* \* sec)" message will be displayed. (\* \* \* sec.) indicates the remaining time.



## To Turn ON the System Alarm

Turning the system alarm ON will activate the alarm setups for each parameter.

**1 Press the [Menu] → [Alarm] keys.**

**2 Set the alarm [ON].**

Press the [Suspend] key when the key LED is lighted. The key LED will extinguish.



The alarm is ON when the key LED is extinguished.

## To Suspend the System Alarm

The alarm can be temporarily suspended. During the alarm suspension, "Alarm Suspended \* \* \* sec." message will be displayed. "\* \* \* sec." indicates the remaining suspended time. The alarm will turn ON when the suspended time completes.

**1 Press the [Menu] → [Alarm] keys.**

**2 Suspend the alarm.**

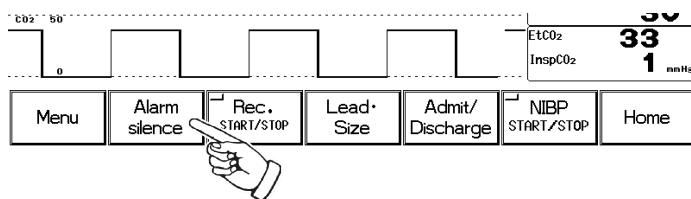
Press the [Suspend] key when the key LED is extinguished. The key LED will light.



Alarm is suspended when the key LED is lighted.

## To Silence the System Alarm

The alarm sound can be silenced for fixed amount of time. This setting will not affect the alarm message. If the alarm cause still remains at completion of silence time, the alarm sound will generate again. Also, if another alarm with the same or higher priority occurs during the alarm silence time, the alarm sound for the new alarm will generate.



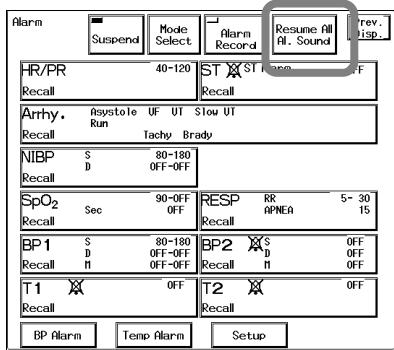
### ●Precautions about Silencing the Alarm

- Alarm silence function is effective for each parameter. If an alarm condition for the selected parameter is resolved for a moment but is generated again during the alarm silence time, the alarm will remain silenced. The recall and alarm recording will not function at this time.
- If another alarm with lower priority occurs during the alarm silence time, alarm sound will not generate. The recall and alarm recording will function.
- If the [Alarm Silence] key is pressed for the alarm of another parameter which occurred during the alarm silence time, the alarm silence time for the first alarm will not be extended.
- The alarm silence condition for all parameters will be ceased in the event of any of the following.
  - When the main power is turned ON.
  - When the system alarm status (ON / suspend) is changed.
  - When [Resume All Al. Sound] key is pressed on the alarm setup menu.
  - When monitoring is suspended on the patient admit / discharge menu.
  - When the alarm mode is changed on the patient admit / discharge menu.
  - When the patient has discharged.
- The alarm silence condition for each parameter will be ceased in the event of any of the following.
  - When the alarm silence time for the parameter is completed.
  - When automatic alarm is selected for the parameter.
  - When the alarm is turned OFF for the parameter.

- If **Linked to each new occurrence** is selected for “Status Alarm Control” in the alarm setup menu, the status alarm sound will not resume after the alarm silence time unless a new status alarm generates.

## ● To Cancel “Alarm Silence”

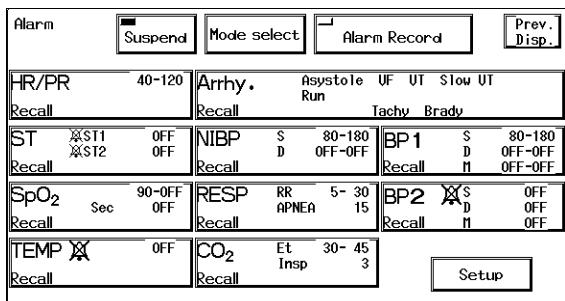
The alarm silence state can be cancelled by pressing the **Resume All Al. Sound** on the Alarm Setup menu. The alarm silence state for all parameters and equipment status will be cancelled and alarm sound will resume if alarm factor exists.



## Alarm Setup for Each Parameter

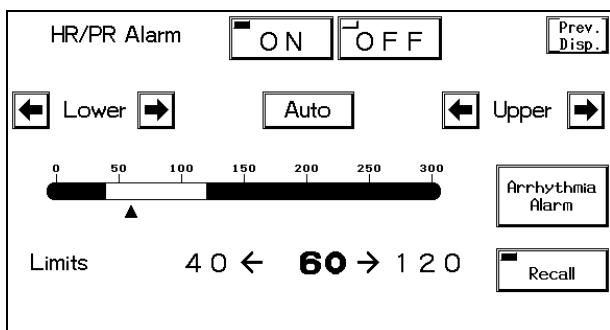
The alarm for each parameter can be turned ON or OFF, and upper and lower alarm limit can be set.

- 1 Press the **Menu** → **Alarm** keys.



The alarm setup menu will be displayed.

- 2 Select the parameter to display the alarm setup menu.



<b>Display</b>	<b>Description</b>
	Displays the upper and lower alarm limit and the current measurement (▲). The limits can be adjusted by directly pressing the bar display or using the arrow keys.
Limits      4 0 ← <b>60</b> → 1 2 0	Displays lower limit←current value→upper limit.

<b>Key</b>	<b>Item</b>	<b>Description</b>
<input type="checkbox"/> <b>ON</b> <input type="checkbox"/> <b>OFF</b>	Individual Alarm	Selecting <b>ON</b> will generate the alarm. Selecting <b>OFF</b> will not generate the alarm.
<input type="checkbox"/> <b>Lower</b> <input type="checkbox"/>	Lower Alarm Limit	Sets the lower alarm limit. The lower limit will be turned OFF when a value below the range is selected.
<input type="checkbox"/> <b>Upper</b> <input type="checkbox"/>	Upper Alarm Limit	Sets the upper alarm limit. The upper limit will be turned OFF when a value above the range is selected.
<input type="checkbox"/> <b>Auto</b>	Automatic Setup	Automatically sets the limits corresponding to the current value. If the limit is turned OFF, it will remain OFF. The system alarm and parameter alarm will be in a ON condition.

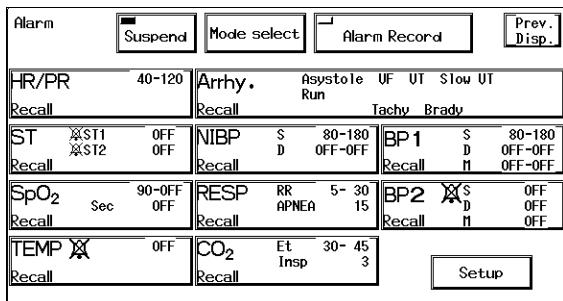
**3 Select ON/OFF and set upper and lower alarm limit for the parameter alarm.**

<i>Numeric Data Key</i>	<i>Item</i>	<i>Description</i>
	HR / PR / BPR	ON, OFF 20–300bpm
	ST	ON, OFF ST1 ±2.0mV ST2 ±2.0mV
	BP1	ON, OFF 0–300mmHg 0.0–40.0kPa
	BP2	ON, OFF 0–300mmHg 0.0–40.0kPa
	SpO <sub>2</sub>	ON, OFF 50–100%
	RR	ON, OFF 5–150bpm (Adult) 2–150bpm (Child, Neonate)
	APNEA (Upper Limit)	ON, OFF 5–20 sec.
	TEMP	ON, OFF 30–50°C 86–122°F
	NIBP	ON, OFF 10–300mmHg 1.5–40.0kPa
	EtCO <sub>2</sub>	ON, OFF 1–100mmHg 0.1–13.3kPa 0.1–13.3%
	InspCO <sub>2</sub> (Upper Limit)	ON, OFF 1–4mmHg 0.1–0.4kPa 0.1–0.4%

## Arrhythmia Alarm Setup

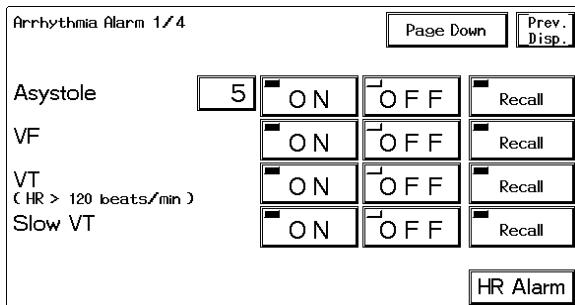
The arrhythmia alarm can be turned ON or OFF, and arrhythmia detection level can be set.

- 1 Press the **Menu** → **Alarm** keys.



The alarm setup menu will be displayed.

- 2 Press the **Arrhy.** key to display the arrhythmia alarm setup menu.



Page	Item
Page 1/4	Asystole, VF, VT, Slow_VT
Page 2/4	Run, Bigeminy, Trigeminy, Pause
Page 3/4	Couplet, Tachy, Brady, Frequent
Page 4/4	HR Low Limit for VT, HR Low Limit for RUN

## ●To Set ON/OFF the Arrhythmia Alarm



Selecting **ON** will generate the arrhythmia alarm.

Selecting **OFF** will not generate the arrhythmia alarm.

However, Asystole, VF, and VT alarm can not be turned OFF at the initial factory setting. Select **ON/OFF** for "Asystole, VF, VT" on the Hospital Setup menu to turn OFF the alarm.



Refer to "8. System Configuration Hospital Setup"

Page	Item	Selection
Page 1/4	Asystole	ON, (ON, OFF)
	VF	ON, (ON, OFF)
	VT	ON, (ON, OFF)
	Slow_VT	ON, (ON, OFF)
Page 2/4	Run	ON, OFF
	Bigeminy	ON, OFF
	Trigeminy	ON, OFF
	Pause	ON, OFF
Page 3/4	Couplet	ON, OFF
	Tachy	ON, OFF
	Brady	ON, OFF
	Frequent	ON, OFF



There are following restrictions when connecting the DS-7100 system to the DS-LANII network.

- Arrhythmia alarm of TACHY, BRADY, COUPLET, PAUSE, TRIGEMINY will not be transmitted.
- "SLOW\_VT" will be transmitted as "VT".



The "Arrhythmia alarm OFF" message will be displayed when the ASYSTOLE, VF, VT, SLOW\_VT, and HR alarm is OFF.



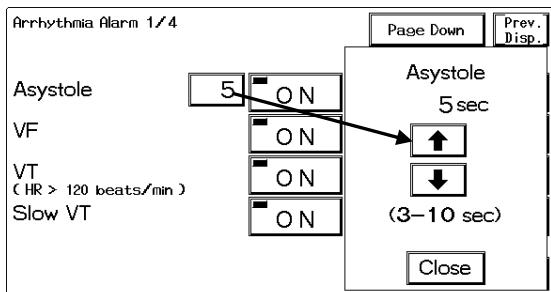
If ON is selected for "Asystole, VF, VT" on the hospital setup menu, Asystole, VF, VT, Slow\_VT alarm can not be set to OFF.

→"8. System Configuration Hospital Setup Asystole, VF, VT"

## ●To Set the Arrhythmia Detection Level

Select the level to detect each arrhythmia.

- 1 Pressing the detection level key (ex. **5** for Asystole) for each arrhythmia will display the window to adjust the detection level.



- 2 Set the detection level.



Use the arrow keys to set the detection threshold.

Item	Range
ASYSTOLE	3 to 10 sec.
RUN	2 to 8 beats
PAUSE	1.5 to 5 sec.
FREQUENT	1 to 50 beats/min.

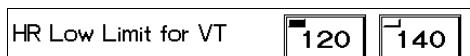
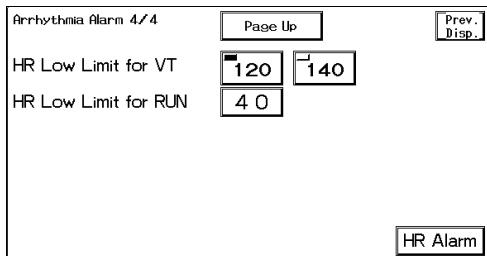
- 3 Close the window to adjust the detection level.



Press the **Close** key.

## ●To Set the HR Low Limit for VT

Select the condition to detect VT.

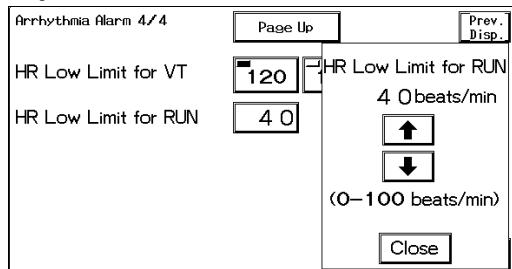


Select the HR low limit to detect VT from 120 or 140bpm.  
If HR is below the set value, it will be detected as Slow\_VT.

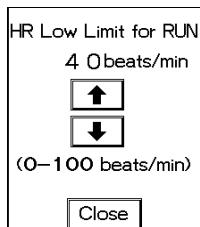
## ●To Set the HR Low Limit for RUN

Set the condition to detect RUN.

- 1 Pressing the detection level key (ex. **40** for the following screen) will display the window to adjust the detection level.



- 2 Set the detection level.



Use the arrow keys to set the detection threshold.  
It can be set in the range from 0 to 100bpm.

### ⚠ CAUTION

- The settings for the "HR Low Limit for VT" and "HR Low Limit for RUN" will be compared with the average HR of continuous VPC. Therefore, the displayed HR value at alarm generation may be lower than the settings if it is just after the VT detection, or if RUN with few continuous VPC is detected.
- If the wired network system (DS-LANII/DS-LANIII) is constructed, the setups for "HR Low Limit for VT" and "HR Low Limit for Run" cannot be performed on some central monitors depending on the model type or software version.

- 3 Close the window to adjust the detection level.

**Close**

Press the **Close** key.

## ●Alarm Limit for TACHY, BRADY

The arrhythmia detection level for tachycardia (TACHY) and bradycardia (BRADY) alarm links with the upper and lower alarm limit for HR / PR.

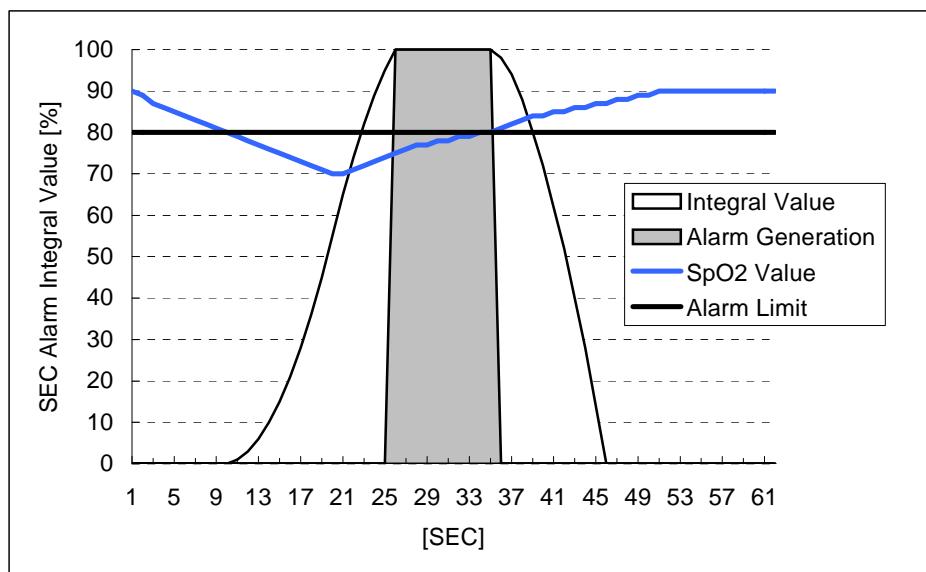
The tachycardia (TACHY) alarm generates when the measurement exceeds the HR / PR upper alarm limit. When the upper alarm limit is OFF, alarm will not generate.

The bradycardia (BRADY) alarm generates when the measurement is below the HR / PR lower alarm limit. When the lower alarm limit is OFF, alarm will not generate.

## SpO<sub>2</sub> SEC Alarm Setup (Nellcor® SpO<sub>2</sub> Unit; DS-7141, DS-7101LT, DS-7101L)

When the SpO<sub>2</sub> value is unstable around the lower alarm limit, the frequently generated alarm may be bothersome. The SEC alarm function controls these frequent alarms.

This function generates the alarm only when the integral value (the accumulation of difference between the alarm limit and SpO<sub>2</sub> value at every second) reaches the preprogrammed SEC alarm threshold value.



On this graph, the SEC alarm threshold value is set as 100.

The SpO<sub>2</sub> value begins to fall below the alarm limit at approximately 10 seconds. At the same time, the integral value begins to increase.

(Alarm limit) – (SpO<sub>2</sub> value) is accumulated each second.

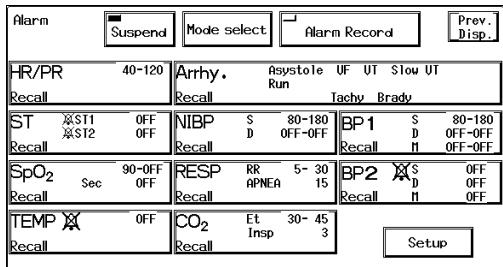
At around 25 seconds, the integral value reaches 100 and the alarm is generated.

At approximately 36 seconds, the SpO<sub>2</sub> value returns to the level within the alarm limit, and at the same time, the integral value begins to decrease.  $\{( \text{Alarm limit} ) - ( \text{SpO}_2 \text{ value} )\} \times 2$  is subtracted each second.

Also, there is a safety net when setting the SEC alarm function. This safety net is for the case when the SpO<sub>2</sub> value frequently falls below the alarm limit but does not last long enough to reach the SEC alarm threshold.

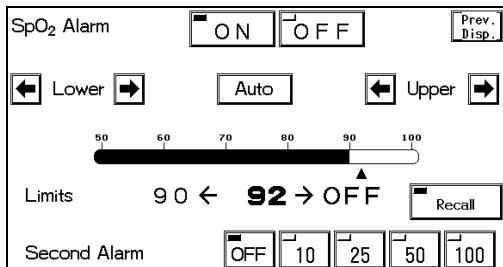
If the SpO<sub>2</sub> value falls below the limit 3 times or more during the last 60 seconds, an alarm will be generated even if the SEC alarm threshold is not reached.

**1 Press the **Menu** → **Alarm** keys.**

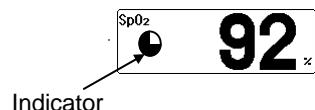


The alarm setup menu will be displayed.

**2 Press the **SpO<sub>2</sub>** key to display the alarm setup menu.**



**3 Select the SEC alarm value according to the alarm frequency.**



If **OFF** is selected, a circular SEC alarm indicator will be displayed inside the parameter key. As the integral value increases, the indicator will begin to fill, and when it is completely filled, an alarm will be generated.

If **OFF** is selected, this SEC alarm indicator will not be displayed.

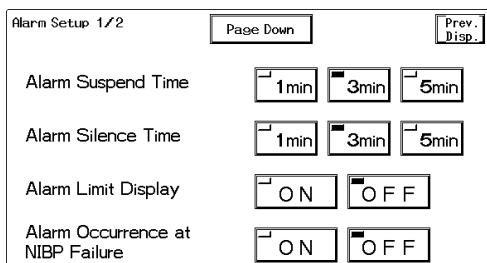
**CAUTION**

- Whether to use the SEC alarm function and its threshold selection should be based on the patient's clinical indication portent and medical evaluation.
- If the SpO<sub>2</sub> alarm and SEC alarm setup is set to OFF, the SEC alarm integral value will be set to 0.

## Alarm Suspend/Alarm Silence Time

The time for suspending the system alarm and suspending the alarm sound can be selected.

**1 Press the **Menu** → **Alarm** → **Setup** keys.**



The second page of the alarm setup menu will be displayed.

**2 Select the time for "Alarm Suspend Time".**

Alarm Suspend Time      **1min**    **3min**    **5min**      Select the appropriate time for alarm suspend time.

**3 Select the time for "Alarm Silence Time".**

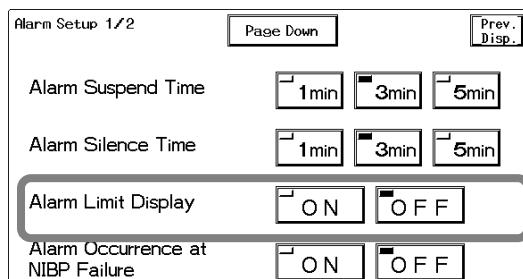
Alarm Silence Time      **1min**    **3min**    **5min**      Select the appropriate time for alarm silence time.

## ON/OFF of Alarm Limit Display

The alarm limit can be selected to display or not display on the home display according to the preference.



**1** Press the **Menu** → **Alarm** → **Setup** keys.



The second page of the alarm setup menu will be displayed.

**2** Select ON or OFF for alarm limit display.

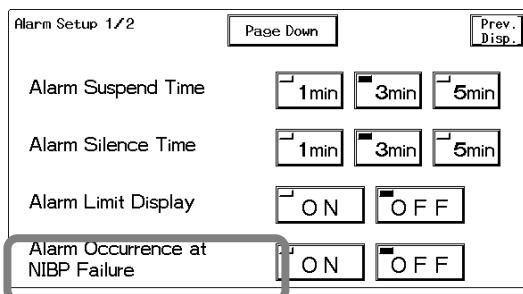
### NOTE

- To display the alarm limit, short trend display should be set to OFF on the display configuration menu.
- The alarm limit for the parameter with the alarm turned OFF will not be displayed regardless of this setup.

## ON/OFF of Alarm Occurrence at NIBP Failure

The NIBP measurement failure can be notified by alarm.

**1** Press the **Menu** → **Alarm** → **Setup** keys.



**2** Select ON or OFF for "Alarm Occurrence at NIBP Failure".

**ON** will display a "NIBP measurement failed." message (equipment status alarm, level 2) and generates an alarm sound when NIBP measurement fails. This alarm can be cancelled by pressing the **Alarm Silence** key.

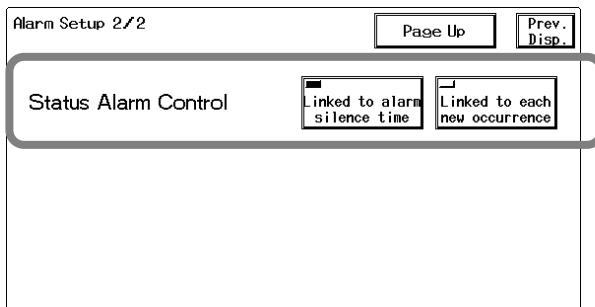
**OFF** will not generate alarm ("NIBP measurement failed." message and alarm sound) even if NIBP measurement fails.

## Alarm Silence Time for Equipment Status Alarm

The alarm silence time for the following equipment status alarm can be set.

- "Check electrodes"
- "SpO<sub>2</sub> Sensor Fault"
- "Check SpO<sub>2</sub> sensor"
- "No pulse detect"
- "SpO<sub>2</sub> Low Perfusion"
- "SpO<sub>2</sub> Pulse Search"
- "Check filterline"
- "Check CO<sub>2</sub> unit"

**1** Press the **Menu** → **Alarm** → **Setup** → **Page Down** keys.



The alarm setup menu will be displayed

**2** Set the "Status Alarm Control".

Status Alarm Control

Linked to alarm silence time     Linked to each new occurrence

**Linked to alarm silence time** will silence the alarm when the **Alarm Silence** key is pressed for fixed amount of time set on "Alarm Silence Time".

- If the alarm cause still remains at completion of silence time, the alarm sound will generate again.
- If the same alarm occurs during the alarm silence time, the alarm sound will not generate.
- If the new alarm occurs during the alarm silence time, the alarm sound for the new alarm will generate.

**Linked to each new occurrence** will silence the alarm when the **Alarm Silence** key is pressed until the situation changes.

- The alarm will be silenced as long as the alarm cause remains.
- If the alarm cause is resolved during the alarm silence time, the alarm silence will be cancelled.
- If the same alarm generates again during the alarm silence time, the alarm sound will generate.

## Chapter 5

# Admit / Discharge of a Patient

This chapter describes the procedure to admit or discharge a patient.

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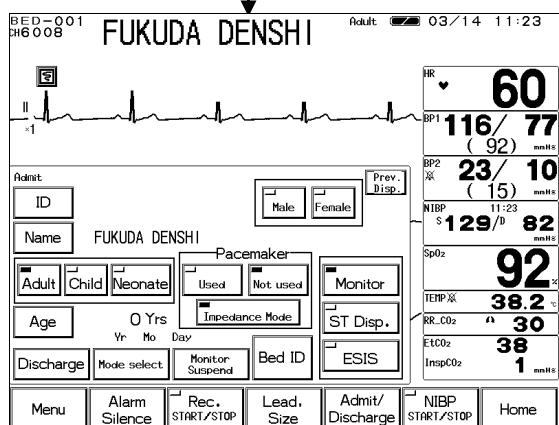
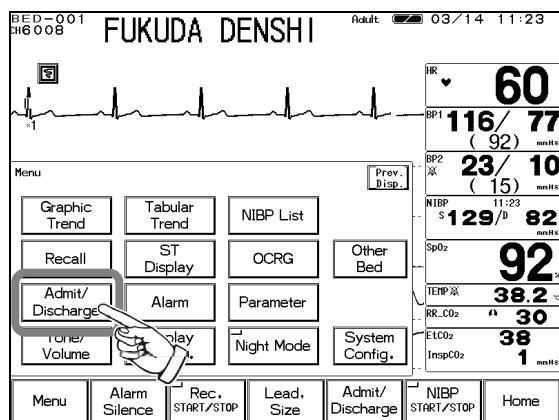
# Admit / Discharge of a Patient

This menu allows setup of admitting, discharging, suspend monitoring of a patient, and selection of the display configuration mode and alarm mode according to the monitoring purpose.



If you start monitoring a new patient without performing a discharge procedure for the previous patient, new data will be added to the previous data which will result in inaccuracy.

- 1 Press the **Menu** → **Admit / Discharge** keys to display patient admit / discharge menu.



There are two ways to enter the patient information.

1. Manually using the alphanumeric keypad displayed on the screen.
2. Automatically acquiring patient information from the patient data server using the patient ID via TCON communication with the central monitor.

# Admitting a Patient

## Entering Name, Sex, and Age

This menu allows entering of patient's name, ID, age, and selection of patient type (adult, child, neonate) and pacemaker use (used, not used) which affects the monitoring accuracy.

### Reference

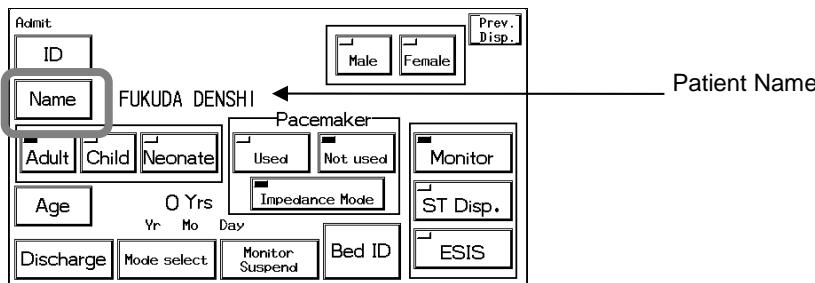
Whether to display or not display the following keys on the admit menu can be selected.

- **[Impedance Mode]** key
- **[Filter Mode key (Monitor) / [ESIS] / [ST Disp.]**
- **[Bed ID]** key

For procedures, refer to "8. System Configuration Ward Setup"

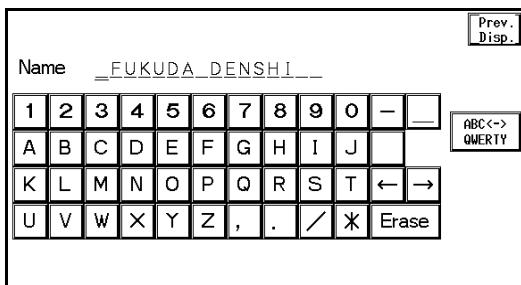
## Patient Name

For entering the patient's name, up to 16 letters can be used.



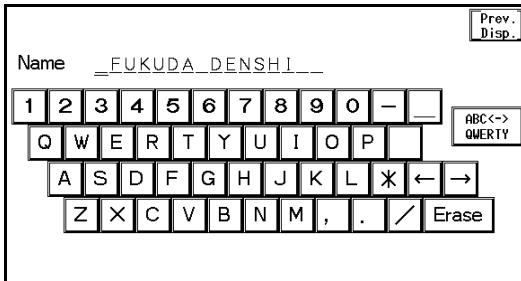
### 1 Press the **[Name]** key.

Enter the name using the keyboard.



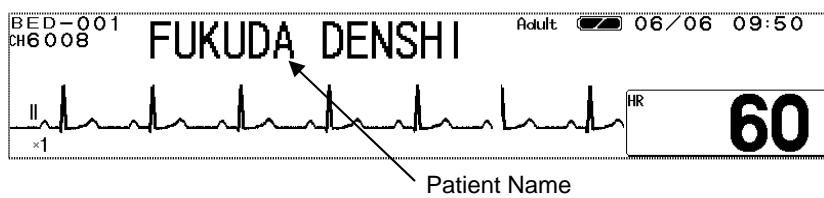
Enter the name using the alphanumeric keypad.  
The keypad can be selected from ABC or QWERTY arrangement.

ABC Arrangement



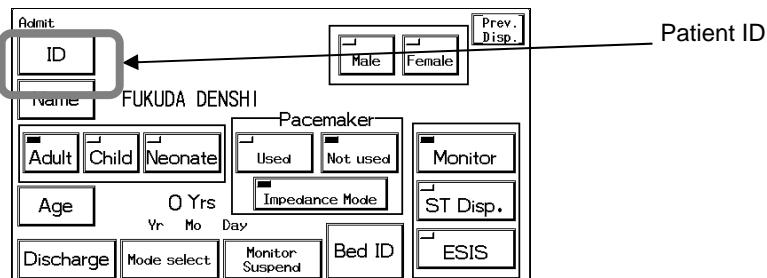
QWERTY Arrangement

### 2 The entered patient's name will be displayed on the home display.

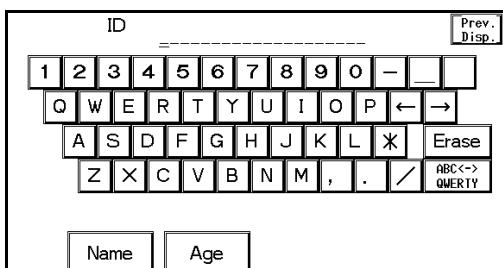


## Patient ID

Up to 20 characters of alphabets, numbers, or symbols can be used for the patient ID.  
Enter the ID according to the monitoring purpose. The entered ID will be output on the recording paper.



- 1 Press the **ID** key.



Enter the ID using the alphanumeric keypad.  
20 digits can be input, but only 10 digits can be transmitted through the DS-LANII network. On the hospital setup of the preset menu, set which 10 digits to send to the central monitor.

When using the DS-LANIII network, 20 digits can be transmitted to the central monitor.



Refer to "8. System Configuration Patient ID Transmission Starting Digit for DS-LAN" for procedure to set the 10-digit patient ID.

## Patient Type

The selection of patient type affects the accuracy of NIBP measurement, HR measurement, and RR measurement. Also the delay time to generate the measurement data alarm will change according to the patient type.

	<b>Adult</b>	<b>Child</b>	<b>Neonate</b>
NIBP measurement range	10 to 280mmHg	10 to 180mmHg	10 to 120mmHg
HR	0bpm, 12 to 300bpm	0bpm, 30 to 300bpm	1.6 to 40Hz
Filter Mode (Monitor)	0.5 to 40Hz	1.6 to 15Hz	1.6 to 15Hz
Filter Mode (ESIS)	0.05 to 40Hz	1.5Hz	none
Filter Mode (ST Display)		5 sec.	0 sec.
Impedance Respiration			2.5Hz
Alarm delay time			

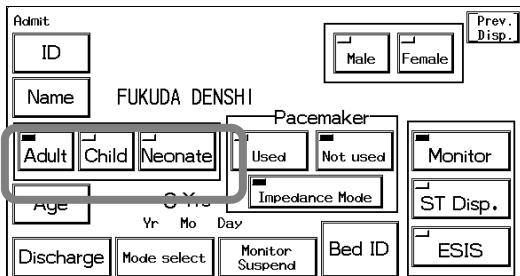
The alarm delay time is the function to prevent frequent generation of the measurement data alarm by holding the alarm generation for the duration of each delay time.

The alarm delay time applies to the measurement data alarm for the following parameters; HR / PR, BP, RR, SpO<sub>2</sub>, TEMP, EtCO<sub>2</sub> / InspCO<sub>2</sub>, TACHY, BRADY.



The monitor determines the detection algorithms for QRS and NIBP according to the selected patient type. Also, incorrect selection may cause blood congestion or other injuries during NIBP measurement. Make sure the proper selection is made.

**1 Select **Adult**, **Child**, or **Neonate**.**



If "ST Display" is selected for the filter mode (Monitor / ST Display / ESIS), **Neonate** can not be selected for the patient type.

To select **Neonate**, set the filter mode to Monitor or ESIS mode.

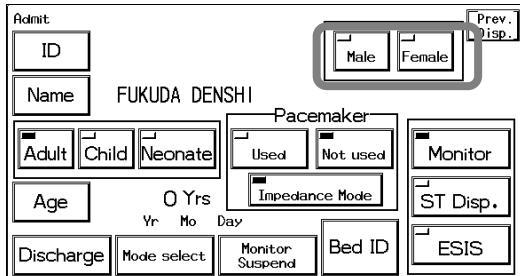
**2 The selected patient type will be displayed on the home display.**



## Patient Sex

Select the patient's sex from male or female. The default is set as undetermined. The selected sex will be output on the recording paper.

**1 Select **Male** or **Female**.**



The selection of sex will not affect the measurement accuracy of the monitoring.

# Pacemaker Use

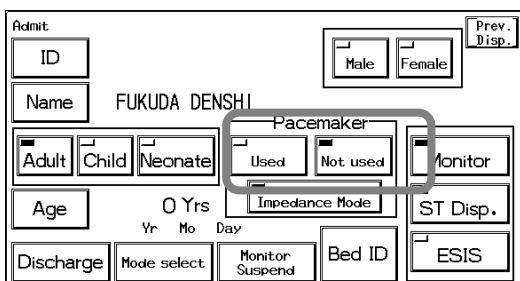
## ●Pacemaker Use Selection

If the patient is wearing a pacemaker, the monitor will identify the pacemaker pulse and insert an artificial pulse onto the ECG waveform for easy identification. By detecting the pacemaker pulse, it prevents to erroneously detect QRS as pacemaker pulse when pacing waveform does not appear (pacing failure). The arrhythmia analysis analyzes pacing beat as P (pacemaker beat) or F (fusion beat) to prevent erroneous judgment of VPC.

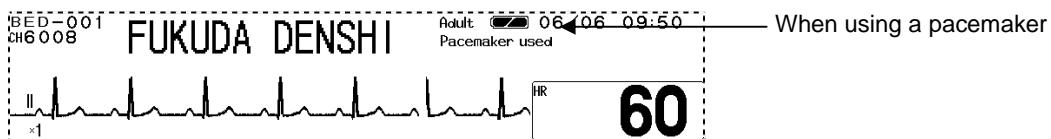


The pacemaker selection influences the precision of the QRS detection and arrhythmia analysis. Make sure the correct selection is made.

- 1 Select **Used** or **Not used** for pacemaker use.



- 2 The pacemaker use will be displayed on the home display.

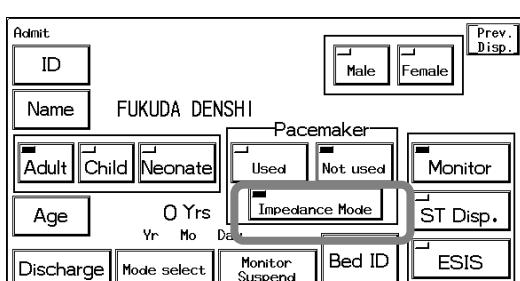


## ●Impedance Respiration Measurement

The respiration measurement using the impedance method conducts high-frequency and weak current between the ECG electrodes attached to the patient, and measures the potential difference between the electrodes caused by thoracic movement using the synchronous rectification system. For the patient using the adaptive (minute ventilation) pacemaker, the pacemaker measurement signal and the high-frequency current of this equipment interferes with each other which causes incorrect respiration measurement.

If the patient is using an adaptive (minute ventilation) pacemaker, set the impedance respiration measurement OFF.

- 1 Press the **Impedance Mode** key.



If the LED is extinguished, the impedance respiration measurement is stopped.

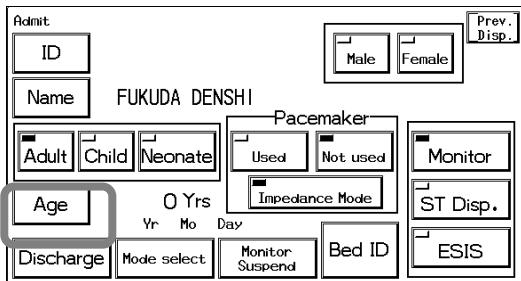


If the LED is lighted, the impedance respiration measurement can be performed.

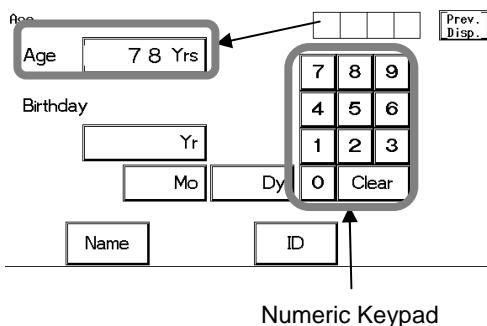
## Patient Age

There are two ways to set patient's age. One is to enter the birth date which will automatically calculate the age, and the other is to directly enter the age using the numeric keypad.

If **Neonate** is selected as patient type, the age in days will be displayed.

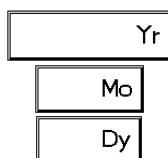


- 1 Press the **Age** key, and enter patient's age.



To directly enter the age, use the numeric keypad to enter the age and press the **Yrs** key.  
The entered age will be displayed inside the **Age** key.

- 2 Enter the patient's birth date using the numeric keypad. The age will be automatically calculated.

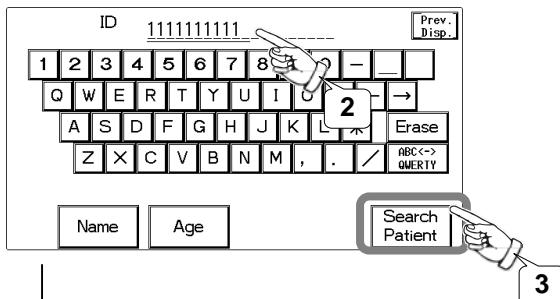


Enter the year, month, day using the numeric keypad, and press the **Yr**, **Mo**, **Dy** keys respectively.  
The entered year, month, day will be each displayed inside the **Yr**, **Mo**, **Dy** keys.

## Acquiring Patient Information from the Patient Data Server (TCON system)

If the TCON system is used and the central monitor is connected to the Patient Data Server, the patient information can be automatically acquired from the Patient Data Server via the central monitor.

- 1 Press the **Menu** → **Admit / Discharge** → **ID** keys.
- 2 Enter the patient ID.
- 3 Press the **Search Patient** key to search patient information on the patient data server.



Based on the entered patient ID, the patient information will be searched on the patient data server via TCON communication with the central monitor.

The acquired patient information will be displayed on the "New Information" field.

A screenshot of a medical software interface titled 'Patient Information'. On the left, under 'Current Information', the 'ID' is listed as '1111111111' and the 'Name' is 'FUKUDA'. On the right, under 'New Information', the 'ID' is '2222222222', the 'Name' is 'DENSHI', and the 'Sex' is 'Male'. Below these fields, there is a note: 'Change only patient info. Keep current meas., data/setting.' and a timestamp: 'Birthday :2000Yr 1Mo 1dy ( 11Yrs )'. At the bottom are three buttons: 'Admit as new patient.', 'Search Patient', and 'Cancel'.

- 4 Press the **Change only patient info.**, **Admit as new patient.**, or **Cancel** key.

**Change only patient info.** : Only the patient information will be changed to the new information. This function is mainly used to correct the patient information.

**Admit as new patient.** : Initializes the current patient data/monitoring condition and performs the admit process with the newly acquired information.

**Cancel** : Cancels the acquired data.

The item not acquired from the patient data server will be left blank. For the blank item, manually input the information.



For procedure on how to manually enter data using the alphanumeric keypad, refer to the above "Patient Name", "Patient Type", "Patient Sex", "Pacemaker Use", and "Patient Age".



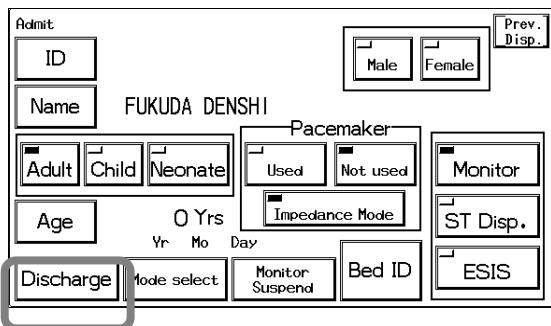
After the information for a new patient is acquired by searching the patient data server, make sure to perform the admit process by pressing the **Admit as new patient.** key.

## Discharging a Patient

## Erasing Name, Data, etc.

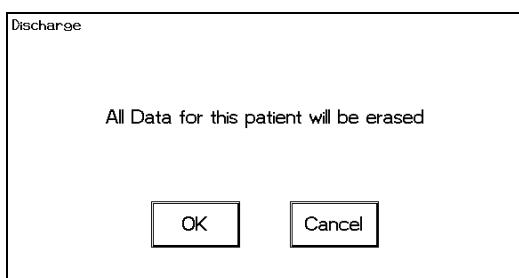
This menu allows to clear the patient name, ID, age, and past measurement data such as tabular trend, graphic trend, and recall data.

## Discharging Procedure



### 1 Press the **Discharge** key.

The confirmation display will appear. If the **Discharge** key is pressed by mistake, press the **Cancel** key to return to the previous display.



### 2 Erase the patient data.

To initialize by erasing the patient data, patient information, press the **OK** key. The data will be initialized and returns to the home display.

Data	Description
Patient Data	Erases the data of graphic trend, tabular trend, NIBP list, recall, ST Display, OCRG. The recall setup condition will remain.
Patient Information	Erases patient name, ID, sex, age. The patient type will not be initialized.
Measurement Condition	Pacemaker use will be set to unused, and respiration measurement condition will be set to ON. The BP zero-balance condition will be cleared.

### NOTE

Depending on the setup of "Backup at Discharge", "Backup at Discharge (NIBP Auto Mode)" on the monitor setup menu, some data may not be initialized.

# Monitoring Mode Selection

# Alarm and Display Mode

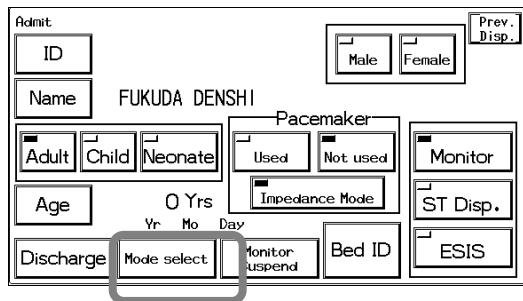
This menu allows to select the alarm mode and display mode.

The alarm setting and display configuration can be each selected from 5 modes depending on the monitoring purpose. Select the appropriate mode when admitting a patient.

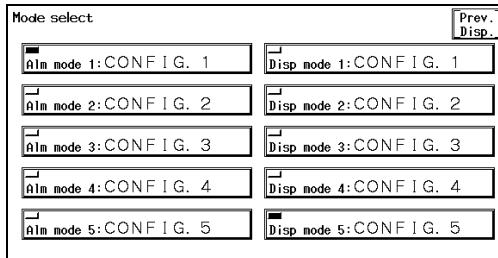
## CAUTION

The setup for the alarm mode and display mode remains stored even when the power is turned off or when discharging procedure is performed. Before monitoring, make sure the current monitoring mode is suitable for the patient's condition.

## Mode Selection

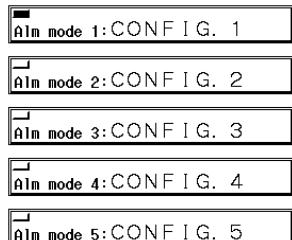


1 Press the **Mode Select** key.



The mode selection menu for alarm mode and display mode will be displayed.

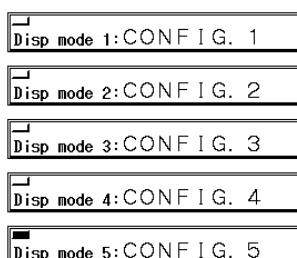
2 Select an alarm mode from the selection.



Press one key from the **Alm Mode 1** to **Alm Mode 5** keys to select an alarm setup mode which meets the monitoring purpose.

The setup for the alarm mode remains stored even when the power is turned off or when discharging procedure is performed. The previously selected alarm mode will be effective if the selection is not made.

3 Select a display mode from the selection.



Press one key from the **Disp mode 1** to **Disp mode 5** keys to select a display configuration mode which meets the monitoring purpose.

The setup for the display mode remains stored even when the power is turned off or when discharging procedure is performed. The previously selected display configuration mode will be effective if the selection is not made.

## ●Display Modes

<b>Item</b>	<b>Default</b>	<b>Backup</b>
Mode Selection	1	<input type="radio"/>
Mode 1	No. of Waveforms	3 Waveform
	No. of Numeric Data	4 Numeric Data
	Displayed Waveforms	ECG1, SpO <sub>2</sub> , RESP
	Displayed Numeric Data	HR, NIBP, SpO <sub>2</sub> , RR
	Enlarged Display	OFF
	Short Trend	OFF
	Comment	CONFIG. 1
Mode 2	No. of Waveforms	3 Waveforms
	No. of Numeric Data	4 Numeric Data
	Displayed Waveforms	ECG1, SpO <sub>2</sub> , RESP
	Displayed Numeric Data	HR, NIBP, SpO <sub>2</sub> , RR
	Enlarged Display	ON
	Short Trend	OFF
	Comment	CONFIG. 2
Mode 3	No. of Waveforms	4 Waveforms
	No. of Numeric Data	6 Numeric Data
	Displayed Waveforms	ECG1, BP1/2 (overlap), SpO <sub>2</sub> , RESP
	Displayed Numeric Data	HR, BP1, BP2, NIBP, SpO <sub>2</sub> , TEMP, RR
	Enlarged Display	OFF
	Short Trend	OFF
	Comment	CONFIG. 3
Mode 4	No. of Waveforms	4 Waveforms
	No. of Numeric Data	6 Numeric Data
	Displayed Waveforms	Cascade, BP1/2 (overlap), SpO <sub>2</sub> , RESP
	Displayed Numeric Data	HR, BP1, BP2, NIBP, SpO <sub>2</sub> , TEMP, RR
	Enlarged Display	OFF
	Short Trend	OFF
	Comment	CONFIG. 4
Mode 5	No. of Waveforms	6 Waveforms
	No. of Numeric Data	7 Numeric Data
	Displayed Waveforms	ECG1, BP1/2 (overlap), SpO <sub>2</sub> , CO <sub>2</sub>
	Displayed Numeric Data	HR, BP1, BP2, NIBP, SpO <sub>2</sub> , TEMP/ RR, CO <sub>2</sub>
	Enlarged Display	OFF
	Short Trend	OFF
	Comment	CONFIG. 5

<b>NOTE</b>	The CO <sub>2</sub> monitoring function is not supported for the DS-7101L, DS-7101LM, DS-7101LT, and DS-7101LTM. If Mode 5 is selected, CO <sub>2</sub> parameter box will be displayed but parameter setup cannot be performed.
-------------	---

## ●Alarm Modes

<i>Item</i>		<i>Default Setting</i>		
Alarm Mode		1		
Alarm Mode 1 to 5	HR	ON, 40–120		
	ASYSTOLE	ON, 5 sec.		
	VF	ON		
	VT	ON, HR Low Limit: 120bpm		
	SLOW_VT	ON		
	RUN	ON, 3 beats, HR Low Limit: 40bpm		
	COUPLETT	OFF		
	PAUSE	OFF, 2 sec.		
	BIGEMINY	OFF		
	TRIGEMINY	OFF		
	FREQUENT	OFF, 10 beats		
	TACHY	ON		
	BRADY	ON		
	ST	OFF		
	BP1	ON SYS 80–180 DIA OFF–OFF MEAN OFF–OFF		
	BP2	OFF SYS OFF–OFF DIA OFF–OFF MEAN OFF–OFF		
	RR	ON 5–30		
	APNEA	ON, 15 sec.		
	SpO <sub>2</sub>	ON, 90–OFF SEC Alarm OFF		
	NIBP	ON SYS 80–180 DIA OFF–OFF MAP OFF–OFF		
	TEMP	OFF OFF–OFF		
	EtCO <sub>2</sub>	ON 30–45mmHg 4.0–6.0kPa 4.0–6.0%		
	InspCO <sub>2</sub>	ON 3mmHg 0.4kPa 0.4%		

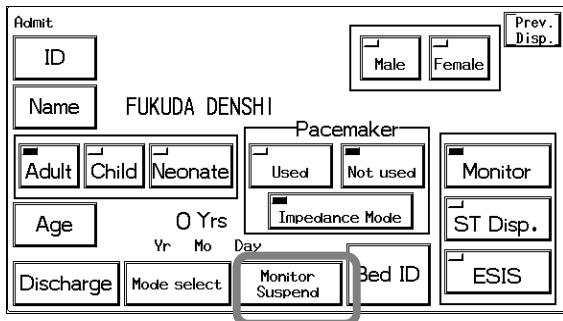
NOTE	The CO <sub>2</sub> monitoring function is not supported for the DS-7101L, DS-7101LM, DS-7101LT, and DS-7101LTM. Note that the EtCO <sub>2</sub> , InspCO <sub>2</sub> alarm will not be generated.
------	--

## Suspend Monitoring

## Suspend and Resume Monitoring

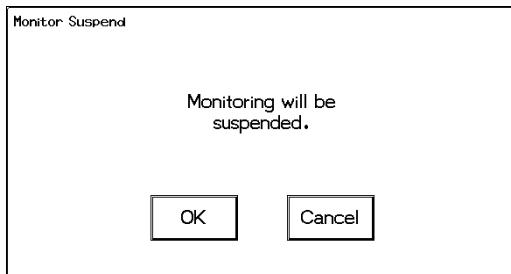
This menu allows to suspend and resume monitoring when a patient temporarily leaves the bed. Turning the power OFF will erase the recall and ST measurement data, but with this suspend monitoring function, data measurement, alarm generation, automatic measurement, and automatic recording can be suspended without erasing any data and setup condition.

### To Suspend Monitoring



#### 1 Press the **Monitor Suspend** key.

The confirmation menu will be displayed. If the **Monitor Suspend** key is pressed by mistake, press the **Cancel** key to return to the previous display.



#### 2 Confirm the monitoring suspension.

Pressing the **OK** key will return to the home display with the **Resume** key displayed. The numeric data display and waveform display on the home display will be suspended and only the **Resume** key will be effective.



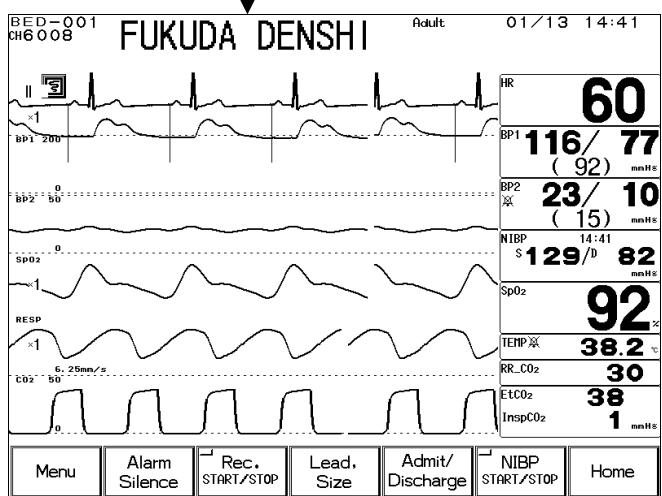
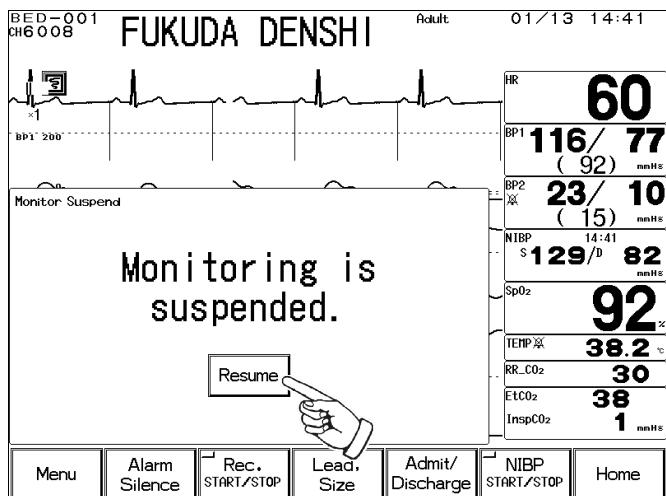
#### NOTE

The telemetry transmission will cease when monitoring is suspended. Note that the square wave will be displayed on the central monitor indicating the too far condition of the telemetry.

## To Resume Monitoring

- 1 Press the **Resume** key.

The monitor suspend display will be cleared and monitoring will resume.

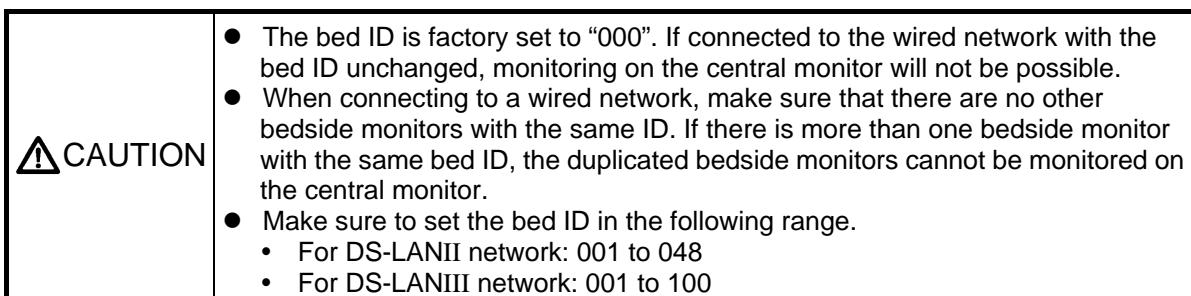


CAUTION Resuming monitoring will also resume the alarm in suspension.

# Room / Bed ID Setup

# for LAN Communication

This section describes the procedure to set the Room / Bed ID. The DS-7100 system incorporates Ethernet LAN unit. The set Room / Bed ID will be remain stored even when the power is turned off.

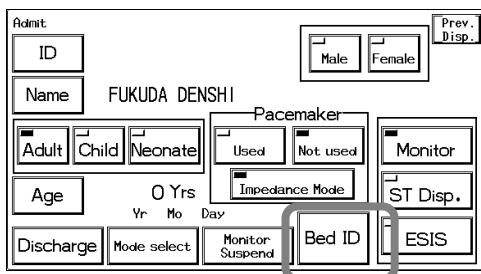


For details of the wired network, please also refer to the following section.  
→"9. Installation Wired Network System"

## Room / Bed ID Setup

To connect to a wired network, it is necessary to set the Room / Bed ID.

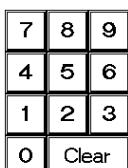
- 1 Press the **Menu** → **Admit / Discharge** → **Bed ID** keys.



### NOTE

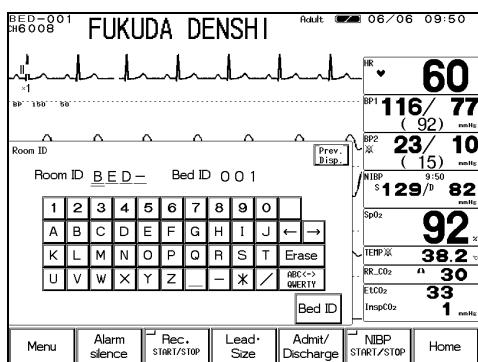
If **Light** is selected for "Admit/Discharge Key Setup" on the ward setup menu, the **Bed ID** key will not be displayed.

- 2 Enter the password.



Use the numeric keypad to enter the password  
The entered number will be displayed as "\*\*\*\*".

- 3 Set the Room ID.

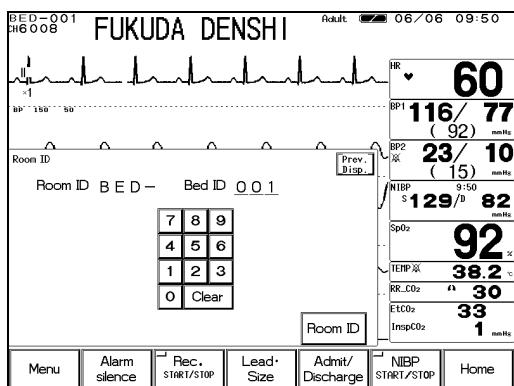


Enter the Room ID using the alphanumeric keypad.  
The keypad can be selected from ABC or QWERTY arrangement.

The entered ID will be displayed on the upper left of the screen.

Next, press the **Bed ID** key to display the Bed ID menu.

#### 4 Set the Bed ID.



Enter the Bed ID using the numeric keypad.  
The entered ID will be displayed on the upper left of the screen.

When connecting to the DS-LANII network, set the ID in the range from 001 to 048.

When connecting to the DS-LANIII network, set the ID in the range from 001 to 100.

# Chapter 6

## Parameter Setup

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## Parameter Setup

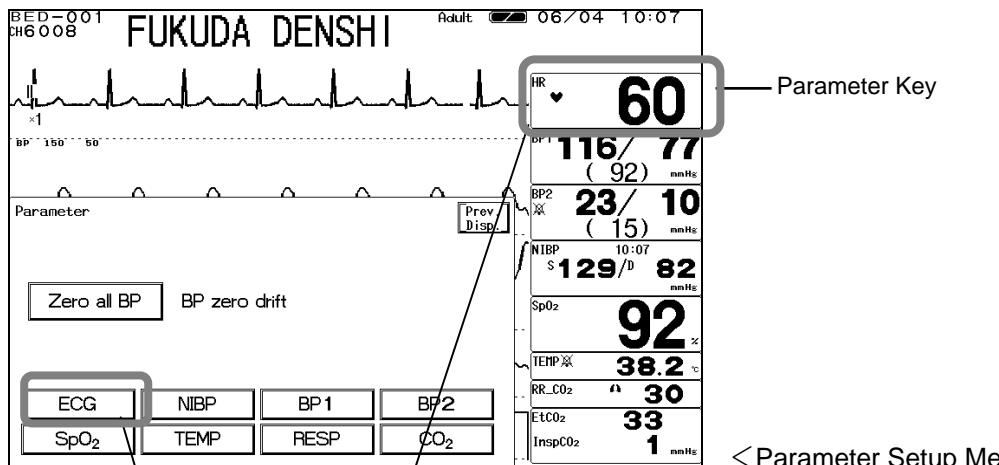
## Setting the Monitoring Condition

This menu allows setup of measurement condition, waveform size, scale, etc. of ECG, BP, NIBP, SpO<sub>2</sub>, RESP, TEMP, and CO<sub>2</sub>.

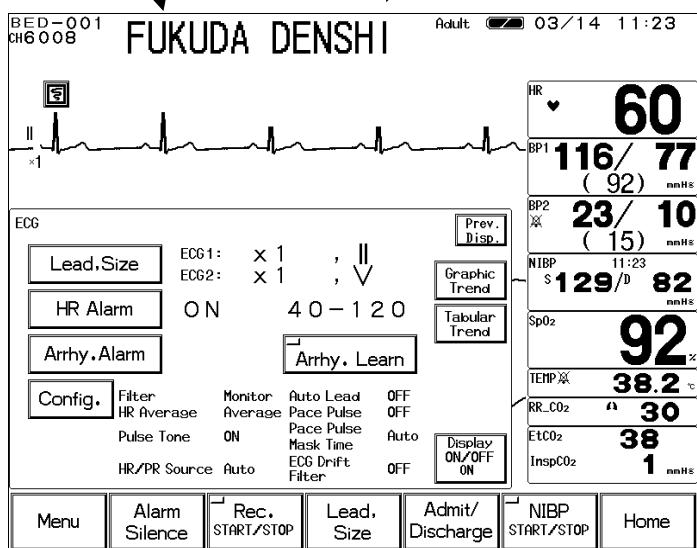
### To Display the Parameter Setup Menu

Press the **Menu** → **Parameter** keys to display the parameter setup menu, and select the parameter. On the parameter setup menu, BP zero balance can be performed.

The parameter setup menu for each parameter can be also accessed by pressing the parameter key where numeric data is displayed.



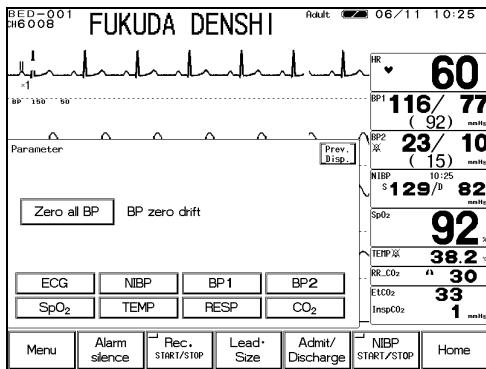
<Parameter Setup Menu>



<ECG Parameter Setup Menu>

## Zero Balance of All Pressure Lines (BP1, BP2)

- 1 Open the three-way valve of all pressure transducers to air.
- 2 Press the **Zero All BP** key.



Verify the BP waveform is positioned at zero, and "0" is displayed for the BP value. A message, "BP zero complete" will be displayed when the procedure is complete. A message, "BP zero failed" will be displayed if the process fails. The three-way valve may not be opened to air, artifact may be present, or the transducer may be defective.

Check the cause and try the zero balance procedure again.

A message, "BP zero drift" will be displayed when the interface cable is not connected. Check if the cable is firmly connected.

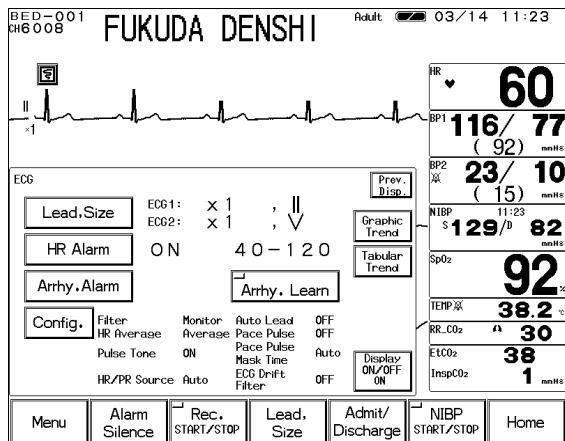
- 3 Close the three-way valve when the zero balance is complete.



Each time the blood pressure transducer or tubing is replaced, the zero balance procedure is required to ensure accurate measurements.

# ECG

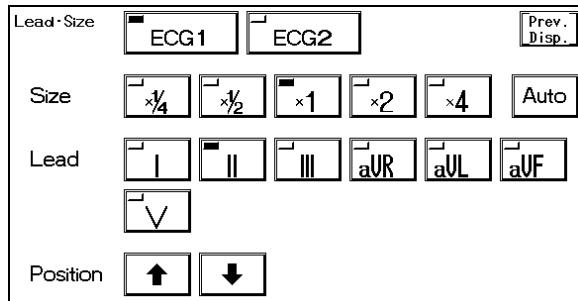
The measurement condition for ECG can be set on this menu.



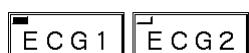
- Lead, Size : Sets the waveform size and lead for ECG display and recording.  
HR Alarm : Sets ON/OFF of HR alarm, and sets upper and lower alarm limit.  
Arrhy. Alarm : Sets ON/OFF and detection threshold for each arrhythmia alarm.  
Configuration : Sets the condition for measuring ECG and HR.  
Arrhy. Learn : The monitor learns the normal QRS at ECG electrode replacement or at misdetection of the arrhythmia analysis.

## ECG Waveform Size and Lead

- 1 Press the **Lead, Size** key to display the size / lead setup menu.



- 2 Select ECG1 or ECG2.



If 4-electrode or 5-electrode ECG relay cable is used, 2 channels of ECG can be measured.

Select **ECG1** or **ECG2** key to set the waveform size, lead, baseline position. The key LED for the selected channel will light.

When 3-electrode is used, these keys will not be displayed.

- 3 Select the waveform size.



Select the waveform size for displaying and recording.

Size	x1/4	x1/2	x1	x2	x4
Voltage (10mm)	4mV	2mV	1mV	500uV	250uV



Pressing the **Auto** key will automatically adjust the ECG amplitude to 10mm.

The automatic adjustment will function only when the key is pressed.

The automatic adjustment will not function when the monitor is learning arrhythmia.

#### 4 Select the lead.

The leads can be selected from 3 leads, 6 leads, 7 leads depending on the connected ECG relay cable.

ECG Relay Cable	Lead
3-electrode	I II III
4-electrode	I II III aVR aVL aVF
5-electrode	I II III aVR aVL aVF V

#### 5 Set the baseline position.

Position



If the waveform is difficult to see due to ECG amplitude, set the 0mV baseline position.

The baseline position for the waveform display and recording will be adjusted.

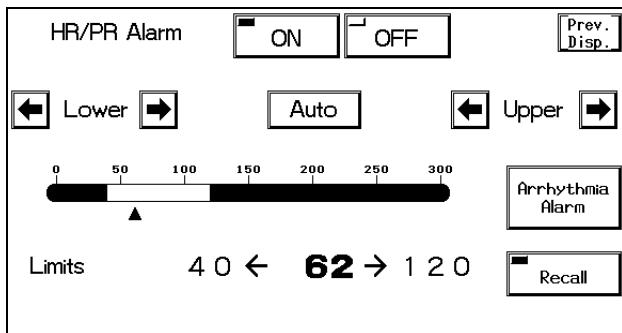
<b>⚠ CAUTION</b>	<ul style="list-style-type: none"> <li>The threshold level for arrhythmia detection changes with ECG waveform size. Set a proper waveform size for monitoring. When the ECG waveform size is <math>\times 1/4</math>, <math>\times 1/2</math>, or <math>\times 1</math>, the detection threshold is 250<math>\mu</math>V. When the ECG waveform size is <math>\times 2</math>, or <math>\times 4</math>, the detection threshold is 150<math>\mu</math>V.</li> <li>Automatic size/position of the ECG is effective only at the time the <b>AUTO</b> key is pressed. This does not continually adjust size and position.</li> </ul>
------------------	--

<b>NOTE</b>	The <b>Auto</b> key for automatic size/position adjustment will not function during arrhythmia learning.
-------------	--

## HR Alarm

- 1 Press the **HR Alarm** key to display the alarm setup menu.

Select ON/OFF of HR/PR alarm, and set the upper and lower alarm limit.



The common alarm value for HR measured from ECG, PR measured from SpO<sub>2</sub>, PR measured from BP can be set.

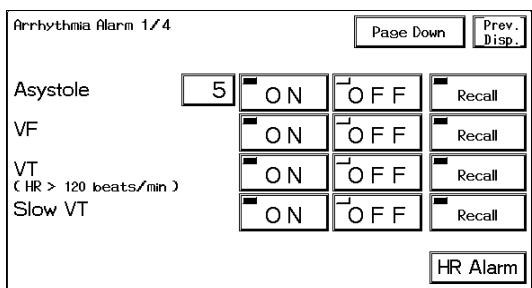
The upper and lower limit can be set in 5bpm increments.

Key	Item	Description
<b>ON</b> <b>OFF</b>	Individual Alarm	Selecting <b>ON</b> will generate the HR/PR alarm. Selecting <b>OFF</b> will not generate the HR/PR alarm.
<b>Lower</b> <b>Upper</b>	Lower Alarm Limit	Sets the lower alarm limit (20 to 295bpm). Setting a value 20bpm or below will turn OFF the alarm.
<b>Upper</b>	Upper Alarm Limit	Sets the upper alarm limit (25 to 300bpm). Setting a value 300bpm or above will turn OFF the alarm.
<b>Auto</b>	Automatic Setup	Automatically sets the upper limit to +40bpm, and the lower limit to -40bpm to the current value.

## Arrhythmia Alarm

- 1 Press the **Arrhy. Alarm** key to display the arrhythmia alarm setup menu.

ON/OFF of each arrhythmia alarm and analysis threshold level can be set.

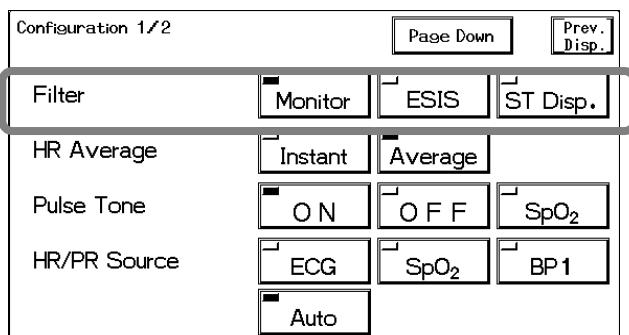


Refer to "4. Monitoring Setup Alarm Setup" for details.

## Filter Mode Selection

The waveform frequency characteristic can be selected from Monitor Mode, ESIS Mode, or ST Display Mode according to the monitoring purpose. Each mode has different frequency characteristic. The AC filter is always set to ON.

- 1 Press the **Config.** key to display the setup menu for selecting the filter.



- 2 Select a frequency characteristic to monitor ECG from **Monitor**, **ESIS**, or **ST Disp.**.

### Monitor Mode

Patient Type	Frequency Characteristic
Adult / Child	0.5 to 40Hz
Neonate	1.6 to 40Hz

This is the standard mode for ECG monitoring. The upper frequency is set to 40Hz to reduce artifact caused by EMG, etc.

### ESIS Mode

Patient Type	Frequency Characteristic
Adult / Child	1.6 to 15Hz
Neonate	1.6 to 15Hz

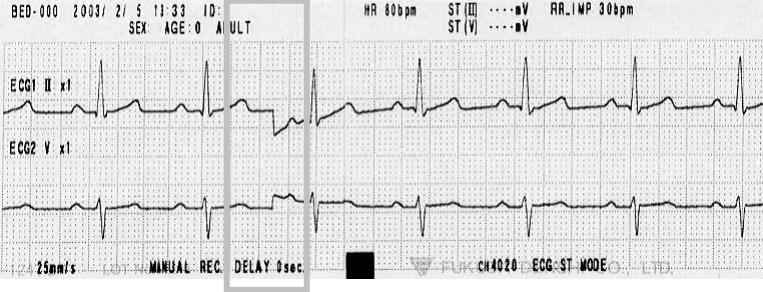
This mode is for ECG monitoring when using electrosurgical instruments. The upper frequency is set to 15Hz which will largely reduce the artifact caused by surgical knife, EMG, etc. However, as this may also reduce the QRS amplitude at the same time, do not select this mode unless using electrosurgical instruments.

### ST Display Mode

Patient Type	Frequency Characteristic
Adult / Child	0.05 to 40Hz

Select this mode if ST measurement is the main purpose of ECG monitoring.

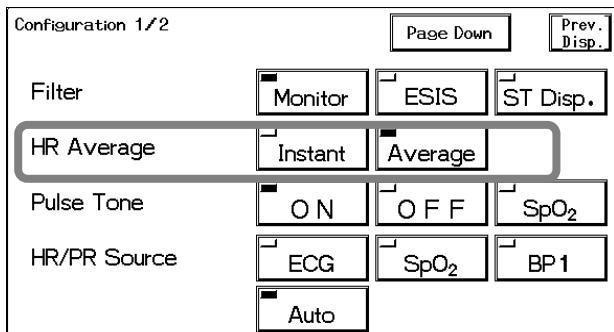
As the lower frequency is set to 0.05Hz, ST level can be accurately measured. If "Neonate" is selected as patient type, this mode cannot be selected

NOTE	When the filter setup is changed, a notch will appear on the ECG waveform due to the change in frequency characteristic.  The image shows a dual-channel ECG tracing. Channel 1 (ECG1 II) shows a clear notch in the baseline between the second and third complexes. Channel 2 (ECG2 V1) shows a normal ECG waveform. The top of the screen displays patient information: BED-000 2003/2/5 11:33 ID: 00000000000000000000000000000000, SEX: F AGE: 0 ADULT. On the right, it shows HR: 60 bpm, ST (II) ... mV, RR: 1.000 sec, ST (V) ... mV. At the bottom, it shows 25mm/s, MANUAL REC, DELAY 0 sec, and the model number CH402B ECG-ST MODE LTD.
------	--

## HR Average Selection

The averaging method of HR measured from ECG can be selected.

- 1 Press the **Config.** key to display the setup menu for HR Average selection.



- 2 Select **Instant** or **Average**.

Selecting **Instant** will display the HR measured from RR interval of each heartbeat.

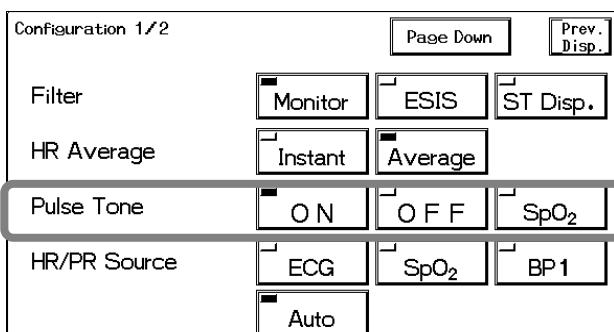
Selecting **Average** will display the HR measured from 6 seconds of heartbeat for adult and child, and 3 seconds of heartbeat for neonate.

## Pulse Tone

The HR mark synchronized to ECG or PR can be displayed inside the parameter key.  
ON/OFF of HR synchronized tone can be also set.



- 1 Press the **Config.** key to display the setup menu for HR synchronized indicator selection.



- 2 Select **ON** or **OFF**.

**OFF** will not display the synchronized mark. The synchronized tone will not be generated.

**ON** will display the synchronized mark. The synchronized tone will be generated.

**NOTE**

If "HR/PR Source" is **SpO<sub>2</sub>**, a tone synchronized to pulse wave will generate.  
The tone will increase as SpO<sub>2</sub> value increases, and will decrease as SpO<sub>2</sub> value decreases.

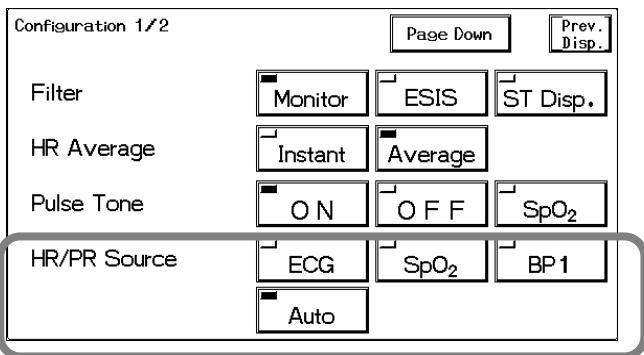
## HR/PR Source

The HR/PR source to display on the home display can be selected.

The alarm will be generated based on this selection.

The tabular trend and graphic trend will be also based on this selection.

- 1 Press the **Config.** key to display the setup menu for selecting the HR/PR source.



- 2 Select a parameter.

HR  
**60**

Selecting **ECG** will measure the HR from ECG.  
“HR” will be displayed inside the parameter key.

PR\_SpO<sub>2</sub>  
**60**

Selecting **SpO<sub>2</sub>** will measure the PR from SpO<sub>2</sub>.  
“PR\_SpO<sub>2</sub>” will be displayed inside the parameter key.

PR\_BP  
**60**

Selecting **BP1** will measure the PR from BP1.  
“PR\_BP” will be displayed inside the parameter key.  
**BP1** can be selected only when **ECG/SpO<sub>2</sub>/BP1** is selected as “HR/PR source” on the monitor setup menu.

Selecting **Auto** will automatically set the measurable HR/PR source in the priority of ECG>SpO<sub>2</sub>>BP1.

<b>WARNING</b>	<ul style="list-style-type: none"><li>The HR/PR alarm will not be generated unless the parameter key corresponded to the selected HR/PR source is displayed. Be sure to display the parameter key for the HR/PR source.</li><li>The alarm for the parameter not selected for the “HR/PR Alarm Source” (ECG/SpO<sub>2</sub>/BP) will be set to OFF on the DS-7600 Central Monitor.<ul style="list-style-type: none"><li>The “HR/PR Alarm Source” setting will synchronize between the bedside monitor and the central monitor.</li><li>For example, if PR is set as the HR/PR alarm source on the DS-7100, HR alarm will be set to OFF on the central monitor.</li></ul></li></ul>
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<b>CAUTION</b>	In case of DS-LANII network, if <b>BP1</b> is selected for “HR/PR source” (Or, if <b>Auto</b> selects BP1 for HR/PR source), ECG waveform will not be transmitted on the network. On the central monitor, PR_BP value will be displayed instead of HR. However, on some central monitor depending on the model type, the HR value from ECG will be displayed on ST measurement list, etc. Refer to the operation manual for the respective central monitor. In case of DS-LANIII network, refer to the operation manual for the central monitor.
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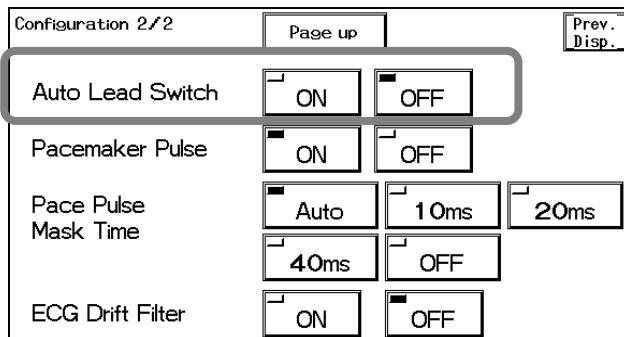
## Automatic Lead Switching

By setting the Automatic Lead Switching ON, a new ECG lead will be automatically set when the electrode comes off. When the lead off condition occurs, the "Check Electrodes" message will be displayed and a new ECG lead will be automatically set if the Automatic Lead Switching is set to ON.

### Lead Switching

Type	Electrode Off	Auto Lead Selected	
		ECG1	ECG2
5-electrode cable	RA / RA+V	III	III
	LA / LA+V	II	II
	V	II	aVR
4-electrode cable	RA	III	III
	LA	II	II

- 1** Press the **Config.** → **Page Down** keys to display the setup menu for setting the auto lead switching.



- 2** Select **ON** or **OFF**.

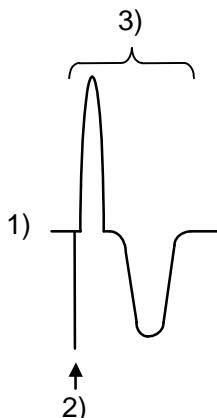
**OFF** will not switch the lead when an electrode comes off.

**ON** will automatically switch to another lead when an electrode comes off.

## Pacemaker Pulse

The artificial pace pulse can be displayed by superimposing it on the ECG waveform. The artificial pace pulse will be displayed in yellow.

### Pacemaker Pulse Detection Algorithm



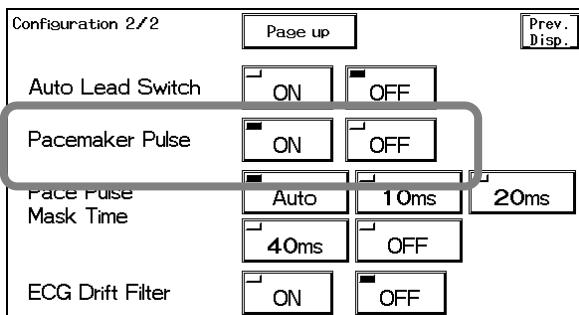
- 1) ECG Signal Input  
Inputs ECG signal.
- 2) Suspension of Pacemaker Pulse and QRS Detection  
Signals with high frequency and large amplitude will be detected as pacemaker pulse. When a pacemaker pulse is detected, QRS detection will be suspended for a certain amount of time to prevent the pacemaker pulse to be erroneously detected as QRS.
- 3) Canceling Arrhythmia Detection  
Arrhythmia detection will be cancelled to avoid detecting the waveform succeeding the pacemaker pulse as an abnormal beat.

### WARNING

Rate meters may continue to count the pacemaker rate during occurrences of cardiac arrest or some arrhythmias. Do not rely entirely upon rate meter alarms. Keep pacemaker patients under close surveillance. See "11 Technical Information" for disclosure of the pacemaker pulse rejection capability of this equipment.

 <b>CAUTION</b>	<p><b>Precautions about Pacemaker Pulse Detection</b></p> <ul style="list-style-type: none"> <li>● There are some cases when pacemaker pulse cannot be detected depending on the pacemaker type, pulse voltage, pulse width, electrode lead type (unipolar, bipolar), or electrode placement which causes the pacemaker pulse amplitude to decrease and disables pacemaker pulse detection.</li> <li>● If signals similar to a pacemaker pulse are present, such as electric blanket noise or excessive AC frequency noise, these may be erroneously detected and displayed as a pacemaker pulse.</li> <li>● When the spontaneous QRS and pacemaker pulse overlaps (as in a fusion beat), QRS detection will be suspended and the heart rate will be reduced.</li> <li>● If a pacemaker pulse is continuously detected due to AC frequency interference, QRS detection will be suspended and the heart rate will be reduced. Also arrhythmia detection will not be possible.</li> </ul>
--	---

- 1 Press the **Config.** → **Page Down** key to display the setup menu for pacemaker pulse selection.**



- 2 Select **ON** or **OFF**.**

**OFF** will not display the pacemaker artificial pulse.

**ON** will display the pacemaker artificial pulse in a different color from the ECG waveform.

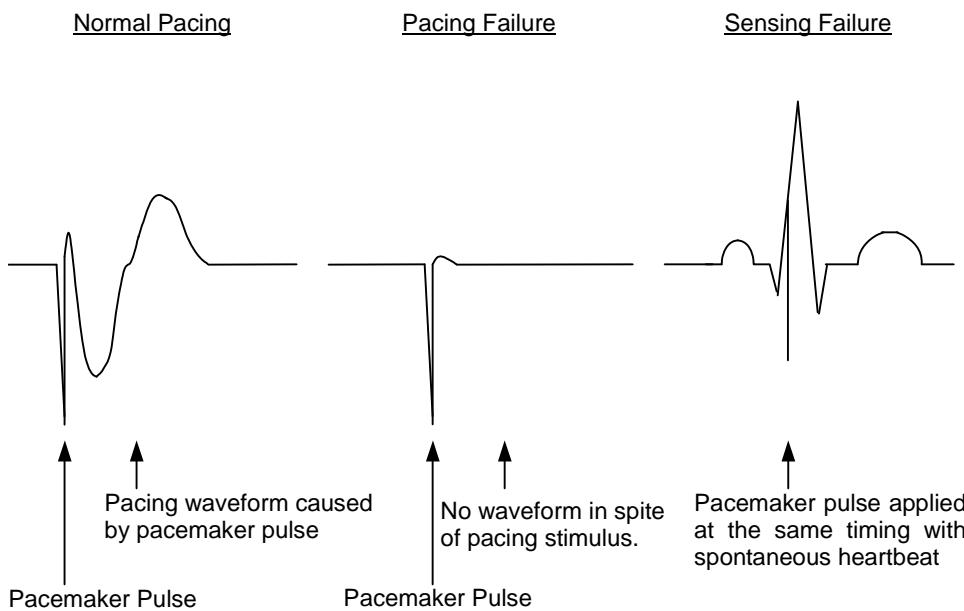
This will automatically be set to **ON** when "Used" is selected for pacemaker use on the patient admit / discharge menu.

## QRS Pace Mask

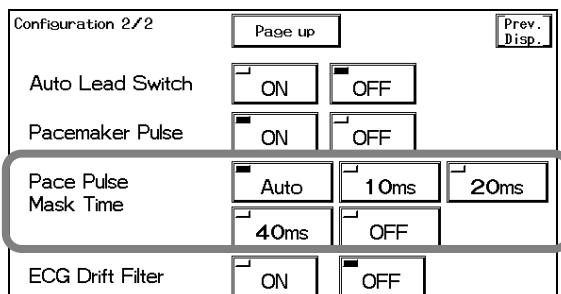
For patients using pacemakers, there are cases when the pacing waveform may not occur in spite of the pacing stimulus. This condition is called "pacing failure", or "failure to capture". To avoid detecting pacemaker pulses as a QRS complex, the monitor has a function to suspend QRS detection for a fixed amount of time starting from the detection of the pacing stimulus. This function is called "pace pulse mask". But if the pacemaker does not detect the patient's spontaneous heartbeat (sensing failure), and the pacing stimulus is applied at the same timing as QRS, this "pace pulse mask" function may erroneously mask the QRS and cause the heart rate measurement to decrease. To avoid this, QRS pace pulse mask function can be set to **OFF**.

**10ms**, or **20ms** for correct measurement of the heart rate. (default setting : ON)

 <b>WARNING</b>	<p>If the QRS pace mask function is set to <b>OFF</b>, <b>10ms</b>, or <b>20ms</b>, a decrease in heart rate may not generate HR or ASYSTOLE alarms due to erroneously detected QRS.</p> <p>Select <b>OFF</b>, <b>10ms</b>, or <b>20ms</b> only if you are sure that pacing failure will not occur, or when the patient can be constantly monitored.</p>
--	--



- 1 Press the **Config.** → **Page Down** keys to display the second page of the configuration menu.



- 2 Select the pace pulse mask time.

Select from **10ms**, **20ms**, **40ms** depending on the pace spike amplitude or presence of fusion beat.

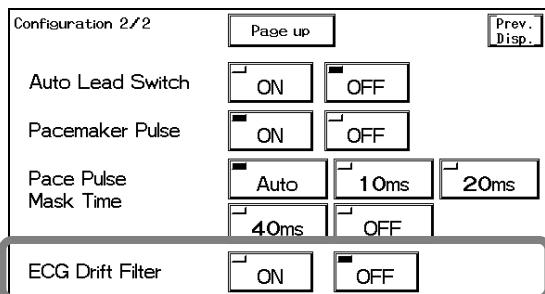
Selecting **OFF** will set the mask time to 0ms.

Selecting **Auto** will switch between **20ms** and **40ms** depending on the pace spike amplitude.

## ECG Drift Filter

By setting the ECG drift filter ON, only the amplitude with frequency component under 1Hz will be attenuated to prevent the ECG baseline drift.

- 1 Press the **Config.** → **Page Down** keys to display the second page of the configuration menu.



## 2 Select **ON** or **OFF** for the ECG drift filter.

Selecting **ON** will set the ECG drift filter and controls the baseline drift.

When the ECG drift filter is set, the patient signal display will delay about 0.5 seconds.

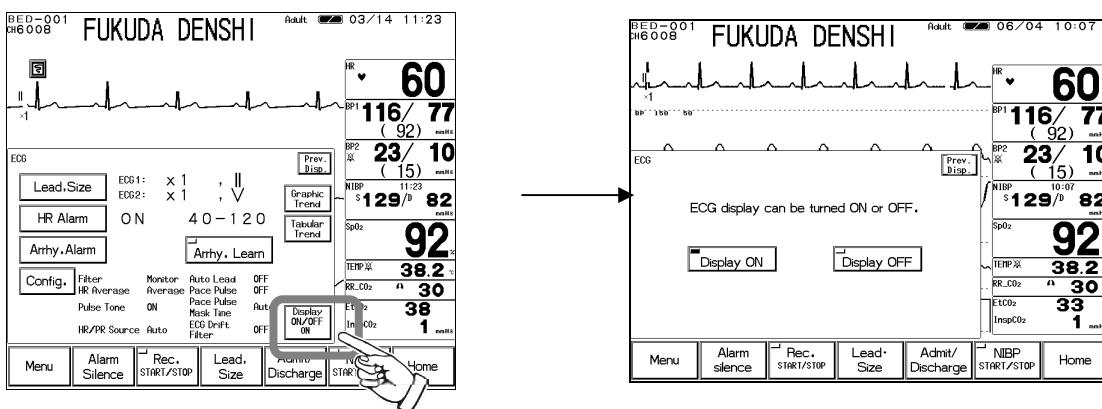
Selecting **OFF** will not set the ECG drift filter.

### NOTE

When a defibrillation and electrosurgery-proof ECG relay cable is used, ECG drift filter cannot be set to **ON**.

## ON/OFF of Parameter Display

### 1 Press the **Display ON/OFF** key. The confirmation display for ON/OFF of ECG display will appear.



### 2 Select **Display ON** or **Display OFF**.

**Display ON**

**Display OFF**

Pressing the **Display ON** key will display the waveform and numeric data.

Pressing the **Display OFF** key will not display the waveform and numeric data.



When ECG electrodes are attached to the patient with the ECG display set to OFF, the ECG waveform and numeric data will be automatically displayed after 10 seconds.

### ⚠ CAUTION

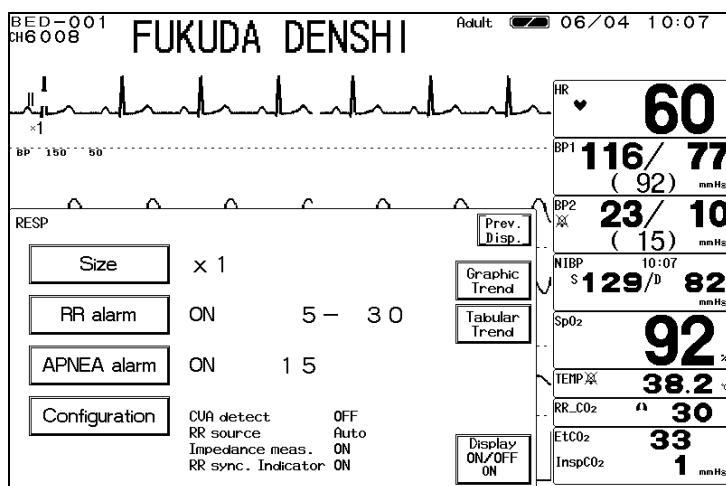
When the waveform and numeric data display is set to OFF, the alarm generation and tabular/graphic trend data input will also cease.

### NOTE

If HR/PR source is set to other than ECG, selecting **Display OFF** will display PR\_SpO<sub>2</sub> or PR\_BP for the HR parameter key.

## Respiration

This menu allows setup for the impedance respiration measurement and CO<sub>2</sub> respiration measurement.



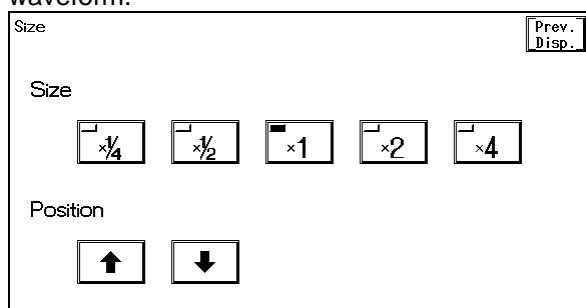
- Size : Selects the waveform size to display impedance respiration.  
RR Alarm : Selects ON/OFF of respiration rate alarm, and sets upper and lower alarm limits.  
APNEA Alarm : Selects ON/OFF of apnea alarm and sets upper alarm limit.  
Configuration : Sets the respiration monitoring configuration.

<b>⚠ CAUTION</b>	<ul style="list-style-type: none"><li>When the following relay cables are used, respiration cannot be measured.<ul style="list-style-type: none"><li>Relay Cable CI-700E-3 (FA) (Defibrillation and electrosurgery-proof, 3-electrode)</li><li>Relay Cable CI-700E-4 (FA) (Defibrillation and electrosurgery-proof, 4-electrode)</li><li>Relay Cable CI-700E-5 (FA) (Defibrillation and electrosurgery-proof, 5-electrode)</li></ul></li><li>When a defibrillator is used during respiration monitoring, a large offset voltage will be placed on the ECG electrodes, which may cause interruption of monitoring for a few seconds.</li></ul>
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## Respiration Waveform Size

- 1 Press the **Size** key to display the size setup menu.

Select the waveform size and baseline position to display and record the impedance respiration waveform.



- 2 Select the waveform size.

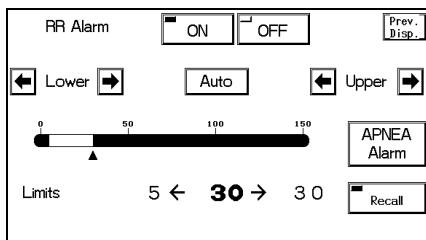
Select the size from  $\times 1/4$ ,  $\times 1/2$ ,  $\times 1$ ,  $\times 2$ ,  $\times 4$ .

- 3 Set the baseline position using the  $\uparrow$ ,  $\downarrow$  keys.

Adjust the baseline position if the waveform is hard to see due to the waveform amplitude.

## RR Alarm

- 1 Press the **RR Alarm** key to display alarm setup menu.



Set ON/OFF of RR alarm and upper and lower alarm limit. The alarm will be set common to RR measured from impedance respiration waveform or RR measured from CO<sub>2</sub> waveform.

The adjustable increment for upper and lower limit depends on the patient type.

Adult / Child : 5bpm increment

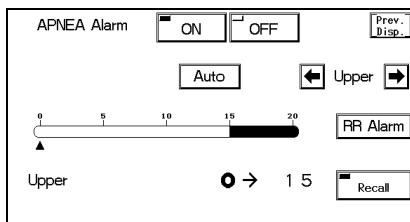
Neonate : 2bpm increment

<b>NOTE</b>	If the alarm is based on the RR measured from CO <sub>2</sub> waveform, RR alarm will not generate unless 2 or more respiration is detected within 30 seconds after power ON or after discharge.
-------------	--

Key	Item	Description
<b>ON</b> <b>OFF</b>	Individual Alarm	Selecting <b>ON</b> will generate the RR alarm. Selecting <b>OFF</b> will not generate the RR alarm.
<b>Lower</b> <b>Upper</b>	Lower Alarm Limit	Sets the lower alarm limit (5 to 145Bpm/2 to 148Bpm). Setting a value 5Bpm or below will turn OFF the alarm.
<b>Upper</b> <b>Lower</b>	Upper Alarm Limit	Sets the upper alarm limit (10 to 150Bpm/4 to 150Bpm). Setting a value 150Bpm or above will turn OFF the alarm.
<b>Auto</b>	Automatic Setup	Automatically sets the upper limit to +20Bpm, and the lower limit to -20Bpm to the current value.

## Apnea Alarm

- 1 Press the **Apnea Alarm** key to display the alarm setup menu.



Set ON/OFF of apnea alarm and upper limit of apnea time. Apnea will be set common to apnea time measured from impedance respiration waveform or apnea time measured from CO<sub>2</sub> waveform.

The upper limit can be set in 1-second increment. There is no lower limit.

<b>WARNING</b>	The purpose of this respiration alarm is to alert the user to evaluate for the possible occurrence of apnea events by identifying the absence of respiration. It is not intended to be classified as an "Apnea Monitor" and will not identify the condition creating the possible event. (Central, Obstructive or Mixed.)
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<b>NOTE</b>	If the alarm is based on the apnea time measured from CO <sub>2</sub> waveform, apnea alarm will not generate unless 2 or more respiration is detected within 30 seconds after power ON or after discharge.
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Key	Item	Description
<b>ON</b> <b>OFF</b>	Individual Setup	Selecting <b>ON</b> will generate the apnea alarm. Selecting <b>OFF</b> will not generate the apnea alarm.
<b>Upper</b> <b>Lower</b>	Upper Alarm Limit	Sets the upper alarm limit (5 to 20sec.). Setting a value equal to or above 20sec. will turn OFF the alarm.
<b>Auto</b>	Automatic Setup	Sets the apnea alarm value set for the currently selected alarm mode.

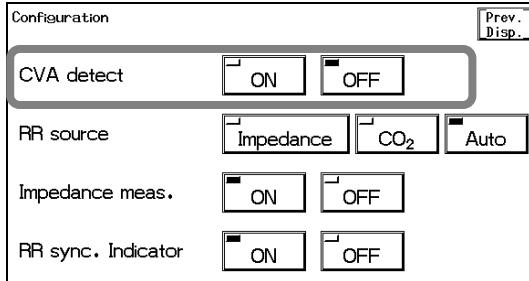
## CVA Detection

When the amplitude of the respiration waveform decreases due to causes such as respiratory pause, the ECG waveform may be superimposed on to the respiration waveform, making the RR equal to the HR. This condition is called CVA (Cardio-Vascular Artifact), and is detected using the CVA detection function.

If the ECG waveform is superimposed on to the respiration waveform, with HR (RR) 30bpm, for 20 seconds or over (10 seconds or over for neonates) and the CVA detection function set to ON, the "CVA detected" message will be displayed, and an alarm sound will be generated.

This function will be effective when **Impedance** is set as the RR source.

- 1 Press the **Configuration** key to display the setup menu for setting the CVA detection.



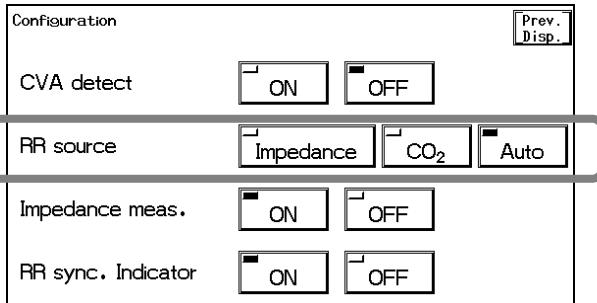
- 2 Select **ON** or **OFF**.

**ON** will generate an alarm and display a message when CVA is detected.  
**OFF** will not perform CVA detection.

## Respiration Source

The parameter to measure respiration rate and apnea time can be selected from impedance, CO<sub>2</sub>, or automatic. RR and apnea alarm will be generated according to the selected parameter. These will be also stored as graphic trend or tabular trend.

- 1 Press the **Configuration** key to display configuration menu for RR source selection.



- 2 Select the parameter.

RR\_IMP  
**30**

**Impedance** will measure respiration rate from impedance respiration curve. The numeric value will be indicated as "RR\_IMP" in the respiration parameter key. Impedance synchronized mark will be displayed.

RR\_CO<sub>2</sub>  
**30**

**CO<sub>2</sub>** will measure respiration rate from CO<sub>2</sub> waveform. The numeric value will be indicated as "RR\_CO<sub>2</sub>" in the respiration parameter key. CO<sub>2</sub> synchronized mark will be displayed.

**Auto** will automatically select the parameter to measure the respiration rate with the priority order of CO<sub>2</sub>>impedance.

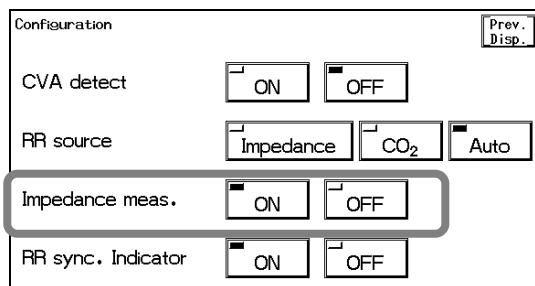
<b>⚠ WARNING</b>	The RR/APNEA alarm will not be generated unless the parameter key corresponded to the selected RR/APNEA source is displayed. Be sure to display the parameter key for the RR/APNEA source.
<b>⚠ CAUTION</b>	<ul style="list-style-type: none"> <li>If the "RR source" is other than impedance respiration (Or, if <b>Auto</b> selects the RR source other than impedance respiration), the respiration waveform will not be transmitted on the DS-LANII network, and will not be recorded on the central recorder.</li> <li>If the "RR source" is other than CO<sub>2</sub> (Or, if <b>Auto</b> selects the RR source other than CO<sub>2</sub>), the CO<sub>2</sub> waveform will not be transmitted on the DS-LANII network, and will not be recorded on the central recorder. For case when transmitted on the DS-LANIII network, please refer to the operation manual of the central monitor.</li> </ul>

## Impedance Respiration Measurement

The respiration measurement using the impedance method conducts high-frequency and weak current between the ECG electrodes attached to the patient, and measures the potential difference between the electrodes caused by thoracic movement using the synchronous rectification system. For a patient using the adaptive (minute ventilation) pacemaker, the pacemaker measurement signal and the high-frequency current of this equipment interferes with each other which causes incorrect respiration measurement.

If the patient is using an adaptive (minute ventilation) pacemaker, set the impedance respiration measurement OFF.

- 1 Press the **Configuration** key to display the setup menu to set the impedance respiration measurement.



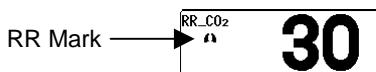
- 2 Select **ON** or **OFF**.

**ON** will perform standard impedance respiration measurement.

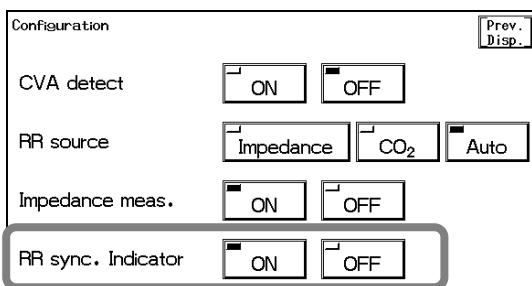
**OFF** will stop the impedance respiration measurement and will not display the impedance respiration waveform and RR. A high frequency electric discharge which is a measurement signal will be also ceased.

## RR Synchronization Mark

The RR mark synchronized to impedance respiration or CO<sub>2</sub> waveform will be displayed inside the parameter key.



- 1 Press the **Configuration** key to display the setup menu for setting the RR synchronized Mark.

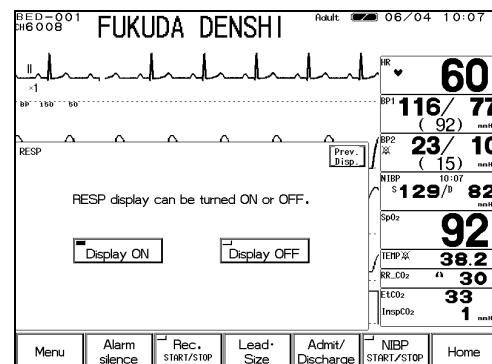
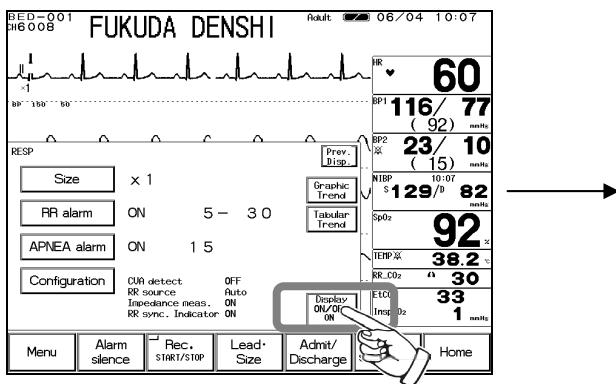


- 2 Select **ON** or **OFF**.

**OFF** will not display the synchronization mark.  
**ON** will display the synchronization mark.

## ON/OFF of Parameter Display

- 1 Press the **Display ON/OFF** key. The confirmation display for ON/OFF of RESP display will appear.

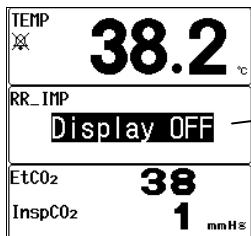


- 2 Select **Display ON** or **Display OFF**.



Pressing the **Display ON** key will display the waveform and numeric data.

Pressing the **Display OFF** key will not display the waveform and numeric data.



The Display OFF message will be displayed inside the parameter key.

When ECG electrodes are attached to the patient with the respiration display set to OFF, the respiration waveform and numeric data will be automatically displayed after 10 seconds.

**⚠ CAUTION**

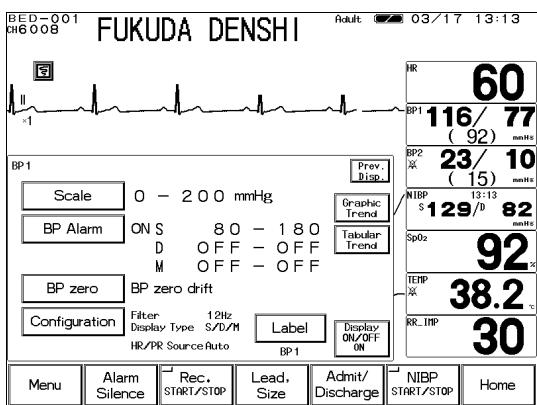
When waveform and numeric data display is set to OFF, the alarm generation and tabular/graphic trend data input will also cease.

**NOTE**

The "Display ON/OFF" selection is not effective if RR source is CO<sub>2</sub>. When RR source is CO<sub>2</sub>, RR-CO<sub>2</sub> parameter key will be always in "Display ON" condition.

# Invasive Blood Pressure (BP1, BP2)

This menu allows setup of the measurement condition for BP1, BP2.



- Label : Selects the label for BP measurement site.  
Scale : Selects the scale for BP waveform display.  
BP Alarm : Sets the upper and lower alarm limit of systolic, diastolic, mean blood pressure and ON/OFF of the alarm.  
BP Zero : Performs zero balance.  
Configuration : Sets the BP monitoring condition.

## CAUTION

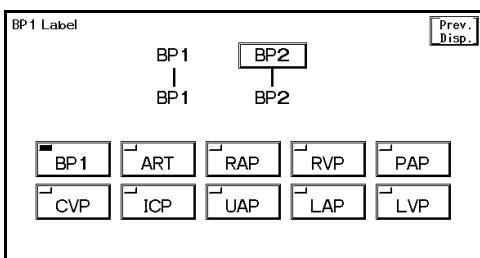
- When the main power is turned ON, the BP value will not be displayed until zero balance is performed. Make sure to perform the zero balance.
- During IABP treatment, the displayed BP value may differ from actual value.

## Label

### NOTE

- Changing the label will initialize the BP scale and display type.
- The same label cannot be selected for BP1 and BP2.

1 Press the **Label** key.



The BP label setup menu will be displayed.  
Select the BP label for display and recording.

2 Select the label.

Select from **BP\***, **ART**, **RAP**, **RVP**, **PAP**, **CVP**, **ICP**, **UAP**, **LAP**, **LVP**.

### [Meaning of Each Label]

- ART : Arterial Pressure
- RAP : Right Atrial Pressure
- RVP : Right Ventricular Pressure
- PAP : Pulmonary Artery Pressure
- CVP : Central Venous Pressure
- ICP : Intra-cranial Pressure
- UAP : Umbilical Artery Pressure
- LAP : Left Atrial Pressure
- LVP : Left Ventricular Pressure

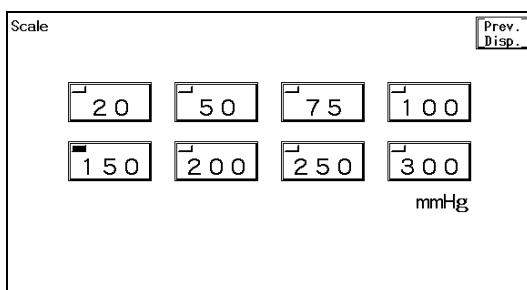
**[Default Display Type and Scale of Each Label]**

	Default Display Type	Default Scale			
		BP unit: "mmHg"		BP unit: "kPa"	
		Adult	Child/Neonate	Adult	Child/Neonate
BP1	S/D/M	200	100	24	16
BP2	S/D/M	50	50	8	8
ART	S/D/M	200	100	24	16
RAP	M	20	20	4	4
RVP	S/D/M	50	50	8	8
PAP	S/D/M	50	50	8	8
CVP	M (fixed)	20	20	4	4
ICP	M	50	50	8	8
UAP	S/D/M	100	100	16	16
LAP	M	50	50	8	8
LVP	S/D/M	200	100	24	16

## BP Scale (BP1, BP2)

- 1 Press the **Scale** key to display the BP scale setup menu.

Select the full scale for displaying and recording.



- 2 Select the scale.

Select from 20, 50, 75, 100, 150, 200, 250, 300 (mmHg).

When the measurement unit is kPa, select from 4, 8, 12, 16, 20, 24, 32, 40 (kPa).

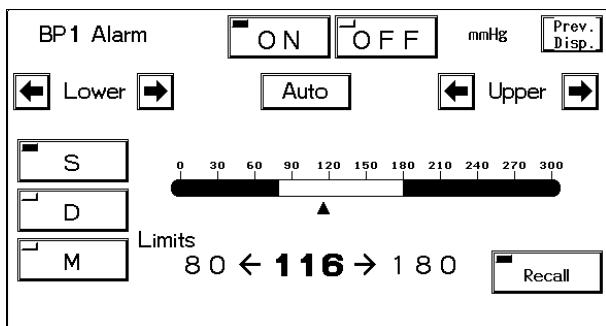


CAUTION For telemetry transmission, BP waveform with a scale above the programmed scale cannot be properly transmitted. Set the appropriate scale.

## BP Alarm (BP1, BP2)

- 1 Press the **BP Alarm** key to display the alarm setup menu.

Select ON/OFF of BP alarm and set the upper and lower alarm limit for systolic (S), diastolic (D), and mean (M) BP.



The alarm value is to be set for each measurement unit. (mmHg / kPa)

The adjustable increment for upper and lower limit changes from 50mmHg / 7kPa.

mmHg : 0 to 50mmHg / 2mmHg increment

50 to 300mmHg / 5mmHg increment

kPa : 0 to 7kPa / 0.2kPa increment

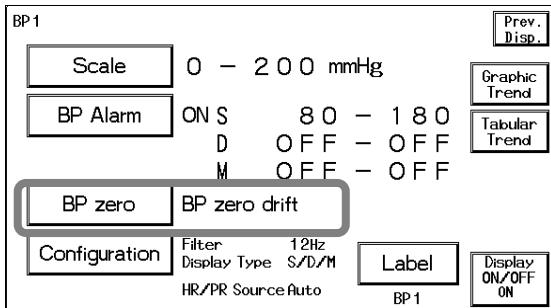
7.0 to 40.0kPa / 0.5kPa increment

Key	Item	Description
<b>ON</b> <b>OFF</b>	Individual Alarm	Selecting <b>ON</b> will generate BP alarm. Selecting <b>OFF</b> will not generate BP alarm.
<b>S</b> <b>D</b> <b>M</b>		Select from S (systolic BP), D (diastolic BP), M (mean BP).
<b>Lower</b> <b>Upper</b>	Lower Alarm Limit Upper Alarm Limit	Sets the lower alarm limit (0 to 295mmHg/0 to 39.5kPa). Setting a value equal to or below 0mmHg/0kPa will turn OFF the alarm.  Set the upper limit (2 to 300 mmHg/0.2 to 40.0kPa). Setting a value equal to or above 300 mmHg/40.0kPa will turn OFF the alarm.
<b>Auto</b>	Automatic Setup	Automatically sets the upper limit to +40mmHg/+5 kPa, and the lower limit to -20mmHg/-3kPa to the current value.

<b>NOTE</b>	The alarm cannot be set if not displayed. For example if <b>S/D</b> is selected for the display type, alarm setup for the mean BP cannot be performed. If <b>M</b> is selected, alarm setup for the systolic and diastolic BP cannot be performed.
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## Zero Balance of Pressure Lines (BP1, BP2)

- 1** Open the three-way valve of the pressure transducer to air.
- 2** Press the **BP zero** key.



Verify the BP waveform is positioned at zero, and "0" is displayed for the BP value. A message, "BP zero complete" will be displayed when the procedure is complete. A message, "BP zero failed" will be displayed when the process fails. The three-way valve may not be opened to air, noise has interfered, or the transducer may be defective. Check the cause and try the zero balance procedure again. A message, "BP zero drift" will be displayed when the interface cable is not connected. Check if the cable is firmly connected.

- 3** Close the three-way valve when the zero balance is complete.

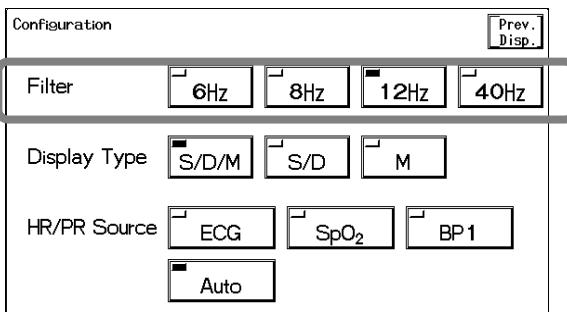


**CAUTION** Each time the blood pressure transducer or tubing is replaced, the zero balance procedure is required to ensure accurate measurements.

## Filter Selection (BP1, BP2)

An artifact may interfere on the BP waveform depending on the combination of BP measurement circuit. Select an appropriate filter from the low-pass filter of 6Hz, 8Hz, 12Hz, 40Hz.

- 1** Press the **Configuration** key to display the setup menu for selecting a filter.



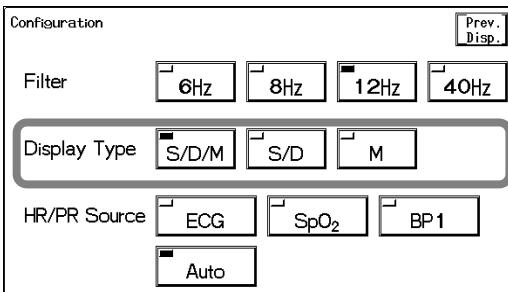
- 2** Select the filter.

Select an appropriate filter from **6Hz**, **8Hz**, **12Hz**, **40Hz**.

## Display Type

The BP display type can be selected from systolic/diastolic/mean, systolic/diastolic, or mean BP. The alarm will not be generated for the not displayed BP value. If the BP label is CVP, the display type is fixed.

- 1 Press the **Configuration** key.



- 2 Select the display type.

BP1 **116/ 77**  
( 92 ) mmHg

**S/D/M** will display systolic, diastolic, and mean blood pressure.

BP1 **116/ 77**  
mmHg

**S/D** will display systolic and diastolic blood pressure.

BP1 **92**  
mmHg

**M** will display only the mean pressure.

### ⚠ CAUTION

- The alarm for any BP not displayed will not be generated. Also, any BP not selected for the display type will not be added to the trend function. Select the appropriate display type according to the monitoring purpose.
- When the BP label is CVP, the display type is fixed as **M**, and cannot be changed.

## HR/PR Source (BP1)

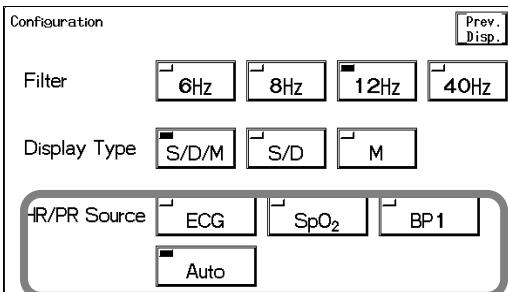
The HR/PR source to display on the home display can be selected.

The alarm will be generated based on this selection.

The graphic trend and tabular trend will be also stored based on this selection.

BP2 cannot be set as HR/PR source.

- 1 Press the **Configuration** key to display the setup menu to set the HR/PR source.



## 2 Select a parameter.



Selecting [ECG] will measure the HR from ECG.  
“HR” will be displayed inside the parameter key.  
HR synchronized mark will be displayed.



Selecting [SpO<sub>2</sub>] will measure the PR from SpO<sub>2</sub>.  
“PR\_SpO<sub>2</sub>” will be displayed inside the parameter key.  
SpO<sub>2</sub> synchronized mark will be displayed.



Selecting [BP1] will measure the PR from BP1.  
BP synchronized mark will be displayed.  
“PR\_BP” will be displayed inside the parameter key.

[BP1] can be selected only when [ECG/SpO<sub>2</sub>/BP1] is selected as “HR/PR source” on the monitor setup menu.

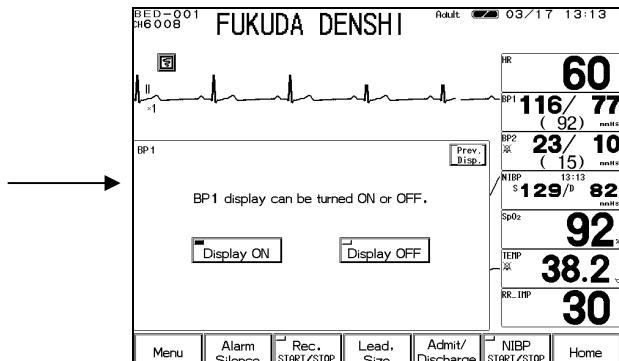
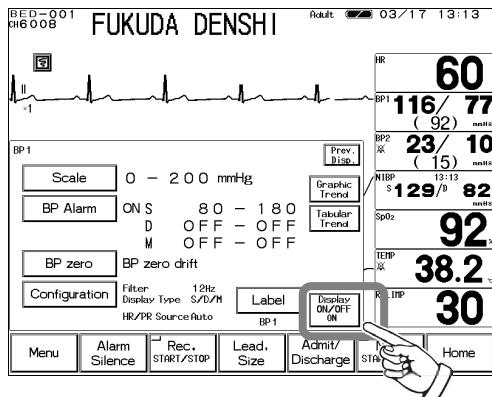
Selecting [Auto] will automatically set the measurable HR source in the priority of ECG>SpO<sub>2</sub>>BP1.

<b>⚠ WARNING</b>	<ul style="list-style-type: none"> <li>The HR/PR alarm will not be generated unless the parameter key corresponded to the selected HR/PR source is displayed. Be sure to display the parameter key for the HR/PR source.</li> <li>The alarm for the parameter not selected for the “HR/PR Alarm Source” (ECG/SpO<sub>2</sub>/BP) will be set to OFF on the DS-7600 Central Monitor.           <ul style="list-style-type: none"> <li>The “HR/PR Alarm Source” setting will synchronize between the bedside monitor and the central monitor.</li> <li>For example, if PR is set as the HR/PR alarm source on the DS-7100, HR alarm will be set to OFF on the central monitor.</li> </ul> </li> </ul>
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<b>⚠ CAUTION</b>	<p>In case of DS-LANII network, if [BP1] is selected for “HR/PR source” (Or, if [Auto] selects BP1 for HR/PR source), ECG waveform will not be transmitted on the network. On the central monitor, PR_BP value will be displayed instead of HR. However, on some central monitor depending on the model type, the HR value from ECG will be displayed on ST measurement list, etc. Refer to the operation manual for the respective central monitor.</p> <p>In case of DS-LANIII network, refer to the operation manual for the central monitor.</p>
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## ON/OFF of Parameter Display

- 1 Press the [Display ON/OFF] key. The confirmation display for ON/OFF of BP display will appear.



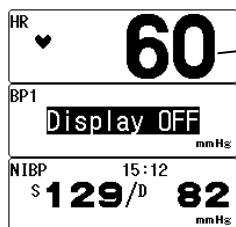
- 2 Select [Display ON] or [Display OFF].

Display ON

Display OFF

Pressing the [Display ON] key will display the waveform and numeric data.

Pressing the [Display OFF] key will not display the waveform and numeric data.



The Display OFF message will be displayed inside the parameter key.



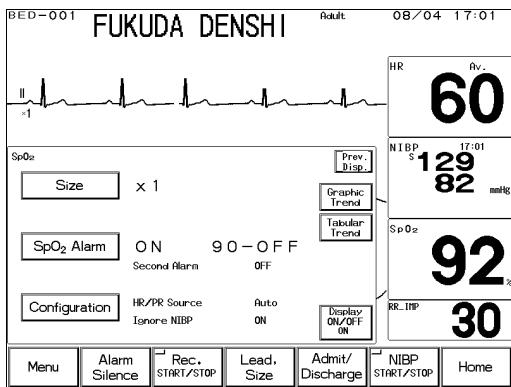
### CAUTION

- When waveform and numeric data display is set to OFF, the alarm generation and tabular/graphic trend data input will also cease.
- If BP display is set to OFF, pulse rate will not be displayed if HR/PR source is set to BP1.

## SpO<sub>2</sub>

(Nellcor® SpO<sub>2</sub> Unit; DS-7141, DS-7101LT, DS-7101L)

This menu allows setup of the SpO<sub>2</sub> monitoring condition for NELLCOR® SpO<sub>2</sub> unit.



Size : Sets the waveform size for SpO<sub>2</sub> waveform display.

SpO<sub>2</sub> Alarm : Sets ON/OFF of alarm, upper and lower alarm limit, and SEC alarm.

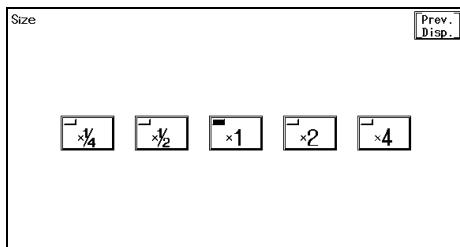
Configuration : Sets the SpO<sub>2</sub> monitoring configuration.

## Pulse Wave Size

6

- 1 Press the **Size** key to display the pulse wave size setup menu.

Select the pulse wave size for displaying and recording.



- 2 Select the waveform size.

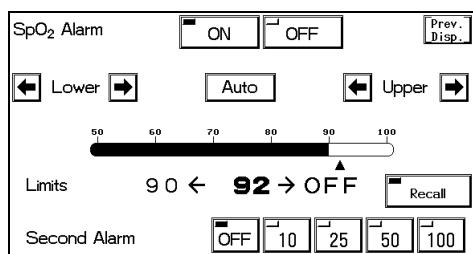
Select the size from **x1/4**, **x1/2**, **x1**, **x2**, **x4**.

## SpO<sub>2</sub> Alarm

- 1 Press the **SpO<sub>2</sub> Alarm** key to display the alarm setup menu.

Select ON/OFF of SpO<sub>2</sub> alarm, and set the upper and lower alarm limit.

Also, when the SpO<sub>2</sub> value is unstable around the lower alarm limit, the frequently generated alarm can be corrected by setting the SEC (second) alarm function.



Refer to "4. Monitoring Setup SpO<sub>2</sub> SEC Alarm Setup" for details of SEC alarm setup procedure.

The upper and lower limits can be set in 1% increment.

Key	Item	Description
<input type="checkbox"/> ON <input type="checkbox"/> OFF	Individual Alarm	Selecting <input type="checkbox"/> ON will generate the SpO <sub>2</sub> alarm. Selecting <input type="checkbox"/> OFF will not generate the SpO <sub>2</sub> alarm.
<input type="checkbox"/> Lower <input type="checkbox"/> Upper	Lower Alarm Limit	Sets the lower alarm limit (50 to 99%). Setting a value 50% or below will turn OFF the alarm.
<input type="checkbox"/> Lower <input type="checkbox"/> Upper	Upper Alarm Limit	Sets the upper alarm limit (52 to 100%). Setting a value 100% or above will turn OFF the alarm.
<input type="checkbox"/> Auto	Automatic Setup	Automatically sets the upper limit to OFF, and the lower limit to 95% to the current value.

NOTE	Whether to use the SEC (second) alarm function and its threshold selection should be based on the patient's clinical indication portent and medical evaluation.
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## HR/PR Source

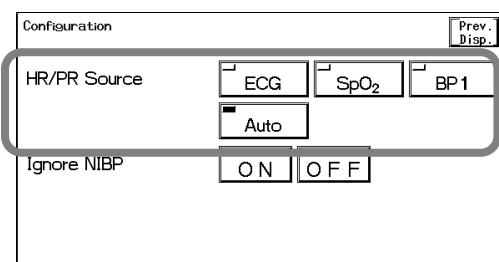
The HR/PR source to display on the home display can be selected.

The alarm will be generated based on this selection.

The graphic trend and tabular trend will be also stored based on this selection.

NOTE	If "HR/PR Source" is <input type="checkbox"/> SpO <sub>2</sub> and "Pulse Tone" is <input type="checkbox"/> SpO <sub>2</sub> for the ECG setup, a tone synchronized to pulse wave will generate. The tone will increase as SpO <sub>2</sub> value increases, and will decrease as SpO <sub>2</sub> value decreases.
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- 1 Press the **Configuration** key to display the setup menu to set the HR/PR source.



- 2 Select a parameter.

HR **60**

Selecting  ECG will measure the HR from ECG.  
"HR" will be displayed inside the parameter key.

HR synchronized mark will be displayed.

PR\_SpO<sub>2</sub> **60**

Selecting  SpO<sub>2</sub> will measure the PR from SpO<sub>2</sub>.  
"PR\_SpO<sub>2</sub>" will be displayed inside the parameter key.

SpO<sub>2</sub> synchronized mark will be displayed.

PR\_BP **60**

Selecting  BP1 will measure the PR from BP1.

BP synchronized mark will be displayed.

"PR\_BP" will be displayed inside the parameter key.

BP1 can be selected only when  ECG/SpO<sub>2</sub>/BP1 is selected as "HR/PR source" on the monitor setup menu.

Selecting  Auto will automatically set the HR/PR source in the priority of ECG > SpO<sub>2</sub> > BP1.

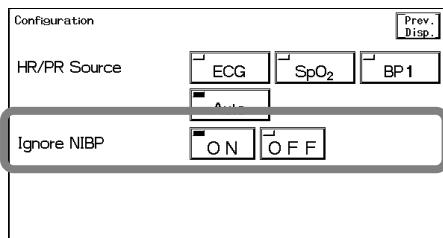
<b>⚠ WARNING</b>	<ul style="list-style-type: none"> <li>The HR/PR alarm will not be generated unless the parameter key corresponded to the selected HR/PR source is displayed. Be sure to display the parameter key for the HR/PR source.</li> <li>The alarm for the parameter not selected for the "HR/PR Alarm Source" (ECG/SpO<sub>2</sub>/BP) will be set to OFF on the DS-7600 Central Monitor.</li> <li>The "HR/PR Alarm Source" setting will synchronize between the bedside monitor and the central monitor.</li> <li>For example, if PR is set as the HR/PR alarm source on the DS-7100, HR alarm will be set to OFF on the central monitor.</li> </ul>
<b>⚠ CAUTION</b>	<p>In case of DS-LANII network, if <b>BP1</b> is selected for "HR/PR source" (Or, if <b>Auto</b> selects BP1 for HR/PR source), ECG waveform will not be transmitted on the network. On the central monitor, PR_BP value will be displayed instead of HR. However, on some central monitor depending on the model type, the HR value from ECG will be displayed on ST measurement list, etc. Refer to the operation manual for the respective central monitor.</p> <p>In case of DS-LANIII network, refer to the operation manual for the central monitor.</p>

## SpO<sub>2</sub> Alarm during NIBP Measurement (Ignore NIBP)

This setup is to be made when the SpO<sub>2</sub> sensor and NIBP cuff is placed on the same limb for measurement. During the NIBP measurement, the cuff inflation restricts the blood flow which disables the correct detection of the SpO<sub>2</sub> value and PR, and may generate an improper alarm.

Selecting **OFF** will not generate the alarm until the NIBP measurement is complete. Similarly, when the HR source is set as **SpO<sub>2</sub>**, the PR alarm will not be generated during NIBP measurement.

- 1 Press the **Configuration** key to display the setup menu for setting "Ignore NIBP".



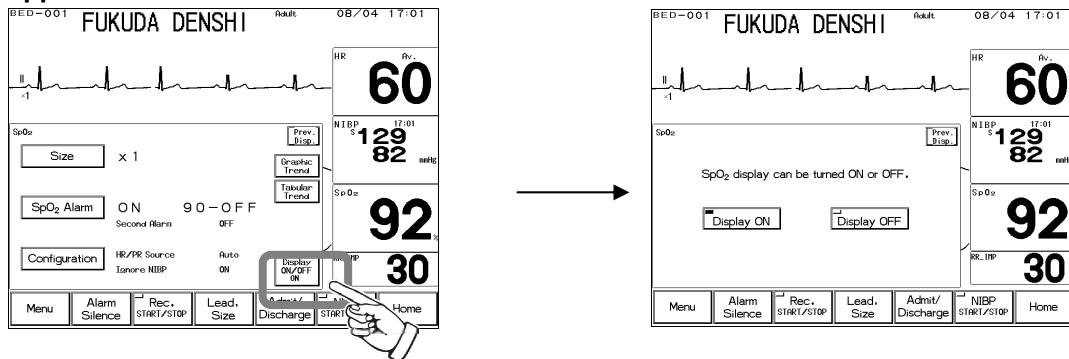
- 2 Select **ON** or **OFF**.

**ON** will generate the alarm during NIBP measurement.

**OFF** will not generate the SpO<sub>2</sub>/PR alarm during NIBP measurement.

## ON/OFF of Parameter Display

- 1 Press the **Display ON/OFF** key. The confirmation display for ON/OFF of SpO<sub>2</sub> display will appear.



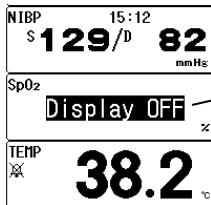
- 2 Select **Display ON** or **Display OFF**.

**Display ON**

**Display OFF**

Pressing the **Display ON** key will display the waveform and numeric data.

Pressing the **Display OFF** key will not display the waveform and numeric data.



The Display OFF message will be displayed inside the parameter key.

When SpO<sub>2</sub> sensor is attached to the patient with the SpO<sub>2</sub> display set to OFF, and SpO<sub>2</sub> can be measured for 10 seconds, the SpO<sub>2</sub> waveform and numeric data will be automatically displayed.

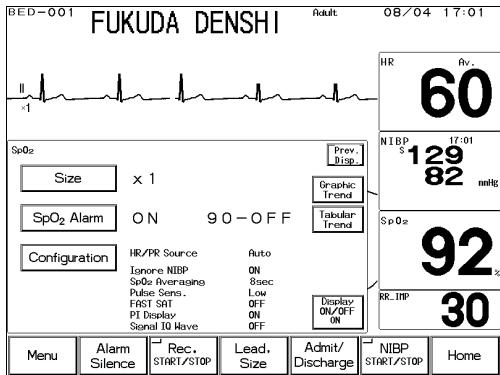
### ⚠ CAUTION

- When the waveform and numeric data display is set to OFF, the alarm generation and tabular/graphic trend data input will also cease.
- If SpO<sub>2</sub> display is set to OFF, pulse rate will not be displayed if HR/PR source is set to SpO<sub>2</sub>.

## SpO<sub>2</sub>

## (Masimo® SpO<sub>2</sub> Unit; DS-7141M, DS-7101LTM, DS-7101LM)

This menu allows the setup of SpO<sub>2</sub> monitoring condition for MASIMO® SpO<sub>2</sub> unit.



Size : Sets the pulse wave size.

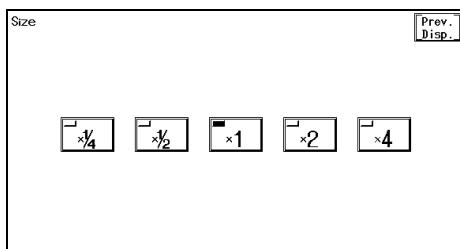
SpO<sub>2</sub> Alarm : Sets ON/OFF of alarm and upper and lower alarm limit.

Configuration : Sets the SpO<sub>2</sub> monitoring configuration.

### Pulse Wave Size

- 1 Press the **Size** key to display the pulse wave size setup menu.

Select the waveform size for displaying and recording.



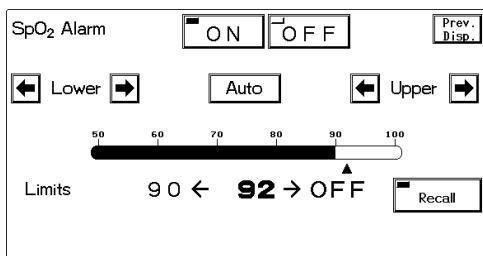
- 2 Select the waveform size.

Select the size from **x1/4**, **x1/2**, **x1**, **x2**, **x4**.

### SpO<sub>2</sub> Alarm

- 1 Press the **SpO<sub>2</sub> Alarm** key to display the alarm setup menu.

Select ON/OFF of SpO<sub>2</sub> alarm, and set the upper and lower alarm limit.



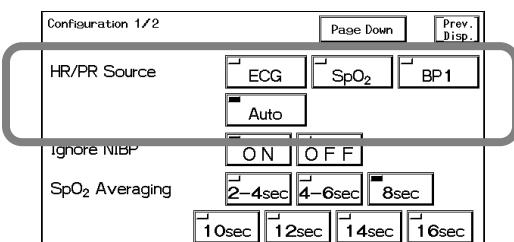
The upper and lower limits can be set in 1% increment.

Key	Item	Description
<input type="checkbox"/> ON <input type="checkbox"/> OFF	Individual Alarm	Selecting <input type="checkbox"/> ON will generate the SpO <sub>2</sub> alarm. Selecting <input type="checkbox"/> OFF will not generate the SpO <sub>2</sub> alarm.
<input type="checkbox"/> Lower <input type="checkbox"/> Higher	Lower Alarm Limit	Sets the lower alarm limit (50 to 99%). Setting a value 50% or below will turn OFF the alarm.
<input type="checkbox"/> Upper <input type="checkbox"/> Lower	Upper Alarm Limit	Sets the upper alarm limit (52 to 100%). Setting a value 100% or above will turn OFF the alarm.
<input type="checkbox"/> Auto	Automatic Setup	Automatically sets the upper limit to OFF, and the lower limit to 95% to the current value.

## HR/PR Source

The HR/PR source to display on the home display can be selected. The alarm will be generated based on this selection. The graphic trend and tabular trend will be also stored based on this selection.

- 1 Press the **Configuration** key to display the setup menu to set the HR/PR source.



- 2 Select a parameter.

**HR** **60**

Selecting **ECG** will measure the HR from ECG.  
“HR” and HR synchronized mark will be displayed inside the parameter key.

**PR\_SpO2** **60**

Selecting **SpO<sub>2</sub>** will measure the PR from SpO<sub>2</sub>.  
“PR\_SpO<sub>2</sub>” and SpO<sub>2</sub> synchronized mark will be displayed inside the parameter key.

**PR\_BP** **60**

Selecting **BP1** will measure the PR from BP1.  
“PR\_BP” and BP synchronized mark will be displayed inside the parameter key.  
**BP1** can be selected only when **ECG/SpO<sub>2</sub>/BP1** is selected as “HR/PR source” on the monitor setup menu.

Selecting **Auto** will automatically set the HR/PR source in the priority of ECG>SpO<sub>2</sub>>BP1.

<b>⚠ WARNING</b>	<ul style="list-style-type: none"> <li>The HR/PR alarm will not be generated unless the parameter key corresponded to the selected HR/PR source is displayed. Be sure to display the parameter key for the HR/PR source.</li> <li>The alarm for the parameter not selected for the “HR/PR Alarm Source” (ECG/SpO<sub>2</sub>/BP) will be set to OFF on the DS-7600 Central Monitor.           <ul style="list-style-type: none"> <li>The “HR/PR Alarm Source” setting will synchronize between the bedside monitor and the central monitor.</li> <li>For example, if PR is set as the HR/PR alarm source on the DS-7100, HR alarm will be set to OFF on the central monitor.</li> </ul> </li> </ul>
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<b>⚠ CAUTION</b>	<p>In case of DS-LANII network, if <b>BP1</b> is selected for “HR/PR source” (Or, if <b>Auto</b> selects BP1 for HR/PR source), ECG waveform will not be transmitted on the network. On the central monitor, PR_BP value will be displayed instead of HR. However, on some central monitor depending on the model type, the HR value from ECG will be displayed on ST measurement list, etc. Refer to the operation manual for the respective central monitor.</p> <p>In case of DS-LANIII network, refer to the operation manual for the central monitor.</p>
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## SpO<sub>2</sub> Alarm during NIBP Measurement (Ignore NIBP)

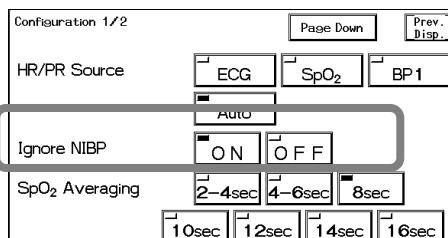
This setup is to be made when the SpO<sub>2</sub> sensor and NIBP cuff is placed on the same limb for measurement.

During the NIBP measurement, the cuff inflation restricts the blood flow which disables the correct detection of the SpO<sub>2</sub> value and PR, and may generate an improper alarm.

Selecting **OFF** will not generate the alarm until the NIBP measurement is complete.

Similarly, when the HR source is set as **SpO<sub>2</sub>**, the PR alarm will not be generated during NIBP measurement.

- 1 Press the **Configuration** key to display the setup menu for setting "Ignore NIBP".



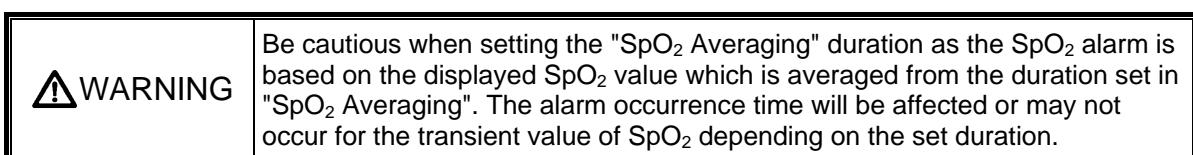
- 2 Select **ON** or **OFF**.

**ON** will generate the alarm during NIBP measurement.

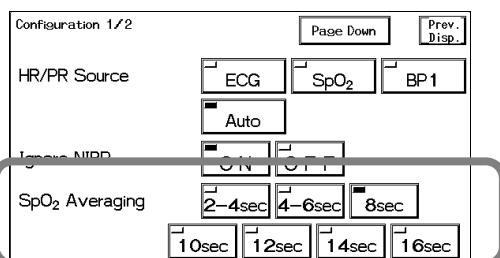
**OFF** will not generate the SpO<sub>2</sub>/PR alarm during NIBP measurement.

## SpO<sub>2</sub> Averaging

The averaging duration for SpO<sub>2</sub> value can be selected.



- 1 Press the **Configuration** key.



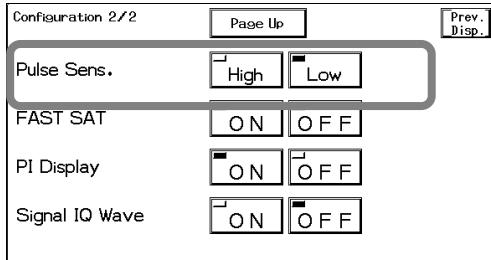
The configuration menu to select the SpO<sub>2</sub> averaging duration will be displayed.

- 2 Select the averaging duration from **2-4sec** / **4-6sec** / **8sec** / **10sec** / **12sec** / **14sec** / **16 sec**.

## Pulse Wave Detection Sensitivity

The sensitivity to detect the pulse wave can be selected from high or low.

- 1 Press the **Configuration** → **Page Down** key.



The configuration menu to select the pulse wave sensitivity will be displayed.

- 2 Select from **High** or **Low**.

For standard use, select **Low**.

To improve the low perfusion condition, or to perform fast tracking when the SpO<sub>2</sub> value changes abruptly, select **High**.



**CAUTION** If **High** is selected, sensor-off detection will become somewhat inaccurate.

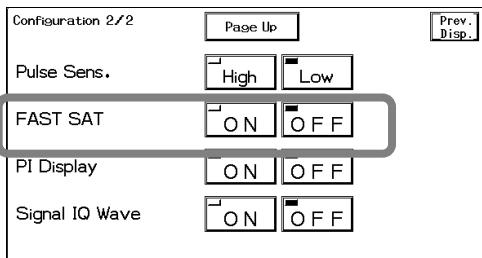
## FAST SAT Setup

By selecting ON for "FAST SAT", abrupt change of the SpO<sub>2</sub> value can be monitored.

### NOTE

To pick up the abrupt change of the value sooner, and to take advantage of the qualities of FAST SAT mode, it is recommended to set **2-4sec** for SpO<sub>2</sub> averaging time when FAST SAT is set ON.

- 1 Press the **Configuration** → **Page Down** key.



The configuration menu to set the FAST SAT will be displayed.

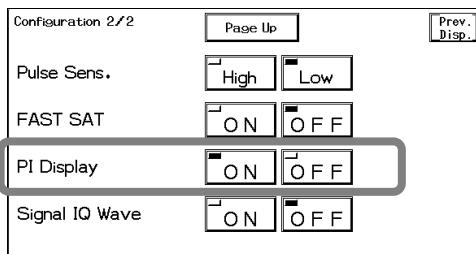
- 2 Select from **ON** or **OFF**.

## PI Display

Whether or not to display the PI (Perfusion Index) data can be selected.

The perfusion index is calculated by pulsatile signal ÷ apulsatile signal ×100, and indicates patient's circulation condition. This can be used to find a good perfusion site to attach the sensor. Also, it can be used as diagnosis index to predict the patient's critical condition when at low perfusion.

- 1 Press the **Configuration** → **Page Down** key.



The configuration menu to set the PI display will be displayed.

- 2 Select from **ON** or **OFF**.



**ON** will display the perfusion index.



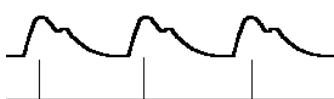
**OFF** will not display the perfusion index.



**CAUTION** If **OFF** is selected, "SpO<sub>2</sub> Low Perfusion" alarm will be indicated by message display only. The alarm sound will not be generated.

## Signal IQ Wave Display

Whether or not to display the signal IQ wave can be selected.



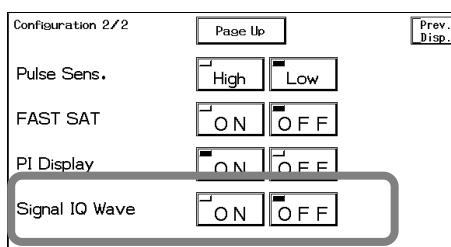
The signal IQ wave indicates the signal force and pulse wave timing.

The vertical length indicates the signal quality. A low vertical line indicates a bad signal quality.

**NOTE**

The signal IQ wave cannot be recorded.

- 1 Press the **Configuration** → **Page Down** key.

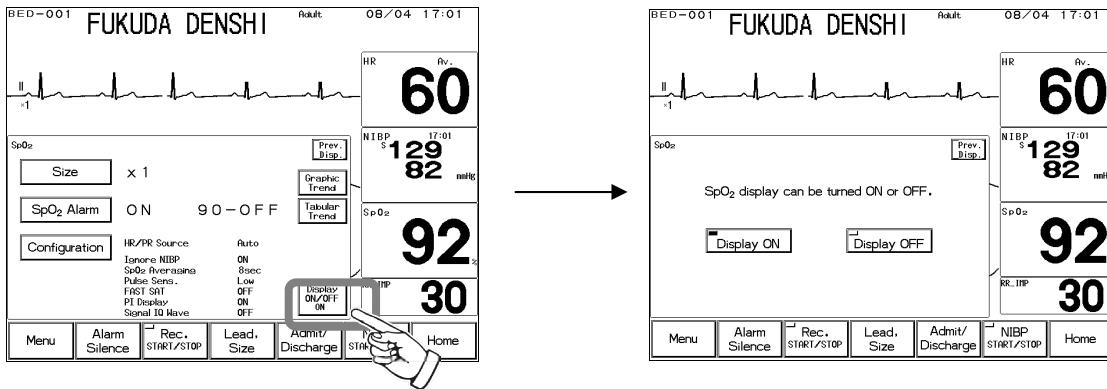


The configuration menu to set the signal IQ wave display will be displayed.

- 2 Select **ON** (display) or **OFF** (not display).

## ON/OFF of Parameter Display

- 1 Press the **Display ON/OFF** key. The confirmation display for ON/OFF of SpO<sub>2</sub> display will appear.



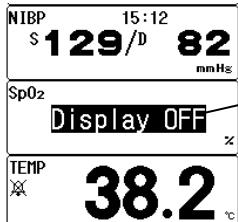
- 2 Select **Display ON** or **Display OFF**.

**Display ON**

**Display OFF**

Pressing the **Display ON** key will display the waveform and numeric data.

Pressing the **Display OFF** key will not display the waveform and numeric data.



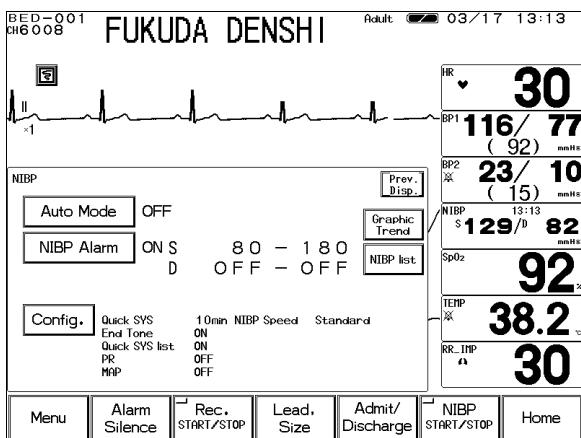
When SpO<sub>2</sub> sensor is attached to the patient with the SpO<sub>2</sub> display set to OFF, and SpO<sub>2</sub> can be measured for 10 seconds, the SpO<sub>2</sub> waveform and numeric data will be automatically displayed.

### ⚠ CAUTION

- When the waveform and numeric data display is set to OFF, the alarm generation and tabular/graphic trend data input will also cease.
- If SpO<sub>2</sub> display is set to OFF, pulse rate will not be displayed if HR/PR source is set to SpO<sub>2</sub>.

## Non-Invasive Blood Pressure

This menu allows the setup of NIBP monitoring condition.

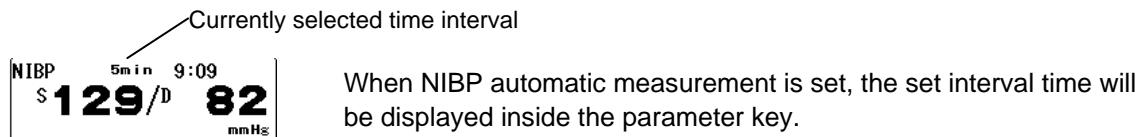


- Auto Mode** : Sets the automatic interval measurement and starts the 1-minute interval measurement and Quick SYS measurement.
- NIBP Alarm** : Sets the ON/OFF of NIBP alarm and upper / lower limit of systolic, diastolic, and mean BP.
- Configuration** : Sets the NIBP monitoring configuration.

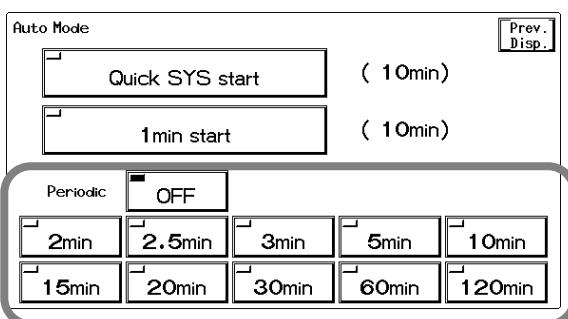
<b>⚠ CAUTION</b>	<p>For the following situation, measurements will be terminated.</p> <ul style="list-style-type: none"> <li>• When the measurement time has exceeded 120 seconds for adult, 90 seconds for child, 60 seconds for neonate.</li> <li>• When the inflation value has exceeded 300mmHg for adult, 200mmHg for child, 150mmHg for neonate.</li> </ul>
<b>⚠ CAUTION</b>	<p>If used with the incorrect patient type, it will not only cause erroneous measurement, but the inflating level for the adult may be applied to child or neonate causing a dangerous situation to the patient.</p>

## NIBP Automatic Measurement

Non-invasive blood pressure can be measured automatically at selected time intervals. If Quick SYS measurement is performed during the NIBP automatic measurement, the automatic measurement will automatically resume when Quick SYS measurement completes.



- 1 Press the **Auto Mode** key to display the measurement interval setup menu for the automatic measurement.**



## 2 Select an interval time.

Select from **2 min** / **2.5 min** / **3 min** / **5 min** / **10 min** / **15 min** / **20 min** /  
**30 min** / **60 min** / **120 min**.

Select **OFF** if not performing the interval measurement.

The measurement time will be the integral multiple of the selected interval time beginning with 0 minute.

Ex.) If the present time is 13:14, the measurement time will be as follows for each interval time.

2 min. : 13:16, 13:18, 13:20, . . .

2.5 min. : 13:15, 13:17:30, 13:20, . . .

3 min. : 13:15, 13:18, 13:21, . . .

5 min. : 13:15, 13:20, 13:25, . . .

### ⚠ CAUTION

The NIBP measurement cannot be started from the central monitor via TCON system if the NIBP measurement interval is set to **2 min** / **2.5 min** / **3 min** / **5 min**. However, it can be stopped.

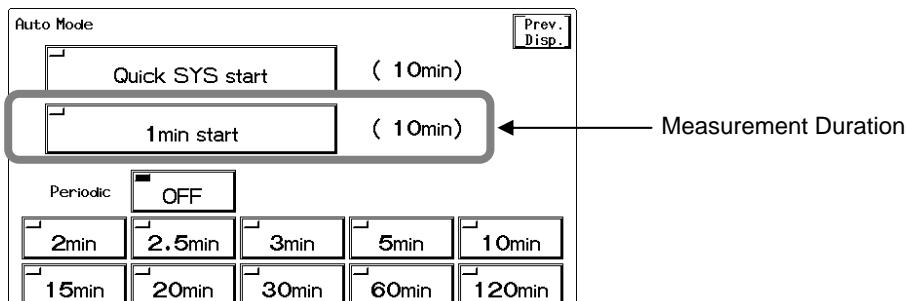
### NOTE

When using the DS-LANIII network or TCON system and if "Timer" is selected for NIBP measurement on the central monitor, NIBP auto mode will be set OFF on the DS-7100, but the measurement will start at fixed time according to the central monitor setting.

## NIBP 1-Minute Interval Measurement

The 1-minute interval measurement will automatically stop after 10 minutes and returns to the previous interval mode setup.

- 1 Press the **Auto Mode** key to display the measurement interval setup menu to start the 1-minute interval measurement.



- 2 Press the **1min Start** key to start the 1-minute interval measurement.

Pressing the **NIBP START/STOP** key will not stop the 1-minute interval measurement.

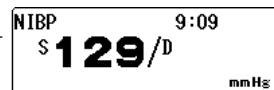
To cancel the measurement, press the **1min Start** key again.

### ⚠ CAUTION

- The 1-minute interval measurement will always start from 00 second. Pressing the **1min Start** key will start the measurement from the next 00 second.
- The 1-minute interval measurement will automatically stop after 10 minutes and returns to the previous interval mode setup.
- The NIBP measurement cannot be started from the central monitor via TCON system during the 1-minute interval measurement. However, it can be stopped.

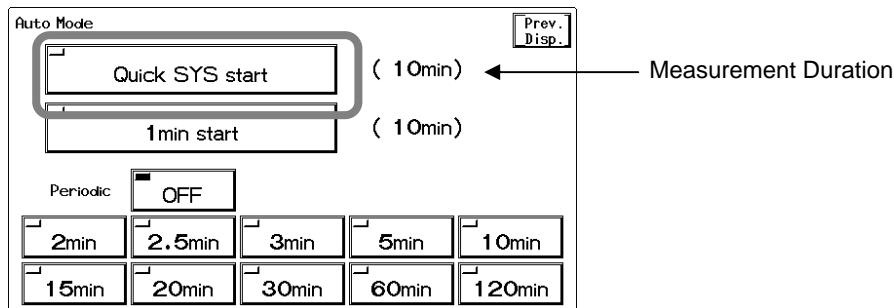
## Quick SYS Start

The NIBP measurement can be continuously performed for 3 min. / 5 min. / 10 min. If any abnormality on the cuff hose, etc. is found during the Quick SYS, the continuous measurement will be ceased.



Only the systolic blood pressure will be measured and displayed.

- Press the **Auto Mode** key to display the measurement interval setup menu to start the Quick SYS.



- Start the Quick SYS.

Pressing the **Quick SYS Start** key will start the continuous measurement.

To cease the measurement, press the **NIBP START/STOP** key, or press again the **Quick SYS Start** key.

The duration of continuous measurement can be selected on the “Quick SYS” of the NIBP configuration menu.

The continuous measurement will automatically cease after the selected duration from **3min**, **5min**, or **10min**.

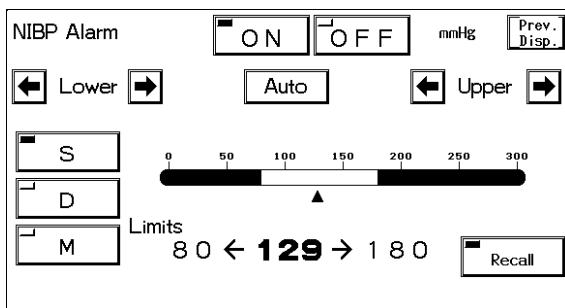


- The alarm function will be ineffective for the BP value measured by Quick SYS regardless of the ON/OFF selection of NIBP alarm.
- The NIBP measurement cannot be started from the central monitor via TCON system during Quick SYS measurement. However, it can be stopped.

## NIBP Alarm

- Press the **NIBP Alarm** key to display the alarm setup menu.

Set ON/OFF of NIBP alarm, upper and lower alarm limits of systolic (SYS), diastolic (DIA), mean (MEAN) NIBP.



Set the alarm value for each measurement unit (mmHg / kPa).

The upper and lower limit can be set in 5mmHg / 0.5kPa increment.

Key	Item	Description
<input type="checkbox"/> ON <input type="checkbox"/> OFF	Individual Alarm	Selecting <input type="checkbox"/> ON will generate the NIBP alarm. Selecting <input type="checkbox"/> OFF will not generate the NIBP alarm.
<input type="checkbox"/> S <input type="checkbox"/> D <input type="checkbox"/> M		Select from S (systolic BP), D (diastolic BP), or M (mean BP)
<input type="checkbox"/> Lower <input type="checkbox"/>	Lower Alarm Limit	Sets the lower alarm limit (10 to 295mmHg/1.5 to 39.5kPa). Setting a value 10mmHg/1.5kPa or below will turn OFF the alarm.
<input type="checkbox"/> Upper <input type="checkbox"/>	Upper Alarm Limit	Sets the upper limit (15 to 300mmHg /2.0 to 40.0kPa). Setting a value 300bpm/40.0kPa or above will turn OFF the alarm.
<input type="checkbox"/> Auto	Automatic Setup	Automatically sets the upper limit to +40mmHg/+5.5kPa to the current value, and the lower limit to -20mmHg/-2.5kPa to the current value.



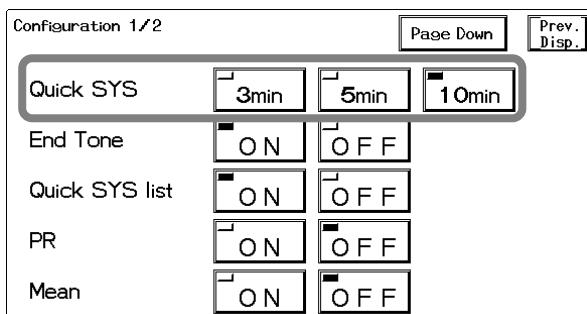
Whether or not to generate an alarm at NIBP measurement failure can be set. (Default: OFF) For details, refer to "4. Monitoring Setup Alarm Setup ON/OFF of Alarm Occurrence at NIBP Failure".

## Quick SYS Measurement Duration

The duration of Quick SYS can be selected from 3 min., 5 min., and 10 min.

The long duration of continuous measurement may congest the blood stream of the measured location. Set the duration according to the patient condition.

- 1 Press the **Configuration** key to display the NIBP configuration menu to set the Quick SYS.



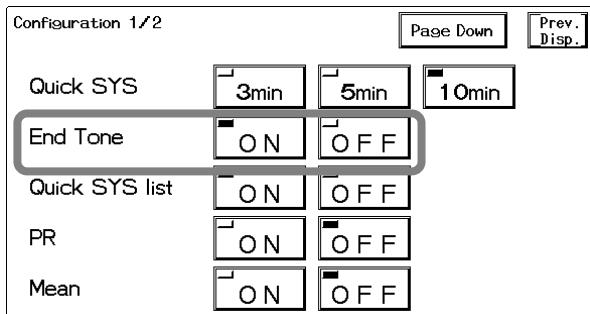
- 2 Select the measurement duration.

Select an appropriate time from **3min**, **5min**, **10min**.  
Quick SYS will automatically cease after the selected duration.

## End of Measurement Tone

By selecting ON for the “End Tone”, a tone will be generated when the NIBP measurement completes.

- 1 Press the **Configuration** key to display the NIBP configuration menu to set ON/OFF for the End Tone.



- 2 Select **ON** or **OFF**.

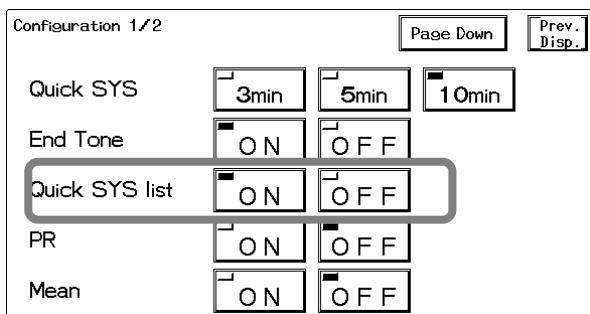
**ON** will generate a tone when the measurement completes.

**OFF** will not generate a tone when the measurement completes.

## Quick SYS List

The systolic blood pressure measured by Quick SYS can be included in the NIBP list.

- 1 Press the **Configuration** key to display the NIBP configuration menu for setting the Quick SYS List.



- 2 Select **ON** or **OFF**.

Quick SYS	NIBP mmHg	HR	PR-SpO <sub>2</sub>	SpO <sub>2</sub>
	128/	76	76	96
	120/	76	76	96
	129/	76	76	96
	129/	76	76	96
	129/	76	76	96
	128/ 91	78	78	95
	129/ 90	76	76	96
	129/ 90	76	76	96
	132/ 93	76	76	96

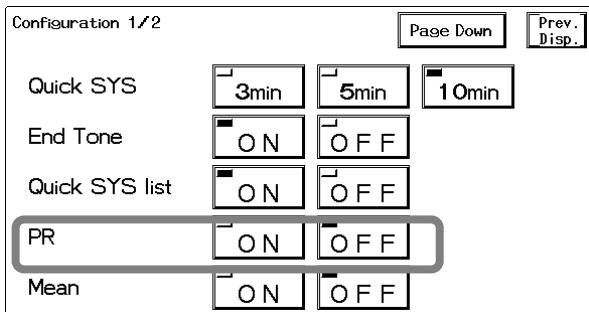
**ON** will include the systolic blood pressure value to NIBP list.

**OFF** will not include the systolic blood pressure value to NIBP list.

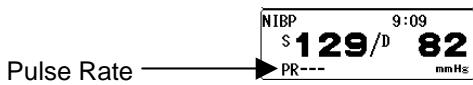
## PR Display

The measured pulse rate can be displayed. This selection is for display only, and alarm function and tabular trend function will be ineffective.

- 1 Press the **Configuration** key to display the NIBP configuration menu for setting the PR display.



- 2 Select **ON** or **OFF**.

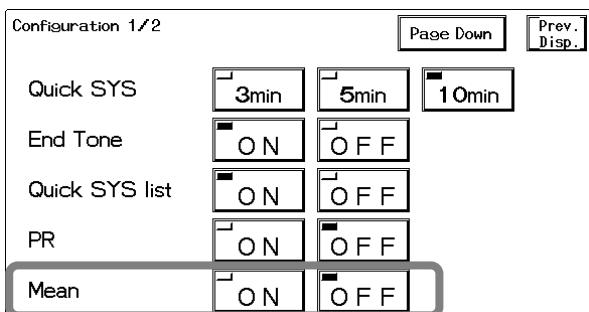


Selecting **ON** will display the pulse rate.  
Selecting **OFF** will not display the pulse rate.

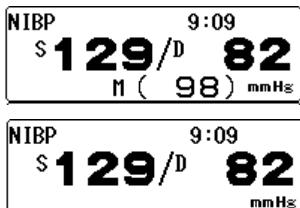
## Mean BP Display

The ON/OFF of mean BP display can be selected.

- 1 Press the **Configuration** key to display the NIBP configuration menu for setting the mean BP display.



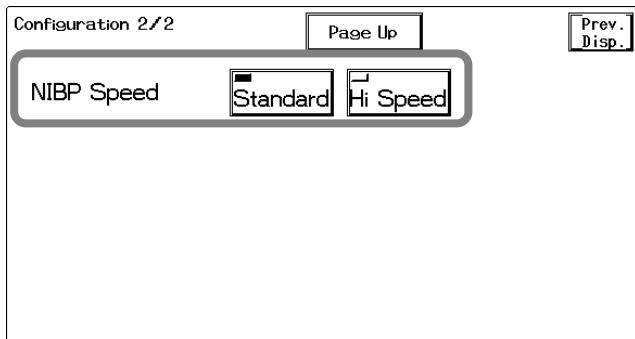
- 2 Select **ON** or **OFF**.



## NIBP Speed

The NIBP cuff inflation speed can be selected from standard or high speed.

- 1 Press the **Configuration** → **Page Down** keys to display the second page of the configuration menu.



- 2 Select the NIBP speed.

Select an appropriate speed from **Standard** or **Hi Speed**.

When **Standard** is selected, it will take about 10 seconds to inflate to 300mmHg with 500cc tank connected.

When **Hi Speed** is selected, it will take about 6 seconds to inflate to 300mmHg with 500cc tank connected. (for adult)

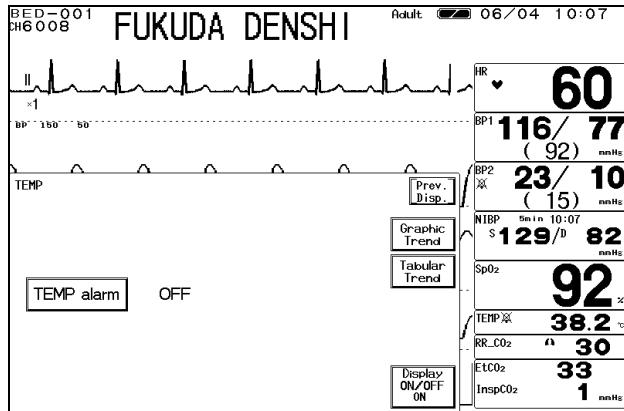
When an adult cuff is wrapped around an arm with a space allowing one finger fitting in between the cuff and arm, the speed to inflate to 190mmHg is within 11 seconds for normal speed, and within 7 seconds for high speed.

NOTE	The NIBP speed setup is effective only when adult or child is selected for patient type. The NIBP speed for neonate will be fixed in spite of the speed selection.
------	--

The NIBP speed setup is effective only when adult or child is selected for patient type. The NIBP speed for neonate will be fixed in spite of the speed selection.

## Temperature

This menu allows the setup of the temperature monitoring condition.

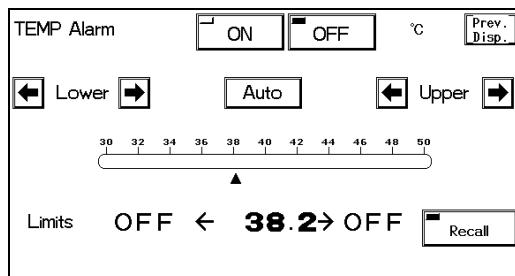


**TEMP Alarm** : Sets ON/OFF of temperature alarm, and upper and lower alarm limits.

## Temperature Alarm

- 1 Press the **TEMP Alarm** key to display the alarm setup menu.

Select ON/OFF of temperature alarm, and set the upper and lower alarm limit.



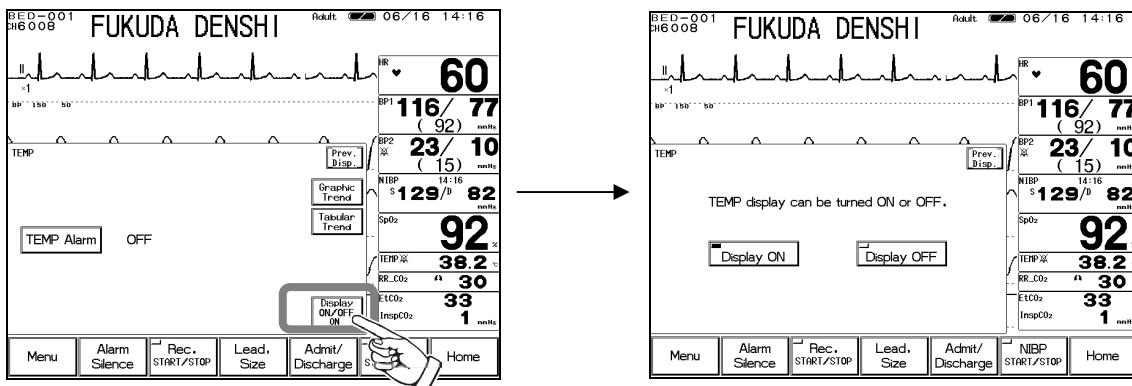
The alarm limit can be set for each measurement unit (°C / °F).

The upper and lower limit can be set in increments of 0.5°C / 1.0°F.

Key	Item	Description
<input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF	Individual Alarm	Selecting <b>ON</b> will generate the TEMP alarm. Selecting <b>OFF</b> will not generate the TEMP alarm.
<input type="checkbox"/> Lower ← →	Lower Alarm Limit	Sets the lower alarm limit (30.0 to 49.0°C/86.0 to 120.0°F). Setting a value 30.0°C/86.0°F or below will turn the alarm OFF.
<input type="checkbox"/> Upper ← →	Upper Alarm Limit	Sets the upper alarm limit (31.0 to 50.0°C/88.0 to 122.0°F). Setting a value 50.0°C/122.0°F or above will turn the alarm OFF.
<input type="checkbox"/> Auto	Automatic Setup	Automatically sets the upper limit to +2.0°C/+3.0°F to the current value, and lower limit to -2°C/-3.0°F to the current value.

## ON/OFF of Parameter Display

- 1 Press the **Display ON/OFF** key. The confirmation display for ON/OFF of TEMP display will appear.



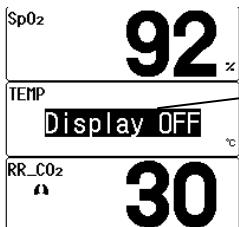
- 2 Select **Display ON** or **Display OFF**.

**Display ON**

**Display OFF**

Pressing the **Display ON** key will display the numeric data.

Pressing the **Display OFF** key will not display the numeric data.

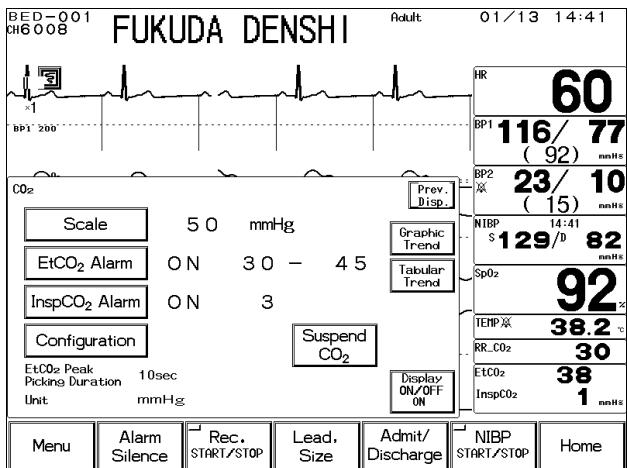


**CAUTION** When the waveform and numeric data display is set to OFF, the alarm generation and tabular/graphic trend data input will also cease.

## CO<sub>2</sub> Concentration

(DS-7141, DS-7141M)

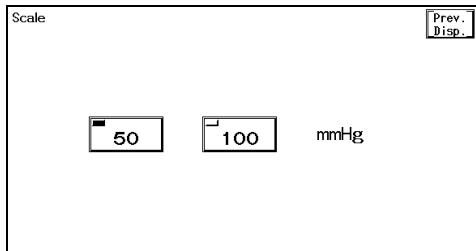
This menu allows the setup of the CO<sub>2</sub> concentration measurement.



- Scale : Sets the CO<sub>2</sub> waveform scale.  
EtCO<sub>2</sub> Alarm : Sets ON/OFF of EtCO<sub>2</sub> alarm, and upper and lower alarm limits.  
InspCO<sub>2</sub> Alarm : Sets ON/OFF of InspCO<sub>2</sub> alarm and upper alarm limit.  
Configuration : Sets CO<sub>2</sub> monitoring conditions.  
Suspend CO<sub>2</sub> : Suspends CO<sub>2</sub> measurement temporarily.

## CO<sub>2</sub> Scale

- 1 Press the **Scale** key to display the scale setup menu.



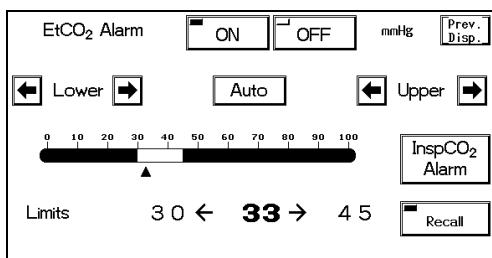
<Scale setup menu for the unit in mmHg>

- 2 Select the CO<sub>2</sub> waveform scale for displaying and recording.

For the measurement unit in mmHg, select the scale from **50**, **100**.  
For the measurement unit in kPa and %, select the scale from **4**, **8**, **10**.

## EtCO<sub>2</sub> (End-Tidal CO<sub>2</sub>) Alarm

- 1 Press the **EtCO<sub>2</sub> Alarm** key to display the alarm setup menu.



Select ON/OFF of EtCO<sub>2</sub> alarm, and set the upper and lower alarm limits.

Set the alarm condition for each measurement unit (mmHg / kPa / %).

Upper and lower alarm limits can be set in increments of 1mmHg, 0.1kPa, 0.1%.

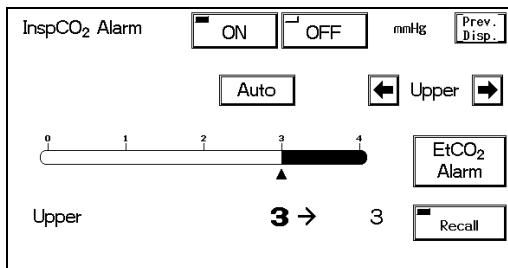
### NOTE

EtCO<sub>2</sub> alarm will not generate unless 2 or more respiration is detected within 30 seconds after power ON or after discharge.

Key	Item	Description
[ ON ] [ OFF ]	Individual Alarm	Selecting [ ON ] will generate the EtCO <sub>2</sub> alarm. Selecting [ OFF ] will not generate the EtCO <sub>2</sub> alarm.
[◀] Lower [▶]	Lower Alarm Limit	Sets the lower alarm limit (1 to 98mmHg, 0.1 to 13.1kPa, 0.1 to 13.1%). Setting a value equal to or below 1mmHg, 0.1kPa, 0.1% will turn the alarm OFF.
[◀] Upper [▶]	Upper Alarm Limit	Sets the upper alarm limit (3 to 100mmHg, 0.4 to 13.3kPa, 0.3 to 13.3%). Setting a value equal to or above 100mmHg, 13.3kPa, 13.3% will turn the alarm OFF.
[ Auto ]	Automatic Setup	Automatically sets the upper alarm limit to +10mmHg, +1.3kPa, +1.3% to the current value, and the lower alarm limit to -10mmHg, -1.3kPa, -1.3% to the current value.

## InspCO<sub>2</sub> (Inspiratory CO<sub>2</sub>) Alarm

- 1 Press the [ InspCO<sub>2</sub> Alarm ] key to display the alarm setup menu.



Select ON/OFF of InspCO<sub>2</sub> alarm, and set the upper alarm limit.

Set the alarm condition for each measurement unit (mmHg / kPa / %).

Upper alarm limit can be set in increments of 1mmHg, 0.1kPa, 0.1%. Lower alarm limit cannot be set.

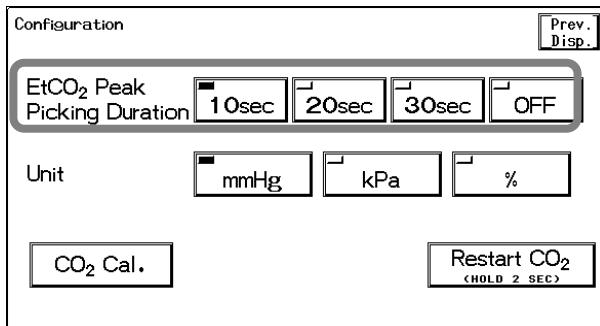
NOTE	InspCO <sub>2</sub> alarm will not generate unless 2 or more respiration is detected within 30 seconds after power ON or after discharge.
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Key	Item	Description
[ ON ] [ OFF ]	Individual Alarm	Selecting [ ON ] will generate the InspCO <sub>2</sub> alarm. Selecting [ OFF ] will not generate the InspCO <sub>2</sub> alarm.
[◀] Upper [▶]	Upper Alarm Limit	Sets the upper alarm limit (1 to 4mmHg, 0.1 to 0.4kPa, 0.1 to 0.4%). Setting a value equal to or above 4mmHg, 0.4kPa, 0.4% will turn the alarm OFF.
[ Auto ]	Automatic Setup	Automatically sets the upper alarm limit to +3mmHg, +0.4kPa, +0.4% to the current measurement.

## **EtCO<sub>2</sub> Peak Picking Duration**

The duration to pick the EtCO<sub>2</sub> maximum value can be selected from 10 sec., 20 sec., 30 sec., or OFF.

- 1 Press the **Configuration** key to select the EtCO<sub>2</sub> peak picking duration.



- 2 Select the peak picking duration.

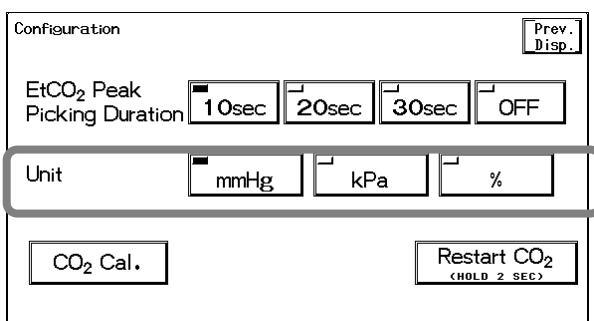
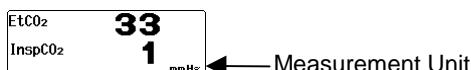
Select the duration to pick the EtCO<sub>2</sub> maximum value from **10sec**, **20sec**, **30sec**.

If **OFF** is selected, EtCO<sub>2</sub> value for each respiration will be displayed.

As the EtCO<sub>2</sub> value display is updated each second, EtCO<sub>2</sub> value for each respiration cannot be displayed if respiration rate is above 60 Bpm.

## **Measurement Unit**

The measurement unit can be selected from mmHg, kPa, or %.



- 1 Press the **Configuration** key to display the configuration menu for measurement unit selection.
- 2 Select the measurement unit from **mmHg**, **kPa**, **%**.

The graphic trend and tabular trend will be displayed with the selected measurement unit.

If the measurement unit is changed frequently, the continuity of the graphic trend and tabular trend may be lost.

When the measurement unit is changed, make sure to set the alarm condition for that unit.  
The alarm setup is necessary for each measurement unit.

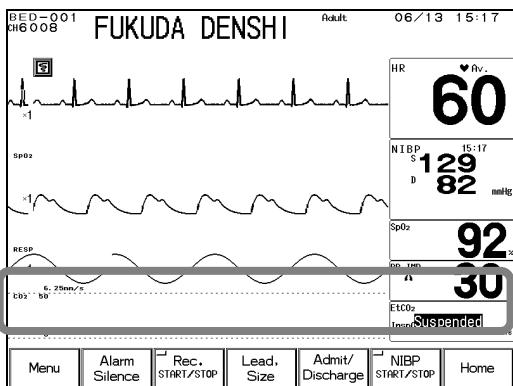
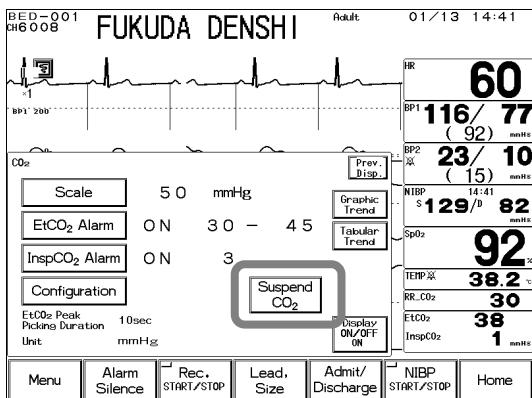
## Suspending CO<sub>2</sub> Measurement

The CO<sub>2</sub> measurement can be temporarily suspended by stopping the CO<sub>2</sub> pump operation.

### ⚠ WARNING

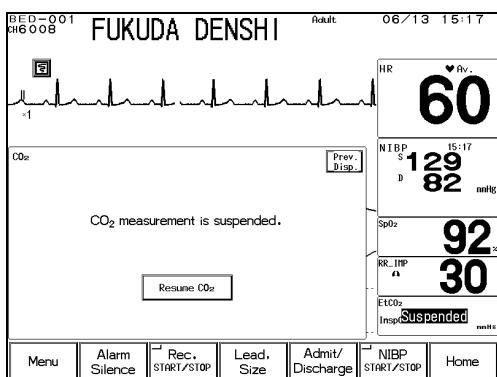
When performing expectoration treatment to the patient with a ventilator connected, make sure to suspend the CO<sub>2</sub> measurement before the treatment. Otherwise, water may enter into the pump causing the equipment to be damaged.

**1 Press the **Suspend CO<sub>2</sub>** key.**



The pump operation will stop, CO<sub>2</sub> waveform and numeric data display will disappear, and "Suspended" will be displayed inside the CO<sub>2</sub>, RR\_CO<sub>2</sub> numeric data box.

**2 If the CO<sub>2</sub> numeric data box (or RR\_CO<sub>2</sub> numeric data box) is pressed when the CO<sub>2</sub> measurement is suspended, the following display will appear.**



Press the **Resume CO<sub>2</sub>** key to resume the CO<sub>2</sub> measurement.

For the following case, CO<sub>2</sub> measurement will automatically resume.

- When 15 minutes has elapsed since the measurement was suspended.
- When the patient is discharged.
- When the power was turned OFF for 5 minutes or more and turned ON again.

### ⚠ CAUTION

- When the CO<sub>2</sub> measurement is suspended, the CO<sub>2</sub> alarm generation and CO<sub>2</sub> data input to the tabular/graphic trend will also cease.
- If CO<sub>2</sub> is selected as the RR source, RR value will also not be displayed when the CO<sub>2</sub> measurement is suspended.

## CO<sub>2</sub> Calibration

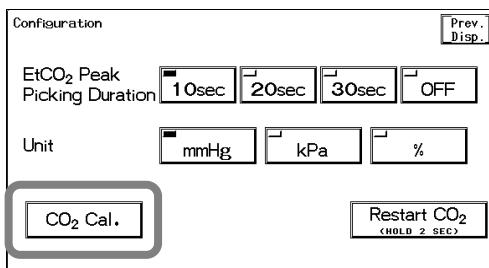
CO<sub>2</sub> calibration can be performed using calibration gas.

Perform calibration when 1 year has elapsed from the last calibration, or any measurement error is found.

### ⚠ CAUTION

If the CO<sub>2</sub> gas calibration is not performed at a specified interval, CO<sub>2</sub> measurement accuracy may be affected and also subsequent gas calibration may not be possible.

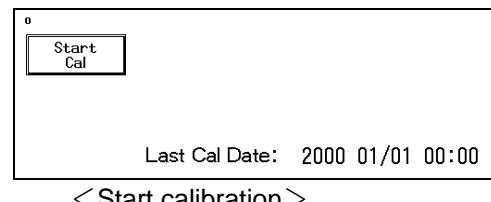
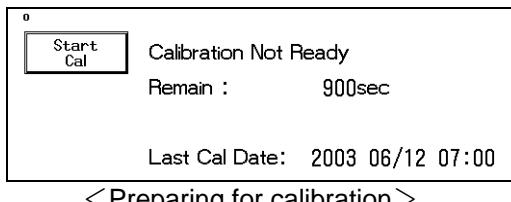
- 1 Press the **Configuration** key to display the configuration menu for **CO<sub>2</sub> Cal.** key display.



- 2 Press the **CO<sub>2</sub> Cal.** key to display the calibration menu.

Due to precision matter, CO<sub>2</sub> calibration cannot be started until 20 minutes has elapsed after the power was turned ON.

During this time, **Start Cal** key will be displayed in gray which indicates that the key is ineffective. The message, "Calibration not ready" and the remaining time for preparation will be displayed.



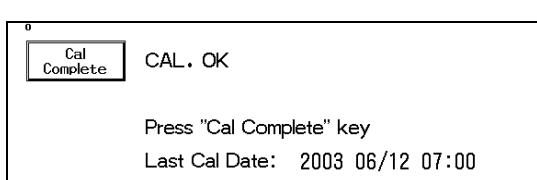
- 3 Press the **Start Cal** key and conduct calibration according to the displayed messages.

- 4 The message, "Feed CAL. GAS" will be displayed. Press the injection button to inject the calibration gas.

- 5 The message, "Calc. Gas can be removed" will be displayed. Stop pressing the injection button to cease the injection.

- 6 The message, "CAL. OK" will be displayed. "Last Cal. Date" will be updated to the current date.

If any of the following messages is displayed, start the procedure again from step 2.  
"CAL. error", "CAL GAS error", "Auto Zero fail", "No stable gas flow", "CAL. failure"



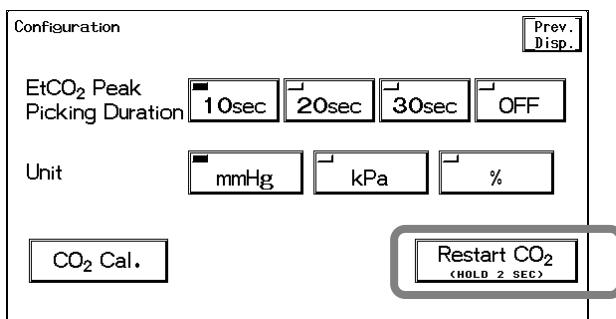
- 7 Press the **Cal Complete** key to end the calibration.

<b>CAUTION</b>	<ul style="list-style-type: none"> <li>● Perform calibration after 20 minutes from turning ON the power of the DS-7100 system.</li> <li>● Do not disconnect the sampling tube during calibration. If disconnected, calibration will cease.</li> <li>● Conduct CO<sub>2</sub> calibration for the following case.           <ul style="list-style-type: none"> <li>• When 1 year has elapsed from the last calibration.</li> <li>• When EtCO<sub>2</sub> measurement is not stable or accuracy is degraded compared with other measuring device.</li> <li>• When the patient monitor was not used for a while, or when EtCO<sub>2</sub> was not measured for a while.</li> </ul> </li> </ul>
----------------	---

## Restarting the CO<sub>2</sub> Unit

The pump will cease functioning when erroneous condition such as blocked exhaust tube, sampling tube or nasal prong is detected. When the pump ceases functioning, "Check CO<sub>2</sub> unit" message will be displayed. After resolving the problem, press the **Restart CO<sub>2</sub>** key and resume the measurement.

- 1 Press the **Configuration** key to display the CO<sub>2</sub> configuration menu.



- 2 Press the **Restart CO<sub>2</sub>** key for 2 seconds.

The **Restart CO<sub>2</sub>** key will be effective only when the "Check CO<sub>2</sub> unit" message is displayed.

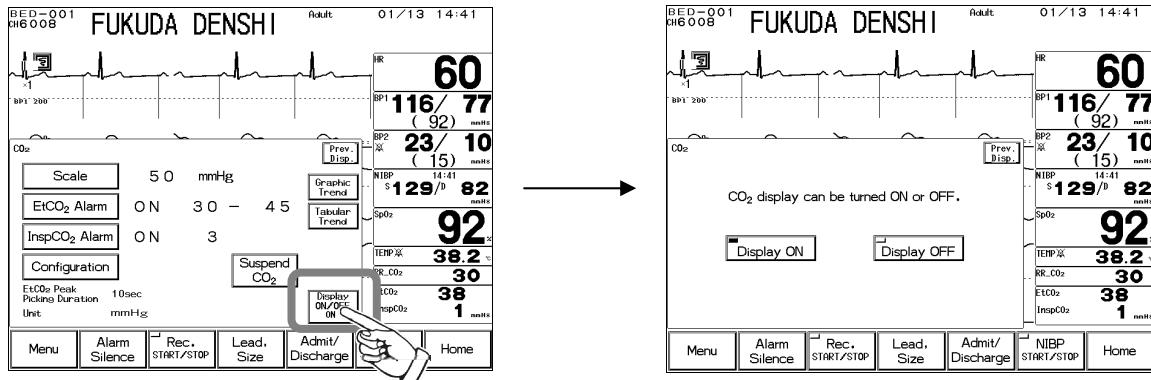
- 3 Check that the measurement is resumed.

The sampling pump will start to function, and the "Check CO<sub>2</sub> unit" message will disappear. Check that the message has disappeared and the measurement data is displayed.

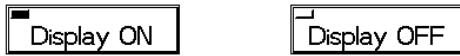
<b>NOTE</b>	If the "Check CO <sub>2</sub> unit" message does not disappear after the measurement is resumed, the replacement of CO <sub>2</sub> unit part may be necessary. Contact our service representative.
-------------	---

## ON/OFF of Parameter Display

- 1 Press the **Display ON/OFF** key. The confirmation display for ON/OFF of CO<sub>2</sub> display will appear.

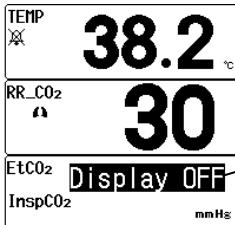


- 2 Select **Display ON** or **Display OFF**.



Pressing the **Display ON** key will display the waveform and numeric data.

Pressing the **Display OFF** key will not display the waveform and numeric data.



The Display OFF message will be displayed inside the parameter key.

When filter line is attached to the patient with the CO<sub>2</sub> display set to OFF, and 2 or more respiration is detected within 30 seconds, the CO<sub>2</sub> waveform and numeric data will be automatically displayed.

### ⚠ CAUTION

- When the waveform and numeric data display is set to OFF, the alarm generation and tabular/graphic trend data input will also cease.
- If CO<sub>2</sub> display is set to OFF, RR will not be displayed if RR source is set to CO<sub>2</sub>.

# Chapter 7

## Function

This chapter describes the functions such as arrhythmia analysis, trend, and recall.

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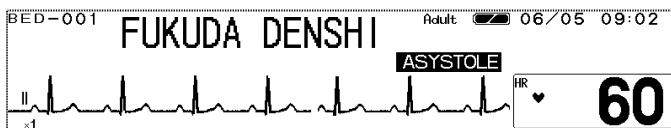
# Arrhythmia Analysis

Definition, etc.

This section explains the arrhythmia analysis and alarm setup procedure.

## Arrhythmia Definition

The arrhythmia detection is performed by learning the normal waveform of the patient and determining VPC by comparing the waveform (QRS pattern) and R-R interval of each heartbeat. A pattern matching is performed with the VPC detected from R-R interval, QRS amplitude, QRS area, QRS polarity, etc., and determines as VPC after discriminating the noise and VPC.



### ●QRS Classification

The QRS analysis is performed by comparing with the learned waveform and QRS pattern matching.

N (Normal)	Normal QRS beat
V (VPC)	Ventricular Extrasystole
? (Undetermined beat)	Learning arrhythmia, or beat not matching the pattern
P (Pacing beat)	Pacing beat
F (Fusion beat)	Fusion beat of pacing and spontaneous beat
S (SVPC)	Supraventricular Extrasystole

### ●Arrhythmia Type

The alarm is generated according to the arrhythmia classification by the pattern or HR of normal QRS and VPC determined QRS.

Type	Meaning	Detection Criteria
ASYSTOLE	Cardiac Arrest	Cardiac arrest is detected for more than preprogrammed time.
VF	Ventricular Fibrillation	A random, rapid electrical activity of the heart is detected.
VT	Ventricular Tachycardia	HR is same or above the preprogrammed value (140bpm or 120bpm), and 9 or more continuous ventricular beats are detected.
SLOW_VT		9 or more continuous ventricular beats are detected. (HR: below 140bpm / 120bpm)
TACHY	Tachycardia	HR is over the upper alarm limit.
BRADY	Bradycardia	HR is below the lower alarm limit.
RUN	Consecutive VPC	HR is same or above the preprogrammed value (0 to 100bpm) and continuous VPC exceeding the preprogrammed value (2 to 8beats) is detected.
COUPLET	Couplet Ventricular Extrasystole	2 continuous beats of VPC is detected.
PAUSE		Cardiac arrest exceeding the preprogrammed duration is detected.
BIGEMINY	Ventricular Bigeminy	3 or more continuous QRS pattern of V-N is detected.
TRIGEMINY	Ventricular Trigeminy	3 or more continuous QRS pattern of V-N-N is detected.
FREQUENT	Frequent VPC	VPC exceeding the preprogrammed value is detected within 1 minute.



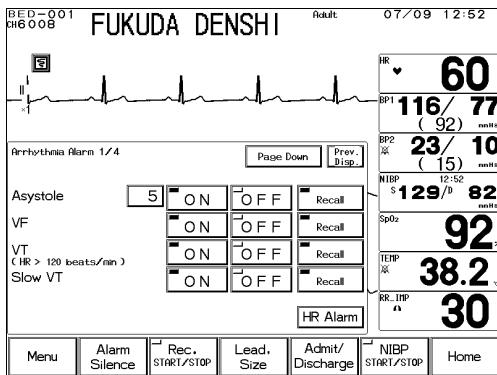
Refer to "8. System Configuration Ward Setup" for setup of HR reference for VT analysis.

<b>⚠ WARNING</b>	Objective and constant arrhythmia detection is possible through the fixed algorithm incorporated in this monitor. However, excessive waveform morphology change, motion artifact, or the inability to determine the waveform pattern may cause an error, or fail to make adequate detection. Therefore, physicians should make final decisions using manual recording, alarm recording and recall waveform for evaluation.
<b>⚠ CAUTION</b>	For proper arrhythmia detection and ECG monitoring, verify proper electrode placement, lead selection, and ECG waveform size. If necessary, turn ON the AC filter. Improper electrode placement, lead selection, and ECG waveform size can cause errors in detection.

## To Set the Arrhythmia Alarm

ON/OFF of arrhythmia alarm and reference of arrhythmia analysis can be set.

- 1 Press the **Menu** → **Alarm** → **Arrhy.** keys.



<Arrhythmia Alarm Setup (1/4) Menu>

The arrhythmia alarm setup menu consists of 3 pages.

Page 1/4 : ASYSTOLE, VF, VT, SLOW\_VT  
 Page 2/4 : RUN, BIGEMINY, TRIGEMINY, PAUSE  
 Page 3/4 : COUPLET, TACHY, BRADY, FREQUENT  
 Page 4/4 : HR Low Limit for VT, HR Low Limit for RUN

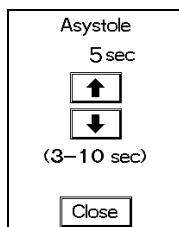
Use the **Page Down** or **Page Up** keys to switch the pages.

- 2 Set the reference range.

Asystole      **5** **ON** **OFF**

**Recall**

Pressing the reference value key will display the **↑** **↓** keys.



Use the **↑** **↓** keys to set the reference value.  
 After setting the reference value, press the **Close** key.

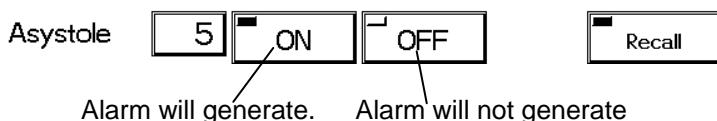
### <Arrhythmia Reference Range>

<b>Arrhythmia</b>	<b>Reference Range</b>	<b>Default</b>
ASYSTOLE	3 to 10 sec.	5 sec.
RUN	2 to 8 beats	3 beats
PAUSE	1.5 to 5 sec.	3 sec.
FREQUENT	1 to 50 beats/min.	10 beats/min.

On the 4th page, HR low limit to perform the arrhythmia analysis for VT and RUN can be set.

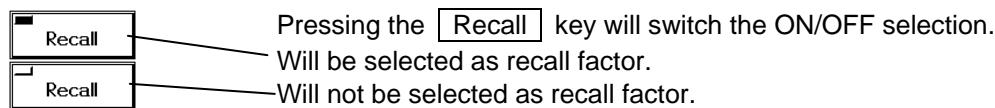
<b>Arrhythmia</b>	<b>HR Low Limit</b>	<b>Default</b>
VT	120bpm, 140bpm	120bpm
RUN	0 to 100bpm	40bpm

### 3 Select ON or OFF for the alarm.



### 4 Select ON or OFF for recall factor.

ON/OFF of recall factor can be set on the alarm setup menu.



## To Perform Arrhythmia Learning

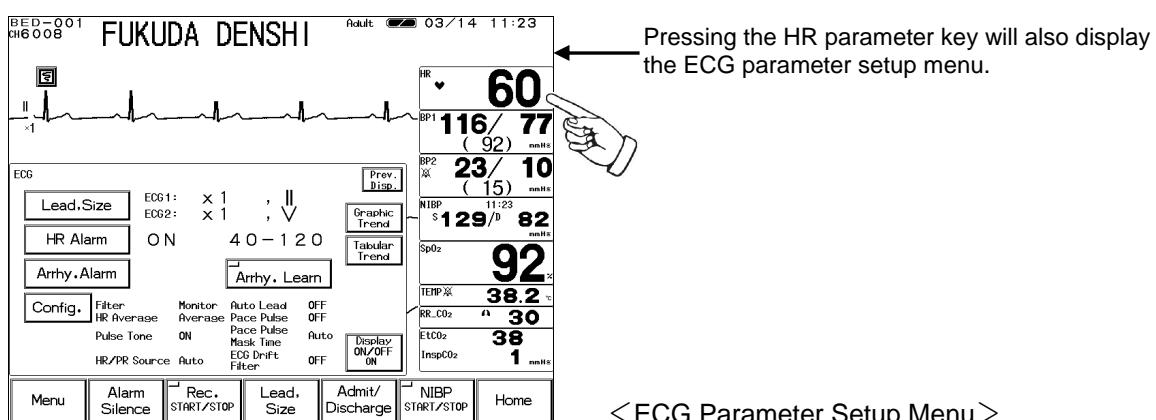
Learning of normal ECG largely affects the accuracy of arrhythmia analysis.

If any error occurs in arrhythmia detection and QRS judgment, performing arrhythmia learning will recover the original analyzing accuracy.

Arrhythmia learning will be performed for about 20 beats for the normal ECG, but it may take longer if the heartbeat is unstable.

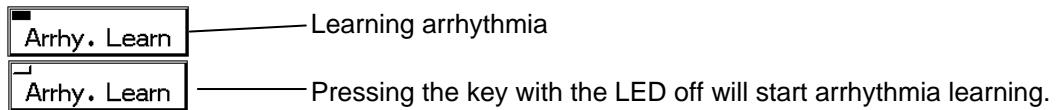
During arrhythmia learning, arrhythmia alarm other than ASYSTOLE, TACHY, BRADY will not be generated.

### 1 Press the **Menu** → **Parameter** → **ECG** keys.



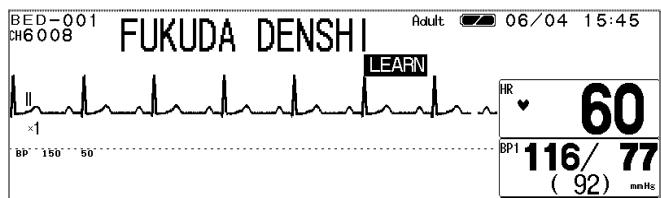
<ECG Parameter Setup Menu>

### 2 Start arrhythmia learning.



Pressing the key while learning arrhythmia will not stop the learning.

**3 During arrhythmia learning, a message will be displayed.**



NOTE	If pacemaker is used, LED on the <b>Arrhy. Learn</b> key will not light and the "LEARN" message will not be displayed although the arrhythmia learn procedure is performed.
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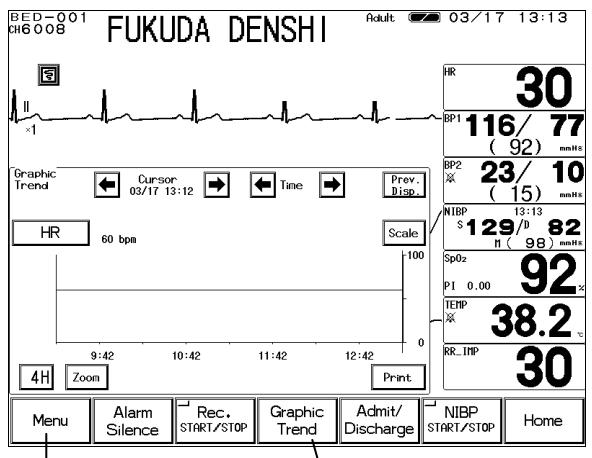
## Graphic Trend Data

Display / Print

This section explains the graphic trend function and printing procedure.

### To Display the Graphic Trend

The graphic trend menu can be accessed from the menu, or from the preprogrammed user key.

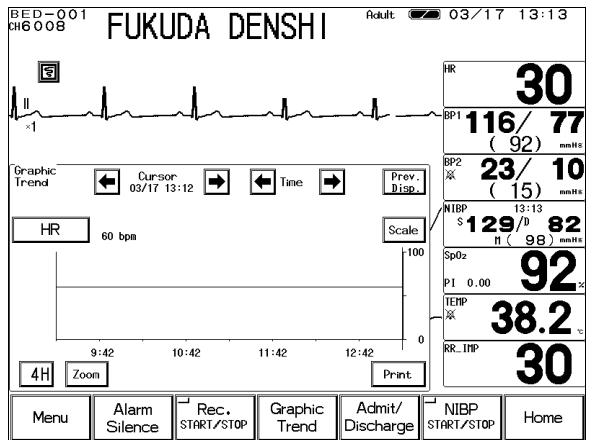


To display from the menu

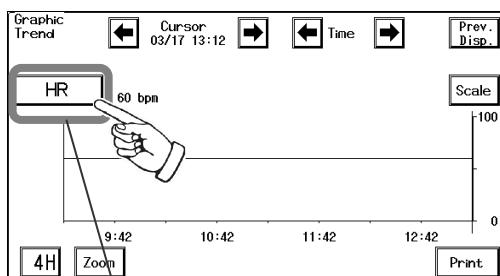
To display from the user key

The 24 hours graphic trend data in 1-minute interval will be automatically stored and displayed if the data is displayed on the home display.

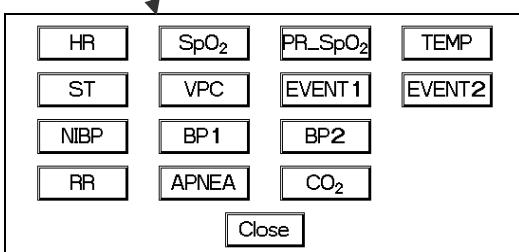
- 1 Press the **Menu** → **Graphic Trend** keys to display the graphic trend menu.



## 2 Select the parameter to display.



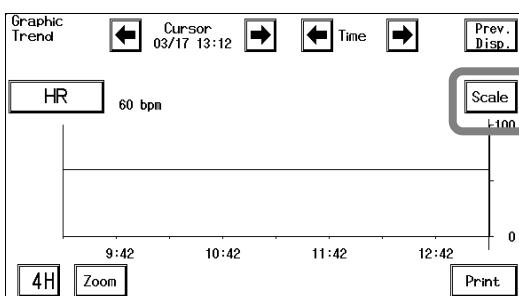
Pressing the parameter selection key will display the selection for display.



Select a parameter and press the **Close** key.

Parameter	Description
HR	HR, PR (SpO <sub>2</sub> , BP)
ST	ST1, ST2
VPC	VPC beats
BP1	BP1 (S/D/M)
BP2	BP2 (S/D/M)
NIBP	NIBP (S/D)
SpO <sub>2</sub>	SpO <sub>2</sub> value
PR_SpO <sub>2</sub>	SpO <sub>2</sub> pulse rate
TEMP	Temperature
RR	Respiration Rate (Impedance, CO <sub>2</sub> )
APNEA	Apnea Time (Impedance, CO <sub>2</sub> )
CO <sub>2</sub>	EtCO <sub>2</sub> / InspCO <sub>2</sub>
EVENT1	ASYSTOLE, VF, VT, SLOW_VT, RUN, BIGEMINY
EVENT2	TRIGEMINY, PAUSE, COUPLET, TACHY, BRADY, FREQUENT

## 3 Select the scale for display.

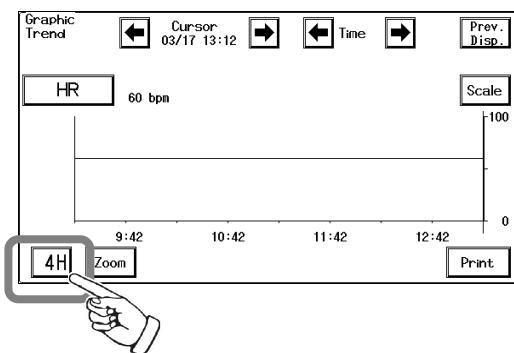


Pressing the **Scale** key will switch the scale according to the displayed parameter as shown below.

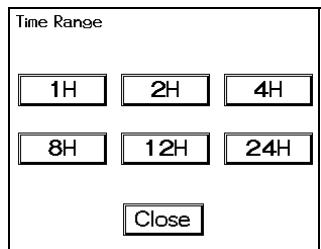
NOTE	The apnea time will be stored/displayed when it exceeds the alarm threshold level. If it is lower than the alarm threshold level, it will be stored/displayed as "0 (zero)".
------	--

<b>Parameter</b>	<b>Scale</b>	<b>Unit</b>
HR	100, 200, 300	bpm
ST	$\pm 0.2, \pm 0.5, \pm 1.0, \pm 2.0$	mV
	$\pm 2, \pm 5, \pm 10, \pm 20$	mm
VPC	20, 50, 100	beat
BP1, BP2	20, 50, 100, 150, 200, 300	mmHg
	4, 8, 16, 20, 24, 40	kPa
NIBP	100, 150, 200, 300	mmHg
	16, 20, 24, 40	kPa
SpO <sub>2</sub>	0–100, 50–100, 80–100	%
PR_SpO <sub>2</sub>	100, 200, 300	bpm
TEMP	20–45, 30–40	°C
	68–113, 86–104	°F
RR	50, 100, 150	Bpm
APNEA	15, 30	Sec
CO <sub>2</sub>	4.0, 8.0, 10.0	%, kPa
	50, 100	mmHg
EVENT	none	

#### 4 Select the display time range.



Pressing the time range key will display the time range selection window.



Select the time range, and press the **Close** key.

<b>Time Range</b>	<b>Resolution</b>
1 hour	1 min.
2 hour	1 min.
4 hour	1 min.
8 hour	1 min.
12 hour	3 min.
24 hour	3 min.

#### 5 Select the time span.

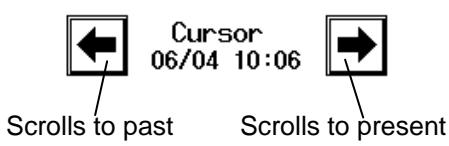


Scrolls the graphic trend display to past or present data with the selected time range.

Pressing the **←** key will scroll to the past data.

Pressing the **→** key will scroll to the present data.

## 6 Move the cursor.

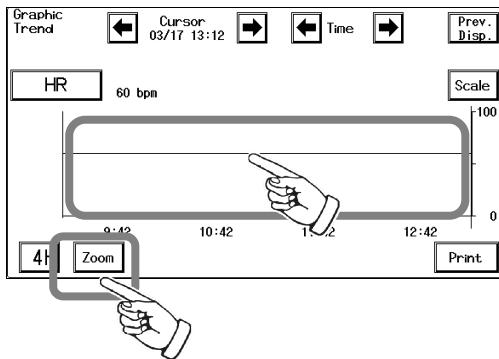


The data of selected time can be displayed by moving the cursor.

Pressing the key will scroll to the past data with the selected time range.

Pressing the key will scroll to the present data.

## 7 Enlarge the display.



Pressing the key will display the 1-hour data with the cursor time in center.

Directly pressing the graph area will move the cursor position.

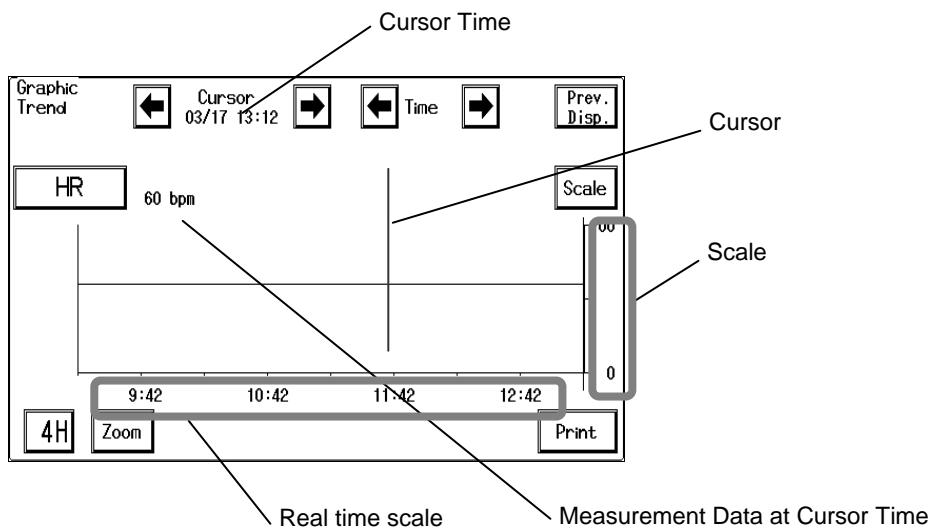
## 8 Print the graphic trend data.



The displayed graphic trend data will be printed.

## The Description of the Display

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The measured data will be compressed for the 12-hour / 24-hour display.

Parameter	Compressed Form
HR	Mean Value
ST	Mean Value
VPC	Maximum Value
BP1, BP2	Mean Value
NIBP	Current Value
SpO <sub>2</sub>	Mean Value
PR	Mean Value
TEMP	Mean Value
RR	Mean Value
APNEA	Maximum Value
CO <sub>2</sub>	Mean Value
EVENT	Logical Sum

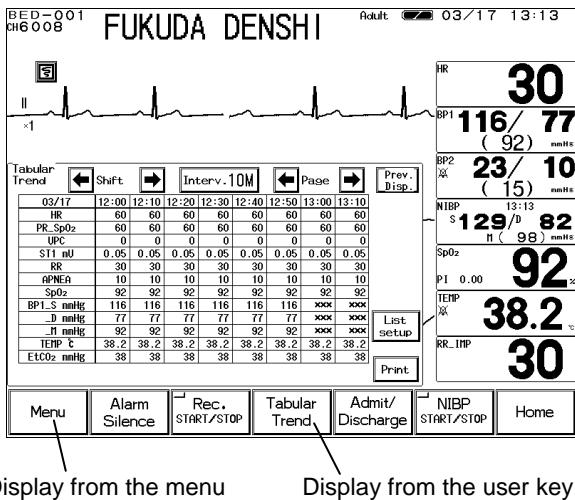
## Tabular Trend

## Display / Print

This section explains the tabular trend function and printing procedure.

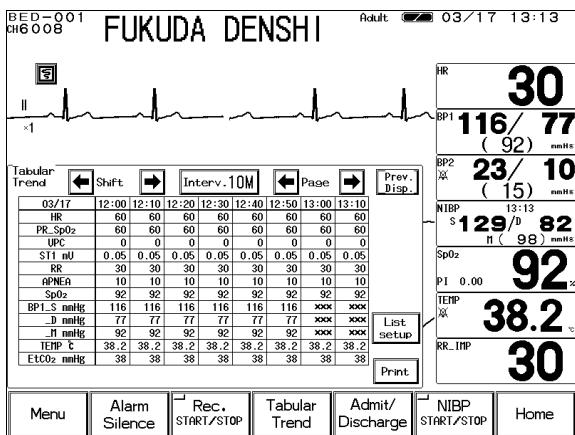
### To Display the Tabular Trend

The tabular trend menu can be accessed from the menu, or from the preprogrammed user key. The 24 hours data in 1-minute interval will be automatically stored and displayed if the data is displayed on the home display.

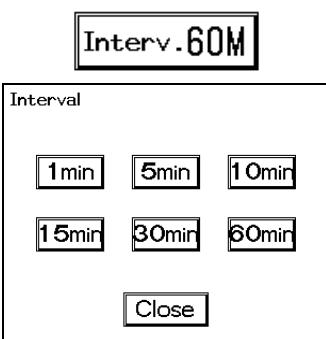


Display from the menu      Display from the user key.

- 1 Press the **Menu** → **Tabular Trend** keys to display the tabular trend.



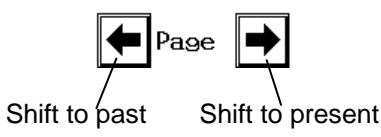
- 2 Select the time interval.



Pressing the key will display the time interval selection window.

Selecting **5min** will display the data in real time such as 10:00, 10:05, 10:25.  
Selecting **60min** will display the data in real time such as 10:00, 11:00, 12:00.  
If the list is displayed at 10:35, the data from 10:00 will be displayed.

### 3 Shift the page.



The page can be shifted past or present by page with the selected time range.

Pressing the key will shift one page to the past data.

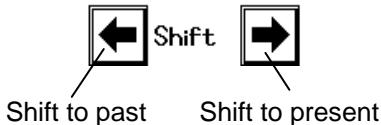
Pressing the key will shift one page to the present data.

The data will be listed in 8 columns.

If 5-minute time range is selected and the starting time on the list is 10:00, 35 minutes from 10:00 to 9:25 will be listed in 1 page.

Pressing the key will display the list from 9:20 to 8:45.

### 4 Shift the displayed column.



The list data can be shifted in displayed columns.

Pressing the key will shift the display to past.

Pressing the key will shift the display to present.

### 5 Print the list data.



The displayed list data will be printed.

## The Description of the Display

Latest Date

Tabular	Trend		Shift		Interv. 10M		Page		Prev. Disp.
03/17		12:00	12:10	12:20	12:30	12:40	12:50	13:00	13:10
HR		60	60	60	60	60	60	60	60
PR_SpO <sub>2</sub>		60	60	60	60	60	60	60	60
UPC		0	0	0	0	0	0	0	0
ST1_mU		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
RR		30	30	30	30	30	30	30	30
APNEA		10	10	10	10	10	10	10	10
SpO <sub>2</sub>		92	92	92	92	92	92	92	92
BP1_S_mmHg		116	116	116	116	116	xxx	xxx	
_D_mmHg		77	77	77	77	77	xxx	xxx	
_M_mmHg		92	92	92	92	92	xxx	xxx	
TEMP_°C		38.2	38.2	38.2	38.2	38.2	38.2	38.2	38.2
EtcO <sub>2</sub> _mmHg		38	38	38	38	38	38	38	38

Latest Time

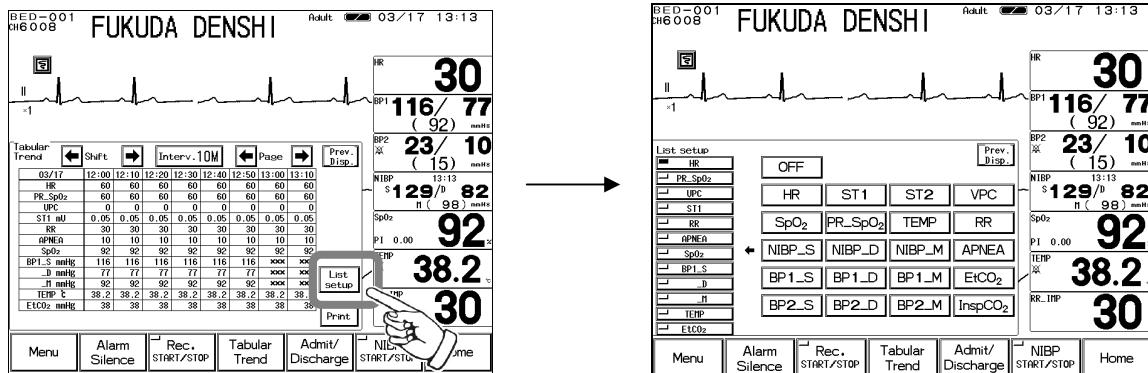


If the data is within 24 hours or if the monitoring is suspended, the time will be displayed as "—:—". Also, if the data is not displayed on the home display, or the BP is not zero balanced, the data will be displayed as "— — —".

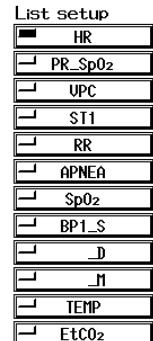
## Parameter Setup for Tabular Trend

The parameters for tabular trend can be selected.

- Press the **List Setup** key on the tabular trend menu to display the tabular trend setup menu.



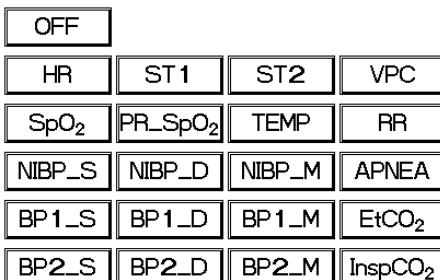
- Select the position on the list.



Select the position.

There are 12 positions on the list to set the parameter.

- Select the parameter for display.



Select the parameter to display for the previously selected position. The position will automatically shift downward so that consecutive parameter selection is possible.

### NOTE

The apnea time will be stored/displayed when it exceeds the alarm threshold level. If it is lower than the alarm threshold level, it will be stored as "0 (zero)".

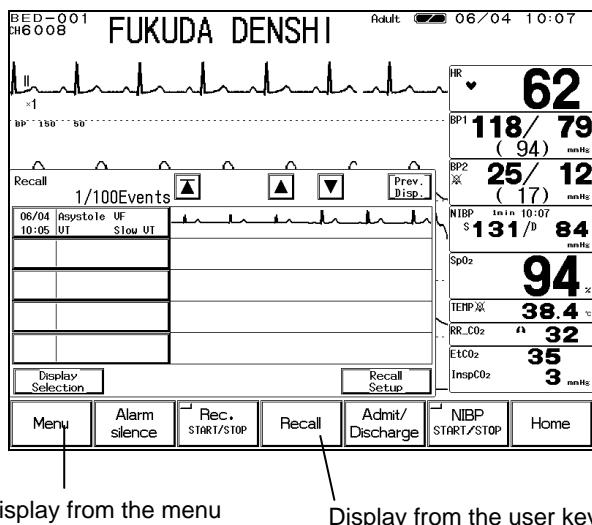
## Recall Data

## Display / Print

This section explains the recall menu function and printing procedure.

### To Display the Recall Menu

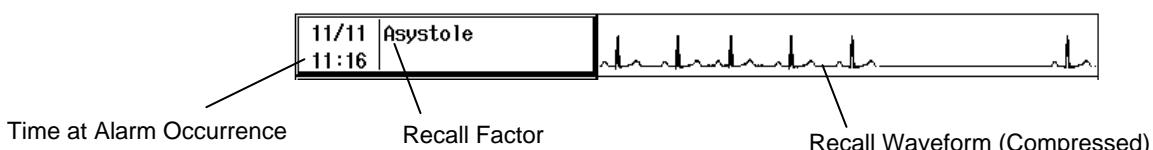
The recall menu can be accessed from the menu, or from the preprogrammed user key.



When the alarm factor assigned on the recall setup occurs, the assigned waveform (12 seconds) and the numeric data at alarm occurrence can be stored for up to 100 data.

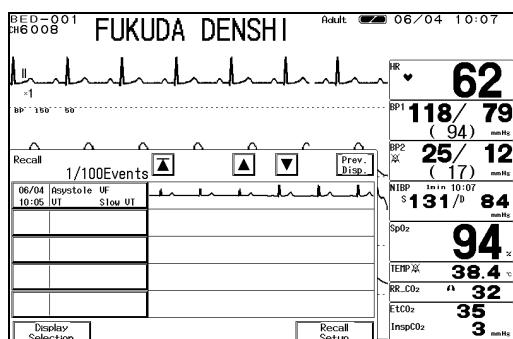
The recall data to be displayed can be selected on the display selection menu.

On the recall list display, 5 compressed recall waveform will be displayed. Pressing one of the compressed recall waveform will enlarge the waveform.



### ● Recall List Display

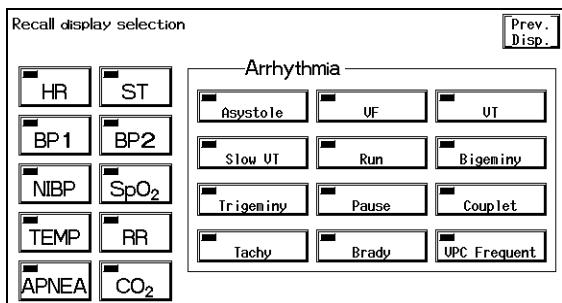
- 1 Press the **Menu** → **Recall** keys to display the recall menu.



The alarm occurrence time, the recall factor occurred at the same time, and the compressed waveform of recall waveform 1 will be displayed.

## 2 Select the recall factor to display on the recall list.

Press the **Display Selection** key and select the recall factor.



Select the numeric data, arrhythmia to display as recall factor.

If the key LED is lighted, recall data will be displayed.

If the key LED is extinguished, recall data will not be displayed.

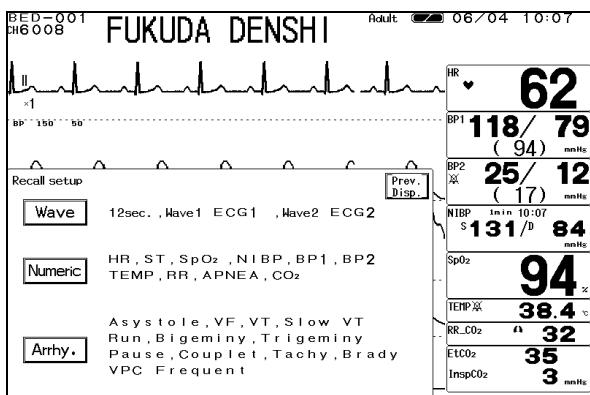
## 3 Shift the recall list display.

The newest 5 data will be displayed from the recall list.

Shift the recall list to newer data by 1 page (5 data).

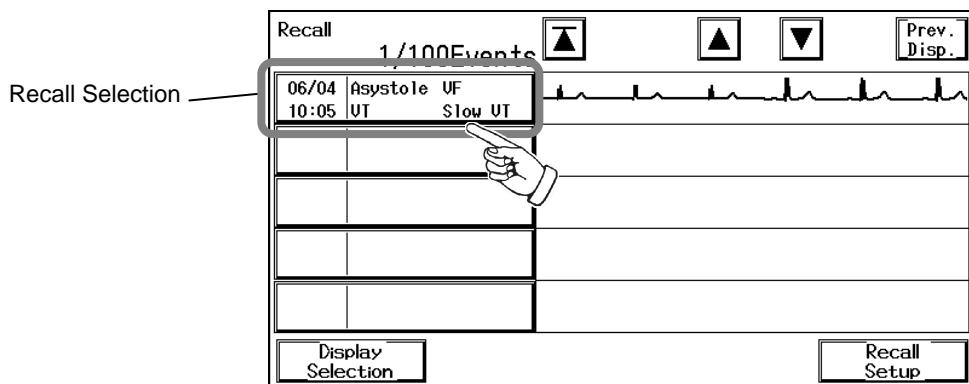
Shift the recall list to older data by 1 page (5 data).

## 4 Press the **Recall Setup** key. The recall factor and recall waveform can be selected on the recall setup menu.

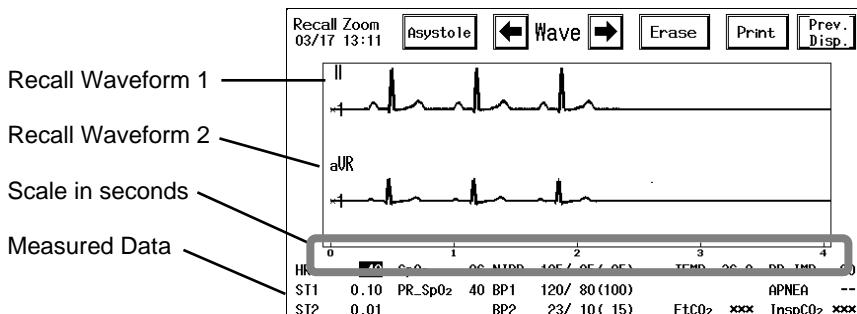


### ●To Display and Record the Enlarged Recall Waveform

On the recall list display, pressing one of the recall factor will display the enlarged recall waveform. On the enlarged recall waveform display, the recall waveform will be displayed in 25mm/s and by using the cursor, the data before and after the alarm occurrence can be checked.



**1 Pressing one of the recall factors will display the enlarged recall waveform.**



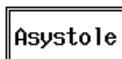
**2 Shift the waveform left or right.**



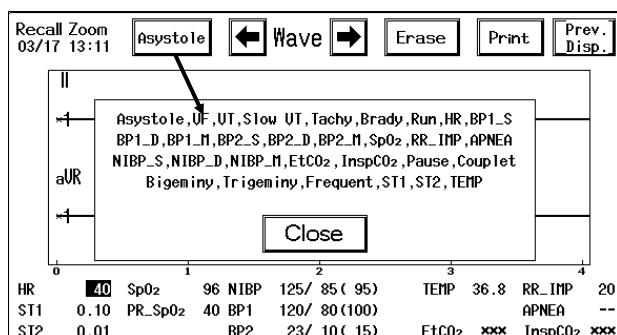
The recall waveform display can be shifted to left or right.

**←** key will shift to the older data.  
**→** key will shift to the newer data.

**3 The alarm factor occurred at the same time will be displayed.**



Pressing the recall factor key will display the recall factor occurred at the same time.



**4 Print the recall waveform.**



Pressing the **Print** key will print the displayed recall waveform and numeric data.

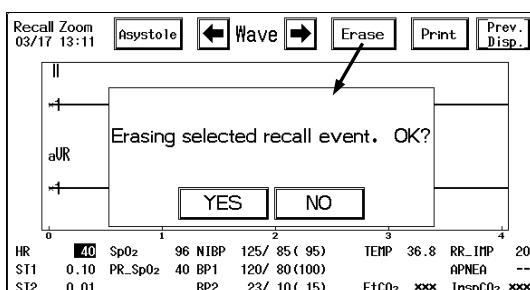
**5 Erase the unnecessary recall waveform.**



Pressing the **Erase** key will display the confirmation message.

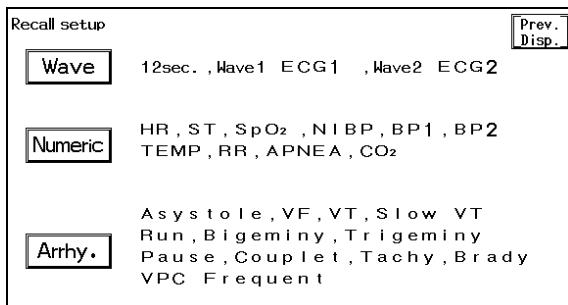
**YES** will erase the waveform and displays the recall list display.

**NO** will return to the previous display.

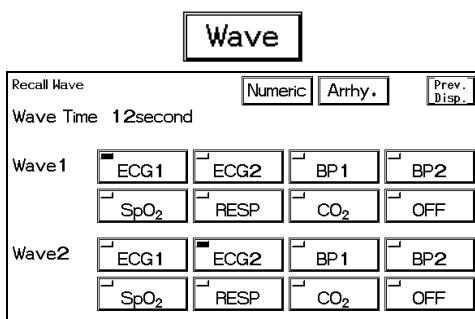


## To Set the Recall Condition

On the recall menu, the storing condition at alarm occurrence can be set.  
The recall waveform and recall factor (numeric data, arrhythmia) can be selected.



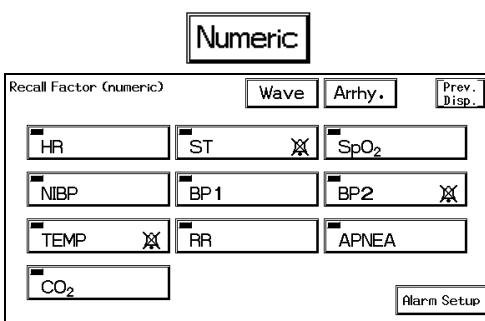
### 1 Select the recall waveform.



Pressing the **Wave** key will display the menu to select the recall waveform.

Up to 2 waveforms can be selected for recall waveform. Select the recall waveform from No. 1 waveform and No. 2 waveform. The key with the LED lighted is the selected waveform.

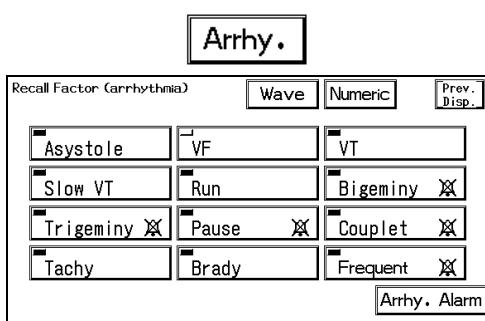
### 2 Select the recall factor (numeric data).



Pressing the **Numeric** key will display the menu to select the numeric data recall factor.

Select the recall factor by pressing the keys. The key with the LED lighted will be the recall factor.

### 3 Select the recall factor (arrhythmia).



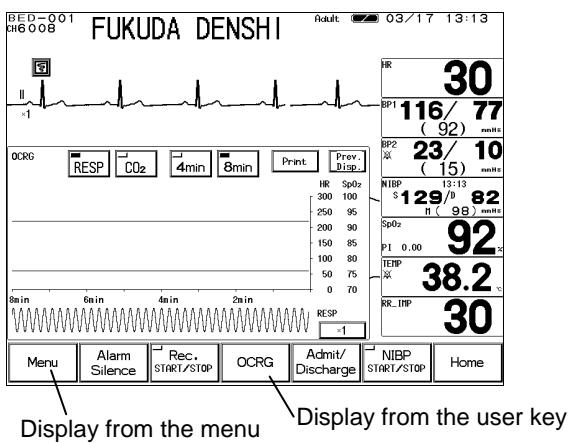
Pressing the **Arrhy.** key will display the menu to select the arrhythmia alarm factor.

Select an arrhythmia for recall factor. The key with LED lighted will be the recall factor.

<b>NOTE</b>	The recall waveform will start with the following delay time tracing back from the alarm occurrence.				
		Adult	Child	Neonate	
	Delay Time	12sec.	12sec.	8sec.	12sec.

This section describes the procedure for OCRG display.

The OCRG display can be accessed from the menu, or from the preprogrammed user key.

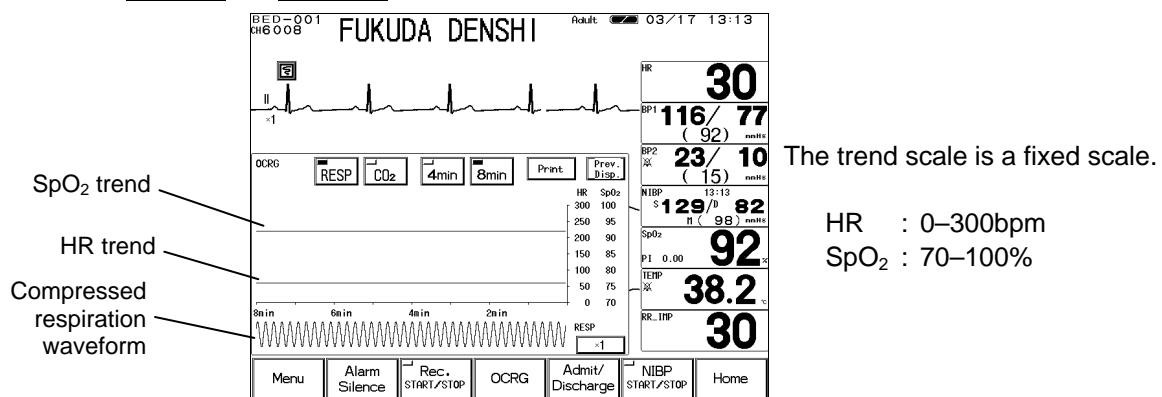


Display from the menu

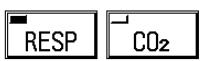
Display from the user key

On the OCRG display, compressed respiration waveform, HR trend and SpO<sub>2</sub> trend are displayed simultaneously.

### 1 Press the **Menu** → **OCRG** keys to display the OCRG menu.



### 2 Select the respiration waveform.



Select **RESP** or **CO<sub>2</sub>** to display the compressed respiration waveform from impedance respiration (RESP) or CO<sub>2</sub> waveform.

### 3 Select the displaying duration.



Select a displaying duration from **4min** or **8min**.

### 4 Select the waveform size for compressed respiration waveform.



Pressing the size key will sequentially change the waveform size.

<b>Respiration Waveform</b>	<b>Size, Scale</b>
Impedance, RESP	x1/4→x1/2→x1→x2→x4→x1/4
CO <sub>2</sub>	100→50→100 (unit : mmHg)
	4→8→10→4 (unit : % or kPa)

### 5 Print the OCRG display on the recorder.

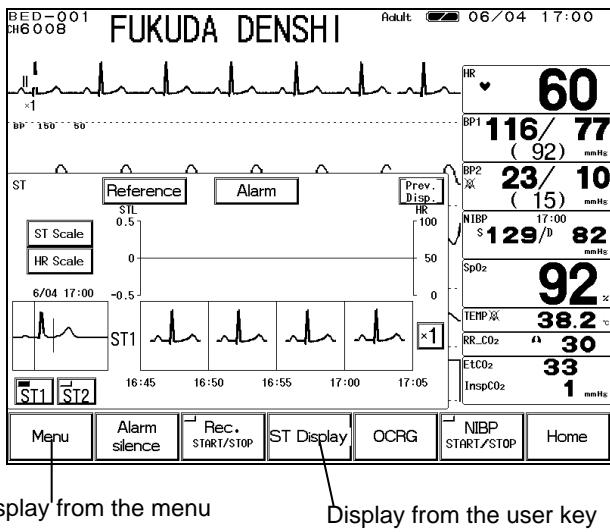


SpO<sub>2</sub> trend and HR trend will be printed on the recorder.

This section describes the operation procedure for the ST display and alarm setup.

## To Display the ST Measurement Menu

The ST display can be accessed from the menu, or from the preprogrammed user key.

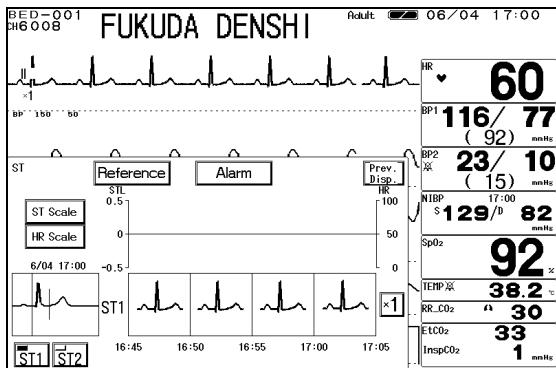


Display from the menu

Display from the user key

On the ST display, the averaged ECG waveform of 16 beats will be superimposed for 5 minutes. 3 frames of superimposed waveform will be displayed. Also, HR and ST level will be simultaneously displayed as graphic trend. ST1 will be measured from ECG1, and ST2 will be measured from ECG2. On the ST display, ST alarm limit and ST reference point / measurement point can be set.

- 1 Press the **Menu** → **ST Display** keys to access the ST display.



- 2 Select the superimposed waveform.



Press the **ST1** or **ST2** key to select the superimposed waveform.

- 3 Select the waveform size for the superimposed waveform.

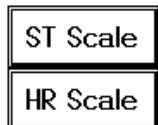


Pressing the key will sequentially change the key as follows;  $\times 1/4 \rightarrow \times 1/2 \rightarrow \times 1 \rightarrow \times 2 \rightarrow \times 4 \rightarrow \times 1/4$ .

### NOTE

The selection of displayed waveform size for the superimposed waveform interlocks with ECG waveform size.

#### 4 Select the trend scale.



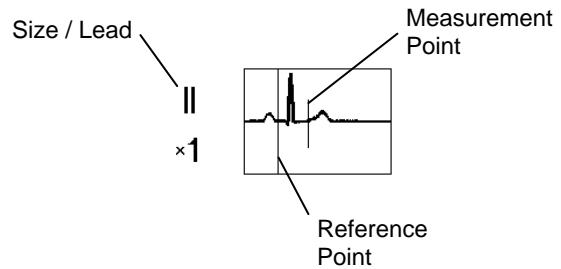
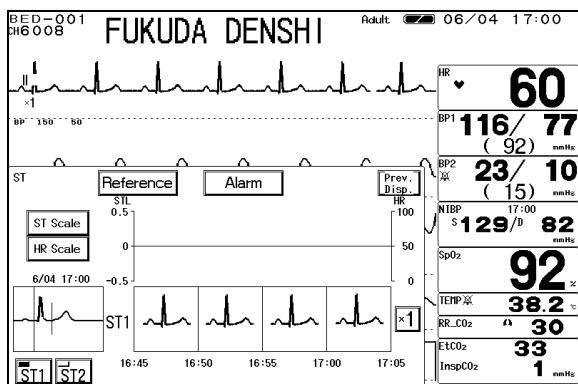
Select the displayed scale for the trend.

Trend	Scale	Unit
HR	100, 200, 300	bpm
ST	$\pm 0.2, \pm 0.5, \pm 1.0, \pm 2.0$	mV
	$\pm 2, \pm 5, \pm 10, \pm 20$	mm

#### ● To Set the Reference Waveform

Set the reference waveform for the ST display and set the reference point and measurement point on the reference waveform.

- 1 Press the **Menu** → **ST Display** → **Reference** keys to display the reference waveform setup menu.



- 2 Read the waveform by pressing the **Wave Set** key.

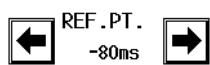


16 beats average of the ECG judged as normal QRS by arrhythmia analysis will be read. If during arrhythmia learning, or if VPC is present, the reference waveform setup will take more than 16 beats.



During the reference waveform setup, the key LED will light.

- 3 Set the reference point on the ST display.



The reference point can be set in the range of -240 to 0ms in increments of 10mS from the peak of QRS to the P wave direction.

- 4 Set the measurement point on the ST display.



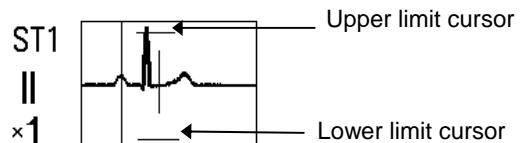
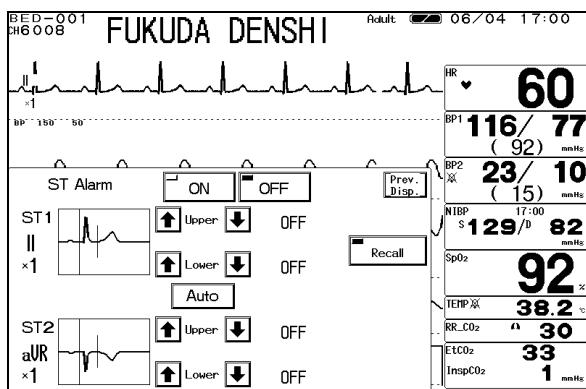
The measurement point can be set in the range of 0 to 560ms in increments of 10mS from the peak of QRS to the T wave direction.

## ● ST Alarm Setup

The ST upper value and lower value compared with the reference waveform will be set.

The alarm value is to be set for each measurement unit (mm / mV). The upper and lower limit can be set in 1mm / 0.1mV increment.

- 1 Press the **Menu** → **ST Display** → **Alarm** keys to display the alarm setup menu.



- 2 Set the upper and lower alarm limit.



Use the **↑**, **↓** keys to adjust the alarm limit.



<i>Item</i>	<i>Description</i>
Lower Alarm Limit	Select the lower alarm limit ( $\pm 20\text{mm} / \pm 2.0\text{mV}$ ). Alarm will be set to OFF if the value $-20\text{mm}/-2.0\text{mV}$ or lower is selected.
Upper Alarm Limit	Select the upper alarm limit ( $\pm 20\text{mm} / \pm 2.0\text{mV}$ ). Alarm will be set to OFF if the value $+20\text{mm}/+2.0\text{mV}$ or above is selected.

- 3 Select ON/OFF of ST alarm.

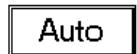
ST Alarm



**ON** will generate the ST alarm.

**OFF** will not generate the ST alarm.

- 4 Select "Auto" for automatically setting the alarm limit.



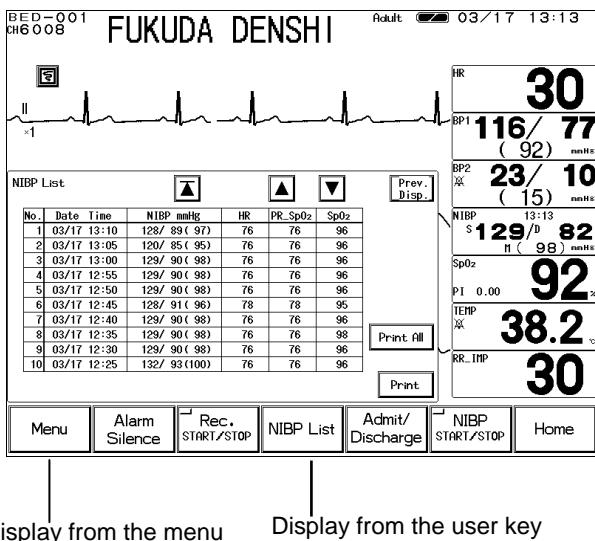
Pressing the **Auto** key will automatically set the upper alarm limit to current ST value  $+0.2\text{mV}$  ( $+2\text{mm}$ ), and lower alarm limit to current ST value  $-0.2\text{mV}$  ( $-2\text{mm}$ ).

Selecting "Auto" will automatically turn ON the ST alarm. If the upper or lower limit is OFF, the limits will remain OFF.

This section explains the NIBP list function and printing procedure.

## To Display the NIBP List

The NIBP list display can be accessed from the menu, or from the preprogrammed user key.

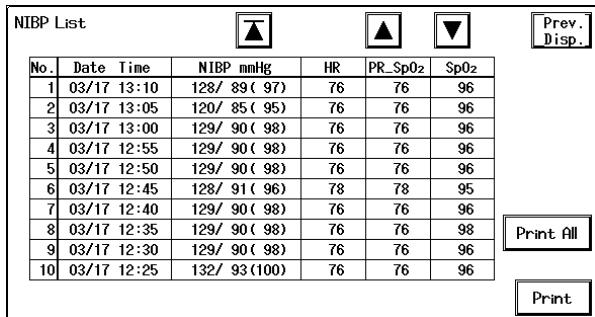


Display from the menu

Display from the user key

On the NIBP list, NIBP data and HR, SpO<sub>2</sub> pulse rate, SpO<sub>2</sub> value at the commencement of NIBP measurement will be stored and displayed for 120 NIBP measurements.

- 1 Press the **Menu** → **NIBP List** keys to display the NIBP list display.



- 2 Shift the displayed column.



Displays the newest 10 data of the NIBP list.



Shifts the display to newer data by 1 page (10 data).



Shifts the display to older data by 1 page (10 data).

- 3 Print the NIBP list.



All the data stored on NIBP list will be printed.



Currently displayed NIBP list will be printed.

## The Description of the Display

No.	Date	Time	NIBP mmHg	HR	PR_SpO <sub>2</sub>	SpO <sub>2</sub>
1	06/04	17:00	128/ 89	76	76	96
2	06/04	16:55	120/ 85	76	76	96
3	06/04	16:50	129/ 90	76	76	96
4	06/04	16:45	129/ 90	76	76	96
5	06/04	16:40	129/ 90	76	76	96
6	06/04	16:35	128/ 91	78	78	95
7	06/04	16:30	129/ 90	76	76	96
8	06/04	16:25	129/ 90	76	76	98
9	06/04	16:20	129/ 90	76	76	96
10	06/04	16:15	132/ 93	76	76	96

The mean BP will be displayed on the NIBP list only if it is displayed on the home display.

If HR or SpO<sub>2</sub> is not measured, or not correctly measured at the commencement of NIBP measurement, the measured data will be displayed as “—”.

For Quick SYS measurement, only the SYS (highest BP value) will be displayed.

### NOTE

If the NIBP measurement was not completed, the data will not be displayed on the NIBP list. At the telemetry center, the time and measurement will be displayed as “00:00” and “—” respectively.

## Other Bed

## Display / Alarm

This section explains about the function to display the waveform and numeric data and to set alarms for other bedside monitors.

To use this function, wired network connection (DS-LANII or DS-LANIII) is required.

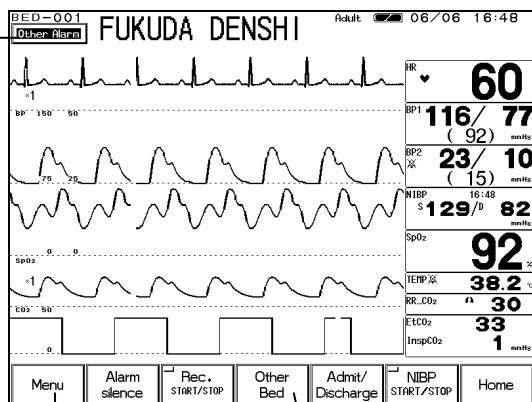
The following section explains this function using the example of DS-LANII network.

### Other Bed Display

The other bed display can be accessed from the menu or from the preprogrammed user key.

Also, by setting the other bed alarm ON, **Other Bed Alarm** key will be displayed when other bedside monitor generates an alarm. By pressing this **Other Bed Alarm** key, the display for the other bed can be accessed.

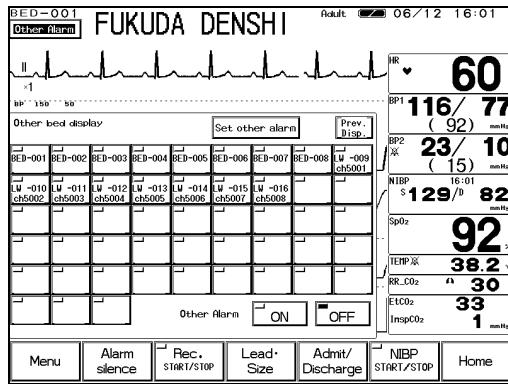
Display from the  
**Other Bed Alarm**  
key.



Display from the menu

Display from the user key

**1 Press the **Menu** → **Other Bed** keys to display the other bed selection menu.**



On the other bed selection menu, select the Room / Bed ID to display.

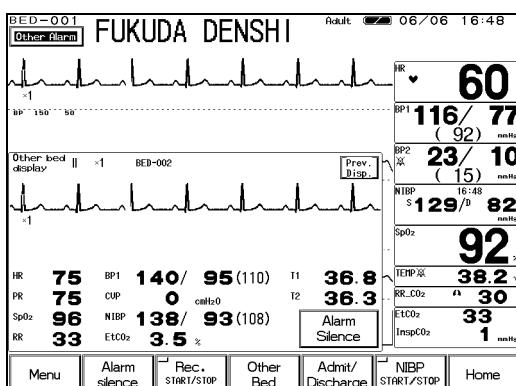
For the DS-LANII network, there are 48 beds selection, and for the DS-LANIII network, there are 100 beds selection.

The Room / Bed ID for the alarm generating bed will be displayed in red.

The bed displaying this menu will be displayed in gray.

The key LED for the bed selected as the other bed alarm generating bed will be lighted.

**2 Press the Room / Bed ID key and access the display for the other bed.**



ECG waveform and numeric data for the selected bed will be displayed.

If an alarm is generated for this bed, the physiological alarm / arrhythmia alarm message will be displayed.

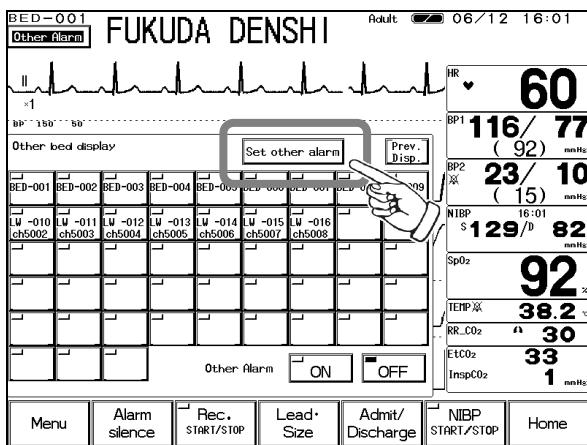
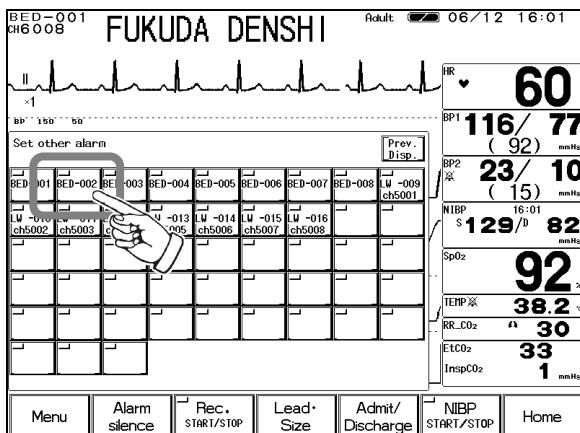
By pressing the **Alarm Silence** key on the other bed display, the alarm sound for the displayed bed can be silenced.

**NOTE**

- When using the DS-LANII network, the temperature value will not be displayed if the unit is °F.
- When using the DS-LANIII network, if the unit for temperature and BP is different between the bedside monitor and the central monitor, the measurement value will not be displayed.

**Other Bed Alarm Setup**

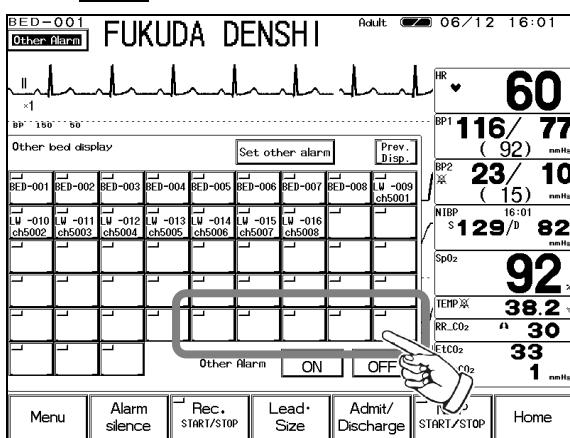
From the bedside monitors connected to the wired network, the ON/OFF setting of the other bed alarm display can be performed.

**1 Select the bed to generate the other bed alarm.**

Press the **Set other alarm** key to display all the other bed.

Select the bed to generate the other bed alarm.

The key LED for the bed selected as the other bed alarm generating bed will be lighted.

**2 Select **ON** for the other bed alarm.**

Press the **Prev. Disp.** key to display the other bed selection menu.

Selecting **ON** will generate the other bed alarm when an alarm generates at the other bed.

Selecting **OFF** will not generate the other bed alarm.

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# Chapter 8

## System Configuration

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# Night Mode Monitoring

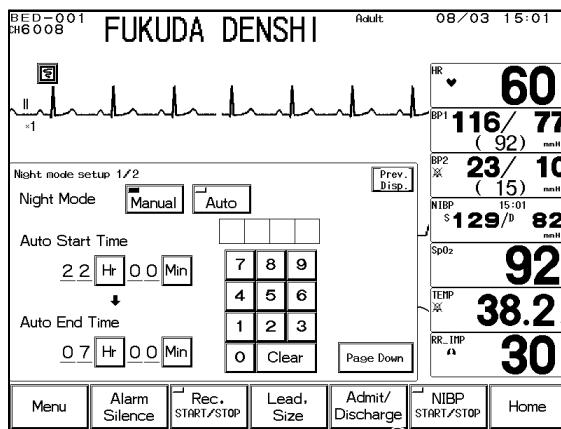
This section explains the procedure to set the night mode.

## About the Night Mode

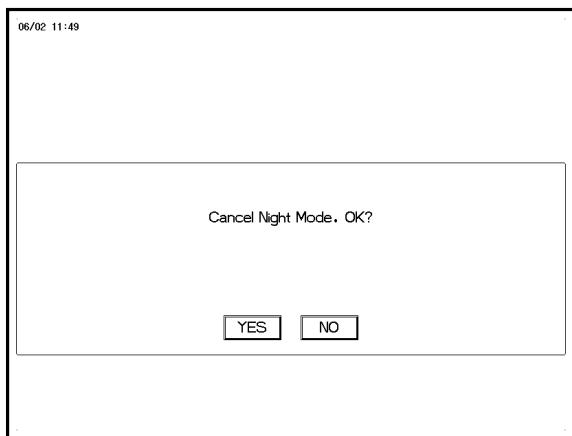
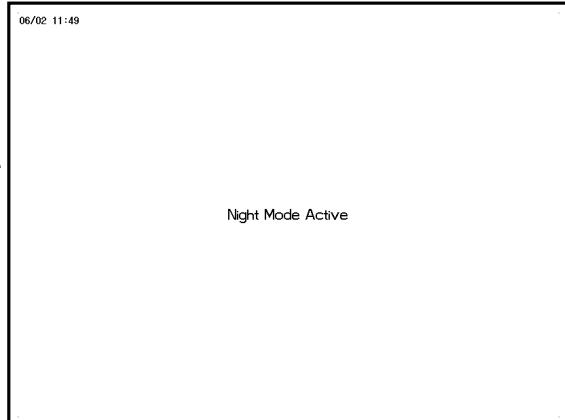
The display brightness and alarm volume can be set to night mode when turning off the light of the ward or when the patient is asleep.

The night mode can be manually set to ON, or automatically set to ON by preprogramming the time to turn ON/OFF the night mode.

### Operation flow when the night mode is set to “Time Display Only”.

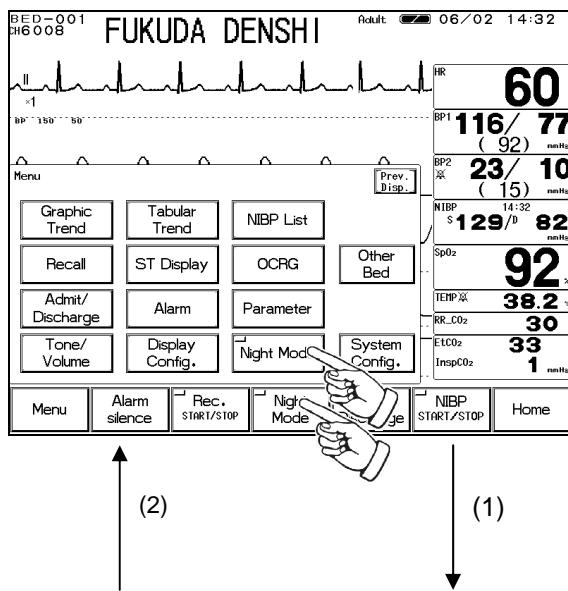


- (1) The night mode can be turned ON manually by pressing the [Night Mode] key on the menu display or the [Night Mode] key preprogrammed as user key. It can be also automatically turned ON at the preprogrammed time.



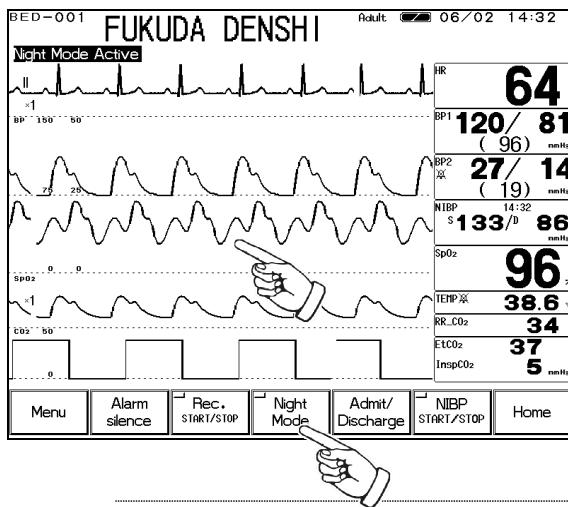
- (2) Pressing the screen will display the confirmation message to cancel the night mode.  
(3) Pressing the [YES] key will cancel the night mode.

## Operation flow when the night mode is set to “Slightly Dark” or “Dark”.



(1) (2)

- (1) The night mode can be turned ON manually by pressing the **Night Mode** key on the menu display or the **Night Mode** key preprogrammed as user key. It can be also automatically turned ON at the preprogrammed time.



Refer to "8. System Configuration Hospital Setup" for procedure to cancel the night mode.

- (2) During the night mode, a message, "Night Mode Active" will be displayed. To cancel the night mode, select **Any Key** for "Night Mode Cancel" on the hospital setup of the preset menu. Touching anywhere on the screen will cancel the night mode. Selecting **Night Mode Key** will cancel the night mode by pressing again the **Night Mode** key on the menu display or **Night Mode** key preprogrammed as user key.

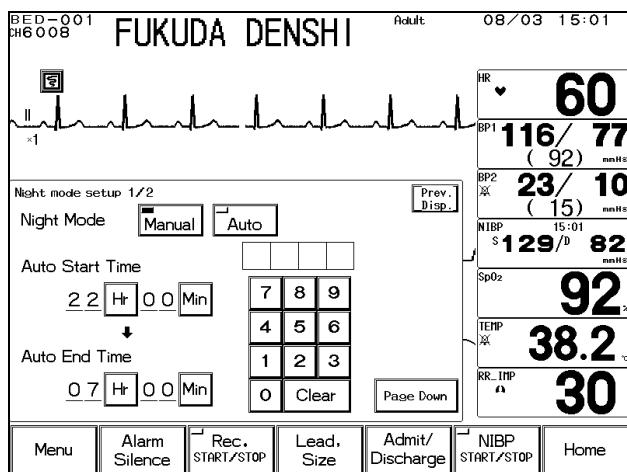
<b>NOTE</b>	Even when the automatic night mode is set, the night mode can be manually set to ON using the user key. In this case, the night mode will automatically set to OFF at the preprogrammed time.
-------------	---

## To Set the Night Mode

The time to start and end the night mode, and the night mode display can be set.

### ●Night Mode Start/End Setup

- 1 Press the **Menu** → **System Config.** → **Night Mode Setup** keys.



- 2 Select **Manual** or **Auto** to start the night mode.

Night Mode       Manual       Auto

**Manual** key will start the night mode manually by pressing the **Night Mode** key set as user key.

**Auto** will start the night mode automatically at the preprogrammed time. If automatic night mode is set to ON, the night mode can be manually turned ON using the user key or remote control.

- 3 Set the "Auto Start Time" and "Auto End Time" of the night mode. (Only for the automatic night mode)

7	8	9	
4	5	6	
1	2	3	
0	Clear		

→

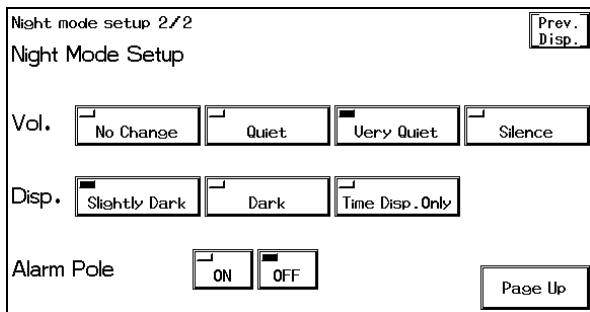
Auto Start Time  
2 2 **Hr** 0 0 **Min**  
↓

Auto End Time  
0 7 **Hr** 0 0 **Min**

Enter the hour and minute using the numeric keypad and press the **Hr** key, **Min** key for the start time and end time.

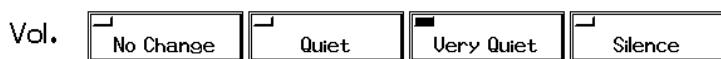
## ●Night Mode Display Setup

- 1** Press the **Page Down** key on the Night Mode Setup (1/2).



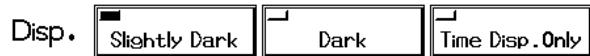
- 2** Set the volume for the night mode.

This volume setup will be effective for all sounds such as key sound and alarm sound.



Selection	Actual Volume
No change	Standard volume
Quiet	Third level from the minimum
Very Quiet	Minimum volume
Silence	No sound

- 3** Select the display brightness of the Night Mode.



Selection	Actual Brightness
Slightly Dark	80% of maximum brightness
Dark	50% of maximum brightness
Time Disp. Only	Only the time will be displayed. The message will disappear after 1 minute from starting the night mode.

- 4** Select ON/OFF of alarm pole for the night mode.



Selection	Alarm Pole
ON	The alarm pole will light during the night mode.
OFF	The alarm pole will not light during the night mode.

## Alarm Mode Setup

## Programming the Alarm Mode

This section explains the procedure to program the alarm mode.

### About the Alarm Mode

On the DS-7100 system, 5 patterns of alarm mode can be programmed according to the monitoring purpose.

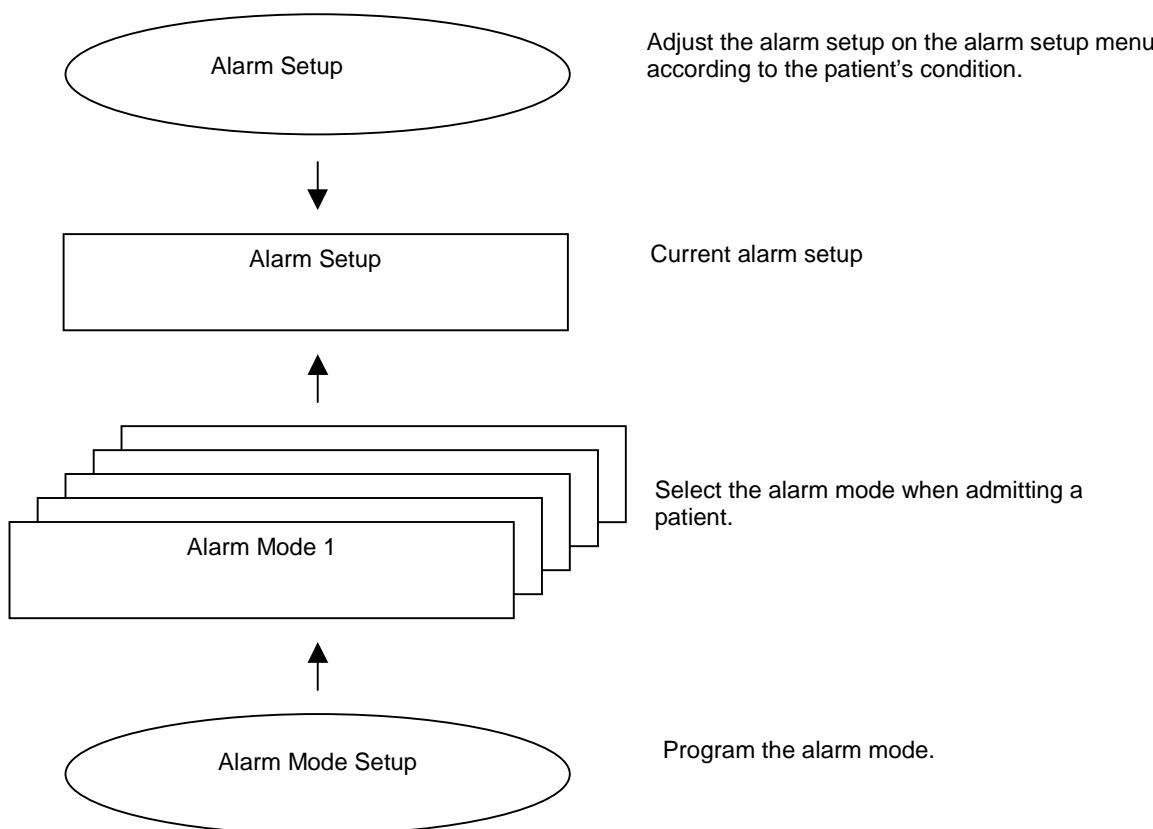
Setting all the alarm condition for each time the patient is admitted may be troublesome.

To simplify this procedure, 5 patterns of alarm mode other than default setting can be programmed according to the monitoring purpose.

By preprogramming the setups to each alarm mode, alarm setups at admitting procedure can be simplified by just selecting the alarm mode.

It is recommended to program the alarm mode in rough classification such as patient's age, monitoring purpose (ICU or surgery), and if necessary, perform unique setup for each patient.

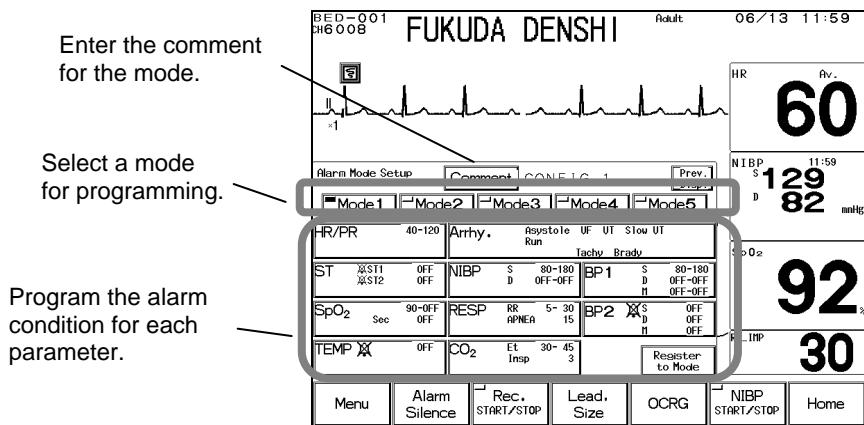
 <b>WARNING</b>	It is recommended to program the alarm mode in rough classification such as patient's age, monitoring purpose (ICU or surgery), and if necessary, perform unique setup for each patient.
--	--



## To Program the Alarm Mode

Programming the alarm condition for each alarm mode can be performed on the standard alarm setup menu. The default setting can be changed by the setup procedure of each alarm mode.

- 1 Press the **Menu** → **System Config.** → **Pre-Set** → **Alarm Mode Setup** keys.

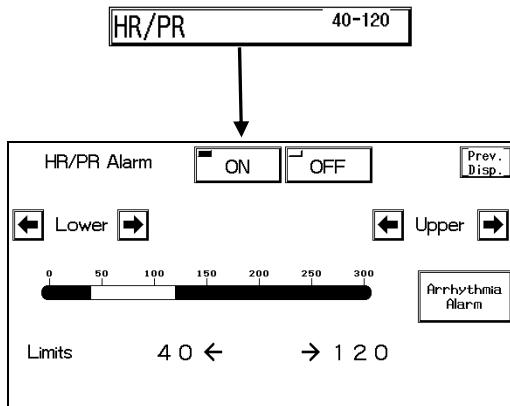


- 2 Select a mode for programming.

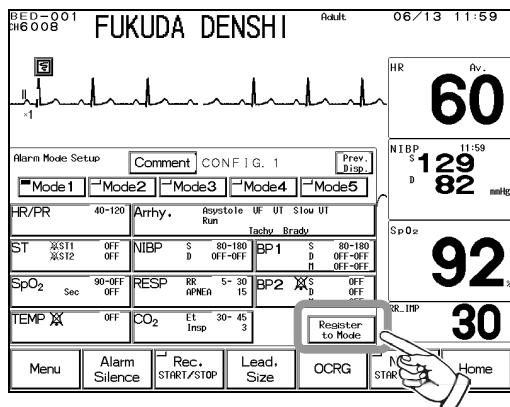
**Mode 1** **Mode 2** **Mode 3** **Mode 4** **Mode 5** Select the mode to program the alarm condition.

<b>NOTE</b>	On the alarm mode setup menu, the setup details of currently selected alarm mode will be displayed. Changing the mode and returning to the home display will set the alarm value with the setup details of the last selected mode.
-------------	--

- 3 Program the alarm condition.

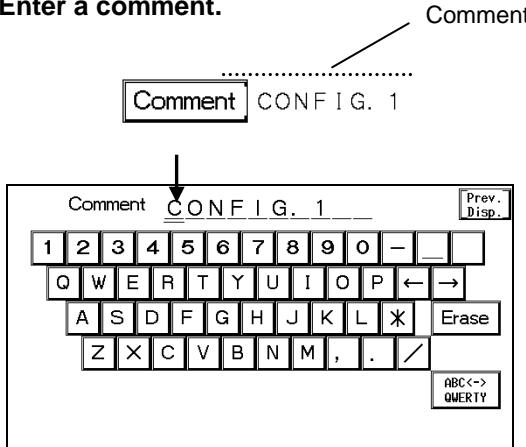


The programmed alarm condition will be displayed inside the numeric data key.  
The programmed value and alarm OFF mark will be displayed simultaneously.  
Pressing the numeric data key will display the alarm setup menu which allows to change the alarm condition.



Press the **Register to Mode** key to register the current alarm setting for the mode (1 to 5) selected on procedure 2.

#### 4 Enter a comment.

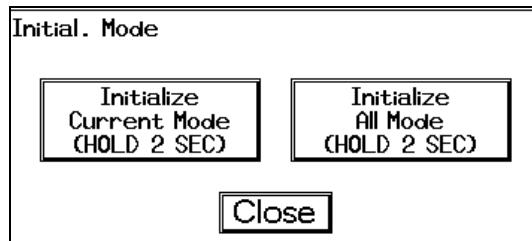
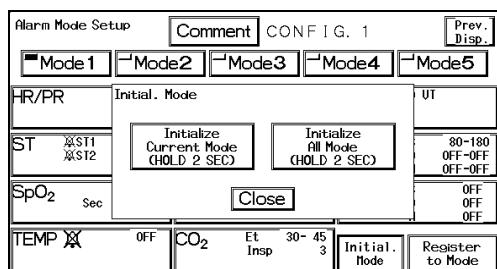


Pressing the **Comment** key will display the keyboard display. Enter a comment using the keyboard.

## To Initialize the Alarm Mode

The alarm mode setting can be initialized to factory default setting.

- 1 Press the **Menu** → **System Configuration** → **Pre-Set** → **Alarm Mode Setup** keys.
- 2 Press the **Initial. Mode Button** to select the initial mode.



**Initialize Current Mode** will initialize the currently selected alarm mode to factory default setting.

**Initialize All Mode** will initialize all alarm modes (Mode1 to Mode5) to factory default setting.

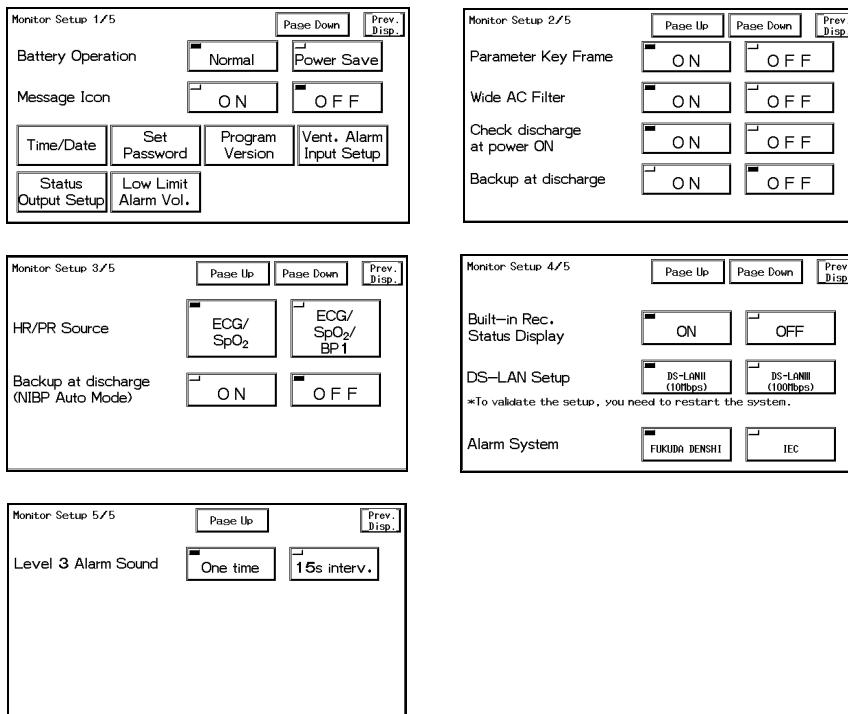


For factory default setting of the alarm mode, refer to "11. Technical Information".

## Monitor Setup

## Setup for Each Monitor

This section describes the setup items that can be set individually for each monitor.



## About the Monitor Setup

The monitoring details can be set different for each monitor on the monitor setup menu.

- Battery Operation
- Time/Date
- Program Version
- Status Output Setup
- Parameter Key Frame
- Check Discharge at Power ON
- HR/PR Source
- Built-in Rec. Status Display
- Alarm System
- Message Icon
- Set Password
- Ventilator Alarm Input Setup
- Low Limit Alarm Vol.
- Wide AC Filter
- Backup at Discharge
- Backup at Discharge (NIBP Auto Mode)
- DS-LAN Setup
- Level 3 Alarm Sound

### ●Battery Operation

Battery Operation

<input checked="" type="checkbox"/> Normal	<input type="checkbox"/> Power Save
--	-------------------------------------

Select the function for the battery operation.

Normal

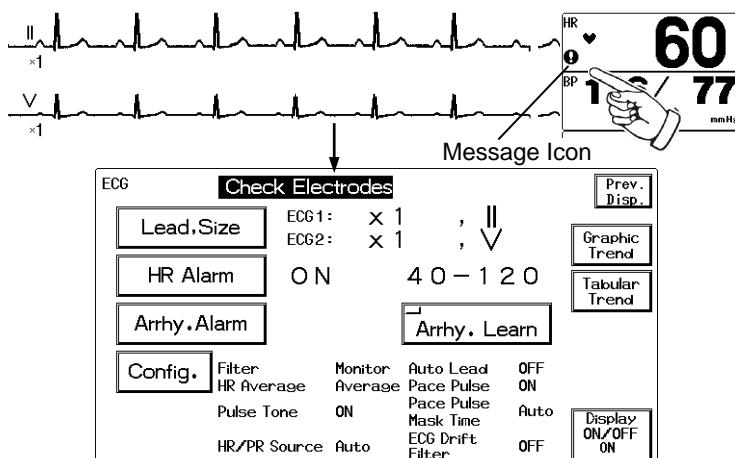
: The monitor will operate the same as with AC operation.

Power Save

: The display brightness will automatically become minimum when battery operation is selected.

## ●Message Icon

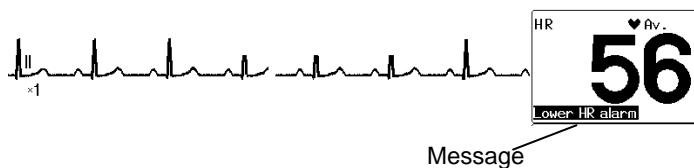
Message Icon   Select ON/OFF to display message icon.



When there are many numeric data display, the parameter key size will be reduced which may disable the message to be displayed inside the parameter key.

In such case, an icon will be displayed inside the parameter key to indicate that there is a message.

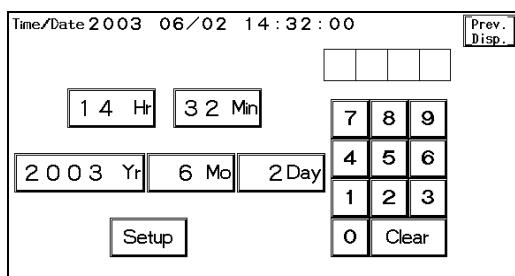
The message can be checked by pressing the parameter key with the icon, and displaying the parameter setup menu.



If the parameter key size is large, a message will be displayed inside the parameter key.

## ●Time/Date Setup

key will display the time/date setup menu.



Enter the time/date using the numeric keypad, and press the corresponded key.

For example, to change the time from 2min to 5min, enter  on the numeric keypad.

Next, press the  key.

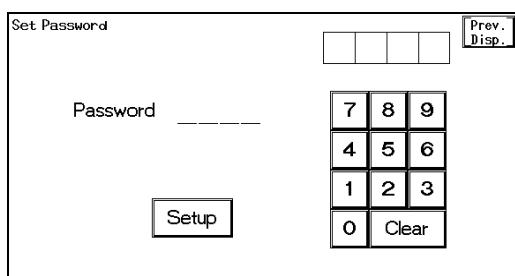
Then, press the  key to finalize the setup.

### ⚠ CAUTION

- If the time/date is not correctly set, or changed during monitoring, erroneous condition may occur to NIBP measurement, periodic recording, trend, NIBP list data.
- If the time/date is changed during monitoring, patient's age will not be recalculated.
- When connected to a wired network, the same time/date with the central monitor will be set.

## ●Password Setup

A 4-digit password to be entered on the preset menu can be set.



If the password is set to ON in the ward setup menu, a password will be required to access the preset menu.

Enter the numbers, and press the  key.

The programmed password will be displayed when the setup is complete.

## ●Program Version

**Program  
Version**

The software information will be displayed.

Pressing the **Program Version** key will display software version of the monitor, produced date, and comment analyzing program version.

Program Version		Prev. Disp.
DS-7100 Version	V11-01 (#0416)	Boot Version V11-01
Date	2012/04/27	
Comment	DYNASCOPE	
	DS-7100 Series	
	EXPORT	
Arrhythmia	(# )	
NIBP	NIBP Version V1.01	

## ●Ventilator Alarm Input Setup

**Vent. Alarm  
Input Setup**

Select the device to input the ventilator alarm.

Pressing the **Vent. Alarm Input Setup** key will display the ventilator selection screen.

Ventilator Alarm Input Setup			Prev. Disp.
Device (HOLD 2 SEC)	OFF	SV-900	SV-300/ Servo-i/-s
	PB	Evita	Savina
*To connect each device, refer to ops manual. *To select SV-300/Servo-i/-s, PB, Evita, Savina, set serial comm. in advance.			Serial Comm. Setup

Select the ventilator from **SV-900**, **SV-300/Servo-i/-s**, **PB**, **Evita**, **Savina**.

If no ventilator is connected, select **OFF**.

Press the key for more than 2 seconds.

Pressing the **Serial Comm. Setup** key will display the setup menu to connect the SV-300, Servo-i/s, PURITAN-BENNETT, Evita, Savina.



If a ventilator is connected, or if a ventilator alarm is suspended, the ventilator alarm input setup cannot be changed.



To set the SV-300, Servo-i/s, PURITAN-BENNETT, Evita, Savina, it is necessary to validate the using ventilator on the serial communication setup of the ward setup menu. To set the SV-900, it is necessary to set other ventilators OFF on the serial communication setup of the ward setup menu. Refer to "8. System Configuration Ward Setup Serial Communication Setup".

## ●Status Output Setup

**Status  
Output Setup**

This device is capable to output synchronized signal (HR, RR) and alarm.

Pressing the **Status Output Setup** key allows to set the details of synchronized signal output and alarm output.

Status Output Setup			Prev. Disp.
Sync Signal Output	Signal to output Output logic	OFF Negative logic	
Alarm Output	Alarm to output Output logic	OFF Negative logic	

Pressing the **Sync Signal Output** key will display the menu to select the synchronized signal (HR, RR) and output logic (positive logic, negative logic).

Pressing the **Alarm Output** key will display the menu to select the alarm to output and output logic (positive logic, negative logic).

## Synchronized Signal Output Setup

Status Output Setup(Sync Signal)		Prev. Disp.
Signal to output	<input checked="" type="checkbox"/> HR <input type="checkbox"/> RR	
Output logic	<input type="checkbox"/> Positive logic <input checked="" type="checkbox"/> Negative logic	

Select the output signal from [HR], [RR].

[HR] will output synchronized signal according to the selected HR source (ECG, SpO<sub>2</sub>, BP1).

[RR] will output synchronized signal according to the selected RR source (impedance, CO<sub>2</sub>).

Select the output logic from [Positive Logic], [Negative Logic].

Positive logic outputs the signal in plus, and negative logic outputs the signal in minus.

### CAUTION

As the synchronous detection is performed after filtering the input signal, the synchronized signal is delayed from the actual synchronization. If HR is selected for "Signal to output", and ECG is selected as HR source, the delay time is 100 to 132ms (standard approx. 100ms) for adult.



Refer to "11. Technical Information External Connection" for connector pin assignments of the output signal.



The output pulse is 100ms pulse of the set logic with 0 to 5V amplitude.

## Alarm Output Setup

Status Output Setup(Alarm)		Prev. Disp.
Alarm to output	<input type="checkbox"/> OFF <input checked="" type="checkbox"/> APNEA <input type="checkbox"/> Level 1 <input type="checkbox"/> Level 1 and 2 <input checked="" type="checkbox"/> Level1,2 and 3	
Output logic	<input type="checkbox"/> Positive logic <input checked="" type="checkbox"/> Negative logic <input type="checkbox"/> Pulse	

Select the alarm to output.

[Level 1] will output a signal when the level 1 alarm generates.

[Level 1 and 2] will output a signal when level 1 or level 2 alarm generates.

[Level 1, 2 and 3] will output a signal when level 1, level 2, or level 3 alarm generates.

[APNEA] will output a signal when apnea alarm generates.

Select [OFF] if it is not necessary to output an alarm.

Select the output logic from [Positive Logic], [Negative Logic], [Pulse].

Positive logic outputs the signal in plus, and negative logic outputs the signal in minus.

A square wave of 440ms cycle is output for [Pulse].



Refer to "11. Technical Information External Connection" for connector pin assignments of the output signal.

### NOTE

The equipment status alarm will be output as level 3.

Select [Level 1, 2, and 3] when outputting the equipment status alarm.

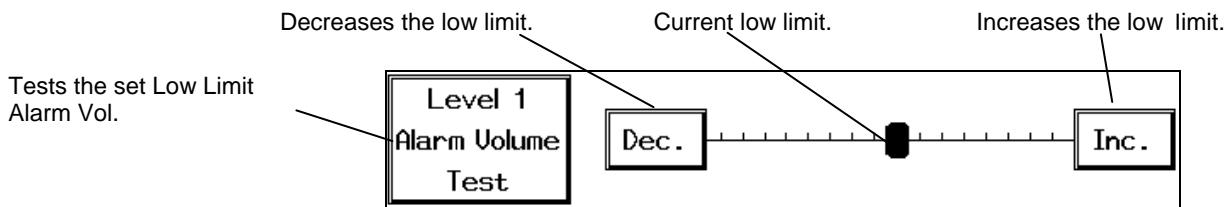
## ● Low Limit for the Alarm Volume

Low Limit for the Alarm Volume		Prev. Disp.
Alarm Priority	Hi <input type="checkbox"/> Level 1 Alarm Volume Test Dec. <input type="checkbox"/> Inc. Level 2 Alarm Volume Test Dec. <input type="checkbox"/> Inc. Level 3 Alarm Volume Test Dec. <input type="checkbox"/> Inc.	
Low		

The low limit for the alarm volume range on the "Tone/Vol." screen can be set.

The alarm volume range can be changed for each alarm level.

The adjustable alarm volume range will be indicated by a yellow underline in the "Tone/Vol." screen.



### CAUTION

- The alarm priority is high for level 1 (life threatening alarm), medium for level 2 (cautionary alarm), and low for level 3 (treatment needed alarm).
- Pay attention not to set the alarm volume too low to avoid missing any important alarms.
- During the night mode, the volume set on the "Night Mode Setup" will be applied.



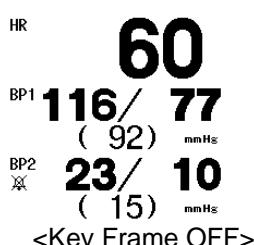
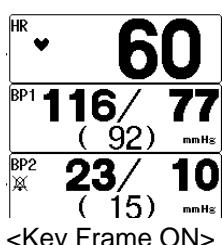
For the night mode setup, refer to "8. System Configuration Night Mode ●Night Mode Display Setup"

## ●Parameter Key Frame

Parameter Key Frame

<input type="checkbox"/> ON	<input checked="" type="checkbox"/> OFF
-----------------------------	---

The parameter key frame on the home display can be erased.



## ●Wide AC Filter

The monitor constantly uses the AC filter, but if AC noise interference is too large, a wide AC filter can be turned ON.

Wide AC Filter

<input type="checkbox"/> ON	<input checked="" type="checkbox"/> OFF
-----------------------------	---

If AC noise interference is large, first check the following items;

- If the monitor and the simultaneously used ME equipment are properly grounded.
- If the power cable is kept far from the patient cable.
- If the electrodes are firmly attached?
- If the electrodes is not dried up due to long term use.
- If the electrode and lead cable is properly connected.
- If the wire of the lead cable is not broken.
- If any noise source such as electric blanket is near the patient.

### NOTE

For the uninterrupted power supply system or other power supply system with the frequency other than 50Hz or 60Hz, the AC filter will have no effect.

## ●Check Discharge at Power ON

Check discharge  
at power ON

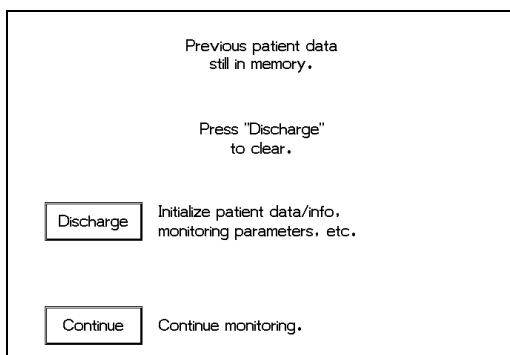
<input checked="" type="checkbox"/> ON	<input type="checkbox"/> OFF
--	------------------------------

The trend data and NIBP list data will remain stored even when the power is turned OFF. To start monitoring a new patient, it is necessary to perform discharge procedure on patient admit/discharge menu, and clear the data of previous patient.

This function allows to select ON/OFF of discharge confirmation display when previous data remains at power ON.

To immediately display the waveform and numeric data at power ON, select  OFF. The discharge confirmation display will not be displayed and monitoring will be immediately started.

Selecting  ON will display the discharge confirmation display when the previous data remains at power ON.



<Discharge Confirmation at Power ON>

## ●Backup at Discharge

Whether or not to backup the setup details at discharge can be selected.

Backup at discharge

<input checked="" type="checkbox"/> ON	<input type="checkbox"/> OFF
--	------------------------------

If you do not wish to initialize the setup details such as alarm setups and display configuration at discharge, select  ON. If  OFF is selected, the setup details will be initialized to the default setting of the selected alarm mode or display mode.

### Numeric Data Alarm

Item	Detail	ON	OFF
HR	ON, OFF 20–300bpm		
ST	ON, OFF $\pm 2.0\text{mV}/\pm 20\text{mm}$		
BP (mmHg)	ON, OFF 0–300mmHg		
BP (kPa)	ON, OFF 0–40.0kPa		
RR	ON, OFF 5–150Bpm		
APNEA	ON, OFF 5–20 sec.		
SpO <sub>2</sub>	ON, OFF 50–100%		
NIBP (mmHg)	ON, OFF 10–300mmHg		
NIBP (kPa)	ON, OFF 1.5–40.0kPa		
TEMP	ON, OFF 30–50°C		
EtCO <sub>2</sub> (mmHg)	ON, OFF 1–100mmHg		
EtCO <sub>2</sub> (kPa)	ON, OFF 0.1–13.3kPa		
EtCO <sub>2</sub> (%)	ON, OFF 0.1–13.3%		
InspCO <sub>2</sub> (mmHg)	ON, OFF 1–4mmHg		
InspCO <sub>2</sub> (kPa)	ON, OFF 0.1–0.4kPa		
InspCO <sub>2</sub> (%)	ON, OFF 0.1–0.4%		

Backup

Alarm Mode

## Arrhythmia Alarm

Item	Detail	ON	OFF
HR	ON, OFF 20–300bpm	Backup	Alarm Mode
ASYSTOLE	ON, OFF 3–10 sec.		
VF	ON, OFF		
VT	ON, OFF HR Low Limit: 120 or 140bpm		
SLOW_VT	ON, OFF		
RUN	ON, OFF 2–8 beats HR Low Limit: 0 to 100bpm		
COUPLET	ON, OFF		
PAUSE	ON, OFF 1.5–5 sec.		
BIGEMINY	ON, OFF		
TRIGEMINY	ON, OFF		
FREQUENT	ON, OFF 1–50 beats/min.		
TACHY	ON, OFF 20–300		
BRADY	ON, OFF 20–300		

## Parameter Setup

Item	Detail	ON	OFF
ECG1 Lead	I, II, III, aVR, aVL, aVF, V	Backup	Lead II
ECG2 Lead	I, II, III, aVR, aVL, aVF, V		Lead V
BP1 Scale	20, 50, 75, 100, 150, 200, 250, 300mmHg 4, 8, 12, 16, 20, 24, 32, 40kPa		Refer to the following*.
BP2 Scale	20, 50, 75, 100, 150, 200, 250, 300mmHg 4, 8, 12, 16, 20, 24, 32, 40kPa		Refer to the following*.
EtCO <sub>2</sub> Peak Picking Duration	10, 20, 30 sec, OFF		10 sec.
CO <sub>2</sub> Scale	50, 100mmHg 4, 8, 10kPa 4, 8, 10%		50mmHg 4kPa 4%



\*The default setting of BP scale and display type differs according to the BP label.  
Refer to "6. Parameter Setup Parameter Setup Label".

## Display Configuration Setup

Item	Detail	ON	OFF
No. of Waveform	0 to 6 waveform	Backup	Display Mode
No. of Numeric Data	0 to 7 numeric data		
Displayed Waveform	ECG1, ECG2, BP, SpO <sub>2</sub> RESP, CO <sub>2</sub>		
Displayed Numeric Data	HR(PR, BPR), VPC/ST, NIBP, BP1, BP2, SpO <sub>2</sub> , SpO <sub>2</sub> +PR, EtCO <sub>2</sub> , RR, TEMP, TEMP/RR		
Enlarged Display	ON, OFF		
Short Trend	ON, OFF, Overlap		

## ●HR/PR Source

This setup will allow HR/PR source selection of **ECG/SpO<sub>2</sub>** or **ECG/SpO<sub>2</sub>/BP1**.

HR/PR Source



**ECG/SpO<sub>2</sub>** will allow HR/PR source selection from ECG or SpO<sub>2</sub>.

**ECG/SpO<sub>2</sub>/BP1** will allow HR/PR source selection from ECG, SpO<sub>2</sub>, or BP1.



The HR/PR source selection can be performed on ECG/SpO<sub>2</sub>/BP1 configuration menu. For the setup procedure, refer to "6. Parameter Setup HR/PR Source".

### ⚠ CAUTION

In case of DS-LANII network, if [BP1] is selected for "HR/PR source" (Or, if [Auto] selects BP1 for HR/PR source), ECG waveform will not be transmitted on the network. On the central monitor, PR\_BP value will be displayed instead of HR. However, on some central monitor depending on the model type, the HR value from ECG will be displayed on ST measurement list, etc. Refer to the operation manual for the respective central monitor.  
In case of DS-LANIII network, refer to the operation manual for the central monitor.

## ● Backup at Discharge (NIBP Auto Mode)

Whether or not to back up the NIBP auto mode function after discharge can be selected.

Backup at discharge  
(NIBP Auto Mode)

ON	OFF
----	-----

Select [ON] to back up the NIBP auto mode function after discharge.

## ● Built-in Recorder Status Display

Whether or not to display the status message for the DS-7100 system built-in recorder can be selected.

Built-in Rec.  
Status Display

ON	OFF
----	-----

## ● DS-LAN Setup

The DS-LAN network to be used can be selected. To change the setup, a password is required.

DS-LAN Setup

DS-LANII (10Mbps)	DS-LANIII (100Mbps)
----------------------	------------------------

\*To validate the setup, you need to restart the system.

### ⚠ WARNING

Do not mix devices with DS-LANII and DS-LANIII setting in the same wired network. The network may cease and proper monitoring may not be possible.

### ⚠ CAUTION

When connecting to the DS-LAN network, perform "DS-LAN Setup" in the Monitor Setup menu and restart the system before connecting the LAN cable.

### NOTE

- During DS-LAN communication, do not change the setting for "DS-LAN Setup".
- The following central monitors can connect to DS-LANII network only. When connecting these central monitors, make sure all monitors in the same wired network is set to [DS-LANII].  
DS-5700, DS-5800N/NX/NX<sup>MB</sup>, DS-7600/7600W (software version of V05 and prior)
- To validate the "DS-LAN Setup", it is necessary to restart the system. Make sure to restart the system when the setting is changed for "DS-LAN Setup".

## ● Alarm System

The alarm system such as alarm sound and alarm indicator will differ depending on this selection.

Alarm System

FUKUDA DENSBI	IEC
---------------	-----

### ⚠ WARNING

When "Alarm System" setting (IEC/FUKUDA DENSBI) is changed on the Monitor Setup menu, make sure to check the alarm sound and alarm indicator.

### 【Tone/Volume Setup】

	When <b>FUKUDA DENSHI</b> is set	When <b>IEC</b> is set
<b>Sound</b>		
Level 1	Continuous beep tone	Continuous tone
Level 2	Beep tone every 5 seconds	5 seconds interval beep tone
Level 3	Single beep tone or Beep tone in 15 seconds interval	Single beep tone (different tone from FUKUDA DENSHI mode) or 15 seconds interval beep tone (*)
<b>Volume Setup</b>		
Level 1	Setting is possible.	Setting is possible.
Level 2		The volume for low level alarm cannot be set higher than the high level alarm.
Level 3		
<b>Tone Setup</b>		
Level 1	Setting is possible.	Setting is possible.
Level 2		Setting is not possible. (Setting for Level 1 will be applied.)
Level 3		Setting is not possible. (Setting for Level 1 will be applied.)
<b>Other Setup</b>		
Other Bed Alarm	Setting is possible.	Setting is not possible. (Setting for Level 1 will be applied.)
Ventilator Alarm	Only ON/OFF setting is possible. (For tone and volume, setting for Level 1 will be applied.)	Only ON/OFF setting is possible. (For tone and volume, setting for Level 1 will be applied.)
Alarm Mute (Hospital Setup)	Setting is possible.	Setting is not possible. (Fixed to "OFF")



\* The time interval for Level 3 alarm sound can be set. The setting can be performed under the "Monitor Setup" menu. For procedure, refer to "8. System Configuration Monitor Setup  
 ●Level 3 Alarm System Sound" (Default: One time)

### 【Alarm Pole Setup】

Setup	When <b>FUKUDA DENSHI</b> is set	When <b>IEC</b> is set
Sync. with Alarm	Setting is possible.	Setting is not possible. (Fixed to "ON")
Alarm Type		Setting is not possible. (Fixed to "Level 1, 2 and 3")
Ventilator Alarm		Setting is not possible. (Fixed to "ON")
Pattern Setup		Setting is not possible.
Sync. with HR		Setting is possible.



The alarm priority is high for level 1 (life threatening alarm), medium for level 2 (cautionary alarm), and low for level 3 (treatment needed alarm).

### ●Level 3 Alarm Sound

The alarm generating time interval for Level 3 alarm can be set.

Level 3 Alarm Sound	<input type="checkbox"/> One time	<input checked="" type="checkbox"/> 15s interv.	If <b>One time</b> is selected, the alarm sound will generate only one time.
			If <b>15s interv.</b> is selected, the alarm sound will generate in 15 seconds interval.

This section describes the procedure to program the mode for display configuration.

### About the Display Mode

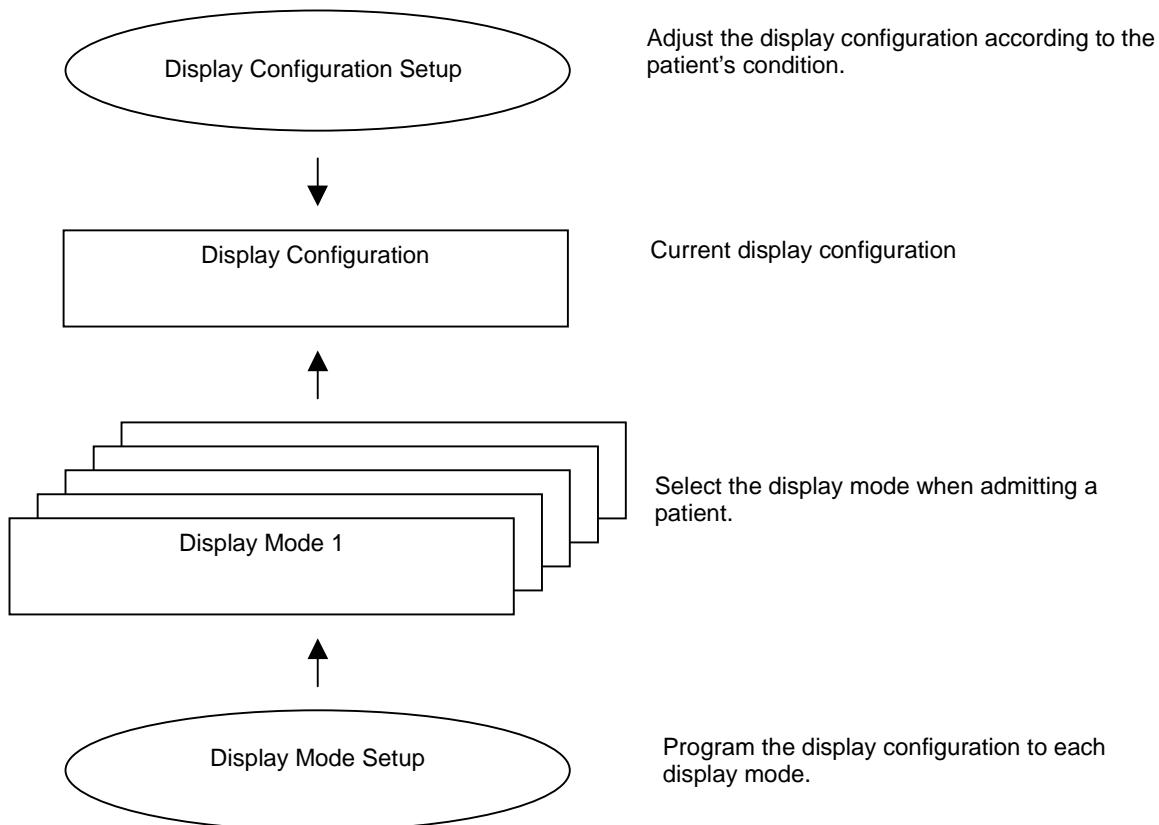
On the DS-7100 system, 5 patterns of display configuration can be programmed according to the monitoring purpose.

Setting the display configuration for each time the patient is admitted or each time the parameter is added or deleted may be troublesome.

To simplify this procedure, 5 patterns of display configuration other than default setting can be programmed according to the monitoring purpose.

By preprogramming the configuration to each display mode, display configuration setups at admitting procedure can be simplified by just selecting the display mode.

It is recommended to program the display mode in rough classification such as patient's condition, monitoring purpose (ICU or surgery), and if necessary, perform unique setup for each patient.

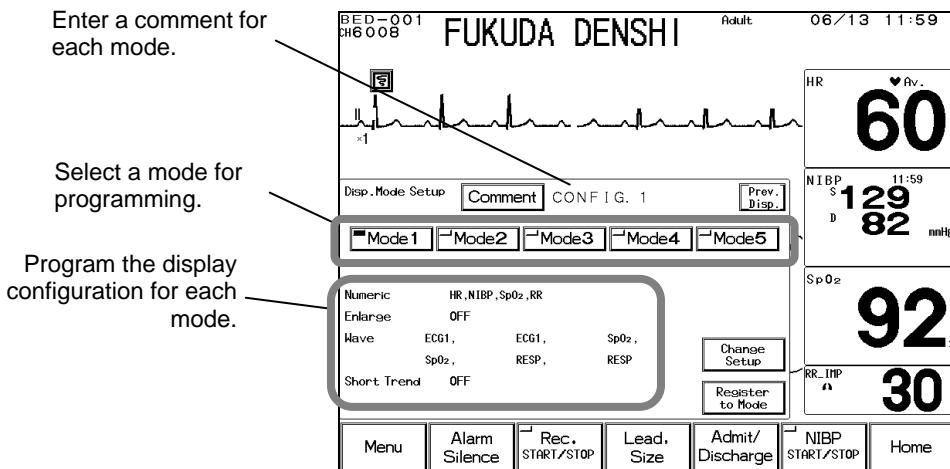


## To Program the Display Mode

Programming the display configuration for each display mode can be performed on the display configuration setup menu.

The default setup can be changed directly on the display configuration menu for each display mode.

- 1 Press the **Menu** → **System Config.** → **Pre-Set** → **Display Mode Setup** keys.

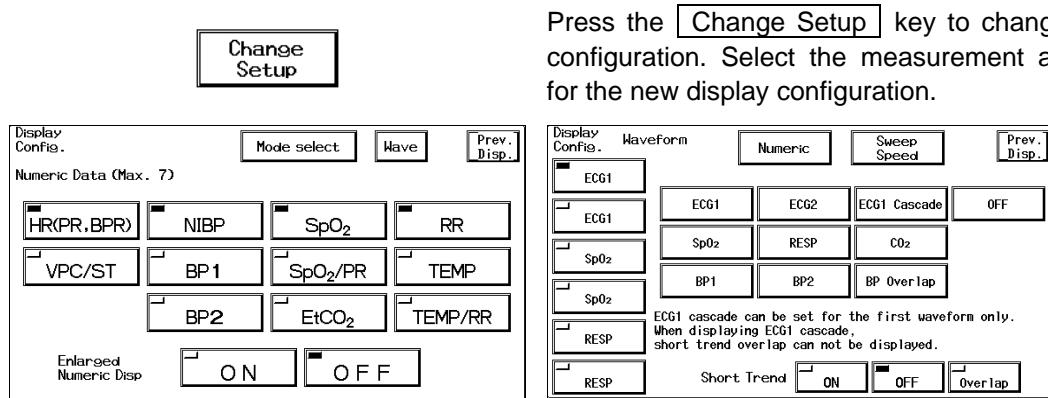


- 2 Select a mode for programming.

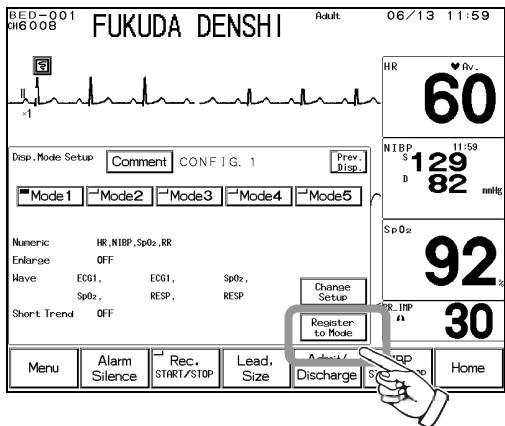
Mode1  Mode2  Mode3  Mode4  Mode5 Select a mode to program the display configuration.

<b>NOTE</b>	On the display mode setup menu, the setup details of currently selected display mode will be displayed. Changing the mode and returning to the home display will set the display configuration with the setup details of the last selected mode.
-------------	--

- 3 Program the display configuration for the mode.

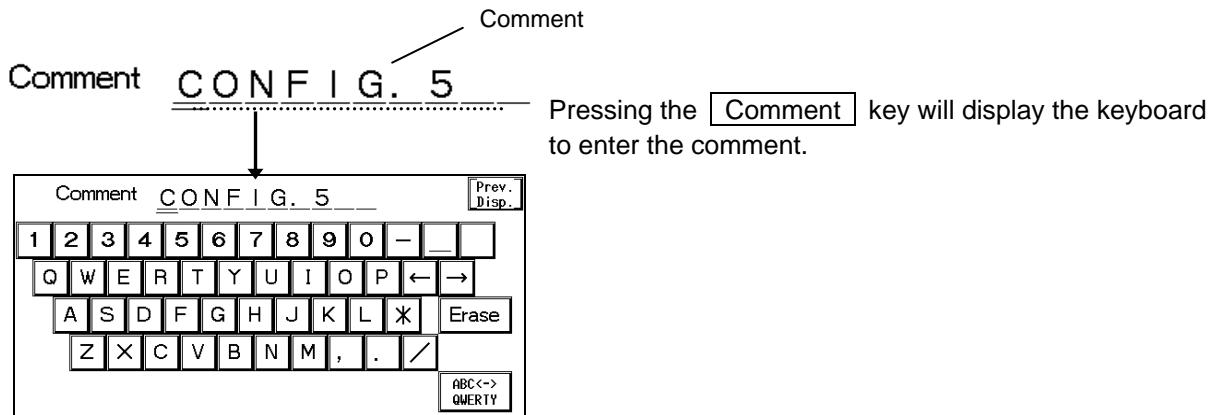


Refer to "4. Monitoring Setup Display Configuration" for display configuration setup,



Press the **Register to Mode** key to register the current display configuration for the mode (1 to 5) selected on procedure 2.

#### 4 Type a comment.



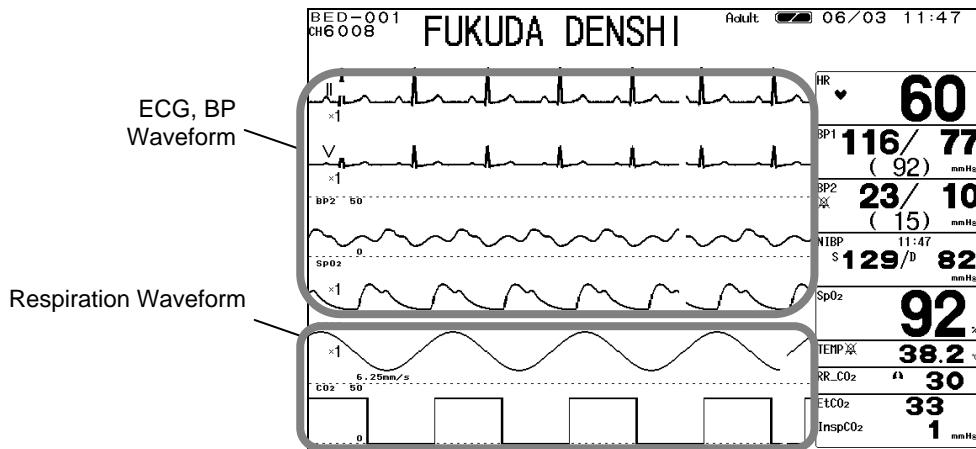
## Sweep Speed

## Waveform Display Speed/Time

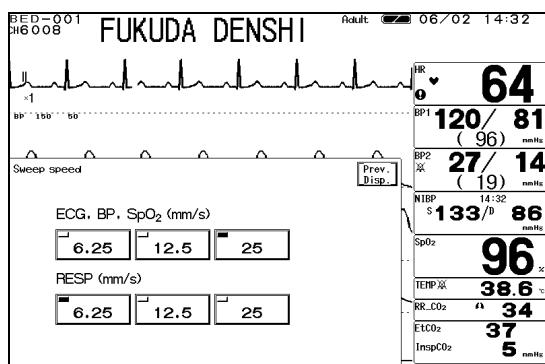
This section describes the procedure to set up the sweep speed of the waveform display.

### To Set the Sweep Speed

The sweep speed can be set separately for ECG/BP waveform and respiration waveform.



- 1 Press the **Menu** → **System Config.** → **Sweep Speed** keys.



- 2 Set the sweep speed for ECG, BP, pulse waveform.

ECG, BP, SpO<sub>2</sub> (mm/s)

6.25	12.5	25
------	------	----

Selection	Display Time	Display Time (Enlarge)
25mm/s	5.1sec.	6.8 sec.
12.5mm/s	10.2 sec.	13.6 sec.
6.25mm/s	20.4 sec.	27.2 sec.

- 3 Select the sweep speed for respiration waveform.

RESP (mm/s)

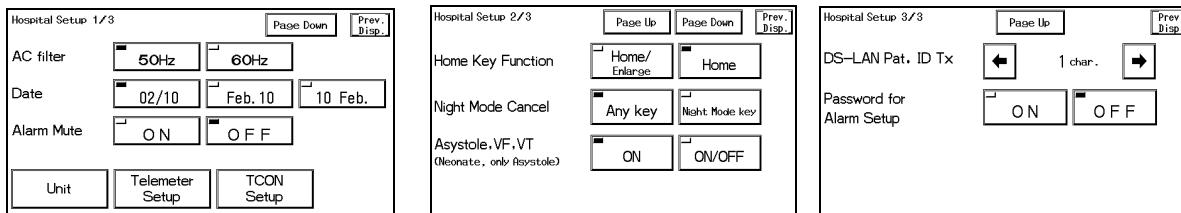
6.25	12.5	25
------	------	----

Selection	Display Time	Display Time (Enlarge)
25mm/s	5.1 sec.	6.8 sec.
12.5mm/s	10.2 sec.	13.6 sec.
6.25mm/s	20.4 sec.	27.2 sec.

# Hospital Setup

# Setup for Each Hospital

This section explains about the different setup for each hospital.



## About the Hospital Setup

A different monitoring condition can be set for each hospital.

- AC Filter
- Date Format
- Alarm Mute
- Measurement Unit
- Telemeter Setup
- TCON Setup
- Home Key Function
- Night Mode Cancel
- Asystole, VF, VT
- DS-LAN Pat. ID Tx
- Password for Alarm Setup

### ●AC Filter

AC filter  50Hz  60Hz Selects the AC filter.

### ●Date Format

Date  06/02  Jun. 02  02 Jun. Selects the date format for display and recording.

### ●Alarm Mute

Alarm Mute  ON  OFF

The alarm sound can be silenced at time of alarm occurrence. Even if the minimum volume is set for the alarm sound, some sound will be generated. To avoid shocking the patient from the alarm sound, or if alarm sound is not necessary, alarm sound can be silenced. This function will not affect recall and alarm recording.

When **IEC** is selected for "Alarm System" on the Monitor Setup menu, ON/OFF setting for "Alarm Mute" is not possible.

#### ⚠ CAUTION

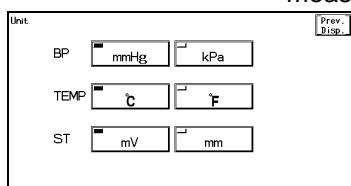
The alarm ON/OFF setup will remain effective even when the power is turned OFF. Be cautious not to miss any important alarm by leaving the alarm silenced.

### ●Measurement Unit Setup

Select the unit for the measurement.

Unit

Changing the unit will erase the tabular trend data and graphic trend data. Also, perform the alarm setup again as alarm condition should be set for each measurement unit.



BP : Changes the unit for max/min/mean value of BP1, BP2 and NIBP.

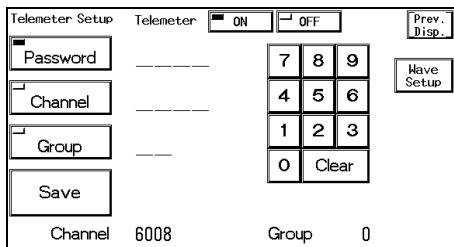
TEMP : Changes the unit for temperature.

ST : Changes the unit for ST measurement.

## ● Telemetry Channel Setup (DS-7141, DS-7141M, DS-7101LT, DS-7101LTM)

**Telemeter Setup**

Set the channel ID for the built-in telemetry transmitter. Pressing the **Telemeter Setup** key will display the telemetry setup menu.



Refer to "9. Installation Telemetry System Channel ID Setup" for telemetry setup.

## ● TCON Setup

**TCON Setup**

TCON: **ON** will turn ON the bidirectional wireless communication.

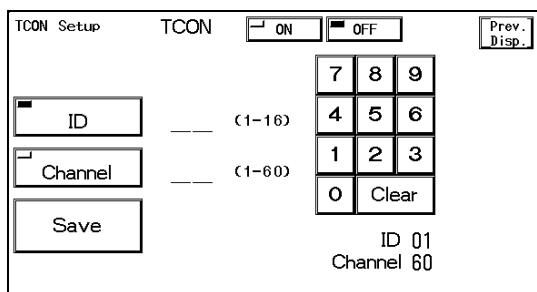
**OFF** will turn OFF the bidirectional wireless communication.

TCON ID:

Set the ID for the bidirectional wireless communications. The ID should not duplicate with other monitors within the same TCON group (channel).

TCON Channel:

Set the channel for the bidirectional wireless communication. The same channel should be set for the monitors within the same TCON group (channel).



Refer to "9. Installation Bidirectional Wireless Communications (TCON) system TCON ID / TCON Channel Setup" for TCON setup.

## ● Home Key Function

Home Key Function

**Home/Enlarge**    **Home**

Select the function for the fixed key,

**Home / Enlarge** key.

To use the key to switch the display between numeric data enlarged display and home display, select **Home / Enlarge**.

To use the key only to return to the home display from different menu, select **Home**.

Home / Enlarge



Home



## ● Night Mode Cancel

Night Mode Cancel

**Any key**    **Night Mode key**

Select the procedure to cancel the night mode when "Slightly Dark" or "Dark" is set.

**Any Key** will cancel the night mode by pressing anywhere on the screen.

**Night Mode Key** will cancel the night mode by pressing the **Night Mode** key preprogrammed as user key or **Night Mode** key on the menu display.

## ● Asystole, VF, VT

**Asystole, VF, VT**  
(Neonate, only Asystole)



**ON** key will not allow the alarms for asystole, ventricular fibrillation, ventricular tachycardia and slow\_VT to be turned off in the arrhythmia alarm setup menu.



Refer to "4. Monitoring Setup To Set ON/OFF of Arrhythmia Alarm" for arrhythmia alarm setup.

## ● Patient ID Transmission Starting Digit for DS-LAN

On the DS-7100 system, patient ID of up to 20 digits can be set, but only 10 digits can be transmitted on the DS-LANII network. This setup will set the starting digit of the 10 digits to be transmitted on the DS-LANII network.

On the DS-LANIII network, if **Center** is selected for the recorder and recording is started on the DS-7100, the central monitor recorder can print only up to 10 digits. This setup will set the starting digit to be printed. However, all 20 digits can be displayed on the central monitor.

DS-LAN Pat. ID Tx



1 char.



The starting digit will shift to left.



The starting digit will shift to right.

## ● Password for Alarm Setup

Whether or not to require password for alarm setup menu can be selected.

Password for  
Alarm Setup



ON



QEE



ON

**ON** will require password for alarm s

**OFF** will not require password for alarm setup menu.

## Ward Setup

## Setup for Each Ward

This section explains about the different setup for each ward.

Ward Setup 1/3		Page Down	Prev. Disp.
Trend Clip	<input checked="" type="checkbox"/> ON	<input type="checkbox"/> OFF	
BP Record Scale	<input checked="" type="checkbox"/> 40mm	<input type="checkbox"/> 20mm	
R.C. Setup	<input type="checkbox"/>	<input type="checkbox"/>	User Key
	<input type="checkbox"/>	<input type="checkbox"/>	Serial Comm. Setup
Alarm Pole Setup	<input type="checkbox"/>	<input type="checkbox"/>	NIBP Data Erase Time

Ward Setup 2/3		Page Up	Page Down	Prev. Disp.
Suspend Arrhy, Analysis during Noise	<input checked="" type="checkbox"/> ON	<input type="checkbox"/> OFF		
Password	<input checked="" type="checkbox"/> ON	<input type="checkbox"/> OFF		
Discharge Mode	<input checked="" type="checkbox"/> Monitor Suspend	<input type="checkbox"/> Admit		
Event Key	<input checked="" type="checkbox"/> ON	<input type="checkbox"/> OFF		
MEAN Calculation (ART, NIBP)	<input checked="" type="checkbox"/> Wave	<input type="checkbox"/> Calc.		

Ward Setup 3/3		Page Up	Prev. Disp.
Admit/Discharge Key Setup	<input checked="" type="checkbox"/> Full	<input type="checkbox"/> Light	
Record key display	<input checked="" type="checkbox"/> ON	<input type="checkbox"/> OFF	

## About the Ward Setup

A different monitoring condition can be set for each ward in the same hospital.

- Trend Clip
- BP Recording Scale
- R.C. Setup
- Key Mask
- User Key
- Serial Comm. Setup
- Alarm Pole Setup
- NIBP Data Erase Time
- Suspend Arrhy. Analysis during Noise
- Password
- Discharge Mode
- Event Key
- MEAN Calculation (ART, NIBP)
- Admit/Discharge Key Setup
- Record Key Display

### ●Trend Clip

If the measurement on the graphic trend display exceeds the vertical axis scale, to display or not display the exceeded portion can be selected.

Trend Clip

<input checked="" type="checkbox"/> ON	<input type="checkbox"/> OFF
--	------------------------------

ON will indicate the exceeded portion with straight line at upper (lower) limit.

OFF will not display the exceeded portion.

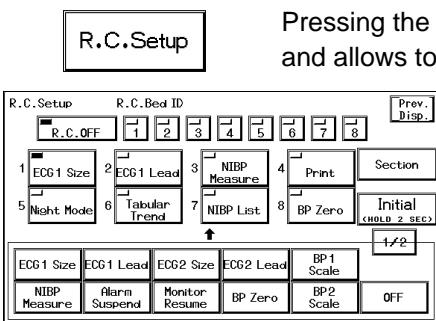
### ●BP Recording Scale

BP Record Scale

<input checked="" type="checkbox"/> 40mm	<input type="checkbox"/> 20mm
--	-------------------------------

Select the scale height for the BP1/BP2 waveform when recording.

## ●R.C. Setup



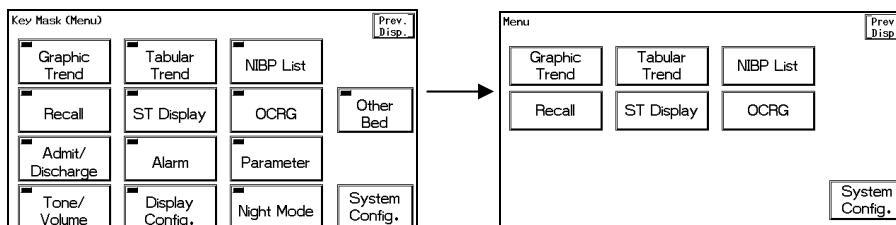
Pressing the **R.C. Setup** key will display the Remote Control Setup screen and allows to set the user keys, ID, and section for the Remote Control Unit.

**Reference** Refer to "4. Monitoring Setup Remote Control Setup" for details.

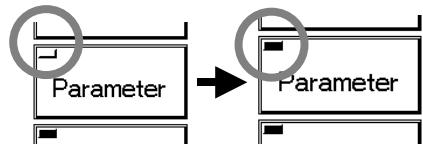
## ●Key Mask

On the menu display, configuration menu display, and preset menu display, unnecessary keys can be erased.

### 1 Press the **Key Mask** key.



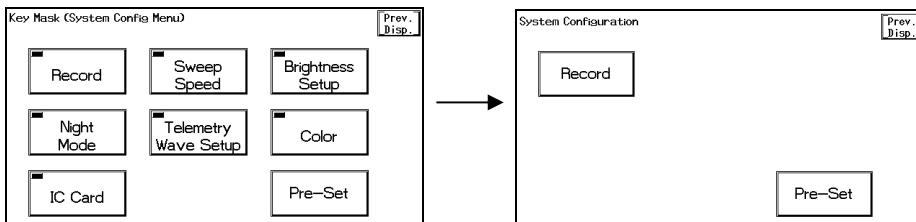
Erase the unnecessary key on the menu display.



will not be displayed      will be displayed

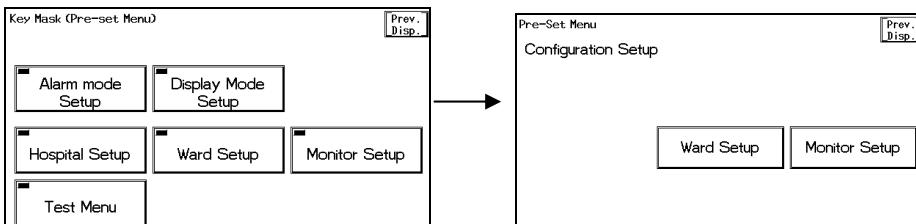
Pressing the key will distinguish the key LED which indicates that the key will not be displayed on the menu display.

### 2 Press the **System Config.** key.



Erase the unnecessary key on the configuration menu display.

### 3 Press the **Pre-Set** key.

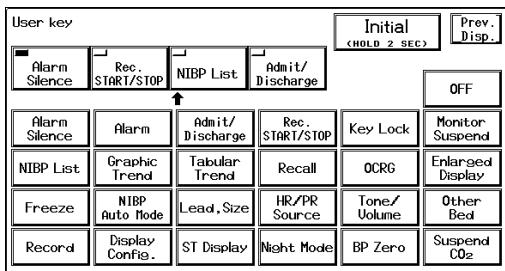


Erase the unnecessary key on the preset menu display.

## ●User Key Setup



Set the frequently used key to be always displayed.  
Press the **User Key Setup** key to display the user key setup menu.

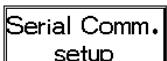


Refer to "4. Monitoring Setup Key Setup" for details.

<b>User Key</b>	<b>Function</b>
Alarm Silence	Silences the alarm for fixed amount of time.
Alarm	Displays alarm setup menu.
Admit / Discharge	Displays admit/discharge menu.
Rec. START/STOP	Starts/stops manual recording.
Key Lock	Turns ON/OFF the touch key operation. This function can be used to make the touch key inoperative when wiping the screen.
Monitor Suspend	Displays the confirmation display whether to suspend monitoring or not.
NIBP List	Displays the NIBP list.
Graphic Trend	Displays the graphic trend.
Tabular Trend	Displays the tabular trend.
Recall	Displays the recall data.
OCRG	Displays the OCRG.
Enlarged Display	Enlarges the numeric data display.
Freeze	Temporarily stops the waveform trace. By pressing the <b>Rec. START/STOP</b> key during freeze mode, the waveform in freeze mode can be recorded.
NIBP Auto Mode	Displays the NIBP measurement interval setup menu.
Lead · Size	Displays the keys to adjust the size, scale, baseline position of the displayed waveform.
HR/PR Source	Sequentially selects the HR source in the order of ECG→SpO <sub>2</sub> →BP1→Auto→ECG.

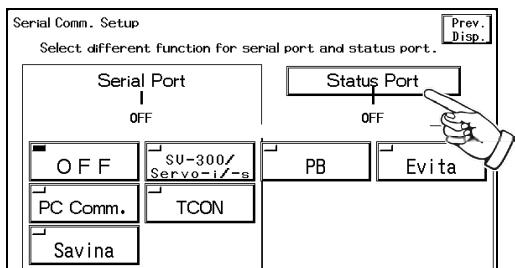
<b>User Key</b>	<b>Function</b>
Tone/Volume	Displays the tone/volume setup menu.
Other Bed	Displays the other bed display menu.
Record	Displays the recording setup menu
Display Config.	Displays the display configuration menu.
ST Display	Displays the ST measurement display.
Night Mode	Turns ON / OFF the night mode.
BP Zero	Performs zero balance of BP1, BP2.
Suspend CO <sub>2</sub>	Suspends CO <sub>2</sub> measurement.
OFF	User keys will not be set.

## ●Serial Communication Setup

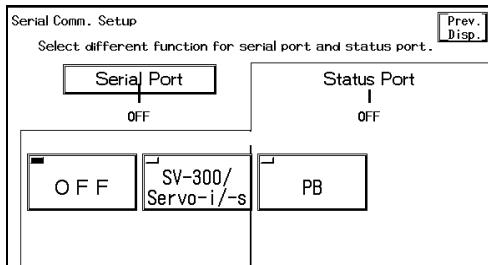


This device is equipped with serial port and status port which allows communication with other device.

Pressing the **Serial Comm. Setup** key will display the screen to select the device to connect to the serial port.



Pressing the **Status Port** key will display the screen to select the device to connect to the status port.



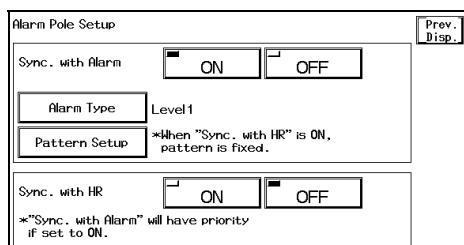
### **⚠ CAUTION**

- The serial port and status port cannot have a same function.
- If a ventilator is connected, or if a ventilator alarm is suspended, the ventilator alarm input setup cannot be changed.

## ● Alarm Pole Setup

**Alarm Pole  
Setup**

Set the function for the alarm pole located at the top of the monitor.  
Press the **Alarm Pole Setup** key to display the alarm pole setup menu.

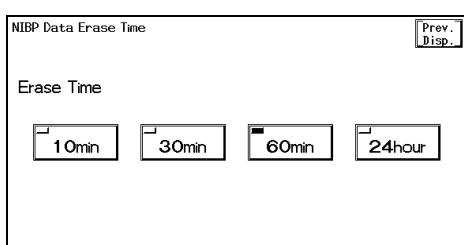


Refer to “4. Monitoring Setup Alarm Pole Setup” for details.

## ● NIBP Data Erase Time

**NIBP Data  
Erase Time**

Set the time to erase the NIBP data. Press the **NIBP Data Erase Time** key to display the setup menu for the erase time.



Select the time from **10min**, **30min**, **60min**, **24hr**. When the selected time passes, the NIBP data will be erased.

## ●Suspend Arrhy. Analysis during Noise

During the arrhythmia analysis, the following conditions will be detected (every second) as noise.

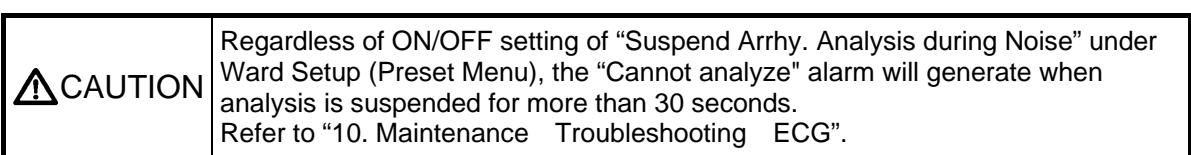
- When poor signals are frequently detected from the picked up QRS candidates.
- When the baseline drift duration is too long.
- When spike noises similar to QRS and baseline noises are frequently detected.

Suspend Arrhy.  
Analysis during Noise  ON  OFF

OFF will suspend arrhythmia analysis for 1 second when a noise is interfering.

ON will suspend arrhythmia analysis for 5 seconds when a noise is interfering.

In addition, more noises will be detected when  ON is selected.



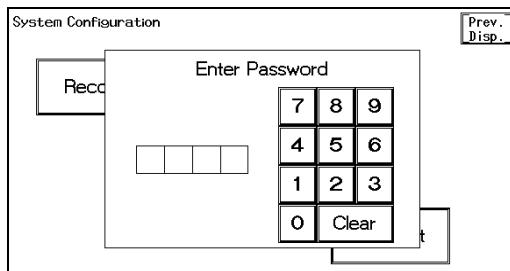
## ●Password

Sets the password requirement to access the preset menu.

Password

ON  OFF

Selecting  ON will require to enter password to access the preset menu.



## ●Monitoring Condition after Discharge

Sets the monitoring condition after the patient has discharged.

Discharge Mode

Monitor Suspend

Admit

Admit will continue monitoring after discharge.

Monitor Suspend will suspend monitoring after discharge. Numeric data display will be erased and alarm generation, NIBP periodic measurement and periodic recording will not be performed.



## ●Event Key

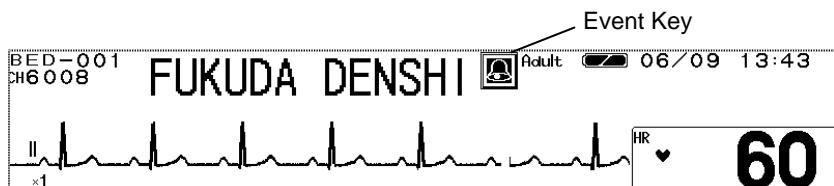
Displays event key on the home display at alarm occurrence.

Event Key

<input checked="" type="checkbox"/> ON	<input type="checkbox"/> OFF
--	------------------------------

ON will display the event key on the home display at alarm occurrence.  
 OFF will not display the event key on the home display.

Pressing the event key will suspend the alarm sound and display the recall menu.



## ●MEAN Calculation (ART, NIBP)

The mean blood pressure value of BP (only when the BP label is "ART") and NIBP can be derived from the waveform or by calculation.

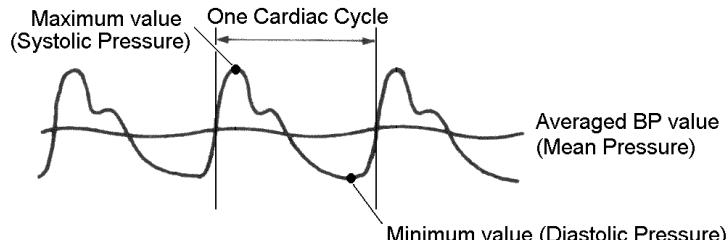
MEAN Calculation  
(ART, NIBP)

<input checked="" type="checkbox"/> Wave	<input type="checkbox"/> Calc.
--	--------------------------------

Calc. : Calculates the mean BP from the following calculation.

$$\text{Mean BP} = (\text{Systolic BP} + \text{Diastolic BP} \times 2) \div 3$$

Wave : Measures the mean BP as follows.



## ●Admit/Discharge Key Setup

Whether or not to display the following keys on the admit menu can be selected.

- Impedance Mode key
- Filter Mode ( Monitor /  ESIS /  ST Display)
- Bed ID key

Full will display the above keys.

Admit/Discharge  
Key Setup

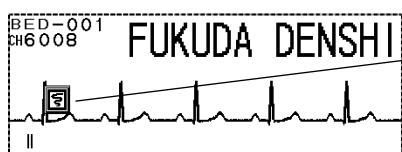
<input checked="" type="checkbox"/> Full	<input type="checkbox"/> Light
--	--------------------------------

Light will not display the above keys.

If these keys are not necessary to be displayed, select light.

## ●Record Key Display

Whether or not to display the record key  on the home display can be selected.



Record key display

<input checked="" type="checkbox"/> ON	<input type="checkbox"/> OFF
--	------------------------------

ON will display the record key.

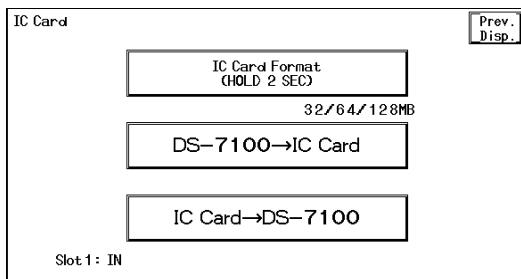
OFF will not display the record key.

This section explains about transferring the setup data using the IC card. To set all the monitors in the same ward to the same alarm setup and display configuration may take large amount of time. However this process can be simplified by performing the setup on one monitor, and copying the data to all the other monitors using the IC card.

<b>CAUTION</b>	<ul style="list-style-type: none"> <li>● Use only the specified IC card. (FCF-128 Flash Memory Card, AD-CFADP Card Adapter)</li> <li>● Use the IC card formatted with this device.</li> <li>● Do not transfer the setup data from a newer to older software version device. The operation of the device may become unstable and proper monitoring may not be possible.</li> <li>● When the DS-7100 system is operated by battery, and if empty mark is displayed for the battery condition, IC card format, read/write process cannot be performed.</li> </ul>
----------------	--

<b>NOTE</b>	When using a CF card with write protect function, make sure to cancel the write protect function before data transfer.
-------------	--

- 1 Press the **Menu** → **System Config.** → **IC Card** keys.



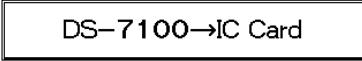
## Data Transfer (DS-7100 → IC Card)

Transfers the data from the monitor to the IC card.

- 1 Insert the IC card to IC card slot 1.

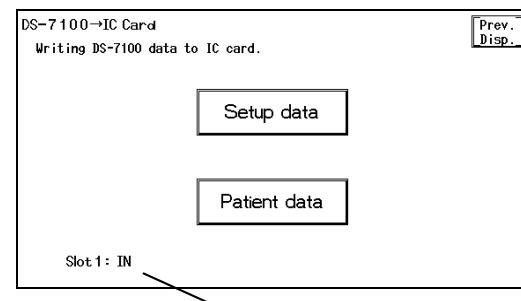
- 2 Select **DS-7100 → IC Card** to transfer the data to the IC card.

The data will be transferred from the monitor to the IC card.



Press the **DS-7100 → IC Card** key to select the data type to transfer.

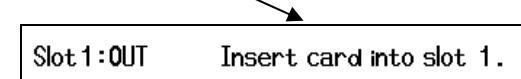
- 3 Select the data type.



**Setup data** key will transfer the setup data such as alarm setup, display configuration, parameter setup to the IC card.

**Patient data** key will transfer the patient data such as admitting data (name, age, ID, etc.), graphic trend and tabular trend.

Recall data, OCFG, ST measurement and short trend data can not be transferred.



If the IC card is not inserted to card slot 1, a message will be displayed.

#### 4 Confirm if OK to write the data to the IC card.

If read and write is confused, the monitor data will be overwritten with the IC card data.  
Press the **YES** key if you are sure to write the data to the IC card.

Write setup data to IC card.  
OK?

Setup Data

Write patient data to IC card.  
OK?

Patient Data

### Data Transfer (IC Card → DS-7100)

Transfers the data from the IC card to the monitor.

#### 1 Insert the IC card to IC card slot 1.

#### 2 Select **IC Card → DS-7100** to transfer the data from the IC card.

IC Card→DS-7100

The data will be transferred from the IC card to the monitor.

Press the **IC Card → DS-7100** key to select the data type to transfer.

#### 3 Select the data type.

IC Card→DS-7100  
Reading IC card data into DS-7100.  
  
  
  
Slot 1: IN

Slot 1: OUT      Insert card into slot 1.

**Setup Data** key will transfer the setup data such as alarm setup, display configuration, parameter setup from the IC card.

**Patient Data** key will transfer the patient data such as admitting data (name, age, ID, etc.), graphic trend and tabular trend from the IC card.

If the IC card is not inserted to card slot 1, a message will be displayed.

#### 4 Confirm if OK to read the data from the IC card.

If read and write is confused, the monitor data will be overwritten with the IC card data.  
Press the **YES** key if you are sure to read the data to the IC card.

Read setup data from IC card.  
OK?

\*If BP or TEMP unit of measurement is different from current setup, all the corresponded trend data and recall data will be initialized.  
\*After reading setup data, power the unit again.

Setup Data

Read patient data from IC card.  
OK?

\*Current patient data (Trend data, Recall data, etc) is initialized.  
\*If BP or TEMP unit of measurement is different from current setup, all the corresponded trend data and recall data will be initialized.

Patient Data



- Restart the system after reading the setup data from the IC card.  
The setup data will become effective after the system is restarted.
- Before reading the patient data from the IC card, all the patient data stored in the patient monitor will be erased.

## IC Card Format

- 1 Insert the IC card to IC card slot 1.**
- 2 Select [IC Card Format] to format the IC card.**



The IC card will be formatted.

Pressing the [IC Card Format] key for more than 2 seconds will allow the system to automatically acknowledge the IC card type (32/64/128Mbyte) and starts formatting.

## Data for Transfer

The setup data such as monitoring condition, alarm setup, and patient data such as graphic trend data and tabular trend data can be transferred.

### Setup Data

<i>Data</i>		<i>Description</i>
Parameter Setup		Stores the monitoring condition (size, lead, etc.) for all the monitoring parameters.
Alarm Setup		Stores the alarm threshold level.
Configuration	ST Display	Stores the current setup.
	Manual Recording	
	Alarm Recording	
	Periodic Recording	
	Sweep Speed	
	Volume	
	Color / Brightness	
	Display Configuration	
	User Key	
	Night Mode	
Menu Display		

### Patient Data

<i>Data</i>		<i>Description</i>
Patient Information		Stores patient information such as name, ID, age, sex, pacemaker use, patient type.
Graphic Trend Data		Stores 24 hours of graphic trend data.
Tabular Trend Data		Stores 24 hours of tabular trend data.

## Error Message

---

### No IC card.

Cause : IC card is not inserted or not correctly set in the IC card slot.  
Solution : Set the IC card into the IC card slot 1.

### Invalid IC card.

Cause : Unspecified IC card is used.  
Solution : Set the specified IC card into the IC card slot 1.

### No data on the IC card.

Cause : There is no data on the IC card.  
Solution : Check if the correct IC card is being used, or rewrite the data on the IC card.

### IC card error.

Cause : An error has been detected when writing/reading data on the IC card.  
Solution : If the error has been detected during writing, try again.  
If the error has been detected during reading, data might not be correctly written on the IC card. Rewrite the data after formatting and try the procedure again.

### No more space on IC card.

Cause : There is no more space on the IC card to write the data.  
Solution : Format the IC card, and try the procedure again.

# Chapter 9

# Installation

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## Precautions for Installing the Equipment

This section describes the environmental condition to use the DS-7100.



The equipment should be installed by a professional person. Otherwise, it may result in damage to the equipment and safety cannot be ensured.

## Precautions about the Operating Environment

- The following environmental conditions should be observed when operating the DS-7100.
  - Surrounding Temperature : 10 to 40°C
  - Relative Humidity : 30 to 85% (non-condensing)
- The DS-7100 is intended for patient monitoring in ICU, CCU, surgery, and ward. Direct use in MRI environment or home-care should be avoided.
- The power source should fulfill the following condition.
  - Use a hospital grade 3-way outlet. If a hospital grade outlet is not available, make sure to connect the equipotential ground terminal with the accessory ground cable.
  - Verify power voltage and frequency before connecting to an AC power source.
  - Use the power source that can provide adequate power to the device.
- Pay attention when installing or storing the device. Do not install or store in the following locations.
  - where chemicals are stored or gas may generate
  - where the equipment will be subject to splashing water or humidity from a nebulizer or vapolizer
  - where the equipment will be subject to direct sunlight
  - Unstable place with inclination, vibration, or shock.
  - where it is difficult to unplug the power cable
- Ensure proper ventilation to cool the device.
  - A minimum space of 5 cm is required between vents on the rear side of the monitor and the wall. If the monitor is embedded in a wall or surrounded by a wall, a minimum space of 10 cm is required.



If the monitor is used in an environment not fulfilling the above conditions, not only the monitor will not deliver its maximum performance, but damage to the equipment may occur and safety can not be ensured.  
If using in an environment other than specified above, contact our service representative.

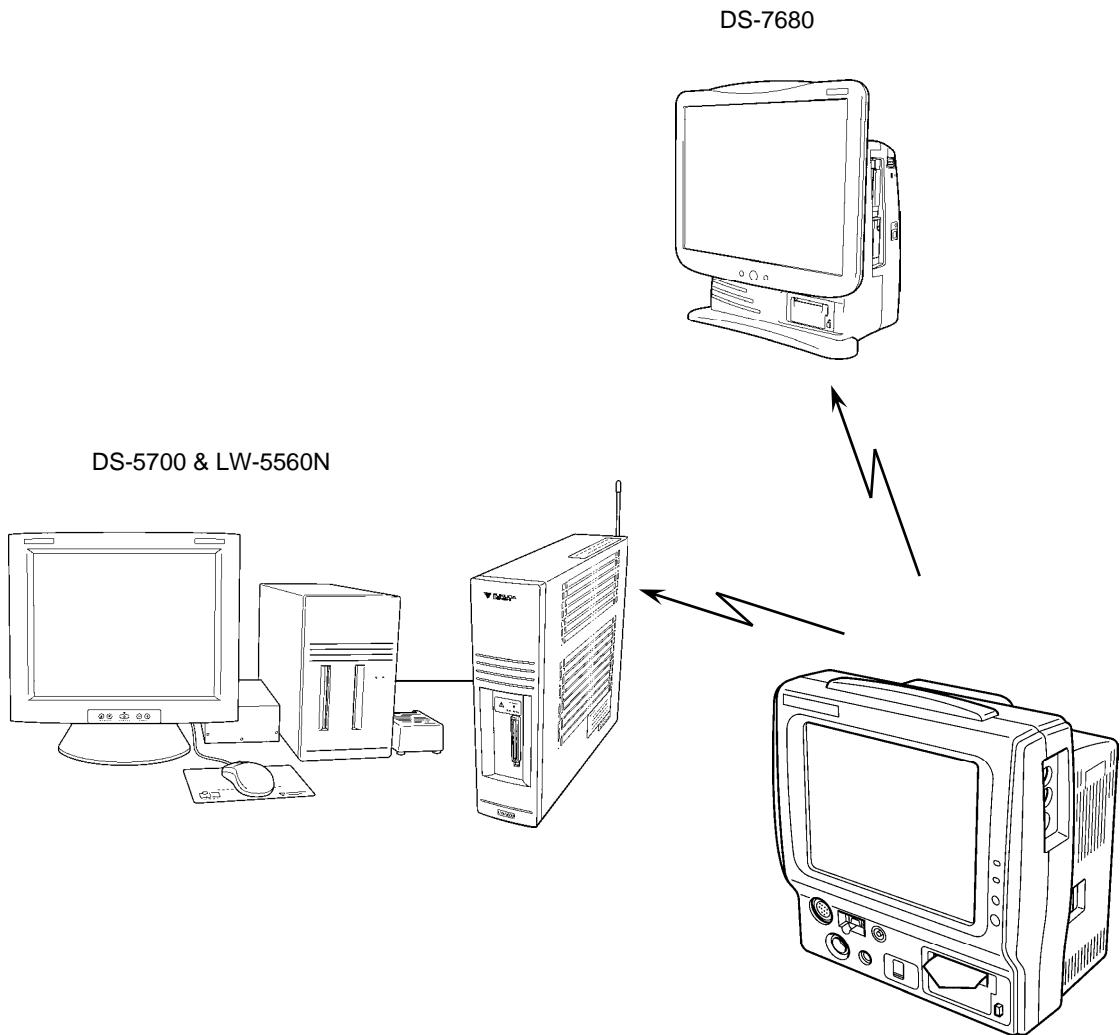


### Equipotential Grounding

When connecting multiple devices, electrical potential difference may be generated between the devices. This may result in electric shock to the patient connected to these devices. Pay special attention for use in the operating room, ICU, CCU, Cardiac Catheter Laboratory, and Cardiovascular X-ray room. To avoid such electrical potential difference, use the accessory ground cable to connect each device's equipotential terminal to the same ground terminal. This is called equipotential grounding.

## Telemetry System

This section explains the procedure on how to use this equipment with telemetry system. The DS-7141, DS-7141M, DS-7101LT, DS-7101LTM incorporates a telemetry transmitter. As antenna is also incorporated, external antenna is not required.



**DANGER** When monitoring a patient using wireless telemetry, make sure the patient data is properly received at the central monitor. Pay special attention when the channel ID at the bedside monitor is changed.

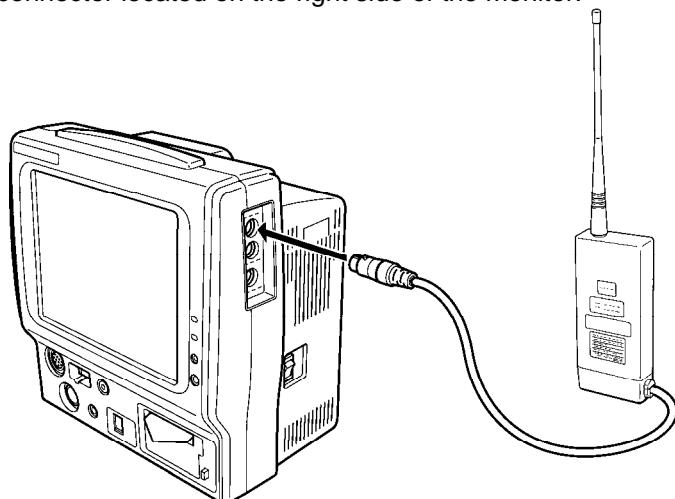


- WARNING**
- Some wireless combinations of telemetry transmitters may generate interference with other devices.
  - Before selecting the channel, verify it will not interfere with other channels.
  - Make sure the telemetry manager of your system is aware of any changes to the telemetry channels.
  - If transmitters are used in a neighboring medical facility, your facility and neighboring facility must make agreements on the setting of telemetry channels to prevent telemetry interference.

<b>⚠ CAUTION</b>	<ul style="list-style-type: none"> <li>When performing telemetry transmission, the numeric data corresponding to the waveform should be selected for display. Otherwise, the displayed waveform or numeric data may not be transmitted.</li> <li>The setup of channel ID and group ID should be performed only by our service representative. Users should not perform this procedure as malfunction to the equipment may occur.</li> <li>If the measurement unit is “°F” and “kPa” on the DS-7100 system, it will be converted to “°C” and “mmHg” respectively when transmitted to the central monitor. If the measurement unit “°F” and “kPa” are set on the central monitor, it will be reconverted to the value in “°F” and “kPa” after transmitted to the central monitor.</li> <li>BP waveform with a scale above the programmed scale can not be properly transmitted. When transmitting the BP waveform, check the displayed BP waveform scale.</li> </ul>																														
<b>NOTE</b>	<p>When the DS-7100 system indicates that the measurement data is out of range (“xxx” display), the minimum or maximum value of the range will be displayed at the central monitor.</p> <table> <thead> <tr> <th></th> <th style="text-align: center;">【Out of range】</th> <th style="text-align: center;">【Central Monitor】</th> </tr> </thead> <tbody> <tr> <td>HR</td> <td style="text-align: center;">301bpm or above</td> <td>Calculates based on ECG waveform.</td> </tr> <tr> <td>PR (DS-71xxM only)</td> <td style="text-align: center;">25bpm or below 240bpm or above</td> <td style="text-align: center;">26bpm 239bpm</td> </tr> <tr> <td>RR</td> <td style="text-align: center;">151Bpm or above</td> <td style="text-align: center;">150Bpm</td> </tr> <tr> <td>BP</td> <td style="text-align: center;">–51mmHg or below 301mmhg or above –6.8kPa or below 40.1kPa or above</td> <td style="text-align: center;">–50mmHg 300mmHg –6.7kPa 40.0kPa</td> </tr> <tr> <td>TEMP</td> <td style="text-align: center;">–0.1°C or below 50.1°C or above 31.9°F or below 122.1°F or above</td> <td style="text-align: center;">0°C 46.1°C 32°F 115.0°F</td> </tr> <tr> <td></td> <td colspan="2" style="text-align: center;">If the measurement unit is kPa, it will be converted to mmHg when transmitted to the central monitor.</td> </tr> <tr> <td>CO<sub>2</sub> (mmHg)</td> <td style="text-align: center;">100mmHg or above</td> <td style="text-align: center;">99mmHg</td> </tr> <tr> <td>CO<sub>2</sub> (kPa, %)</td> <td style="text-align: center;">13.3 (kPa, %) or above</td> <td style="text-align: center;">13.2 (kPa, %)</td> </tr> <tr> <td colspan="3" style="text-align: center;">*If the temperature measurement value is 46.1°C (115.0°F) or above, 46.1°C (115.0°F) will be displayed at the central monitor.</td> </tr> </tbody> </table>		【Out of range】	【Central Monitor】	HR	301bpm or above	Calculates based on ECG waveform.	PR (DS-71xxM only)	25bpm or below 240bpm or above	26bpm 239bpm	RR	151Bpm or above	150Bpm	BP	–51mmHg or below 301mmhg or above –6.8kPa or below 40.1kPa or above	–50mmHg 300mmHg –6.7kPa 40.0kPa	TEMP	–0.1°C or below 50.1°C or above 31.9°F or below 122.1°F or above	0°C 46.1°C 32°F 115.0°F		If the measurement unit is kPa, it will be converted to mmHg when transmitted to the central monitor.		CO <sub>2</sub> (mmHg)	100mmHg or above	99mmHg	CO <sub>2</sub> (kPa, %)	13.3 (kPa, %) or above	13.2 (kPa, %)	*If the temperature measurement value is 46.1°C (115.0°F) or above, 46.1°C (115.0°F) will be displayed at the central monitor.		
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## ● Wireless System Using the External Telemeter Module

Other than using the built-in telemeter, the DS-7100 system is capable of forming a wireless system using the external telemeter module. To use the external telemeter module, connect the cable of HLX-561 to the serial connector located on the right side of the monitor.



### ⚠ CAUTION

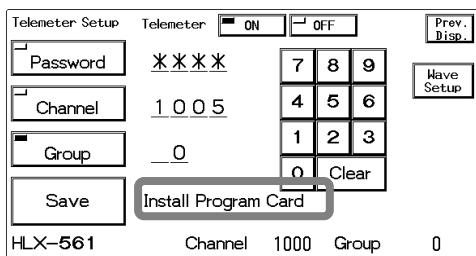
- To use the external telemeter module, open the side cover and set the Dip\_SW (6) to ON. For details of Dip\_SW setting, contact our service representative.
- Some telemeter module cannot be used depending on the software version. For details, contact our service representative.

## Channel ID Setup

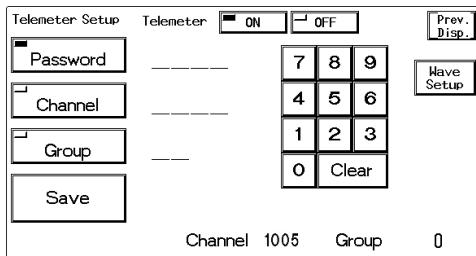
Once the transmitting channel ID and group ID are programmed, these will be retained even after the main power is turned OFF. In case if external telemeter module is used, these will be retained on the telemeter module.

- 1 Press the **Menu** → **System Config.** → **Pre-Set** → **Hospital Setup** → **Telemeter Setup** keys.

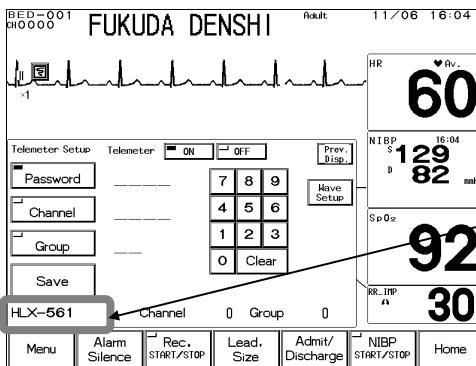
If the software program card is not inserted, telemeter setup cannot be performed. The following error message will be displayed.



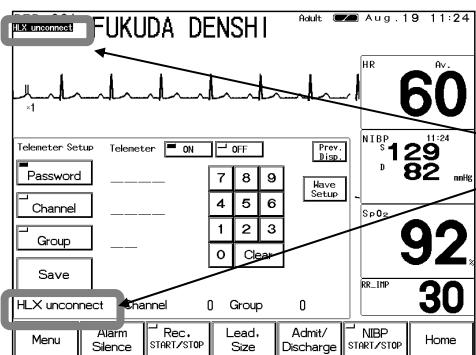
<Telemeter Setup Menu when built-in telemeter is used>



<Telemeter Setup Menu when external telemeter module is used>



The connected module type will be displayed.



An error message will be displayed when a module is not connected.

## 2 Select ON/OFF of telemetry transmission.

Telemeter

If  is selected, telemetry transmission will not be performed. The channel ID on the home display will be displayed as "CH OFF".  
To perform telemetry transmission, select .

## 3 Enter the password.

\_\_\_\_\_

Press the  key, and enter the password.

Use the numeric keypad to enter the password  
The entered number will be displayed as "\*\*\*\*".

## 4 Enter the channel ID.

\_\_\_\_\_

Press the  key, and enter the channel ID.

Use the numeric keypad to enter the 4-digit medical telemetry channel ID.

## 5 Enter the group ID

\_\_\_\_\_

Press the  key, and enter the group ID.

Use the numeric keypad to enter the group ID in the range of 00 to 63.

## 6 Save the channel ID and group ID.

Pressing the  key will store the channel ID and group ID. Verify that the "Complete" message is displayed.

If an error is found on the password, channel ID, or group ID, the following message will be displayed.

"Invalid password"

: The entered password is incorrect. Enter the password again and press the  key.

"Invalid data"

: The entered channel ID or group ID is outside the allowable range. Enter the ID again and press the  key.

"Telemetry Unit Error"

: Abnormality is found on the built-in telemetry transmitter. Contact our service representative.

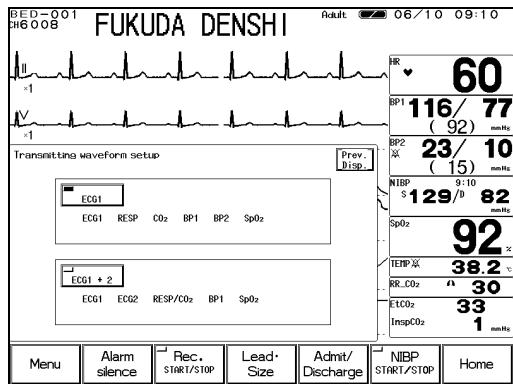
## 7 Verify the stored channel ID and group ID.

Channel 1005 Group 0

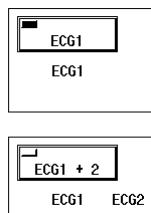
## Transmitting Waveform Setup

This function allows to select the transmitting waveform.

- 1 Press the **Menu** → **System Config.** → **Telemetry Wave Setup** keys.



- 2 Select the waveform to transmit.



Select the waveform to transmit from **ECG1**, **ECG1+2**.

Selecting **ECG1** will transmit ECG1, CO<sub>2</sub>, RESP, BP1, BP2, SpO<sub>2</sub>. RESP waveform will be transmitted when "Impedance" is selected for RR source.

Selecting **ECG1+2** will transmit ECG1, ECG2, CO<sub>2</sub>/RESP, BP1, SpO<sub>2</sub>. CO<sub>2</sub> and RESP waveform to be transmitted will be in accordance with RR source setup.

### NOTE

The waveform not displayed on the home display will not be transmitted even if selected as the transmitting waveform.

# Wired Network System

This section describes the procedure on how to use this monitor in a wired (DS-LANII/ DS-LANIII) system.

The DS-7100 system incorporates a LAN unit. Through the connection with the LAN cable, a wired network system can be constructed.



The setting for the wired network (DS-LANII/ DS-LANIII) can be performed on the Monitor Setup menu. For procedure, refer to "8. System Configuration Monitor Setup ●DS-LAN Setup".

<b>WARNING</b>	<ul style="list-style-type: none"><li>● Do not connect unspecified device to a wired network.</li><li>● Do not mix devices with DS-LANII and DS-LANIII setting in the same wired network. The network may cease and proper monitoring may not be possible.</li><li>● Before setting the bed ID, make sure that the DS-LAN (DS-LANII/DS-LANIII) is correctly set on the Monitor Setup menu. If not correctly set, the network may cease which may lead to accidents such as not transmitting life threatening alarms to the central monitor.</li></ul>
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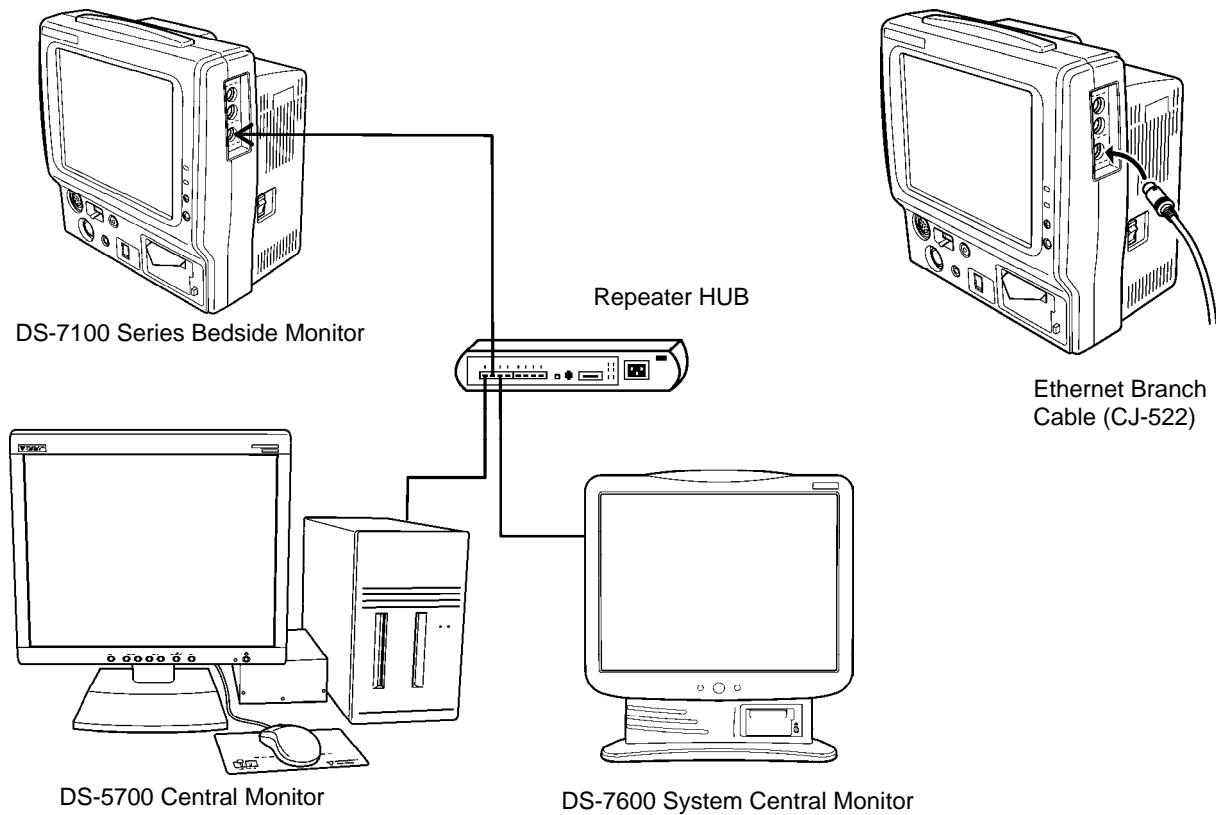
<b>CAUTION</b>	<ul style="list-style-type: none"><li>● When connecting to the DS-LAN network, perform "DS-LAN Setup" in the Monitor Setup menu and restart the system before connecting the LAN cable.</li><li>● If performing wired network transmission, configure the display so that the numeric data corresponded to the waveform is displayed. If not, the displayed waveform or numeric data may not be transmitted.</li><li>● The Bed ID is factory set to 000. If connected to the wired network with the ID unchanged, monitoring on the central monitor will not be possible.</li><li>● When connecting to the wired network, verify that the Bed ID does not duplicate with other bedside monitors. Otherwise, monitoring on the central monitor for both bedside monitors will not be possible.</li><li>● Make sure to set the bed ID in the following range.<ul style="list-style-type: none"><li>• For DS-LANII network: 001 to 048</li><li>• For DS-LANIII network: 001 to 100</li></ul></li><li>● When connected to a wired network, time/date will be the same with the central monitor. Even if the time/date is changed on the DS-7100 system, it will be corrected to the time/date of the central monitor.</li><li>● On some central monitors depending on the model type or software version, the setups for "HR Low Limit for VT" and "HR Low Limit for Run" cannot be performed.</li><li>● For the alarm generation on the bedside monitor, maximum of 2.5 seconds delay will occur for the alarm generation on the central monitor.</li><li>● In case of DS-LANII network, if <b>BP1</b> is selected for "HR/PR source" (Or, if <b>Auto</b> selects BP1 for HR/PR source), ECG waveform will not be transmitted on the network. On the central monitor, PR_BP value will be displayed instead of HR. However, on some central monitor depending on the model type, the HR value from ECG will be displayed on ST measurement list, etc. Refer to the operation manual for the respective central monitor. In case of DS-LANIII network, refer to the operation manual for the central monitor.</li><li>● There are following restrictions when connecting the DS-7100 system to the DS-LANII network.<ul style="list-style-type: none"><li>• When DS-5800N/NX/NX<sup>MB</sup> is used as a central monitor, recall, graphic trend, and tabular trend will not be displayed.</li><li>• On the ST display of the DS-5800N/NX/NX<sup>MB</sup>, the overlap waveform will not be displayed until 15 minutes have elapsed after the reference waveform has been set on the DS-7100.</li><li>• The DS-7100 system will not communicate to the AU-5500N 8-channel recorder. The data for the DS-7100 system cannot be recorded on the AU-5500N.</li><li>• If the measurement unit for BP (mmHg/kPa) is different between the bedside monitor and the central monitor, the corresponding waveform and numeric data will not be displayed on the central monitor.</li></ul></li></ul>
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 CAUTION	<ul style="list-style-type: none"> <li>• When the temperature unit is °F, the temperature data will not be transmitted. It will be treated as not measured data, and will not be displayed on the central monitor. Also, alarm limit setup on the central monitor cannot be performed.</li> <li>• Arrhythmia alarm of TACHY, BRADY, COUPLET, PAUSE, TRIGEMINY will not be transmitted.</li> <li>• “SLOW_VT” will be transmitted as “VT”.</li> <li>• For numeric data displayed as “xxx”, maximum or minimum value of measurable range will be transmitted.</li> <li>• The numeric data displayed as “---” will be treated as not measured data.</li> <li>• For QRS classification, the “S” (Supraventricular Extrasystole) printed on the built-in recorder will be printed as “N” (Normal QRS beat) on the HR-500 Recorder.</li> <li>• Some central monitors cannot set the periodic recording interval time to 1min, 2min, or 3min.</li> <li>• When DS-5800N/NX/NX<sup>MB</sup> or DS-5700 is used as a central monitor, ST measurement cannot be recorded.</li> <li>• If <input type="checkbox"/> BP1 is selected for “HR/PR source” (Or, if <input type="checkbox"/> Auto selects BP1 for HR/PR source), ECG will not be recorded on the central recorder. PR_BP value will be printed for the HR value.</li> <li>• If the “RR source” is other than impedance respiration (Or, if <input type="checkbox"/> Auto selects the RR source other than impedance respiration), respiration waveform will not be transmitted on a wired network and will not be recorded on the central recorder.</li> <li>• If the “RR source” is other than CO<sub>2</sub> (Or, if <input type="checkbox"/> Auto selects the RR source other than CO<sub>2</sub>), the CO<sub>2</sub> waveform will not be transmitted on a wired network, and will not be recorded on the central recorder.</li> <li>• If the SpO<sub>2</sub> (PR_SpO<sub>2</sub>) lower alarm limit is set, and “---” is displayed for the SpO<sub>2</sub> (PR_SpO<sub>2</sub>) value due to a cause such as SpO<sub>2</sub> sensor off, etc. on the DS-7100, it will be notified as SpO<sub>2</sub> (PR_SpO<sub>2</sub>) lower alarm on some central monitors even if the alarm is not generated on the DS-7100.</li> <li>● There are following restrictions when connecting the DS-7100 system to the DS-LANIII network.       <ul style="list-style-type: none"> <li>• If the measurement unit for BP (mmHg/kPa) and temperature (°C/°F) is different between the bedside monitor and the central monitor, the corresponding waveform and numeric data will not be displayed on the central monitor.</li> <li>• If the same lead is set for ECG1 and ECG2, it will function as follows.           <ul style="list-style-type: none"> <li>- The waveform size setting for ECG1 will be transmitted.</li> <li>- ST alarm setting for only ECG1 will be transmitted. Therefore ST2 alarm will not generate.</li> </ul> </li> <li>• For numeric data displayed as “xxx”, maximum or minimum value of measurable range will be transmitted.</li> <li>• For QRS classification, the “S” (Supraventricular Extrasystole) printed on the built-in recorder will be printed as “N” (Normal QRS beat) on the HR-500 Recorder.</li> <li>• Some central monitors cannot set the periodic recording interval time to 1min, 2min, or 3min.</li> <li>• If <input type="checkbox"/> Center is selected for the recorder and recording is started on the DS-7100, the central monitor recorder will print patient ID of only up to 10 digits. If the recording is started on the central monitor, all 20 digits can be printed.</li> </ul> </li> </ul>
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## DS-LANII Connection

By connecting a LAN cable to the DS-LAN connector on the DS-7100, a wired network can be constructed.

The DS-7600 system, DS-5700, and other central monitor with the central ID “1” will function as the network administrator.

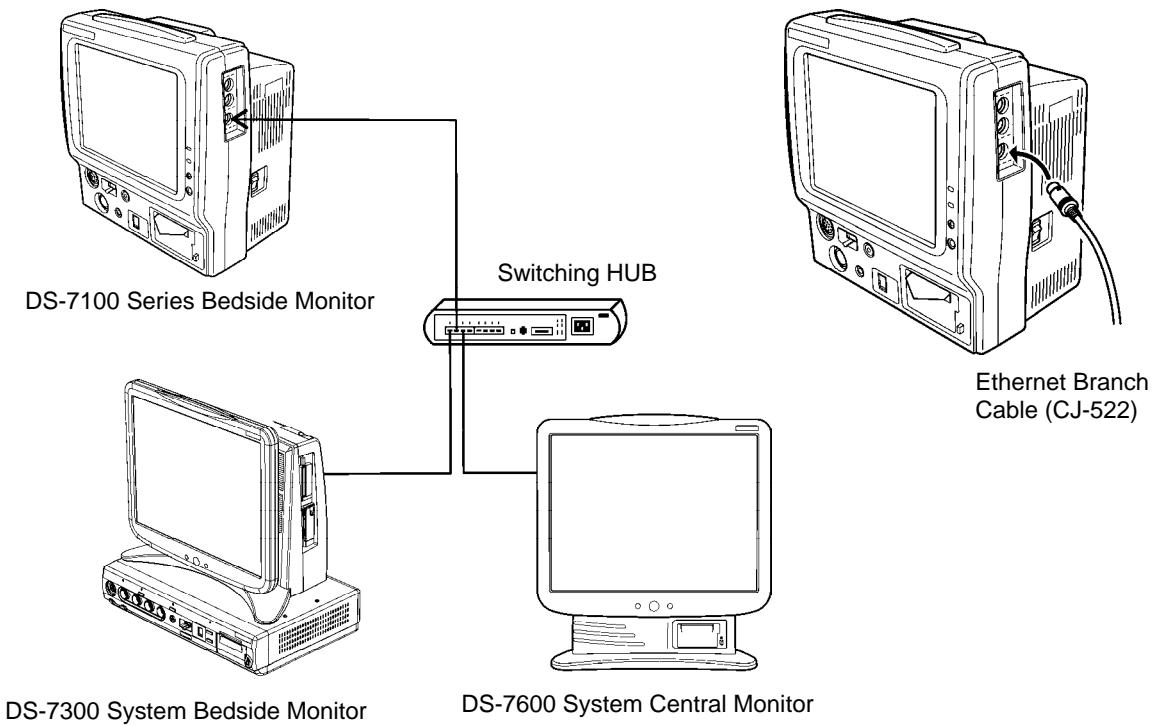


- Make sure that the “DS-LAN Setup” on all the bedside monitors and central monitors are set to **DS-LANII** before connecting the monitors to the network.
- When connected to the DS-LANII network, set the Bed ID in the range from “001” to “048”.
- If using a HUB for the DS-LANII network construction, make sure to use a repeater HUB recommended by Fukuda Denshi.

## DS-LANIII Connection

By connecting a LAN cable to the DS-LAN connector on the DS-7100, a wired network can be constructed.

The DS-7600 system or other central monitor with the central ID “1” will function as the network administrator.



- In order to connect to the DS-LANIII network, a special LAN board needs to be mounted on the DS-7100. The software version also needs to be the version which supports the DS-LANIII. For details, refer to our service representative.
- Make sure that the “DS-LAN Setup” on all the bedside monitors and central monitors are set to **DS-LANIII** before connecting the monitors to the network.
- When connected to the DS-LANIII network, set the Bed ID in the range from “001” to “100”.
- If using a HUB for the DS-LANIII network construction, make sure to use a switching HUB recommended by Fukuda Denshi.

## Room / Bed ID Setup

To connect to a wired network, it is necessary to set the Room / Bed ID.

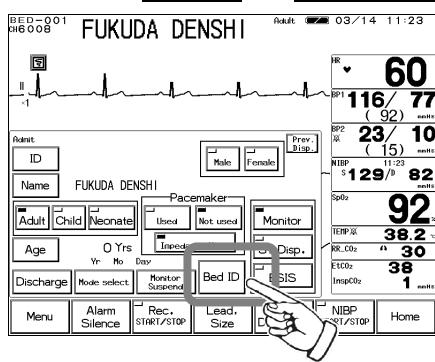
### ⚠ WARNING

Before setting the bed ID, make sure that the DS-LAN (DS-LANII/DS-LANIII) is correctly set on the Monitor Setup menu. If not correctly set, the network may cease which may lead to accidents such as not transmitting life threatening alarms to the central monitor.

### ⚠ CAUTION

When connecting to a wired network, make sure that there are no other bedside monitors with the same ID. If there is more than one bedside monitor with the same bed ID, the duplicated bedside monitors cannot be monitored on the central monitor.

- 1 Press the **Menu** → **Admit / Discharge** → **Bed ID** keys.

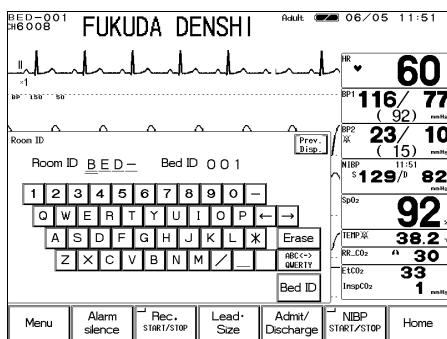


- 2 Enter the password.



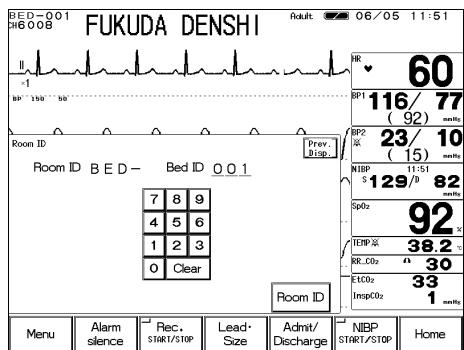
Use the numeric keypad to enter the password  
The entered number will be displayed as “\* \* \* \*”.

- 3 Set the Room ID.



Enter the Room ID using the alphanumeric keypad.  
The entered ID will be displayed on the upper left of the screen.  
Next, press the **Bed ID** key to display the Bed ID menu.

#### 4 Set the Bed ID.



Enter the Bed ID using the numeric keypad.  
The entered ID will be displayed on the upper left of the screen.

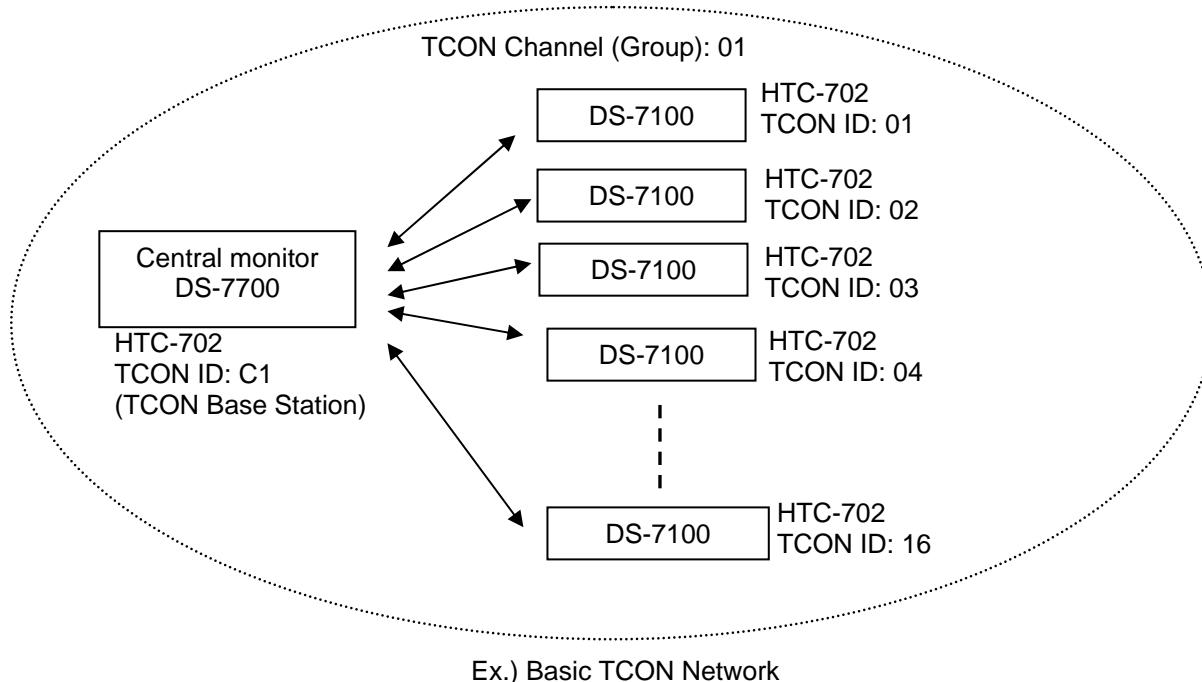
When connecting to the DS-LANII network, set the ID in the range from 001 to 048.

When connecting to the DS-LANIII network, set the ID in the range from 001 to 100.

## Bidirectional Wireless Communications (TCON) System

This section explains the setup procedure to use the optional bidirectional wireless communications module, HTC-702.

The TCON system can be constructed with the HTC-702 (Bidirectional Wireless Communications Module).



Ex.) Basic TCON Network

### ⚠ CAUTION

- When using the TCON system, pay attention to the following.
  - The medical institution (hereinafter referred to as "Institution") must execute investigation required to prevent interference including types of radio waves, frequencies, and antenna power if wireless equipment is already installed and being used in the facility.
  - Even if this device is installed within the range of radio communication, the communication may not be possible due to noise or multi-path phasing etc. Always consider this thoroughly before use.
  - Do not install this device in an area where it will be subject to splashing water. Water entering the equipment may cause the equipment to malfunction or be damaged.
- In managing the TCON system, make sure to follow the precautions below.
  - The Institution should appoint a person (hereinafter referred as the "Overall Manager") to manage the wireless devices for the whole facility.
  - When installing the TCON, the Overall Manager has to receive an explanation of the precautions for use of the TCON from the manufacturer or sales representative.
  - The Overall Manager is responsible for the maintenance and storage of the equipment.
  - The Overall Manager should create a management log (hereinafter referred to as the "log"), which contains a list of the management status of the wireless channels for the whole facility. When assigning or changing wireless channels, register it in the log, and give proper instructions to the TCON user.
  - The user needs to verify the transmitting/receiving operation before use.
  - If interference or breakdown occurs in the communication, the TCON user is required to stop using the TCON and to inform the Overall Manager of the problem. The Overall Manager is to deal with the problem properly and/or contacts the nearest Fukuda Denshi representative for service.

 CAUTION

- Precautions for operations

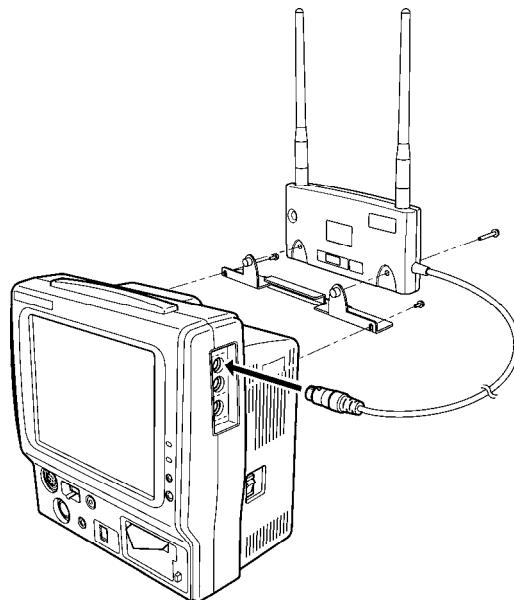
The Bidirectional Wireless Communications Module (TCON) uses radio waves to transmit data. Therefore, necessary precautions need to be taken for the characteristics and difficulties of using the device that emits radio waves. The TCON user should fully understand these precautions beforehand, and use the TCON device safely.

Furthermore, situations in which interference may occur are outlined below. In such cases, pay special attention to the condition of the patient connected to the bedside monitor, and eliminate the cause of interference.

1. The patient's data may become mixed with a different patient's data due to interference.
  - When there are multiple TCON communication devices set to the same TCON ID and channel (group).
2. When symptoms such as being unable to communicate, unstable communication, or poor reception may occur.
  - When the radio communication is bad because there are metal, concrete, or other such obstacles between the Bidirectional Wireless Communications Modules (TCON).
  - When a different wireless device is using the same frequency (channel).
  - When there are other TCON devices nearby using different channels (groups).
  - When a cell telephone or other wireless device is being used nearby.
  - When citizens broadcast bands such as amateur radio or truck radios are used in the vicinity of the TCON operating area. When the TCON device is installed or moved to a location that is outside the radio communication range.
  - When a computer or word processor, or electrical device that has an internal computer, is used near the TCON device antenna.
  - When the TCON device is installed or moved to a location that is outside the radio communication range.
  - If a nearby different TCON group is set with a TCON channel frequency that is too close to the channel frequency set for the current TCON group.
- Follow the instructions of the Overall Manager for the wireless channel when setting the TCON ID or channel (group) to prevent interference within the same institution.
- For the TCON ON/OFF setup, if the "OFF" is selected, the message such as "Check TCON Comm." will not be displayed.
- Follow the instructions of the Overall Manager for the wireless channel when setting the TCON ID or channel (group) to prevent interference within the same institution.
- For the TCON ON/OFF setup, if the "OFF" is selected, the message such as "Check TCON Comm." will not be displayed.
- There are following restrictions when connecting the DS-7100 system to the TCON Network.
  - If the measurement unit for temperature is "°F", the central monitor can not receive the measurement data for temperature. In addition, the alarm settings for temperature can not be operated from the central monitor.
  - If the measurement unit for BP is "kPa", the central monitor can not receive the measurement data for NIBP, BP1, and BP2. In addition, the alarm settings for NIBP, BP1, and BP2 can not be operated from the central monitor.
  - The NIBP measurement cannot be started from the central monitor via TCON system if the NIBP measurement interval is set to 2 min / 2.5 min / 3 min / 5 min or during the 1-minute measurement/Quick SYS measurement. However, it can be stopped.

## HTC-702 connection

Connect the HTC-702 (Bidirectional Wireless Communications Module) to the serial connector of the monitor. Install the HTC-702 at the back of the monitor, which can keep good communication condition.

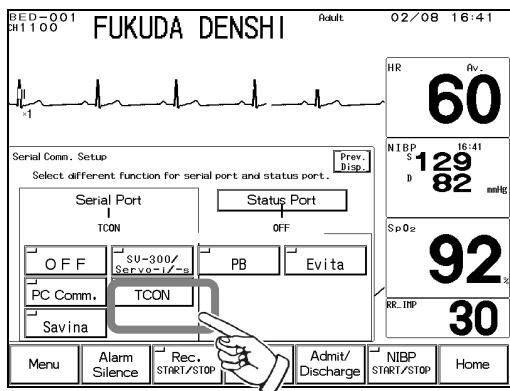


Refer to "HTC-702 Instruction Manual" for detailed information of installation to the Patient Monitor.

## TCON ID / TCON Channel Setup

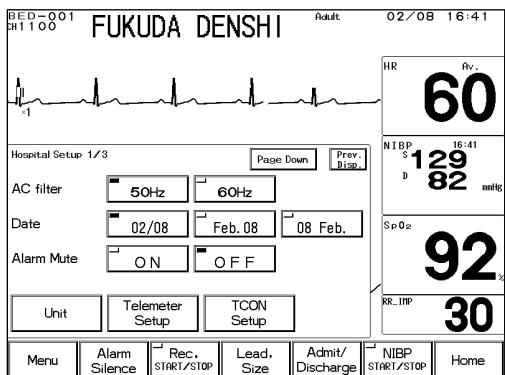
To connect to the TCON network, TCON ID / TCON Channel Setup are required.  
The set TCON ID /TCON Channel will be effective even after the power is turned OFF.

- 1 Press the **Menu** → **System Config.** → **Pre-Set** → **Ward Setup**  
→ **Serial Comm. Setup** keys.

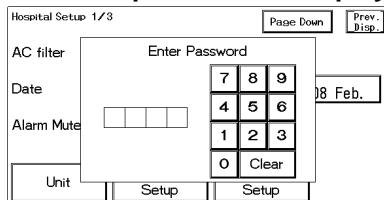


Select **TCON** for the serial port function.

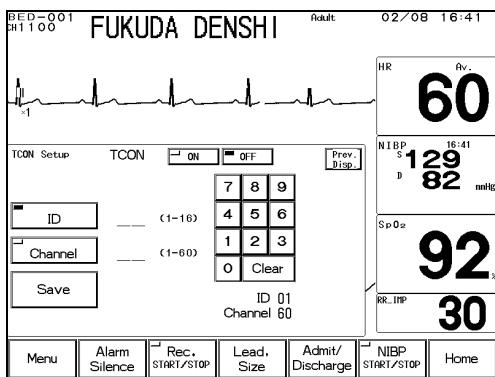
- 2 Press the **Menu** → **System Config.** → **Pre-Set** → **Hospital Setup**  
→ **TCON Setup** keys.



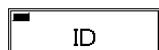
- 3 Enter the password to display the TCON Setup screen.



Use the numeric keypad to enter the password  
The entered number will be displayed as “\* \* \* \*”.



**4 Enter the TCON ID used in the bidirectional communications group and the TCON channel for the module.**

 ID      (1-16)

Press the **ID** key, and enter the TCON ID.

Use the numeric keypad to enter the ID in the range from 01 to 16. The ID should not be duplicated with other bedside monitor with the same TCON channel (group).

**5 Enter one TCON channel used in the same TCON Group.**

 Channel      (1-60)

Press the **Channel** key, and enter the TCON Channel.

Use the numeric keypad to enter the TCON channel in the range from 01 to 60. The same channel should be set for the monitors within the same TCON group (channel).

**6 Save the TCON ID and channel.**

Press the **Save** key to store the TCON ID and Channel.

If an error is found on the TCON communication, the “Check TCON comm.” message will be displayed.

 Save

If the entered TCON ID or channel is outside the programmable range or one of them is left blank, **Save** key will not function. Enter the appropriate TCON ID or channel and press the **Save** key again.

**7 Verify the stored TCON ID and channel.**

ID 01  
Channel 20

**8 Start the TCON communication.**

TCON  

**ON** will turn ON the bidirectional wireless communication.

**OFF** will turn OFF the bidirectional wireless communication.

## Setup Item Synchronizing within the Same Network / TCON System

When monitoring on a wired network (DS-LANII/DS-LANIII) or TCON system, some settings will synchronize with other monitors in the same network. (If a setting is changed on one monitor, the same change will apply to the other monitor.) The following list shows the setup items which will synchronize within the same network (DS-LANII/DS-LANIII) or TCON system.

However, there are some items with "Yes" (synchronize) that may not synchronize depending on the type of central monitor. Please also refer to the operation manual of the central monitor.

Ex) Sex (Male/Female)

The same setting will apply to all monitors within the same network. If the sex is changed on the DS-7100, it will also change on the central monitor. And, if the sex is changed on the central monitor, it will also change on the bedside monitor.

<b>NOTE</b>	Depending on the type of central monitor, not all setup items listed below are available and cannot be synchronized. Please also refer to the operation manual of the central monitor.		
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<b>DS-7100 Setup Item</b>	<b>Synchronize within the Same Network</b>		<b>Synchronize within the TCON System</b>
	<b>DS-LANII</b>	<b>DS-LANIII</b>	
Monitoring			
Discharge	Yes	Yes	Yes
Monitor Suspend	No	No	No
ON/OFF of Night Mode	No	Yes	Yes
NIBP Measurement	No	Yes	Yes

<b>DS-7100 Setup Item</b>	<b>Synchronize within the Same Network</b>		<b>Synchronize within the TCON System</b>
	<b>DS-LANII</b>	<b>DS-LANIII</b>	
Admit/Discharge			
Patient ID	Yes (Only 10 digits)	Yes	Yes
Patient Name	No	Yes	Yes
Sex (Male/Female)	Yes	Yes	Yes
Age	Yes	Yes	Yes
Birth Date	Yes	Yes	Yes
Patient Classification	Yes	Yes	Yes
Pacemaker	Yes	Yes	Yes
Impedance Mode	No	No	No
Filter Mode	No	No	No
Room/Bed ID	Bed ID Room ID	Yes (Only display) Yes (Only display)	Yes (Only display) Yes (Only display)

Ex)

DS-7100 Setup Item	Synchronize within the Same Network		Synchronize within the TCON System
	DS-LANII	DS-LANIII	
<b>Alarm</b>			
All Alarm Suspend	Yes	Yes	Yes
HR	Yes	Yes	Yes
ASYSTOLE	Yes (Max. 8sec.)	Yes	Yes
VF	Yes	Yes	Yes
VT	Yes	Yes	Yes
SLOW_VT	No (Synchronize with VT)	Yes	Yes
RUN	Yes	Yes	Yes
COUPLET	No	Yes	Yes
PAUSE	No	Yes	Yes
BIGEMINY	Yes	Yes	Yes
TRIGEMINY	No	Yes	Yes
FREQUENT	Yes	Yes	Yes
TACHY	No	Yes	Yes
BRADY	No	Yes	Yes
ST1-ST12 (mm)	Yes (Only ST1, ST2)	Yes	Yes
ST1-ST12(mV)	Yes(Only ST1, ST2)	Yes	Yes
BP1(mmHg)	Yes	Yes	Yes
BP1 (kPa)	Yes	Yes	Yes
BP2 (mmHg)	Yes	Yes	Yes
BP2 (kPa)	Yes	Yes	Yes
CVP (mmHg)	Yes	Yes	Yes
CVP (kPa)	Yes	Yes	Yes
CVP (cmH <sub>2</sub> O)	Yes	Yes	Yes
RR	Yes	Yes	Yes
APNEA	Yes	Yes	Yes
SpO <sub>2</sub>	Yes	Yes	Yes
NIBP (mmHg)	Yes	Yes	Yes
NIBP(kPa)	Yes	Yes	Yes
TEMP(°C)	Yes	Yes	Yes
TEMP(°F)	No	Yes	Yes
EtCO <sub>2</sub> (mmHg)	Yes	Yes	Yes
EtCO <sub>2</sub> (kPa)	Yes	Yes	Yes
EtCO <sub>2</sub> (%)	Yes	Yes	Yes
InspCO <sub>2</sub> (mmHg)	Yes	Yes	Yes
InspCO <sub>2</sub> (kPa)	Yes	Yes	Yes
InspCO <sub>2</sub> (%)	Yes	Yes	Yes
<b>Alarm Setup</b>			
Alarm Suspend Time	No	No	No
Alarm Silence Time	No	No	No
Alarm Limit Display	No	No	No
Alarm Occurrence at NIBP Failure	No	No	No
Status Alarm Control	No	No	No
<b>Arrhythmia Setup</b>			
HR Low Limit for VT	Yes*	Yes*	Yes*
HR Low Limit for RUN	Yes*	Yes*	Yes*

\* On some central monitors depending on the model type or software version, the setups for "HR Low Limit for VT" and "HR Low Limit for RUN" cannot be performed.

DS-7100 Setup Item	Synchronize within the Same Network		Synchronize within the TCON System	
	DS-LANII	DS-LANIII		
<b>Parameter Setup</b>				
<b>ECG</b>				
Lead	Yes	Yes	No	
Size	Yes	Yes	No	
Filter	Yes	Yes	No	
HR/PR Source	No	No	No	
Auto Lead Switch	Yes	Yes	No	
Pacemaker Pulse	Yes	Yes	No	
HR Average	No	No	No	
Pulse Tone	No	No	No	
Pace Pulse Mask Time	Yes (Only display)	Yes (Only display)	No	
ECG Drift Filter	Yes	Yes	No	
<b>RESP</b>				
Size	Yes	Yes	No	
CVA detect	Yes	Yes	Yes	
RR Source	No	No	No	
Impedance Measurement	No	No	No	
RR Sync. Indicator	No	No	No	
<b>SpO<sub>2</sub> (DS-71xx)</b>				
Size	Yes	No	No	
SpO <sub>2</sub> SEC Alarm	No	No	No	
HR/PR Source	No	No	No	
Ignore NIBP	No	No	No	
<b>NIBP</b>				
Auto Mode	No	Yes	Yes	
Quick SYS	No	No	No	
End Tone	No	No	No	
MEAN	No	No	No	
PR	No	No	No	
NIBP Speed	No	No	No	
<b>BP1/BP2</b>				
Scale	Yes	Yes	No	
Label	Yes (Only display)	Yes (Only display)	No	
Filter	No	No	No	
Display Type	No	No	No	
HR/PR Source	No	No	No	
<b>CO<sub>2</sub></b>				
Scale	Yes	Yes	No	
EtCO <sub>2</sub> Peak Picking Duration	No	No	No	
Unit	No	Yes	No	

Setup Item	Synchronize within the Same Network		Synchronize within the TCON System
	DS-LANII	DS-LANIII	
<b>Patient Data Review</b>			
Graphic Trend	No	No	No
Tabular Trend	No	No	No
OCRG	No	No	No
Recall	No	No	No
<b>ST Measurement</b>			
Ref. Point / Meas. Point	Yes	Yes	No
<b>System Configuration</b>			
<b>Tone/Volume</b>			
Pulse Sound	No	No	No
Key Sound	No	No	No
Alarm Sound	No	No	No
Other Bed Sound	No	No	No
Other Sound	No	No	No
Ventilator Alarm Sound	No	No	No
<b>Manual Recording Setup</b>			
Waveform	Yes	No	No
Recording Duration	Yes	No	No
Delay Time	Yes	No	No
<b>Alarm Recording Setup</b>			
ON/OFF/Center	Yes	No	No
Waveform	Yes	No	No
Recording Duration	Yes	No	No
Alarm Factor	Yes	No	No
Arrhythmia Factor	Yes	No	No
<b>Periodic Recording Setup</b>			
ON/OFF/Center	Yes	No	No
Waveform	Yes	No	No
Periodic Interval	Yes	No	No
Interval	Yes	No	No
Timer	Yes	No	No
Recording Duration	Yes	No	No
<b>Recorder Setup</b>			
Paper Feed to Top	No	No	No
Paper Feed to End	No	No	No
QRS Classification	No	No	No
Print Calibration	No	No	No
<b>Sweep Speed</b>			
ECG, BP, SpO <sub>2</sub>	No	No	No
RESP	No	No	No
<b>Night Mode Setup</b>			
Manual/Auto	No	Yes	Yes
Auto Start Time	No	No	No
Auto End Time	No	No	No
Display	No	No	No
Volume	No	No	No
ON/OFF of Alarm Pole	No	No	No
<b>Color, Brightness Setup</b>			
Color	No	No	No
Brightness	No	No	No
<b>Other Bed Setup</b>			
Other Bed Alarm Setup	No	No	No
<b>Telemetry Wave Setup</b>			
All Setup	No	No	No

Setup Item	Synchronize within the Same Network		Synchronize within the TCON System	
	DS-LANII	DS-LANIII		
<b>Preset</b>				
<b>Display Mode</b>				
Mode 1-5 Setup Items	No	No	No	
<b>Alarm Mode</b>				
Mode 1-5 Setup Items	No	No	No	
<b>Preset / Hospital Setup</b>				
AC Filter	No	No	No	
Date Format	No	No	No	
Alarm Mute	No	No	No	
Home Key Function	No	No	No	
Night Mode Cancel	No	No	No	
Asystole, VF, VT	No	No	No	
DS-LAN Patient ID Tx	No	No	No	
Unit	No	No	No	
Telemeter Setup	No	No	No	
TCON Setup	No	No	No	
<b>Preset / Ward Setup</b>				
Trend Clip	No	No	No	
BP Record Scale	No	No	No	
Suspend Arrhy. Analysis during Noise	No	No	No	
Password	No	No	No	
Discharge Mode	No	No	No	
Event Key	No	No	No	
MEAN Calculation	No	No	No	
Admit/Discharge Key Setup	No	No	No	
Record Key Display	No	No	No	
Remote Control Setup	No	No	No	
Key Mask Setup	No	No	No	
User Key Setup	No	No	No	
Serial Communication Setup	No	No	No	
Alarm Pole Setup	No	No	No	
NIBP Data Erase Time	No	No	No	
<b>Preset / Monitor Setup</b>				
Battery Operation	No	No	No	
Message Icon	No	No	No	
Parameter Key Frame	No	No	No	
Wide AC Filter	No	No	No	
Check Discharge at Power ON	No	No	No	
Backup at Discharge	No	No	No	
HR/PR Source	No	No	No	
Backup at Discharge (NIBP Auto Mode)	No	No	No	
Built-in Rec. Status Display	No	No	No	
DS-LAN Setup	No	No	No	
Ventilator Alarm Input Setup	No	No	No	
Status Output Setup	No	No	No	

## Ventilator Alarm Input

## Ventilator Connection

By connecting a ventilator, the DS-7100 is capable to notify the ventilator alarm to the central monitor via telemetry or wired network.

This section explains the procedure on how to connect the DS-7100 with a ventilator.

Connect the ventilator cable (optional accessory) to the serial connector or status connector on the right side of the DS-7100 and to the ventilator.

When connecting to a ventilator, check the corresponded software version of the ventilator.

Ventilator	Corresponded Software Version
SV900	Not specified
SV300	Not specified
Servo-i	v1.5 / v2.0
Servo-s	v2.0
PB740	M
PB760	H
PB840	K
Evita 2 dura	04.14
Evita 4	04.14
Evita XL	05.10
Savina	03.01



The ventilator alarm on this monitor should be used as supplementary function. Check the patient's condition, ventilator alarm sound and message occasionally.



- The ventilator should be operated by well-trained, approved person.
- Use only the specified cable for connecting the DS-7100 and the ventilator.
- Verify that the DS-7100 and the ventilator are securely connected.
- Verify that the power of the DS-7100 and the ventilator is turned OFF when connecting the cable.

## Precautions about the Ventilator Alarm



- If the DS-7100 system does not generate an alarm even though the ventilator is generating an alarm, or if any other malfunction occurs, immediately check the ventilator, monitor, and the cable, and replace the cable if necessary. If the malfunction still occurs, stop using the device.
- The alarm generation on the DS-7100 is not assured if the alarm other than the following generates at the ventilator.
  - SV-900  
gas supply alarm, power failure alarm, expiratory minute volume alarm, airway pressure upper limit alarm, apnea alarm, O<sub>2</sub> concentration alarm
  - SV-300  
airway pressure upper limit alarm, high continuous pressure alarm, O<sub>2</sub> concentration lower limit alarm, expiratory minute volume upper/lower limit alarm, apnea alarm, gas supply alarm, air supply alarm, O<sub>2</sub> supply alarm, battery alarm, limited battery alarm, no battery alarm, overrange alarm
  - Servo-i  
airway pressure upper limit alarm, high continuous pressure alarm, O<sub>2</sub> concentration lower limit alarm, expiratory minute volume upper/lower limit alarm, apnea alarm, gas supply alarm, O<sub>2</sub> supply alarm, battery alarm, no battery alarm, limited battery alarm, overrange alarm, expiratory cassette disconnected alarm, backup ventilation alarm, regulation pressure limited alarm, respiratory rate alarm, PEEP low alarm, EtCO<sub>2</sub> upper limit alarm, EtCO<sub>2</sub> lower limit alarm

 <b>WARNING</b>	<ul style="list-style-type: none"> <li>• <u>Servo-s</u> airway pressure upper limit alarm, high continuous pressure alarm, O<sub>2</sub> concentration lower limit alarm, expiratory minute volume upper/lower limit alarm, apnea alarm, gas supply alarm, air supply alarm, O<sub>2</sub> supply alarm, backup ventilation alarm, respiratory rate alarm, PEEP low alarm</li> <li>• <u>PB-740 / PB-760 / PB-840</u> The PB-740/PB-760/PB-840 ventilator acquires alarm information from nurse call port. The ventilator alarm that cannot be acquired from nurse call port is not guaranteed. For corresponding alarm, refer to the service representative of the ventilator manufacturer.</li> <li>● Precautions about Evita 2 dura / Evita 4 / Evita XL / Savina <ul style="list-style-type: none"> <li>• The Evita 2 dura / Evita 4 / Evita XL / Savina acquires alarm information from the serial port. The ventilator alarm that cannot be acquired from the serial port is not guaranteed. For corresponding alarm, refer to the service representative of the ventilator manufacturer.</li> <li>• The DS-7100 will not correspond to the following alarm generated at Evita 2 dura / Evita 4 / Evita XL. O<sub>2</sub> monitoring disabled alarm, CO<sub>2</sub> alarm disabled alarm, Oximeter alarm disabled alarm, Neo. volume measurement inoperable alarm, Minute volume alarm disabled alarm, Minute volume alarm low off alarm, Tidal volume alarm high off alarm, Apnea alarm off alarm, Nebulizer active alarm</li> <li>• The DS-7100 will not correspond to the following alarm generated at Savina. O<sub>2</sub> monitoring disabled alarm, Minute volume alarm disabled alarm, Minute volume alarm low off alarm, Tidal volume alarm high off alarm, Apnea alarm off alarm, Nebulizer active alarm</li> </ul> </li> </ul>
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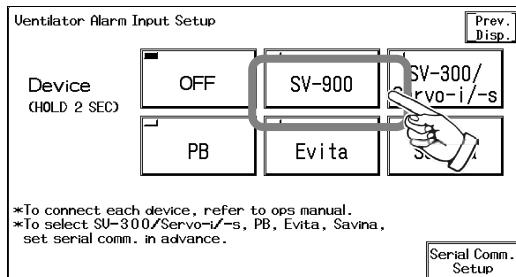
 <b>CAUTION</b>	<ul style="list-style-type: none"> <li>● The ventilator alarm will continue for 5 seconds even after the alarm cause is resolved.</li> <li>● When the 2min alarm silence button on the SV-900 is pressed, the ventilator alarm on the DS-7100 will be also silenced. However, airway pressure upper limit alarm will be generated even when the 2min alarm silence button is pressed.</li> <li>● If the alarm silence key on the PURITAN-BENNETT Ventilator 740 / 760 / 840 is pressed, the ventilator alarm on the DS-7100 will not be generated.</li> <li>● When the SV-300, Servo-i, Servo-s is operated by battery, "Vent. Alarm" will be generated on the DS-7100. Do not use the DS-7100 in such case.</li> </ul>
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## Ventilator Selection

Select the ventilator type on the ventilator alarm input setup menu.  
This setup should be performed before connecting the ventilator to the DS-7100 system.

### ● To Connect the SV-900

- 1 Press the **Menu** → **System Config.** → **Pre-Set** → **Monitor Setup** → **Vent. Alarm Input Setup** keys.



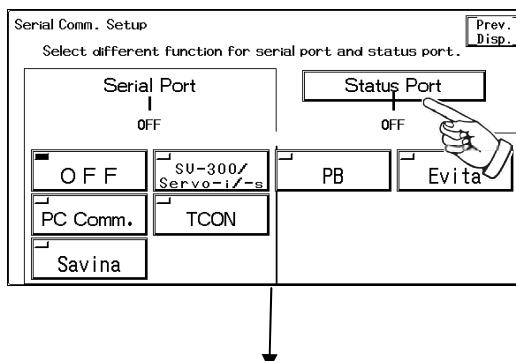
Press the **SV-900** key.

#### NOTE

To set the SV-900, it is necessary to set other ventilators OFF on the serial communication setup of the ward setup menu.

### ● To Connect the SV-300, Servo-i, Servo-s, PB, Evita, Savina Ventilator

- 1 The connecting device should be validated on the serial communication setup menu before performing ventilator alarm input setup.  
Press the **Menu** → **System Config.** → **Pre-Set** → **Ward Setup** → **Serial Comm. Setup** keys.



The DS-7100 is equipped with serial port and status port to communicate with the ventilator.

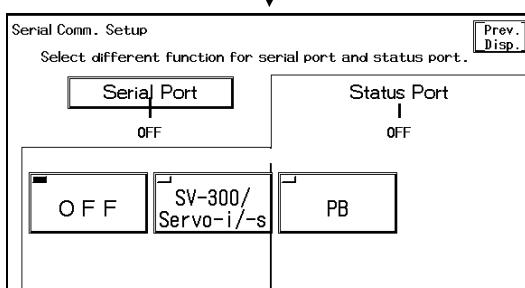
**Serial Comm. Setup** will display the menu to select the device for serial port connection.

**Status Port** will display the menu to select the device for serial port connection.

Select **SV-300/Servo-i/-s** / **PB** / **Evita** /

**Savina** for serial port or status port connection.

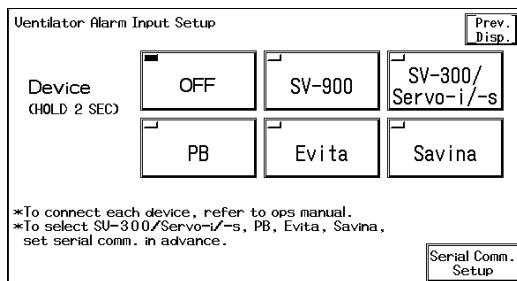
**Evita** / **Savina** can be selected only for the serial port connection.



#### ⚠ CAUTION

- The serial port and status port cannot have a same function.
- If a ventilator is connected, or if a ventilator alarm is suspended, the ventilator alarm input setup cannot be changed.

**2 Press the [Menu] → [System Config.] → [Pre-Set] → [Monitor Setup] → [Vent. Alarm Input Setup] keys.**



Press one of the keys from [SV-300/Servo- i/-s] / [PB] / [Evita] / [Savina] for more than 2 seconds.

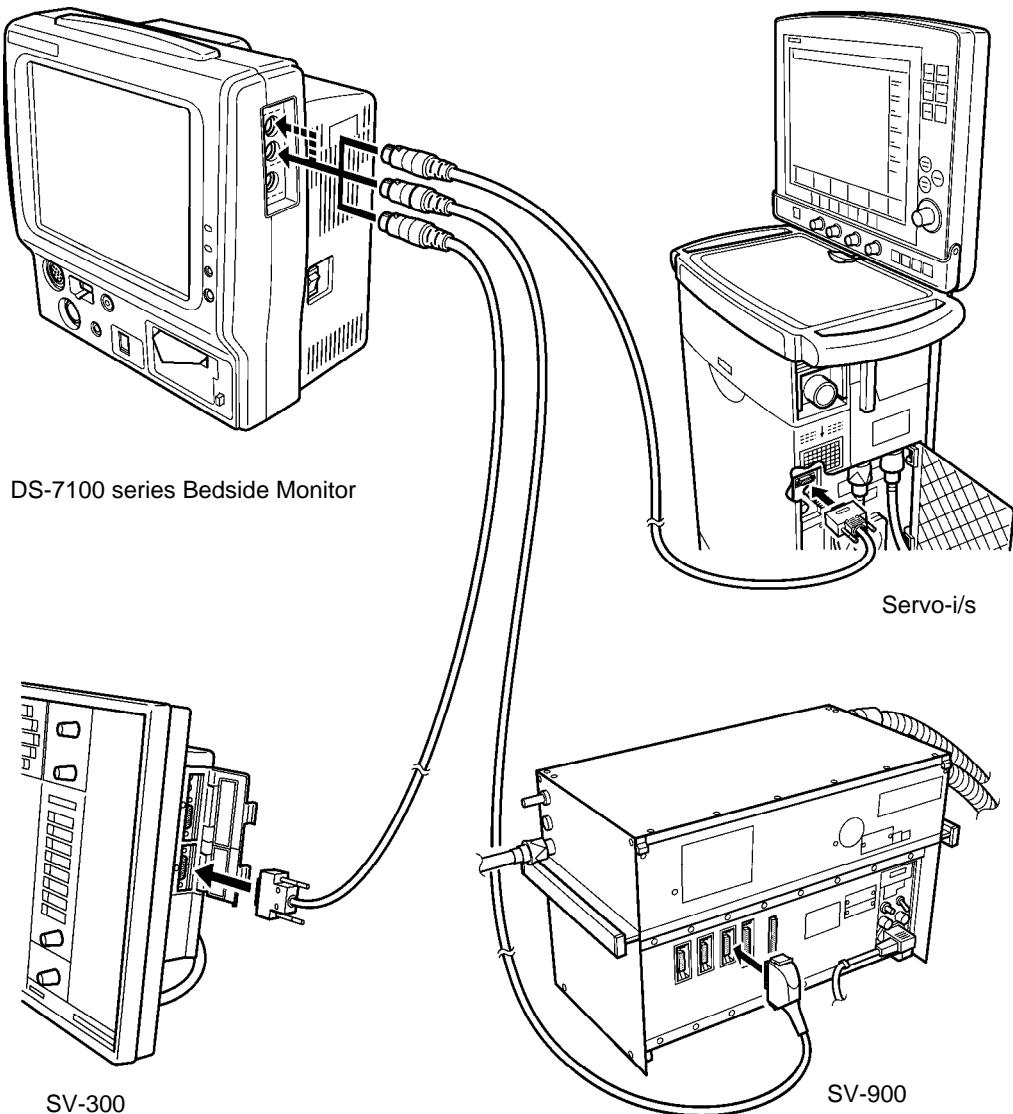
## Ventilator Cable Connection

The ventilator can be connected to the status connector or serial connector located at the right side of the DS-7100 using a ventilator cable (optional accessory).

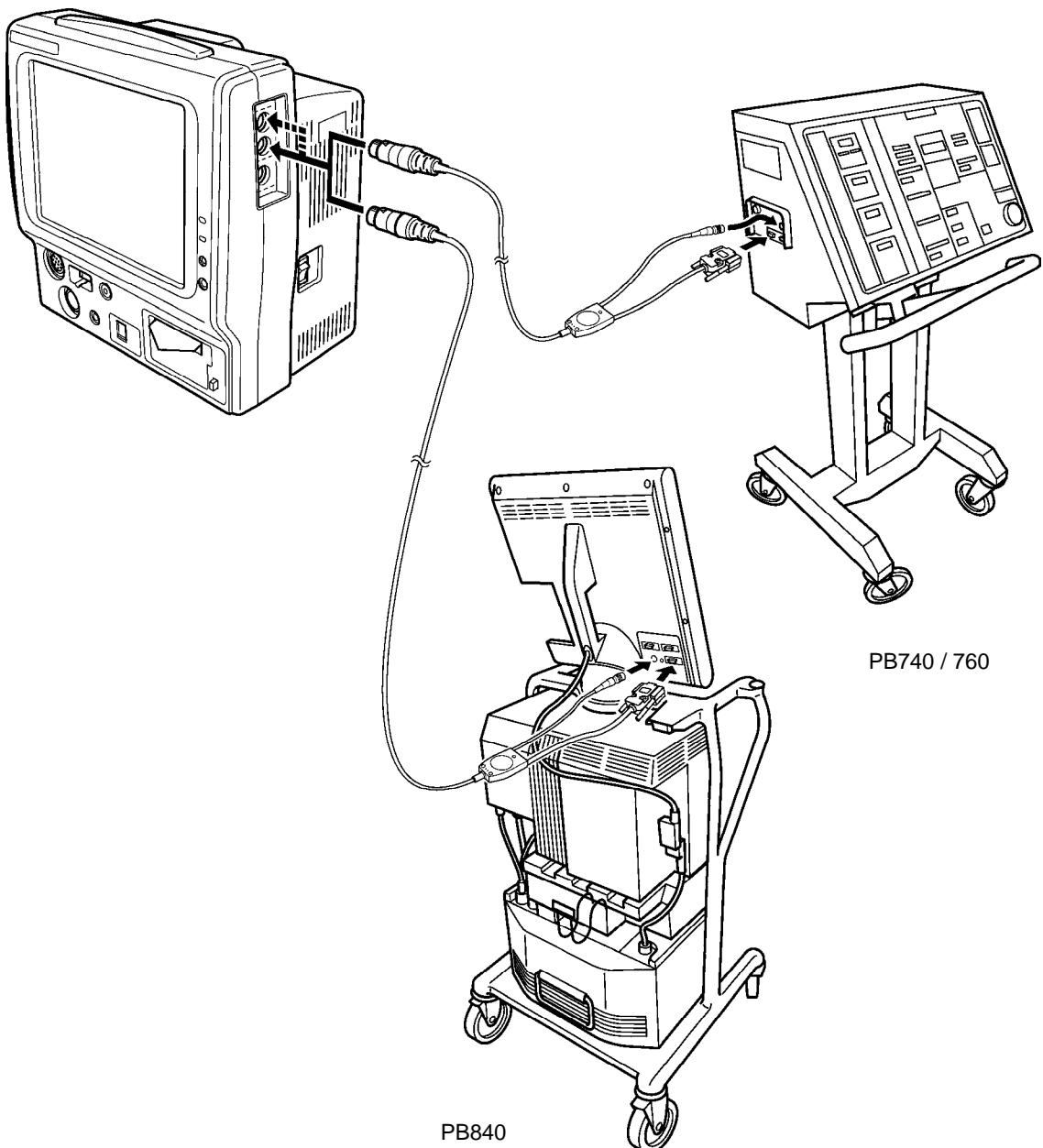
Ventilator	Ventilator Cable	
	Serial Connector	Status Connector
Servo Ventilator 900C/900D/900E	CJ-500*	CJ-400RI-70SV9
Servo Ventilator 300/300A	CJ-501	CJ-401RI-70SV3*
Servo Ventilator Servo-i/s	CJ-502	CJ-402RI-70SVI*
PURITAN-BENNETT Ventilator 740 / 760 / 840	CJ-504*	CJ-403RI-70PB*
Dräger Medical® Ventilator Evita 4 / Evita XL / Evita 2 dura / Savina	CJ-502	(Connection not possible)

NOTE	<ul style="list-style-type: none"><li>The output signal of the serial connector and status connector differs according to the device serial number. It can be distinguished by the notation, "Status" or "Status II" on the connector part. The device with "Status" notation cannot be connected to CJ-500, CJ-504, CJ-401RI-70SV3, CJ-402RI-70SVI, and CJ-403RI-70PB. The device with "StatusII" notation is capable to connect to all cables.</li><li>Only one ventilator can be connected to each DS-7100 system.</li></ul>
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### 【Servo Ventilator】

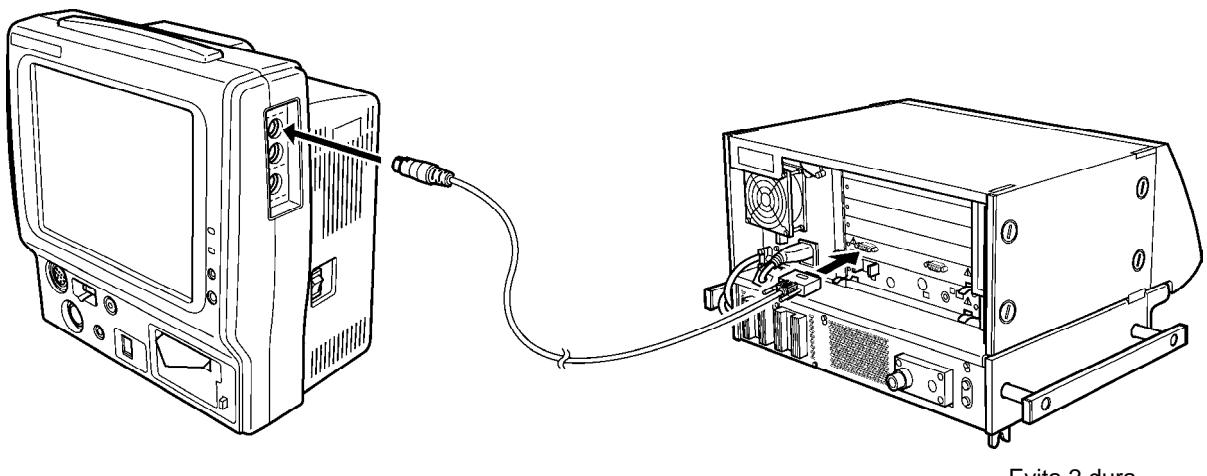


**[PURITAN-BENNETT Ventilator]**



<b>⚠ CAUTION</b>	<p>When connecting the PURITAN-BENNETT ventilator, follow the precautions below.</p> <ul style="list-style-type: none"><li>• The serial port (RS-232C) of the ventilator should be set as follows. Refer to the service representative of the ventilator manufacturer. Baud Rate : 9600 Data Bit : 8bit Parity Bit : none</li><li>• The DS-7100 system detects the “ventilator alarm” when the nurse call port on the ventilator outputs the alarm signal. For details of ventilator setup and alarm signal output condition from the nurse call port, refer to the service representative of the ventilator manufacturer.</li></ul>
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**【Evita / Savina Ventilator】**



Evita 2 dura

<b>⚠ WARNING</b>	<p>The Evita2dura / Evita4 / EvitaXL / Savina acquires alarm information from the serial port. The ventilator alarm that cannot be acquired from the serial port is not guaranteed.</p> <p>For corresponding alarm, refer to the service representative of the ventilator manufacturer.</p>																														
<b>⚠ CAUTION</b>	<p>When connecting the Evita 2 dura / Evita 4 / Evita XL / Savina, the serial port (RS-232C) setup of the ventilator should be as follows. Refer to the service representative of the ventilator manufacturer.</p> <ul style="list-style-type: none"> <li>• For Evita 2 dura / Evita 4 / Evita XL           <table style="margin-left: 20px;"> <tr><td>Protocol</td><td>:</td><td>Medibus</td></tr> <tr><td>Baud Rate</td><td>:</td><td>19200bps</td></tr> <tr><td>Data Bit</td><td>:</td><td>8bit</td></tr> <tr><td>Parity Bit</td><td>:</td><td>Even</td></tr> <tr><td>Stop Bit</td><td>:</td><td>1bit</td></tr> </table> </li> <li>• For Savina           <table style="margin-left: 20px;"> <tr><td>Protocol</td><td>:</td><td>Medibus</td></tr> <tr><td>Baud Rate</td><td>:</td><td>9600bps</td></tr> <tr><td>Data Bit</td><td>:</td><td>8bit</td></tr> <tr><td>Parity Bit</td><td>:</td><td>None</td></tr> <tr><td>Stop Bit</td><td>:</td><td>1bit</td></tr> </table> </li> </ul>	Protocol	:	Medibus	Baud Rate	:	19200bps	Data Bit	:	8bit	Parity Bit	:	Even	Stop Bit	:	1bit	Protocol	:	Medibus	Baud Rate	:	9600bps	Data Bit	:	8bit	Parity Bit	:	None	Stop Bit	:	1bit
Protocol	:	Medibus																													
Baud Rate	:	19200bps																													
Data Bit	:	8bit																													
Parity Bit	:	Even																													
Stop Bit	:	1bit																													
Protocol	:	Medibus																													
Baud Rate	:	9600bps																													
Data Bit	:	8bit																													
Parity Bit	:	None																													
Stop Bit	:	1bit																													

# Attaching Mounting Brackets to the DS-7100

Before attaching each mounting bracket, check the package contents. If any shortage or damage is found, please contact Fukuda Denshi.

## OA-451 Mounting Kit

By using the OA-451 Mounting Kit, the DS-7100 can be attached to a place such as bed-pipe.

### 【Package Items】

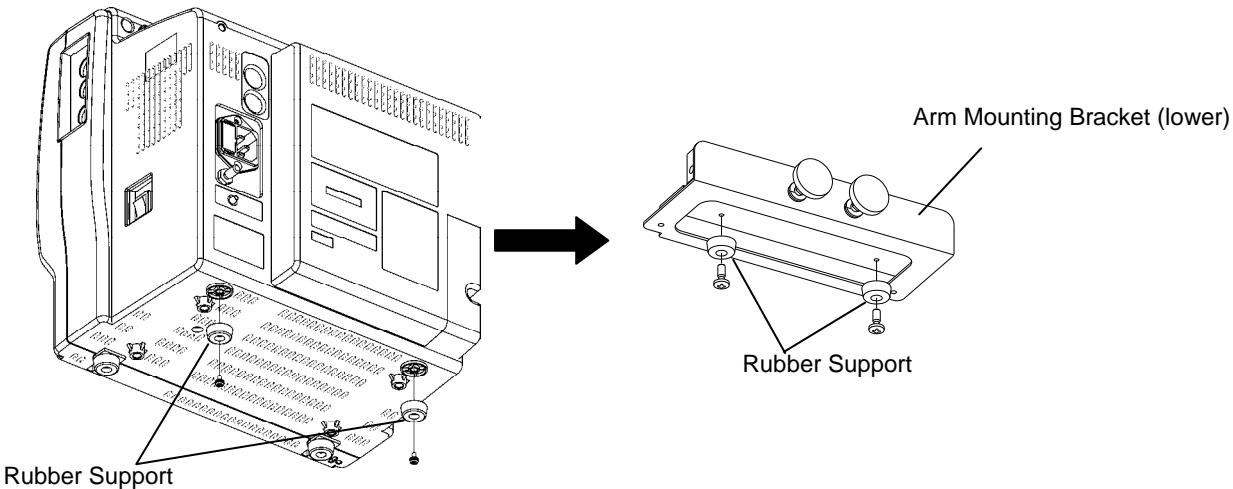
	Item	Q'ty
(1)	Arm Mounting Bracket (upper)	1
(2)	Arm Mounting Bracket (lower)	1
(3)	Arm	1
(4)	Screw (small) M3x8	6
(5)	Screw (large) M4x12	6

### NOTE

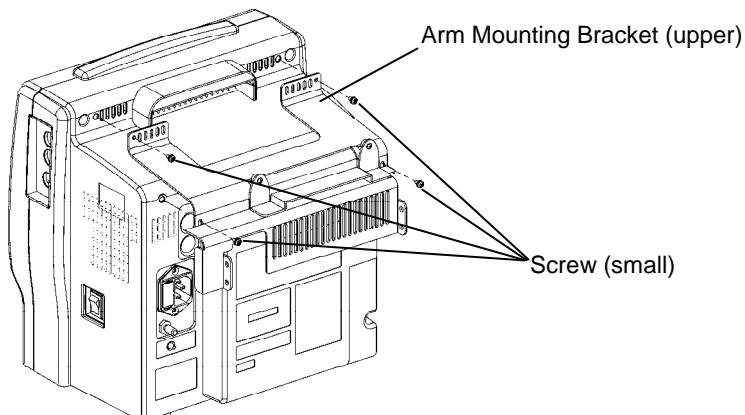
- Attach this product on a level surface following the procedure below.
- Prepare a Phillips-head screwdriver.

### ● Attaching the OA-451

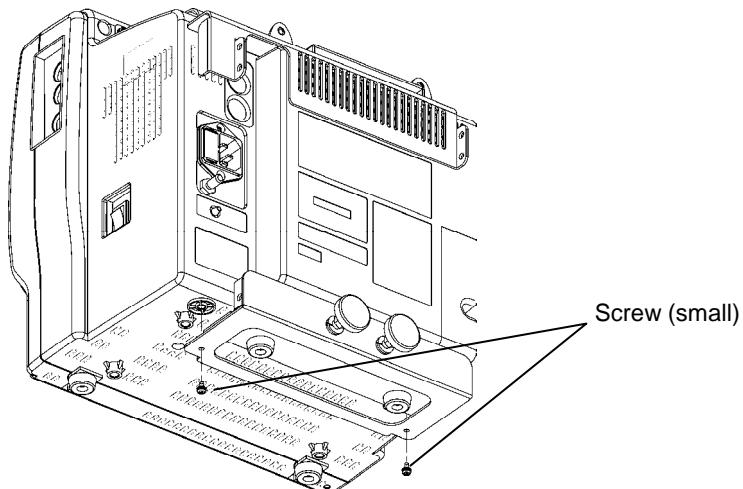
- 1 Remove the two rubber supports attached under the main unit and set them into the arm mounting bracket (lower) [(2)]. To secure the rubber supports to the arm mounting bracket (lower), use the screws removed from the main unit.



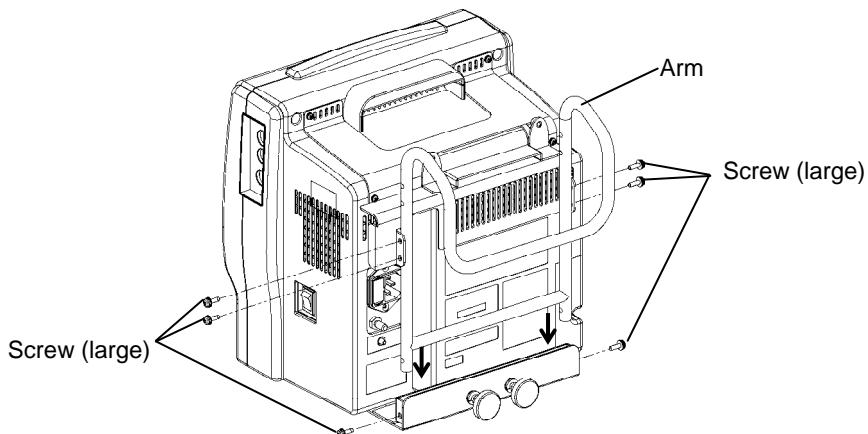
- 2 Set the arm mounting bracket (upper) [(1)] in place using the screws (small) [(4)].



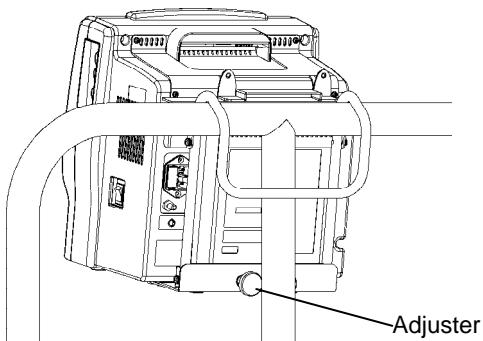
- 3 Set the arm mounting bracket (lower) (assembled in procedure “1”) in place using the screws (small) [(4)].**



- 4 Set the arm [(3)] using the screws (large) [(5)].**



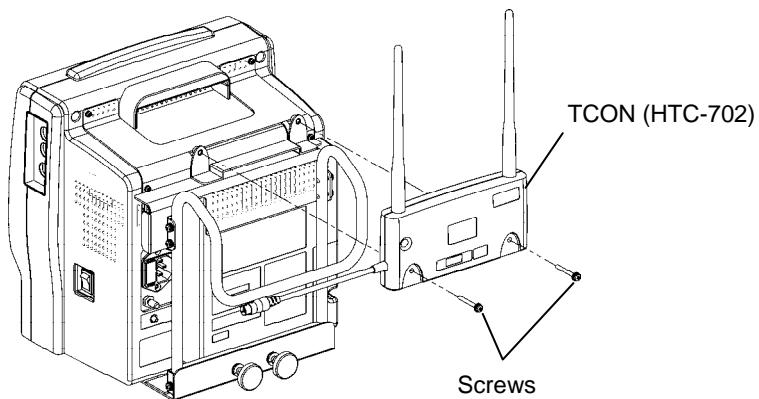
**[Precaution for Usage]**



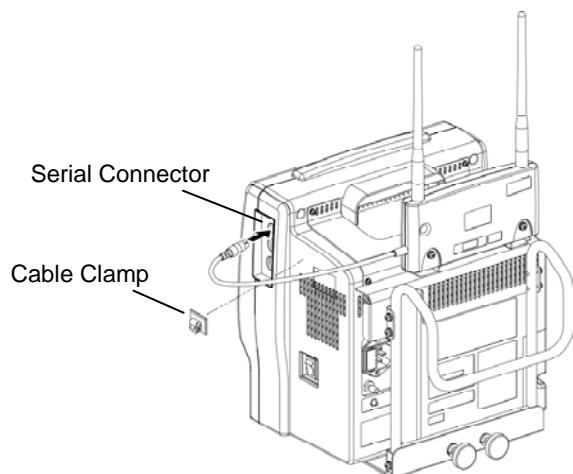
When attaching to a bed-pipe, attach the adjuster part of the arm mounting bracket to the bed-pipe.

## ● Attaching the TCON (HTC-702) with the OA-451

- 1 Fix the TCON (HTC-702) to the OA-451 in place using the screws (large, 2 locations), which are included in the TCON (HTC-702) accessories.



- 2 Connect the Connecting Plug of the HTC-702 cable to the Serial Connector on the right side of the monitor unit. Attach the Cable Clamp, which is included in the TCON (HTC-702) accessories, to the monitor unit, and pass the connecting cable through the clamp.



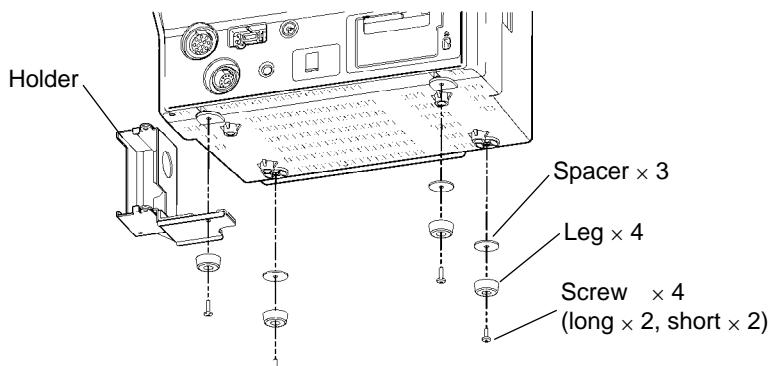
## OA-474 2ch BP Conversion Cable Holder

This product is an exclusive holder to fix the CJ-7546 2ch BP Conversion Cable to the DS-7100 series Bedside Monitor. Using this product allows to securely attach the relay part of the 2ch BP conversion cable to the patient monitor.

### 【Package Items】

	Item	Q'ty	Description
(1)	Holder	1	Holder A, B assembly
(2)	Spacer	3	For the monitor legs

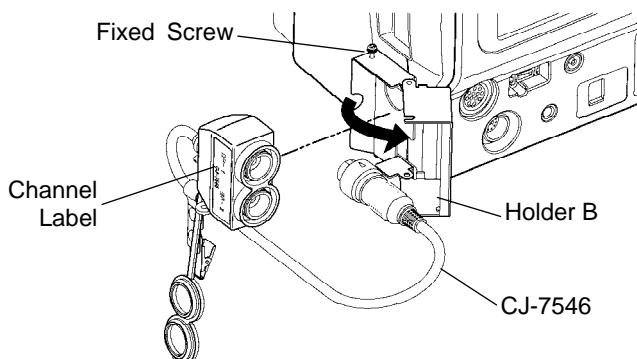
- 1 Remove the 4 legs attached to the bottom of the patient monitor using a screwdriver, and insert the holder and 3 spacers as shown below.



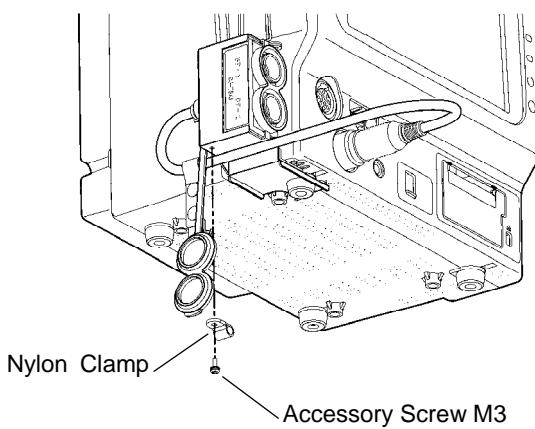
#### NOTE

Note that the screw length is different for the front side and the rear side. Use the longer screws for the front side.

- 2 Open the Holder B by loosening the fixed screw, and insert the relay part of the conversion cable so that the channel label faces front. Close the Holder B and tighten the fixed screw.



- 3 Fix the cable to the bottom of the holder using the nylon clamp and accessory screw (provided as accessory for the conversion cable).



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## Chapter 10

# Maintenance

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This section describes precautions for handling the equipment.

### Handling After Use

- Do not apply excessive force when disconnecting the cables. Always pull on the connector housing and not on the cable.
- Clean the unit, accessories, and cables, and keep them together in one place for next use.
- Always check for adequate supply of disposable accessories such as ECG electrodes. If any shortage, contact our service representative and supply as necessary.

### Handling the Touch Panel

- The touch panel utilizes exclusive fluorescent light for the backlight.  
As this fluorescent light tube has product life cycle, it needs to be replaced periodically. If the display becomes dark, scintillates, or does not light, contact your nearest service representative.
- Although the LCD utilizes highly accurate picture elements, occasionally, there may be few pixels which does not light or constantly lights. Please note that this is not an equipment failure, and will not affect monitoring operation.
- Due to its material characteristic, the touch panel expands/contracts depending on the temperature/humidity. When the touch panel is left unused for a while, or when the ambient temperature is low, the surface film of the touch panel may expand, but this is not an abnormal condition. This expansion will be reduced in few hours or half a day after the power is turned ON.

This section describes about the storage of the device and recording paper.

### Storing the Device

- Store in a place where the device will not be exposed to splashing water.
- Store in a place where the device will not be adversely affected by atmospheric pressure, temperature, humidity, ventilation, sunlight, dust or atmosphere containing salt or sulfur.
- Store in a level area where the device is not exposed to vibration and shock (including during transportation).
- The following environmental conditions should be observed when storing the device.  
    Storage Temperature : -10 to 60°C  
    Storage Humidity : 10 to 95% (at 60°C)  
    Storage Atmospheric Pressure : 700 to 1060hPa

### Storing the Recording Paper

The DS-7100 system utilizes heat sensitive recording paper. If placed in a high temperature for long period of time, the print may become indistinct, and unable to read. When storing, follow the precautions below.

- Store in a place where light is shut off and avoid direct sunlight.
- Do not leave the paper in a high temperature (50 °C or 122 °F or above).
- Do not store the paper in polyvinyl chloride bag.
- Do not expose the paper to alcohol, hydrochloric acid, or ester ketone.
- Avoid using adhesive agents other than water based glue.

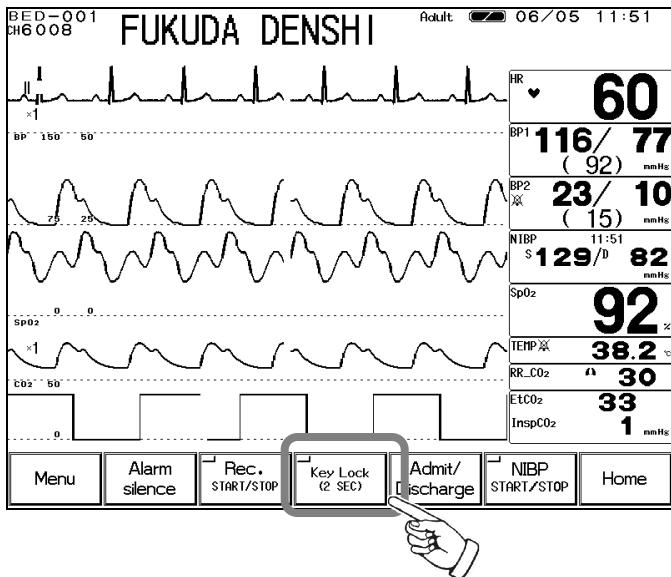
This chapter explains about the cleaning of the touch panel, housing, and accessories.

## Cleaning the Touch Panel

Since this device incorporates a touch panel, finger prints and other stains are likely to appear on the touch panel.

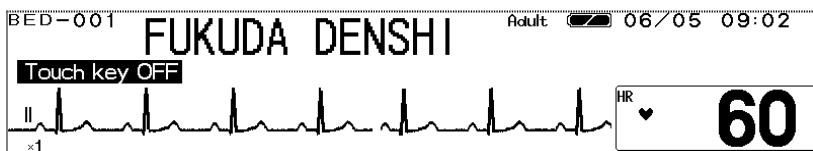
Follow the procedure below to clean the touch panel.

### 1 Press the **Key Lock** key for more than 2 seconds.



The **Key Lock** key needs to be preprogrammed as user key.  
Refer to "8. System Configuration Ward Setup" for user key setup.

### 2 Clean the touch panel.



While the "Touch key OFF" message is displayed, the touch panel key will be deactivated. If "LEAD OFF" or other message is displayed, the key lock message will not be displayed.

### 3 Wipe the touch panel using a cleaning cloth.

### 4 Press again the **Key Lock** key for more than 2 seconds.

The message will disappear and the keys will be activate again.

<b>CAUTION</b>	<ul style="list-style-type: none"><li>If stains cannot be removed from the touch panel surface, wipe softly with a dry or ethanol dampened cleaning cloth. Never use strong-acidic cleaning solution. Neither is it recommended that mild acidic or alkaline cleaning solution to be used.</li><li>A special coating is applied to the surface of the touch panel. Do not wipe the surface with a cloth or gauze with coarse texture. Wipe the surface with the soft cleaning cloth provided as optional accessory or with an eyeglass cleaning cloth.</li></ul>
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## Cleaning the Housing

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Clean the housing using tightly squeezed gauze or an absorbent cotton cloth dampened with alcohol or a neutral cleanser.

 CAUTION	<ul style="list-style-type: none"><li>● Clean the equipment frequently so stains can be removed easily.</li><li>● To prevent injury, it is recommended to wear gloves when cleaning the equipment.</li><li>● Do not allow liquids such as alcohol or cleaning solution enter the monitor or connectors.</li><li>● Do not use organic solvents, thinner, toluene and benzene to avoid damaging the resin case.</li><li>● Do not polish the housing with abrasive or chemical cleaner.</li><li>● When sterilizing the entire room using a spray solution, pay close attention not to have liquids get into the monitor or connectors.</li><li>● Use only neutral detergent to clean the housing. Do not use chemical cloth, scrub brush, abrasive, polishing powder, hot water, volatile solvent and chemicals (cleanser, thinner, benzine, benzol, and synthetic detergent for house and furniture), or sharp-edged tools. The surface resin coating may be damaged, resulting in discoloration, scratches, and other problems.</li></ul>
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## Disinfecting the Blood Pressure Transducers

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Disinfect the blood pressure transducers according to the manufacturer's guidelines.

## Disinfecting the Temperature Probes

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Disinfect the temperature probes according to the manufacturer's guidelines.

## Disinfecting the CO<sub>2</sub> Filter Line

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Disinfect the Filter Line/Capno Line according to the manufacturer's guidelines.

## **Cleaning and Disinfecting the SpO<sub>2</sub> Sensor**

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### **【Nellcor Sensor】**

- Do not soak the transducer in water or antiseptic solution.
- Wipe the Durasensor® (DS-100A) with disinfectant such as 70% alcohol. Do not sterilize by applying radioactive rays, steam, or ethylene oxide.
- The OxiMax® can be reused on the same patient as long as the adhesive tape attaches without slippage. Do not resterilize and reuse it on other patients. It is intended for single patient use only.

### **【Masimo Sensor】**

- Do not soak or immerse the sensor or patient cable in any liquid solution. (Sensor and connector are not water-proof.)
- Do not sterilize the sensor and cable by irradiation, steam, or ethylene oxide.
- Clean the Masimo reusable sensor (LNOP® DCI) and patient cable using the following procedure.
  - (1) Remove the sensor from the patient. Disconnect the patient cable from the sensor.
  - (2) Disconnect the sensor from the main unit.
  - (3) Wipe the sensor and cable using 70% isopropyl alcohol cotton.
  - (4) Dry the sensors and cables prior to placement on a patient.
- The Masimo single patient use type sensor can be reused on the same patient as long as the light emitting and receiving part is clean, and if it is still adhesive to the skin.  
The adhesiveness will return by cleaning with alcohol and completely drying it. Do not resterilize and reuse it on other patients.

## **Cleaning and Disinfecting the NIBP Cuff**

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- Do not soak the cuff in water or antiseptic solution.
- Wipe the NIBP cuff with disinfectant such as 70% alcohol. Do not disinfect by applying radioactive rays, steam, or ethylene oxide.

## **Cleaning and Disinfecting the ECG lead Cable**

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- Do not soak the cable in water or antiseptic solution.
- Wipe the ECG lead cable with disinfectant such as 70% alcohol. Do not disinfect by applying radioactive rays, steam, or ethylene oxide.

This section describes about the handling and storage of the battery pack.

### Handling the Battery

- The battery pack can be continually used for more than 300 times (or about 1 year) under normal temperature, but the continuous use will degrade the battery and shorten the usable time.
- When the battery operation time becomes short even after it is fully charged, the battery pack needs to be replaced.
- When the battery pack level becomes low, charge the battery well in advance for the next use.
- The battery should be charged at room temperature (10 to 30°C).
- When the DS-7100 system is operated by battery, and if empty mark is displayed for the battery condition, IC card format, read/write process cannot be performed.
- When using the battery for the first time, or using after leaving it for a while, be sure to charge the battery before use by connecting the power supply cable.

### Storing the Battery

To take advantage of the characteristic of battery pack, pay attention to the following when storing.

#### Storage Temperature and Humidity of the Battery Pack

- Store in an environment specified below without corrosive gas.

Storage Period	Storage Temperature	Storage Humidity
Within 30days	-20 to 60°C	65±20%
30 to 90 days	-20 to 45°C	
90 days to 1year	-20 to 35°C	

- Do not store in an environment outside the specified temperature range or excessive high humidity. This may result in leakage caused by expansion/contraction inside the battery pack, or rusting of the metal part.

#### Long-term Storage

- If the battery is left installed in the monitor without use for long period of time, the electrolyte may leak, or inactivation of the battery may occur which degrades the capacity recovery after storage. When storing the monitor with battery installed for long period of time, remove the battery from the monitor, or supply AC power to the monitor and perform rapid charging every 2 to 3 months.

## Maintenance Check

## Daily and Periodic Check

This section explains the daily check and periodic check items of the device.

### About the Maintenance Check

Periodic inspection must be performed. When reusing the device which was left unused for a while, always check that the device operates properly and safely before use.

To ensure safety, reliability, and high performance, a “Daily Check” and “Periodic Inspection” must be performed. We are not liable for any accident arising from lack of maintenance.



- Do not open the housing of this device.
- Avoid alcohol or other liquids from getting into the equipment.

#### ● Daily Check

Perform daily inspection using the “Daily Check List” on the next page.

#### ● Periodic Check

Periodic inspection of medical electronic equipment is mandatory to prevent failures and accidents and to ensure safety and reliability.

Periodic maintenance may be performed by each medical institution or by a third party by concluding a “Maintenance Contract”.

For more details, contact your nearest service representative.

### Periodic Replacement Parts

To ensure reliability of safety, function, and performance of this device, the periodic replacement parts must be replaced periodically. When replacing, contact our service representative.

The periodic replacement period for each part is as follows.

<b>Short Term Backup Battery</b>	3 years
<b>LCD Unit, Inverter Unit</b>	50,000 hours or 6 years
<b>EtCO<sub>2</sub> Unit (MiniMediCO<sub>2</sub>)</b>	20,000 hours (EtCO <sub>2</sub> meas. accumulated time)
<b>NIBP Unit</b>	100,000 times of use or 6 years
<b>Battery Pack</b>	1 year or 300 times of charging / discharging.



The periodic replacement parts must be replaced at specified period.

# Daily Check List

No. \_\_\_\_\_

Inspected Date \_\_\_\_\_

Inspected by \_\_\_\_\_

Location \_\_\_\_\_

Device Type \_\_\_\_\_

Serial No. \_\_\_\_\_

Date of Purchase \_\_\_\_\_

<b>Item</b>	<b>Details</b>	<b>Criteria</b>	<b>Judgment</b>
<b>Appearance</b>	Visually check the exterior for scratches, cracks, deformation, and rust.	No abnormality should be found.	<input type="checkbox"/> OK / <input type="checkbox"/> NG
<b>Installation</b>	Check whether the unit is installed on a level surface.	The installation area must be level and free from vibration and shock.	<input type="checkbox"/> OK / <input type="checkbox"/> NG
	Check whether the unit is installed in a place susceptible to adverse environment.	The environmental condition (ex. temperature, humidity) of the installed place should be as specified. The unit should not be subjected to splashing water.	<input type="checkbox"/> OK / <input type="checkbox"/> NG
<b>Functions</b>	Turn ON the monitor, and check whether it operates normally.	The home display appears, and the lamp located at the right side of the display panel lights.  The date and time should be correct.	<input type="checkbox"/> OK / <input type="checkbox"/> NG
<b>Cables</b>	Visually check all cables for any damage.	No damage should be found.	<input type="checkbox"/> OK / <input type="checkbox"/> NG
<b>Periodic Inspection</b>	Check the date of previous periodic inspection.	Should be within 1 year.	<input type="checkbox"/> OK / <input type="checkbox"/> NG
<b>CO<sub>2</sub> Calibration (DS-7141, DS-7141M)</b>	Check the date of previous calibration date.  Previous Date Day ____ Year ____ Month ____	Should be within 1 year.	<input type="checkbox"/> OK / <input type="checkbox"/> NG

(\* Refer to the following  CAUTION.)

\*  CAUTION: If the CO<sub>2</sub> gas calibration is not performed at a specified interval, CO<sub>2</sub> measurement accuracy may be affected and also subsequent gas calibration may not be possible.

Comment

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## Troubleshooting

This section explains the troubleshooting for each case.

### ECG

#### The “LEAD OFF” message is displayed.

- Cause : The electrode is detached, or is not making good electrical contact with the skin.  
Solution : • Check if the electrodes are properly attached.  
              • Replace the electrode, or check the lead cable.

#### The “ECG failed” message is displayed.

- Cause 1 : The ECG amplitude is 0.25mV or below for the waveform size of  $\times 1$ ,  $\times 1/2$ ,  $\times 1/4$ , and 0.150mV or below for the waveform size of  $\times 2$ ,  $\times 4$ .  
Solution : Change the electrode attachment site, or select the lead with higher QRS amplitude.  
Note : Using 4-electrode or 5-electrode instead of 3-electrode allows more accurate QRS detection.
- Cause 2 : The electrode contact is poor.  
              Electrical blanket or other noise source is near the patient.  
Solution : Attach the electrode firmly.  
              • Replace the lead cable if defective.  
              • If any noise source is near the patient, locate it away from the patient as much as possible.

#### ECG waveform contains noise.

#### The “Artifact” message is displayed.

- Cause 1 : The electrode contact is poor.  
              Electrical blanket or other noise source is near the patient.  
Solution : Attach the electrodes firmly.  
              • Replace the lead cable if defective.  
              • If any noise source is near the patient, locate it away from the patient as much as possible.
- Cause 2 : EMG is interfering.  
Solution : • Change the electrode site to a location where EMG will less likely to interfere.  
              • Select ESIS mode for the filter mode.  
Note : Selecting a ESIS mode for the filter mode will decrease the QRS amplitude and may result in not counting the heart rate.

#### The “Check electrode” message is displayed.

- Cause : The electrode contact with the skin is poor. There is substantial contact resistance between the electrodes.  
Solution : Replace all the electrodes.  
              Use the electrodes of the same type.

#### The “ECG unit error” message is displayed.

- Cause : A communication error with the ECG measuring unit exists.  
Solution : The breakage of wire or failure of the ECG unit can be considered.  
              Contact our service representative.

**The measured data is displayed as “xxx”.**

- Cause : The heart rate is outside the measurement range.  
 Solution : • Check the electrode application.  
               • Replace the electrode, or check the lead cable.

**Heart rate is not counted. Heart rate is low.**

- Cause : The ECG waveform amplitude is below the QRS detection level (0.3mV).  
 Solution : Change the electrode site, or select a lead with higher QRS amplitude.  
 Note : Using 4-electrode or 5-electrode instead of 3-electrode allows more accurate QRS detection.  
 Also, if large amount of noise is interfering, the noise may be erroneously detected as QRS. It is recommended to change the electrode site and increase the ECG amplitude.

**Heart rate is not counted, and “LEAD OFF” message is displayed.**

- Cause : The electrode of the displayed lead type is detached, or is not making good electrical contact with the skin.  
 Solution : • Check the electrode application.  
               • Replace the electrode, or check the lead cable.

**Artificial pacemaker is not displayed.**

- Cause : On the admit / discharge menu, **Not used** is selected for the pacemaker use.  
 Solution : Select **Used** for the pacemaker use.

**The “Pacemaker error” message is displayed.**

- Cause : The pacemaker pulse is detected 16 pulses or more per second.  
 Solution 1 : Attach the electrodes firmly.  
               • Replace the lead cable if defective.  
               • If any noise source is near the patient, locate it away from the patient as much as possible.  
 Solution 2 : If the patient is not wearing a pacemaker, set to **Not used** for the pacemaker use in the patient admit/discharge menu.

**The “ECG not connected” message is displayed.**

- Cause : When the ECG relay cable is disconnected during ECG monitoring, this message will be displayed.  
 Solution 1 : To cease monitoring, press the **Alarm Silence** key to clear the message and silence the alarm.  
 Solution 2 : To continue monitoring, plug in the ECG relay cable. This will clear the message and silence the alarm.

**The “Cannot analyze” message is displayed.**

- Cause : Regardless of ON/OFF setting of “Suspend Arrhy. Analysis during Noise” under Ward Setup (Preset Menu), the “Cannot analyze” alarm will generate when analysis is suspended for more than 30 seconds.  
 Solution : Check the electrode attachment, and remove the noise source.  
               • Check if electrodes and lead cables are properly attached.  
               • Replace the electrode, lead cable if defective.  
               • If any noise source is near the patient, locate it away from the patient as much as possible.  
               • If EMG is interfering, change the electrode site to a location where EMG will less likely to interfere.

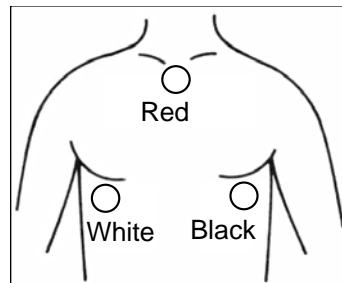
## Respiration

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### The “CVA detected” message is displayed.

Cause : Heartbeat is interfering and superimposed on the respiration waveform.

Solution : Place the electrode as shown below where the heartbeat will be less likely to interfere.



### “0” is displayed for respiration rate, or apnea alarm is generated.

Cause : The respiration waveform amplitude is below the detection level ( $0.2\Omega$ ).

Solution : Change the electrode site.

### The respiration waveform and respiration rate is not displayed.

Cause 1 : The ECG relay cable designed for electrosurgical knife is used.

Solution : The impedance respiration can not be measured if the cable designed for electrosurgical knife is used. Use the standard ECG relay cable if not using the electrosurgical knife.

Cause 2 : The impedance respiration measurement is ceased.

Solution : Turn ON the impedance respiration measurement on the admit / discharge menu or RESP configuration menu.

Note : If the pacemaker with the minute ventilation measuring function is used, turn OFF the impedance respiration measurement. Otherwise, both the pacemaker and the monitor will not be able to perform accurate measurement.

### The measured data is displayed as “xxx”.

Cause : The respiration rate is outside the measurement range.

Solution : • Check the electrode application.  
• Replace the electrode, or check the lead cable.

## Invasive Blood Pressure

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### The “BP1 Transducer OFF”, “BP2 Transducer OFF” message is displayed.

Cause : The transducer for BP1 or BP2 is not connected.

Solution : Connect the transducer.

### The “BP1 not zero balanced”, “BP2 not zero balanced” message is displayed.

Cause : The BP zero balance has not been performed since the power is turned ON.

Solution : Open the three-way cock of the transducer to air and perform zero balance.

### The measured data is displayed as “- - -”.

Cause : The BP zero balance has not been performed since the power is turned ON.

Solution : Open the three-way cock of the transducer to air and perform zero balance.

**BP value and waveform are not displayed properly.**

Cause : Blood pressure line has not been zero balanced.

Solution : Open the three-way cock of the transducer to air and perform zero balance.

**The measured data is displayed as “xxx”.**

Cause : The BP value is outside the measurement range.

Solution : Perform zero balance again.

**The “BP not connected” message is displayed.**

Cause : When the BP interface cable or 2ch BP conversion cable is disconnected during BP monitoring, this message will be displayed.

Solution 1 : To cease monitoring, press the **Alarm Silence** key to clear the message and silence the alarm.

Solution 2 : To continue monitoring, plug in the BP interface cable or 2ch BP conversion cable. This will clear the message and silence the alarm.

**The “Incorr. BP cable” message is displayed.**

Cause : The cable other than 2ch BP conversion cable is plugged in to the BP connector.

Solution : Use the 2ch BP conversion cable.

**SpO<sub>2</sub> (Nellcor)****The “Check SpO<sub>2</sub> sensor” message is displayed.**

Cause : Sensor is detached from the patient.

Solution 1 : Check if the sensor part is properly attached to the patient.

Solution 2 : Check if the light emitting part and light receiving part of the sensor LED is aligned.

**The “Pulse search” message is displayed.**

Cause : The amplitude of the pulse waveform is low, or the sensor is not positioned correctly.

Solution : Check if the light emitting part and light receiving part of the sensor LED is aligned.

**The “No pulse detect” message is displayed.**

Cause : The amplitude of the pulse waveform is low, or the sensor is not positioned correctly.

Solution : Check if the light emitting part and light receiving part of the sensor LED is aligned.

**The “Motion Artifact” message is displayed.**

Cause : There is excessive body motion of the patient.

Solution : Change the sensor position where the body motion will have less effect.

**The pulse waveform is not displayed, or interrupted**

Situation : “Check SpO<sub>2</sub> sensor” is displayed.

Cause 1 : The amplitude of the pulse waveform is low, or the sensor is not positioned correctly.

Solution : Check if the light emitting part and light receiving part of the sensor LED is aligned.

Cause 2 : Sensor is defective.

Solution : Replace the sensor.

Cause 3 : SpO<sub>2</sub> sensor is not firmly connected to the SpO<sub>2</sub> input connector.

Solution : Make sure the SpO<sub>2</sub> sensor is securely connected.

Cause 4 : Sensor is exposed to light.

Solution : Place a black or dark cloth over the sensor to avoid direct sunlight. Also when not used, avoid placing the sensor in light or unplug the sensor from the connector.

### **The SpO<sub>2</sub> measurement is unstable.**

- Cause : There is excessive body motion of the patient which disables correct measurement.  
Solution 1 : Have the patient lie still as much as possible.  
Solution 2 : Relocate the sensor, or change the sensor to which the body motion will have less influence.

### **The “SpO<sub>2</sub> unit error” message is displayed.**

- Cause 1 : Sensor is defective.  
Solution : Replace the sensor.
- Cause 2 : There is a failure of communication with the SpO<sub>2</sub> measurement unit.  
Solution : Breaking of wire or SpO<sub>2</sub> unit failure can be considered.  
Contact our service representative.

### **The “SpO<sub>2</sub> sensor fault” message is displayed.**

- Cause 1 : The sensor is not connected securely.  
Solution : Connect the sensor securely.
- Cause 2 : The sensor is defective.  
Solution : Replace the sensor.
- Cause 3 : A wrong sensor is used.  
Solution : Replace the sensor. For details of usable sensors, refer to P12-4 “Optional Accessories SpO<sub>2</sub> Measurement (Nellcor)”.

### **The “SpO<sub>2</sub> not connected” message is displayed.**

- Cause : When the SpO<sub>2</sub> relay cable is disconnected during SpO<sub>2</sub> monitoring, this message will be displayed.  
Solution 1 : To cease monitoring, press the **Alarm Silence** key to clear the message and silence the alarm.  
Solution 2 : To continue monitoring, plug in the SpO<sub>2</sub> relay cable. This will clear the message and silence the alarm.

## **SpO<sub>2</sub> (Masimo)**

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### **The “SpO<sub>2</sub> sensor fault” message is displayed.**

- Cause 1 : The sensor is not connected securely.  
Solution : Connect the sensor securely.
- Cause 2 : The sensor is defective.  
Solution : Replace the sensor.
- Cause 3 : A wrong sensor is used.  
Solution : Replace the sensor. For details of usable sensors, refer to P12-4 “Optional Accessories SpO<sub>2</sub> Measurement (Masimo)”.

### **The “Check SpO<sub>2</sub> sensor” message is displayed.**

- Cause : The sensor is detached from the patient.  
Solution 1 : Check if the sensor is properly attached to the patient.  
Solution 2 : Check if the light emitting part and light receiving part of the sensor LED is aligned.

### **The “SpO<sub>2</sub> low perfusion” message is displayed.**

- Cause : The amplitude of the pulse waveform is low, or the sensor is not positioned correctly.  
Solution : Check if the light emitting part and light receiving part of the sensor LED is aligned.

### **The “SpO<sub>2</sub> pulse search” message is displayed.**

- Cause : The amplitude of the pulse waveform is low, or the sensor is not positioned correctly.  
Solution : Check if the light emitting part and light receiving part of the sensor LED is aligned.

**The “SpO<sub>2</sub> too much ambient light” message is displayed.**

- Cause : The sensor is exposed to too much ambient light. The detecting part of the sensor is not covered appropriately.  
 Solution 1 : Turn down or turn off the light.  
 Solution 2 : Avoid sensor from exposure to ambient light.  
 Solution 3 : Relocate the sensor position.

**The “SpO<sub>2</sub> interference detected” message is displayed.**

- Cause : External signal or energy is interfering the measurement.  
 Solution : Remove the external interference.

**The “SpO<sub>2</sub> unrecognized sensor” message is displayed.**

- Cause : Unrecognizable sensor is connected.  
 Solution : Replace the sensor.

**The “SpO<sub>2</sub> low signal IQ” message is displayed.**

- Cause : There is excessive body motion or sensor attached position is not appropriate.  
 Solution 1 : Check if the light emitting part and light receiving part of the sensor LED is aligned.  
 Solution 2 : Relocate the sensor to which the body motion will have less influence.

**The “SpO<sub>2</sub> unit error” message is displayed.**

- Cause : There is a failure of communication with the SpO<sub>2</sub> measurement unit.  
 Solution : A defective cable or SpO<sub>2</sub> unit failure can be considered. Contact our service representative.

**The “SpO<sub>2</sub> disconnect” message is displayed.**

- Cause : The SpO<sub>2</sub> relay cable is disconnected during SpO<sub>2</sub> monitoring.  
 Solution 1 : To cease monitoring, press the **Alarm Silence** key to clear the message and silence the alarm.  
 Solution 2 : To continue monitoring, plug in the SpO<sub>2</sub> relay cable. This will clear the message and silence the alarm.

---

## Non-Invasive Blood Pressure

---

**The cuff is not inflated although the pump is operating.**

- Cause1 : The air hose is not firmly connected, and the air is leaking.  
 Solution : Check if the air hose is properly connected.  
  
 Cause 2 : The cuff size is not corresponded to the selected patient type.  
 Solution : Check if the cuff size is corresponded to the selected patient type.

**The monitor repeats the measurement, or “- - -” is displayed for the numeric data.**

- Cause 1 : The measurement accuracy is not reliable due to body motion artifact.  
 Solution : Have the patient stay still as much as possible during the measurement.  
  
 Cause 2 : The pulse is too small to acquire reliable measurement accuracy.  
 Solution : Check if the cuff application is proper, and if the cuff size is corresponded to the selected patient type.

**The “Check NIBP hose” message is displayed.**

- Cause : The applied pressure to the cuff has exceeded the maximum limit. The measurement time has exceeded the maximum limit.  
 Solution : Check if the cuff application is proper, if the cuff size is corresponded to the selected patient type, or if the air hose is not bent. After checking the above, perform the measurement again.  
 If the same message is displayed again, a failure of the equipment can be considered.  
 Cease the measurement, and contact our service representative.

#### **The “NIBP unit error” message is displayed.**

- Cause : The zero balancing before the measurement has failed, and measurement could not be started.
- Solution : The body movement or other artifact may cause zero balance failure. During the measurement, have the patient stay still as much as possible. If the same message is displayed again, the failure of the equipment can be considered. Cease the measurement, and contact our service representative.

#### **The “NIBP measurement failed.” message is displayed.**

- Cause : The pressure applied to the cuff or the measurement time has exceeded the limit, and measurement could not be performed.
- Solution : Check if the cuff is properly attached to the patient, or cuff size is correct. Also check if the air hose is not bent, and perform the measurement again. If the same message is displayed again, equipment failure can be considered. Contact our service representative.

#### **The time of measurement disappears and the numeric data is displayed as “- - -”.**

- Cause : The NIBP data will be erased when the preprogrammed NIBP erase time has elapsed.
- Solution : Select the appropriate time for NIBP data erase time from 10min, 30min, 60min, 24hrs which best fits the monitoring purpose.

## **Temperature**

---

#### **The “Wrong Temp Probe” message is displayed.**

- Cause 1 : The YSI-700 is used.
- Solution : Use the YSI-400 temperature probe for measurement. The YSI-700 cannot be used with the DS-7100 series.
- Cause 2 : There is a contact failure of the temperature probe.
- Solution : Check if the temperature probe is properly inserted.

#### **The numeric data is displayed as “xxx”.**

- Cause : The temperature measurement is outside the measurement range.
- Solution : Check if the temperature probe is properly inserted.

#### **The “TEMP not connected” message is displayed.**

- Cause : When the temperature sensor is disconnected during temperature monitoring, this message will be displayed.
- Solution 1 : To cease monitoring, press the **Alarm Silence** key to clear the message and silence the alarm.
- Solution 2 : To continue monitoring, plug in the temperature sensor. This will clear the message and silence the alarm.

#### **The “TEMP auto check” message is displayed. The numeric data is displayed as “- - -”.**

- Cause : The temperature is calibrated once every hour on this monitor. During calibration, the numeric data will be displayed as “- - -”.
- Solution : The calibration will complete in 10 seconds. If the calibration does not complete within 10 seconds, cease the measurement and contact our service representative.

#### **The “TEMP unit check” message is displayed.**

- Cause : Error is detected during temperature calibration.
- Solution : A unit failure can be considered. Cease the measurement and contact our service representative.

## CO<sub>2</sub> Concentration

### The “Check filter line” message is displayed.

- Cause : The sampling tube is clogged.  
Solution : Replace the sampling tube.

### The “Self-diag CO<sub>2</sub>” message remains displayed.

- Cause : An error has occurred to the self-check procedure at power ON.  
Solution : The CO<sub>2</sub> unit failure can be considered.

### The “Initializing CO<sub>2</sub>” message does not disappear.

- Cause : An error has occurred during the initialization at power ON.  
Solution : The CO<sub>2</sub> unit failure can be considered.

### The “Check CO<sub>2</sub> unit” message is displayed.

- Cause 1 : The exhaust connector is clogged.  
Solution : After checking the exhaust system and removing the clog, press the “Restart CO<sub>2</sub>” key on the CO<sub>2</sub> configuration menu. When this message is displayed, the CO<sub>2</sub> configuration menu can be directly displayed by pressing the CO<sub>2</sub> numeric data box.
- Cause 2 : The sampling tube or nasal prong is clogged.  
Solution 1 : Replace the sampling tube.  
Solution 2 : After checking the inhalation system and removing the clog, press the “Restart CO<sub>2</sub>” key on the CO<sub>2</sub> configuration menu. When this message is displayed, the CO<sub>2</sub> configuration menu can be directly displayed by pressing the CO<sub>2</sub> numeric data box.
- Cause 3 : The CO<sub>2</sub> unit needs to be replaced.  
Solution : Contact our service representative.

### The “CO<sub>2</sub> unit error” message is displayed.

- Cause : There is a communication error with the CO<sub>2</sub> unit.  
Solution : The break of wire or CO<sub>2</sub> unit failure can be considered.  
Contact our service representative.

### There is substantial measurement error.

- Cause 1 : 20 minutes have not yet elapsed since the power is turned ON.  
Solution : For 20 minutes from turning ON the power, there will be a substantial measurement error.
- Cause 2 : The calibration is not properly performed.  
Solution : Perform CO<sub>2</sub> calibration again.

### The “CO<sub>2</sub> not connected” message is displayed.

- Cause : When the filter line is disconnected during CO<sub>2</sub> monitoring, this message will be displayed.  
Solution 1 : To cease monitoring, press the **Alarm Silence** key to clear the message and silence the alarm.  
Solution 2 : To continue monitoring, plug in the filter line. This will clear the message and silence the alarm.

## Recorder

---

### No recording is performed.

- Situation : The "Paper Out" message is displayed on the upper left of the screen.  
Cause : There is no recording paper in the paper cassette.  
Solution : Install a new pad of paper into the paper cassette.
- Situation : The "Magazine Open" message is displayed.  
Cause : The paper cassette is open.  
Solution : Close the cassette.
- Situation : The "Paper jammed" message is displayed.  
Cause : The paper is jammed.  
Solution : Open the cassette and install the paper correctly.
- Situation : No message is displayed, but recording can not be performed.  
Cause : The recording paper is not correctly installed. The front and backside of the paper is set oppositely.  
Solution : The "END" printed side of the paper should be facing down in the magazine.

### The second waveform and third waveform are not recorded.

- Situation : The second waveform and third waveform are not recorded for manual recording or alarm recording.  
Cause : The second waveform and third waveform are not set on the recording setup menu.  
Solution : Set the second waveform and the third waveform on each recording setup menu.

### The "Recorder error" message is displayed.

- Cause : The thermal head temperature has increased.  
Solution : A damage to the thermal head can be considered.  
Contact our service representative.

## Wired Network (DS-LANII/DS-LANIII)

---

### The data cannot be displayed on the central monitor.

- Cause 1 : The DS-LAN setup is not correct.  
Solution : Make sure that the DS-LAN Setup (DS-LANII/DS-LANIII) for all bedside monitors and central monitors in the same network are the same. If the DS-LAN setting is changed, make sure to restart the system.
- Cause 2 : A central monitor which is not compatible with the DS-LANIII network is used.  
Solution : The following central monitors can not be used with the DS-LANIII network.
  - DS-5700
  - DS-5800N/NX/NX<sup>MB</sup>
  - DS-7600/7600W with software version V05 and priorWhen using these central monitors, all monitors in the same network should be set to DS-LANII.
- Cause 3 : Inappropriate HUB is used.  
Solution : Use a repeater HUB for DS-LANII network and a switching HUB for DS-LANIII network.
- Cause 4 : The bed ID is duplicated in the same network.  
Solution : If bedside monitors with the same bed ID exist in the same network, communication is not possible. Make sure to set a unique bed ID for each bedside monitor.

- Cause 5** : Under the Monitor Setup menu, “DS-LANII/DS-LANIII” selection is not displayed.  
**Solution** : If “DS-LANII/DS-LANIII” selection under the Monitor Setup menu is not displayed, the monitor is not compatible with the DS-LANIII network.  
 To connect to the DS-LANIII network, a special LAN board needs to be mounted on the DS-7100. Also, the software version needs to be compatible with the DS-LANIII network.  
 For details, contact our service representative.
- Cause 6** : An equipment not specified by Fukuda Denshi is connected to the network.  
**Solution** : Do not connect PC, printer, or other unspecified equipment to the network.
- Cause 7** : The DS-LAN cable is not properly connected.  
**Solution** : The DS-LAN connection will be performed by our service representative. Contact our service representative.

**On the central monitor, ECG waveform is not displayed although other waveforms are displayed.**

- Cause** : Under the ECG configuration menu, “HR/PR Source” is set to  BP.  
 Or, “HR/PR Source” is set to  Auto, and BP is automatically selected due to lead-off, etc.  
**Solution 1** : Select  ECG or  SpO<sub>2</sub> for “HR/PR Source”.  
**Solution 2** : Under the Monitor Setup menu, select  ECG/SpO<sub>2</sub> for “HR/PR Source”.  
 If this selection is made, the system will not automatically select BP for HR/PR source.

**On the central monitor, CO<sub>2</sub> waveform is not displayed although CO<sub>2</sub> numeric data is displayed.**

- Cause** : Under the respiration configuration menu, “RR Source” is set to  Impedance.  
**Solution** : Select  CO<sub>2</sub> for “RR Source”.

**On the central monitor, impedance respiration waveform is not displayed although RR numeric data is displayed.**

- Cause** : Under the respiration configuration menu, “RR Source” is set to  CO<sub>2</sub>.  
**Solution** : Select  Impedance for “RR Source”.

**NOTE**

- If “RR Source” is set to  CO<sub>2</sub>, the impedance respiration waveform will not be displayed. But AWF and AWP waveform will be displayed.
- If “RR Source” is set to  Impedance, the CO<sub>2</sub> waveform will not be displayed. But AWF and AWP waveforms will be displayed.

**On the central monitor, PR alarm cannot be set.**

- Cause** : Under the SpO<sub>2</sub> configuration menu, “HR/PR Source” is set to  ECG or  BP.  
**Solution** : Select  SpO<sub>2</sub> for “HR/PR Source”.

**On the central monitor, HR alarm cannot be set.**

- Cause** : Under the SpO<sub>2</sub> configuration menu, “HR/PR Source” is set to  SpO<sub>2</sub>.  
**Solution** : Select  ECG for “HR/PR Source”.

## Telemetry

**The “Telemetry unit error” message is displayed.**

- Cause** : There is a communication error with the telemetry transmission unit.  
**Solution** : The breaking of wire or telemetry transmission unit failure can be considered.  
 Contact our service representative.

**There is no reception at the telemetry center.**

- Cause** : The channel ID or group ID is not corresponded with the telemetry receiver.  
**Solution** : Set the correct channel ID and group ID.

### **The BP waveform of 100mmHg or above cannot be properly received.**

- Cause : The BP waveform and scale is not corresponded.  
Solution : When BP waveform is above 100mmHg, set the BP scale above 100mmHg.

## **TCON**

---

### **Can not communicate with the central monitor. The “Chk TCON Receive” message is displayed.**

- Cause 1 : The distance from the central monitor is too far.  
Solution : Rearrange the monitor position so that it is not too far from the central monitor.
- Cause 2 : The TCON setup is not correct.  
Solution : Check whether the TCON ID and/or channel corresponds to the central monitor.
- Cause 3 : The TCON module is disconnected from the monitor.  
Solution : Securely connect the cable of the TCON module to the serial connector on the monitor.

### **The “Check TCON Comm.” message is displayed.**

- Cause : A communication error occurred between the TCON module and the monitor.  
Solution : Check the connection between the TCON module and the monitor.  
Check whether the **TCON** is selected for the serial port on the “Serial Comm. Setup” under “Ward Setup”.

### **The “TCON Interference” message is displayed.**

- Cause : The TCON ID is duplicated with other monitor in the same TCON group (channel).  
Solution : Make sure to set a unique TCON ID for each bedside monitor within the same TCON group (channel).

## **General**

---

### **Nothing is displayed but the main power indicator is lighted.**

- Cause : A system error has occurred.  
Solution : Turn off the power, unplug the power cable, and contact our service representative.

### **The “Adjusting” message is displayed. Numbers are displayed large on the display.**

- Cause : This is the test mode. Stop using the device immediately.  
Solution : Restart the system. The test mode will be cancelled.  
If the same situation is observed again, contact our service representative.  
Turn off the DIP switch No.1.

### **The data is initialized each time the power is turned ON.**

- Cause 1 : The internal switch is set to initialize.  
Solution : The internal switch setting needs to be changed. Contact our service representative. Set the rotary switch to 0.
- Cause 2 : The battery for backup memory is depleted.  
Solution : The battery needs to be replaced. Contact our service representative.

### **The display is not clear.**

- Cause 1 : The display brightness is not adjusted.  
Solution : Due to the LCD display characteristic, the visible range is limited. Adjust to the appropriate brightness.
- Cause 2 : The monitor is set to the night mode.  
Solution : Cancel the night mode.

### **The system does not start although the power switch is turned ON.**

- Cause 1 : The power cable is not connected.  
The battery is not charged.

- Solution : Turn off the power and connect the power cable. If the battery is not charged, use the power cable until the battery charging is complete.
- Cause 2 : Incorrect IC card is inserted.  
 Solution : Turn off the DIP switch No.8.

#### **The clock is often delayed.**

- Cause : The battery for the backup memory is depleted. Check if the time is delayed when the power is turned off.  
 Solution : The battery needs to be replaced. Contact our service representative.

## **Battery**

---

#### **The operation time is short although the battery is charged.**

- Cause 1 : The battery life has expired.  
 Solution : The battery pack is a consumable product. Replace it once a year.
- Cause 2 : The ambient temperature is too high or too low.  
 Solution : For safety, the charging operation will be in a standby mode when the battery pack temperature becomes excessively high or low.  
     The charging will automatically resume when appropriate temperature is reached.  
     Charge the battery in an ambient temperature of 10 to 30°C.

#### **The charge lamp on the patient monitor does not light.**

- Cause 1 : The AC power cable is disconnected.  
 Solution : Plug in the AC power cable.  
     The battery pack can be charged only during the AC operation.
- Cause 2 : The battery pack is not installed.  
 Solution : The battery pack is optional. If a battery pack is required, contact our service representative and install the battery pack.
- Cause 3 : The battery life has expired.  
 Solution : Replace the battery pack.

#### **During the charging procedure, the charge lamp (orange) does not switch to charge complete status (green) and extinguishes.**

- Cause 1 : The battery pack temperature is too high or too low.  
 Solution : For safety, the charging operation will be in a standby mode when the battery pack temperature becomes excessively high or low.  
     The charging will automatically resume when appropriate temperature is reached.
- Cause 2 : The breakdown of battery pack can be considered.  
 Solution : If the charging operation does not complete within the specified charging time, the charging operation will cease for safety purpose.  
     Contact our service representative and replace the battery pack.
- Cause 3 : The battery life has expired.  
 Solution : Replace the battery pack.

#### **The “Charge battery” message is displayed.**

- Cause : The AC power cable is disconnected.  
 Solution : Plug in the AC power cable.  
     The battery pack can be charged only during the AC operation.

## Ventilator

---

### The “VENT alarm” message is displayed.

Cause : The following alarm has generated on the ventilator.

- Parameter alarm such as AWP, MV, FiO<sub>2</sub>
- Technical alarm such as battery replacement

Solution : Check the alarm cause of the ventilator, and take appropriate action.

### The “Vent. Disable”, “Vent. Invalid” message is displayed. The ventilator screen is also displayed.

Cause 1 : The cable is not properly connected.

Solution : Securely connect the ventilator cable to appropriate connector.

Cause 2 : The power of the ventilator is turned OFF.

Solution : Turn ON the power of the ventilator.

Cause 3 : The ventilator is in standby mode.

Solution : Start the ventilation on the ventilator.

Cause 4 : The communication setup of the DS-7100 system and ventilator is not corresponded.

Solution : The communication setup of the DS-7100 system and ventilator is fixed as follows.

Check the communication setup of the ventilator.

For procedures, refer to the operation manual of the ventilator.

#### Servo-900 / 300 / i / s

No communication setup

#### Evita 2 dura / 4 / XL

Baud Rate : 19200bps

Parity Bit : EVEN

Data Bit : 8 bit

Stop Bit : 1 bit

Communication : MEDIBUS

#### PB-7200 / 740 / 760 / 840

Baud Rate : 9600bps

Parity Bit : None

Data Bit : 8 bit

Stop Bit : 1 bit

#### Savina

Baud Rate : 9600bps

Parity Bit : NONE

Data Bit : 8 bit

Stop Bit : 1 bit

Communication : MEDIBUS

## IC Card

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### The key does not function on the IC Card display.

Cause 1 : The remaining battery capacity is less than 10 minutes. (Battery Mark: 

Solution : When the DS-7100 system is operated by battery, and if empty mark is displayed for the battery condition, IC card format, read/write process cannot be performed.

Connect the power supply cable and operate the system by AC power source.

Cause 2 : IC card is not inserted.

Solution : Set the IC card into the IC card slot.

## Chapter 11

# Technical Information

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# Specification/Performance

This section states the specification and performance of this equipment.

## Specification

### Size

260 (W) × 197 (D) × 264 (H) mm (not including the protrusion)

### Weight (not including the battery)

DS-7141, DS-7141M : 5.3kg

DS-7101L, DS-7101LM : 5.1kg

DS-7101LT, DS-7101LTM : 5.2kg

### Environmental Condition

Operating Temperature : 10 to 40°C

Operating Humidity : 30 to 85% (non-condensing)

Transport / Storage Temperature : -10 to 60°C

Transport / Storage Temperature : 10 to 95% (at 60°C)

### Safety

General Standard : EN60601-1:1990  
(Medical electrical equipment – Part 1: General requirements for safety)  
Amendment A1 to EN 60601-1:1993  
Amendment A2 to EN 60601-1:1995

EMC Standard : IEC 60601-1-2: 2001+A1: 2004  
(Medical electrical equipment – Part 1: General requirements for safety –  
2. Collateral standard: Electromagnetic compatibility – Requirements and  
tests)

The class of protection  
against electric shock : Class I Equipment, Internally Powered Equipment

The type of protection  
against electric shock : Type CF Applied Part

### Power Requirements

Voltage	AC100 to 240V ±10%	DC14V ±10%
Frequency	50/60Hz	—
Power Consumption	82VA	60W

# Performance

## Display

Device Control	: 8.4 inch TFT Color LCD
Waveform Trace	: Touch Screen Type
Waveform Speed	: Stationary Trace
Waveform Speed	: ECG / SpO <sub>2</sub> / BP (6.25mm/s, 12.5mm/s, 25mm/s) RESP / CO <sub>2</sub> (6.25mm/s, 12.5mm/s, 25mm/s)
Accuracy Parameter	: Less than ±10%
Measurement Updating Interval	: ECG, RESP, TEMP, SpO <sub>2</sub> (Arterial Oxygen Saturation), BP1, BP2, NIBP, CO <sub>2</sub> concentration
Updating Interval	: Every 1 second

## Recording

Recording Method	: Thermal Array Type
Recording Speed	: 25mm/s
Recording Waveform	: Max. 3 waveforms
Recording Width	: 50mm

## Operation

Touch Screen	: Eight-Wire Resistive Analog Touch Screen
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## Alarm Function

When the alarm system is IEC and the alarm tone is the factory default (2nd level from the lowest level)

Volume	Sound Pressure (dB)		
	Level 1 (High Priority)	Level 2 (Medium Priority)	Level 3 (Low Priority)
Highest	91.5	90.6	90.5
Lowest	41.5	40.6	40.4

## ECG

Lead Type	: Wired 3-electrode, 4-electrode, 5-electrode
Frequency Characteristic	: 40Hz / 15Hz
Input Impedance	: 5MΩ or above
Max. Input Voltage	: ±10mV
Polarization Voltage	: ±825mV or above
Common Mode Rejection Ratio	: 80 dB or above
Lead-off Sensing	
DC Current	: Less than 0.1µA
HR Measurement Range	: Adult 0, 12 to 300bpm±3% or ±5bpm Neonate 0, 30 to 300bpm±3% or ±5bpm
HR Display	
Response Time	: Average HR Adult/Child: average of 6 sec., Neonate: average of 3 sec. Instant HR Latest RR interval is used to calculate HR of every second
Waveform Size Selection	: ×1/4 (2.5mm/mV) ×1/2 (5mm/mV) × 1 (10mm/mV) × 2 (20mm/mV) × 4 (40mm/mV)
Waveform Display Accuracy	: Less than ±10%
Defibrillation Proof	: Provided
Tall T-wave Rejection Capability	: When tested according to ANSI/AAMI EC-13: 1992 3.1.2.1 c), 1.2mV T-wave can be removed.
ST Meas. Range	: -2.0 to +2.0mV
ST Meas. Channel	: Wired 3-electrodes 1 channel Wired 4, 5-electrodes 2 channels

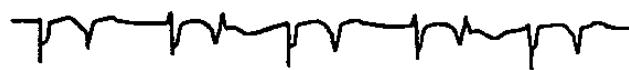
Heart rate meter accuracy and response to irregular rhythm (ANSI/AAMI EC-13: 1992 3.1.2.1 e))  
80bpm Ventricular Bigeminy : 80bpm



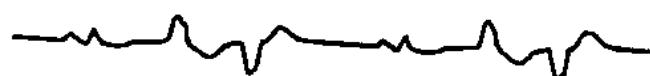
60bpm Slow Alternating Ventricular Bigeminy : 60bpm



120bpm Rapid Alternating Ventricular Bigeminy : 120bpm



90bpm Bidirectional Systoles : 90bpm



Response time of heart rate meter to change in heart rate (ANSI/AAMI EC-13: 1992 3.1.2.1 f))

HR change from 80bpm to 120bpm : Range 4.8 to 6.1 sec. Average 5.4 sec.

HR change from 80bpm to 40bpm : Range 5.1 to 5.7 sec. Average 5.4 sec.

Time to ALARM for tachycardia (ANSI/AAMI EC-13: 1992 3.1.2.1 g))

Ventricular Tachycardia 1mVpp, 206bpm : Range 7.8 to 8.5 sec. Average 8.1 sec.



Ventricular Tachycardia 2mVpp, 206bpm : Range 8 to 8.8 sec. Average 8.5 sec.

Ventricular Tachycardia 0.5mVpp, 206bpm : Range 10.1 to 10.4 sec. Average 10.4 sec.  
(at ×2)

Ventricular Tachycardia 2mVpp, 195bpm : Range 6.7 to 7.3 sec. Average 7.0 sec.



Ventricular Tachycardia 4mVpp, 195bpm : Range 6.8 to 7.4 sec. Average 7.0 sec.

Ventricular Tachycardia 1mVpp, 195bpm : Range 8.6 to 9.5 sec. Average 8.9 sec.

Pacemaker Pulse Display Capability (ANSI/AAMI EC-13: 1992 3.2.9.12)

3-electrodes : Detects with the selected lead.

4, 5, 10-electrodes : If lead I, II, III is selected for ECG1, pulse is detected with the selected lead.  
If a lead other than lead I, II, III is selected, pulse is detected with lead II.

Capable to detect pulses of pulse width 0.5 to 2ms, amplitude  $\pm 2$  to  $\pm 700$ mV

Rejection of Pacemaker Pulse (ANSI/AAMI EC-13: 1992 3.1.4)

a) Pacemaker Pulse without Over/Ubershoot:

Capable to reject pulses of pulse width 0.1 to 2ms, amplitude  $\pm 2$  to  $\pm 700$ mV

b) Pacemaker Pulse with Over/Ubershoot:

Rejection is not possible.

**Respiration**

Method	: Impedance Method
Frequency Characteristic	: 1.5Hz (adult, child) / 2.5Hz (neonate)
Transient Characteristic	: Time Constant 1.5 sec.
Current	: 100 $\mu$ A or lower, 66.7kHz $\pm$ 5%
Measurement Range	: 0, 4 to 150Bpm $\pm$ 5Bpm
Base Impedance	: 500 $\Omega$ to 2k $\Omega$
Waveform Size Selection/	
Delta Impedance	: $\times$ 1/4 (2.5mm/ $\Omega$ ) / 1.6 to 10 $\Omega$ $\times$ 1/2 (5mm/ $\Omega$ ) / 0.8 to 10 $\Omega$ $\times$ 1 (10mm/ $\Omega$ ) / 0.4 to 10 $\Omega$ $\times$ 2 (20mm/ $\Omega$ ) / 0.2 to 10 $\Omega$ $\times$ 4 (40mm/ $\Omega$ ) / 0.1 to 10 $\Omega$
Waveform Display	
Accuracy	: Less than $\pm$ 20%

**Temperature**

Method	: Thermistor Method
Probe	: only YSI-400 series
Measurement Range	: 0 to 50°C $\pm$ 0.2°C
No. of Channel	: 1 channel
Measurement	
Response Time	: Less than 150 sec.

**SpO<sub>2</sub> (Arterial Oxygen Saturation) : Nellcor**

Method	: 2 Wavelength Pulse Wave Method
Measurement Range	: 1 to 100%
Resolution	: 1%
Accuracy	: Adult      70 to 100% $\pm$ 2% Neonate    70 to 100% $\pm$ 2% The accuracy depends on the used sensor. Refer to the operation manual of the used sensor for details.
PR Measurement Range	: 20 to 300bpm
PR Accuracy	: $\pm$ 3bpm for 20 to 250bpm

**SpO<sub>2</sub> (Arterial Oxygen Saturation) : Masimo**

Method	: 2 Wavelength Pulse Wave Method
Measurement Range	: 1 to 100%
Resolution	: 1%
Accuracy	: Adult      at 70 to 100% $\pm$ 2% Neonate    at 70 to 100% $\pm$ 3% The accuracy depends on the used sensor. Refer to the operation manual of the used sensor for details.
PR Measurement Range	: 25 to 240bpm
PR Accuracy	: 25 to 240bpm for $\pm$ 3bpm
Perfusion Index	: 0.02 to 20%

**Blood Pressure**

Transducer Sensitivity	: 5 $\mu$ V / V / mmHg
Measurement Range	: -50 to 300mmHg
Frequency Characteristic	: DC to 6Hz / 8Hz / 12Hz / 40Hz
Accuracy	: $\pm$ 2% of full scale or within $\pm$ 1mmHg
Zero Balance Range	: within $\pm$ 150mmHg
Measurement Range	: Adult      20 to 300bpm $\pm$ 3% Neonate    30 to 300bpm $\pm$ 3%
Channel	: 2 channels

**Non-Invasive Blood Pressure**

Method	: Oscillometric Method
Static Pressure Accuracy	: $\pm$ 4mmHg
Measurement Range	: Adult      Systolic BP: 30 to 280mmHg Mean BP: 15 to 260mmHg Diastolic BP: 10 to 240mmHg

	Child	Systolic BP: 30 to 180mmHg Mean BP: 15 to 160mmHg Diastolic BP: 10 to 150mmHg
	Neonate	Systolic BP: 30 to 120mmHg Mean BP: 15 to 110mmHg Diastolic BP: 10 to 100mmHg
Resolution	:	1mmHg
PR Measurement Range	:	40 to 240bpm
PR Measurement Accuracy	:	Less than $\pm 5\%$
Inflation Target Value (Default)	:	Adult 180mmHg Child 140mmHg Neonate 110mmHg
Inflation Target Value (After normal completion)	:	Previous systolic value +40mmHg
Deflation Speed	:	$5 \pm 1$ mmHg/sec.
Safety Mechanism	:	Adult 310mmHg and below Child 210mmHg and below Neonate 160mmHg and below
Measurement Duration	:	Adult less than 120 sec. (15mmHg and above) Child less than 90 sec. (15mmHg and above) Neonate less than 60 sec. (10mmHg and above)

### **CO<sub>2</sub> Concentration (DS-7141, DS-7141M)**

The performance is according to the Oridion Medical 1987 Ltd. MiniMediCO<sub>2</sub> Microstream® CO<sub>2</sub> Module specification.

Method	:	Infra-Red Solid-State, Microstream
CO <sub>2</sub> Measurement Range	:	0 to 99mmHg (at sea level)
CO <sub>2</sub> Resolution	:	1mmHg
CO <sub>2</sub> Accuracy	:	0 to 38mmHg: $\pm 2$ mmHg 39 to 99mmHg: $\pm (5\% \text{ of reading} + 0.08\% \text{ for every } 1 \text{ mmHg above } 38 \text{ mmHg})$
Flow Rate	:	50ml/min (+15ml/min, -7.5ml/min) flow measured by volume
Initialization Time	:	Typically 30 seconds (maximum 180 seconds). At full accuracy when value appears.
RR Measurement Range	:	0 to 150bpm
RR Measurement Accuracy	:	0 to 70Bpm: $\pm 1$ Bpm 71 to 120Bpm: $\pm 2$ Bpm 121 to 150Bpm: $\pm 3$ Bpm
Response Time	:	2.9 seconds (Typical)
Calibration Interval	:	Initial calibration after 1,200 operating hours, then once a year or after 4,000 operating hours, whichever comes first.

### **Telemetry (DS-7141, DS-7141M, DS-7101LT, DS-7101LTM)**

Transmission Freq.	:	600 MHz band Exact frequency depends on the destination.
RF Output Power	:	1.0mW $\pm 2$ dB
Channel Spacing	:	12.5kHz
Occupied Band Width	:	8.5kHz
Modulation Mode	:	Digital, Frequency Shift Keying

## Setup Item

## Default and Backup

This section lists selection, default setting, and backup status for each setup item.

### Backup Item

“○” : Setup item will be retained even when the power is turned OFF.

“△” : Setup item will be retained even when the power is turned OFF. When discharging procedure is performed, the value will be reset to initial setting.

The alarm setup will be reset to initial setting with the selected alarm mode.

“—” : Setup item will be reset to initial setting when the power is turned OFF.

○/△ : Setup item will be retained even after discharge if “ON” is selected for “Backup at Discharge”. If “OFF” is selected, the setup item will be initialized after discharge. Alarm setup will be initialized with the selected alarm mode. Display configuration will be initialized with the selected display mode.



Refer to “8. System Configuration Monitor Setup” for “Backup at Discharge” setup.

## Patient Admit / Discharge

Item	Selection	Default	Backup
Patient Name	Numeric, Alphabet, Symbol (16 characters)	Blank	△
Sex	Male, Female	Undetermined	△
Age	0 to 150 years or 0 to 999 days	0 year	△
Birth Date	Birth Date (Year, Month, Day)	Blank	△
ID	Numeric, Alphabet, Symbol (20 characters)	Blank	△
Patient Type	Adult, Child, Neonate	Adult	○
Pacemaker	Used, Not used	Not used	△
Impedance Measurement	ON, OFF	ON	△
Filter Mode	Monitor, ST Display, ESIS	Monitor	○
Room/Bed ID	Bed ID 0 to 999	0	○
	Room ID Numeric, Alphabet, Symbol (4 characters)	BED-	○

## Alarm Setup

Item	Selection	Default	Backup
System Alarm	Suspend, ON	Suspend	
HR	ON, OFF 20 to 300bpm	ON 40 to 120	
ASYSTOLE	ON, OFF 3 to 10 sec.	ON 5 sec.	
VF	ON, OFF	ON	
VT	ON, OFF	ON	
SLOW_VT	ON, OFF	ON	
RUN	ON, OFF 2 to 8 beats	ON 3 beats	
COUPLET	ON, OFF	OFF	
PAUSE	ON, OFF 1.5 to 5 sec.	OFF 3 sec.	
BIGEMINY	ON, OFF	OFF	
TRIGEMINY	ON, OFF	OFF	
FREQUENT	ON, OFF 1 to 50 beats / min.	OFF, 10 beats	O/△
TACHY	ON, OFF 20 to 300	ON	
BRADY	ON, OFF 20 to 300	ON	
HR Low Limit for VT	120, 140	120	
HR Low Limit for RUN	0 to 100	40	
ST	ON, OFF		
	ST1 ±2.0mV / ±20mm		
	ST2 ±2.0mV / ±20mm	OFF	

<b>Item</b>	<b>Selection</b>	<b>Default</b>	<b>Backup</b>
BP1 (mmHg)	ON, OFF 0 to 300mmHg	ON SYS 80 to 180 DIA OFF to OFF MEAN OFF to OFF	
BP1 (kPa)	ON, OFF 0 to 40.0kPa	ON SYS 10.0 to 24.0 DIA OFF to OFF MEAN OFF to OFF	
BP2 (mmHg)	ON, OFF 0 to 300mmHg	OFF SYS OFF to OFF DIA OFF to OFF MEAN OFF to OFF	
BP2 (kPa)	ON, OFF 0 to 40.0kPa	OFF SYS OFF to OFF DIA OFF to OFF MEAN OFF to OFF	
RR	ON, OFF 5 to 150Bpm	ON 5 to 30	
APNEA	ON, OFF 5 to 20sec.	ON 15sec.	
SpO <sub>2</sub>	ON, OFF 50 to 100%	ON 90 to OFF	
NIBP (mmHg)	ON, OFF 10 to 300mmHg	ON SYS 80 to 180 DIA OFF to OFF MEAN OFF to OFF	
NIBP (kPa)	ON, OFF 1.5 to 40.0kPa	ON SYS 10.0 to 24.0 DIA OFF to OFF MEAN OFF to OFF	
TEMP	ON, OFF 30 to 50°C	OFF OFF to OFF	
EtCO <sub>2</sub> (mmHg)	ON, OFF 1 to 100mmHg	ON 30 to 45mmHg	
EtCO <sub>2</sub> (kPa)	ON, OFF 0.1 to 13.3kPa	ON 4.0 to 6.0kPa	
EtCO <sub>2</sub> (%)	ON, OFF 0.1 to 13.3%	ON 4.0 to 6.0%	
InspCO <sub>2</sub> (mmHg)	ON, OFF 1 to 4mmHg	ON 3mmHg	
InspCO <sub>2</sub> (kPa)	ON, OFF 0.1 to 0.4kPa	ON 0.4kPa	
InspCO <sub>2</sub> (%)	ON, OFF 0.1 to 0.4%	ON 0.4%	

○/△

<b>Item</b>	<b>Selection</b>	<b>Default</b>	<b>Backup</b>
Alarm Setup	Alarm Suspend Time	1min, 3min, 5min	○
	Alarm Silence Time	1min, 3min, 5min	○
	Alarm Limit Display	ON, OFF	○
	Alarm Occurrence at NIBP Failure	ON, OFF	○
	Status Alarm Control	Linked to alarm silence time, Linked to each new occurrence	○

<b>NOTE</b>	The alarm setup will be retained even after the power is turned OFF. If discharging procedure is performed, the alarm setup will be initialized with the selected alarm mode.
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## Parameter Setup

Item		Selection	Default	Backup
ECG	Lead	I, II, III, aVR, aVL, aVF, V	ECG1 Lead II ECG2 Lead V	○/△
	Waveform Size	×1/4, ×1/2, ×1, ×2, ×4	ECG1 ×1 ECG2 ×1	△
	Filter Selection	Monitor, ST Display, ESIS	Monitor	○
	HR/PR Source	Auto, ECG, SpO <sub>2</sub> , BP	Auto	○
	Automatic Lead Switch	ON, OFF	OFF	○
	Pacemaker Pulse	ON, OFF	ON	○
	HR Average	ON, OFF, Instant, Average	Average	○
	Pulse Tone	ON, OFF	ON	○
	Pace Pulse Mask Time	Auto, 10ms, 20ms, 40ms, OFF	Auto	○
RESP	ECG Drift Filter	ON, OFF	OFF	○
	Waveform Size	×1/4, ×1/2, ×1, ×2, ×4	×1	△
	RR Sync. Indicator	ON, OFF	ON	○
	CVA	ON, OFF	OFF	△
	RR Source	Auto, Impedance, CO <sub>2</sub>	Auto	○
SpO <sub>2</sub> (Nellcor® unit)	Impedance Meas.	ON, OFF	ON	○
	Waveform Size	×1/4, ×1/2, ×1, ×2, ×4	×1	△
	SpO <sub>2</sub> SEC Alarm	OFF, 10, 25, 50, 100	OFF	○
	HR/PR Source	Auto, ECG, SpO <sub>2</sub> , BP	Auto	○
SpO <sub>2</sub> (Masimo® unit)	Ignore NIBP	ON, OFF	ON	○
	Waveform Size	×1/4, ×1/2, ×1, ×2, ×4	×1	△
	HR/PR Source	Auto, ECG, SpO <sub>2</sub> , BP	Auto	○
	Ignore NIBP	ON, OFF	ON	○
	SpO <sub>2</sub> Averaging	2-4sec, 4-6sec, 8sec, 10sec, 12sec, 14sec, 16sec	8sec.	○
	Pulse Sensitivity	High, Low	Low	○
	FAST SAT	ON, OFF	OFF	○
NIBP	PI Display	ON, OFF	ON	○
	Signal IQ Wave	ON, OFF	OFF	○
	Auto Mode	ON, OFF	OFF	△
	End Tone	ON, OFF	ON	○
	Quick SYS List	ON, OFF	ON	○
	PR	ON, OFF	OFF	○
	Quick SYS	3, 5, 10 min.	10 min.	○
BP1	Mean	ON, OFF	OFF	○
	NIBP Speed	Standard, Hi Speed	Standard	○
	Scale	20, 50, 75, 100, 150, 200, 250, 300mmHg 4, 8, 12, 16, 20, 24, 32, 40kPa	150mmHg 20kPa	○/△
	Label	BP1, ART, RAP, RVP, PAP, CVP, ICP, UAP, LAP, LVP	BP1	○
	Filter	6, 8, 12, 40Hz	12Hz	○
	Display Type	S/D/M, S/D, M	S/D/M	○

BP2	Scale	20, 50, 75, 100, 150, 200, 250, 300mmHg 4, 8, 12, 16, 20, 24, 32, 40kPa	50mmHg 8kPa	<input checked="" type="radio"/> O/ <input type="radio"/> Δ
	Label	BP2, ART, RAP, RVP, PAP, CVP, ICP, UAP, LAP, LVP	BP2	<input type="radio"/> O
	Filter	6, 8, 12, 40Hz	12Hz	<input type="radio"/> O
	Display Type	S/D/M, S/D, M	S/D/M	<input type="radio"/> O
CO <sub>2</sub>	Meas. Unit	mmHg, kPa, %	mmHg	<input type="radio"/> O
	EtCO <sub>2</sub> Peak Picking Duration	10, 20, 30 sec., OFF	10 sec.	<input checked="" type="radio"/> O/ <input type="radio"/> Δ
	Scale	50, 100mmHg 4, 8, 10kPa 4, 8, 10%	50mmHg 4kPa 4%	<input checked="" type="radio"/> O/ <input type="radio"/> Δ

## Review Function Setup

<b>Item</b>		<b>Selection</b>	<b>Default</b>	<b>Backup</b>
	Parameter	HR, PR, VPC, ST1/ST2, RR, APNEA, SpO <sub>2</sub> , BP, NIBP, TEMP, EtCO <sub>2</sub> / InspCO <sub>2</sub> , EVENT1, EVENT2	HR	<input type="radio"/> O
	Duration	1, 2, 4, 8, 12, 24 hours	4 hours	<input type="radio"/> O
Graphic Trend	Scale	HR : 100, 200, 300bpm ST : ±0.2, ±0.5, ±1.0, ±2.0mV ±2, ±5, ±10, ±20mm VPC : 20, 50, 100 beats BP1 : 20, 50, 100, 150, 200, 300mmHg 4, 8, 16, 20, 24, 40kPa BP2 : 20, 50, 100, 150, 200, 300mmHg 4, 8, 16, 20, 24, 40kPa NIBP : 100, 150, 200, 300mmHg 16, 20, 24, 40kPa TEMP : 20-45, 30-40°C SpO <sub>2</sub> : 0-100, 50-100, 80-100% RR : 100, 200, 300bpm APNEA : 15, 30 sec. CO <sub>2</sub> : 50, 100mmHg 4, 8, 10kPa 4, 8, 10%	HR : 100bpm ST : ±0.5mV ±5mm VPC : 20 beats BP1 : 150mmHg 20kPa BP2 : 50mmHg 8kPa NIBP : 150mmHg 20kPa TEMP : 30-40°C SpO <sub>2</sub> : 80-100% RR : 50bpm APNEA : 15 sec. CO <sub>2</sub> : 50mmHg 4.0kPa 4.0%	<input type="radio"/> O
Tabular Trend	Duration	1, 5, 10, 15, 30, 60 min.	60 min.	<input type="radio"/> O
OCRG	Display Time	4, 8 min.	8 min.	<input type="radio"/> O
	Waveform	Impedance Resp., CO <sub>2</sub>	Impedance Resp.	<input type="radio"/> O

<b>Item</b>	<b>Selection</b>	<b>Default</b>	<b>Backup</b>
Recall	Parameter	ECG1, ECG2, BP, SpO <sub>2</sub> , RESP, CO <sub>2</sub>	ECG1, ECG2
	Alarm Factor	HR/PR/BPR : ON, OFF ST : ON, OFF RR : ON, OFF APNEA : ON, OFF SpO <sub>2</sub> : ON, OFF BP1 : ON, OFF BP2 : ON, OFF NIBP : ON, OFF TEMP : ON, OFF CO <sub>2</sub> : ON, OFF	HR/PR/BPR : ON ST : ON RR : ON APNEA : ON SpO <sub>2</sub> : ON BP1 : ON BP2 : ON NIBP : ON TEMP : ON CO <sub>2</sub> : ON
		ASYSTOLE : ON, OFF VF : ON, OFF VT : ON, OFF SLOW_VT : ON, OFF RUN : ON, OFF COUPLET : ON, OFF PAUSE : ON, OFF BIGEMINY : ON, OFF TRIGEMINY : ON, OFF FREQUENT : ON, OFF TACHY : ON, OFF BRADY : ON, OFF	ASYSTOLE : ON VF : ON VT : ON SLOW_VT : ON RUN : ON COUPLET : ON PAUSE : ON BIGEMINY : ON TRIGEMINY : ON FREQUENT : ON TACHY : ON BRADY : ON
ST Meas.	Meas. Point	0 to 560ms	120ms
	Ref. Point	0 to -240ms	-80ms

<b>NOTE</b>	<ul style="list-style-type: none"> <li>The graphic trend data, tabular trend data will be retained even after the power is turned OFF.</li> <li>The ST data, OCRG data, recall data will be retained until 5 minutes after the power is turned OFF.</li> </ul>
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## System Configuration Setup

### ● Tone/Volume Setup

<b>Item</b>	<b>Selection</b>	<b>Default</b>	<b>Backup</b>
Tone/Volume	Pulse Volume	16 levels	Level 8 from left
	Key Volume	16 levels	Level 10 from left
	Alarm Volume	16 levels	Level 10 from left
	Alarm Tone	8 levels	Level 2 from left
	Other Bed Volume	16 levels	Level 10 from left
	Other Volume	16 levels	Level 8 from left
	Ventilator Alarm	ON, OFF	OFF

## ●Display Configuration

	<b>Item</b>	<b>Selection</b>	<b>Default</b>	<b>Backup</b>
Display Configuration	No. of waveforms	0 to 6 waveforms	3 waveforms	O/Δ
	No. of numeric data	0 to 7 numeric data	4 numeric data	
	Displayed waveform	ECG1, ECG2, BP, SpO <sub>2</sub> , RESP, CO <sub>2</sub>	ECG1, SpO <sub>2</sub> , RESP	
	Displayed numeric data	HR(PR, BPR), VPC/ST, BP, NIBP, BP1, BP2, SpO <sub>2</sub> , SpO <sub>2</sub> /PR, EtCO <sub>2</sub> , RESP, RR, CO <sub>2</sub> , TEMP, TEMP/RR	HR, NIBP, SpO <sub>2</sub> , RR	
	Enlarged Display	ON, OFF	OFF	
	Short Trend	ON, OFF, Overlap	OFF	

<b>NOTE</b>	By selecting <b>ON</b> for backup at discharge, the setup item will be stored even after discharge. Selecting <b>OFF</b> will initialize the display configuration to the initial setting of the selected display mode.
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## ●System Configuration Menu

	<b>Item</b>	<b>Selection</b>	<b>Default</b>	<b>Backup</b>
Manual Recording	Waveform	ECG1, ECG2, BP, SpO <sub>2</sub> , RESP, CO <sub>2</sub>	ECG1, BP, RESP	O
	Rec. Duration	24 sec., Continuous	24 sec.	O
	Delay Time	None, 8sec., 16 sec.	8 sec.	O
Alarm Recording	Alarm Record	ON, OFF, Center	OFF	O
	Waveform	ECG1, ECG2, BP, SpO <sub>2</sub> , RESP, CO <sub>2</sub> , Alarm Factor	ECG1, Alarm Factor	O
	Rec. Duration	12, 24 sec.	12 sec.	O
	Alarm Factor	HR (HR / PR / BPR) Numeric Data, Arrhythmia	HR (HR / PR / BPR) Arrhythmia	O
	Arrhythmia Record	ASYSTOLE, VF, VT, SLOW_VT, RUN, COUPLETT, PAUSE, BIGEMINY, TRIGEMINY, FREQUENT, TACHY, BRADY	ASYSTOLE, VF, VT, SLOW_VT, RUN, TACHY, BRADY	O
Periodic Recording	Periodic Record	ON, OFF, Center	OFF	O
	Waveform	ECG1, ECG2, BP, SpO <sub>2</sub> , RESP, CO <sub>2</sub>	ECG1, BP, RESP	O
	Interval	5, 10, 15, 30, 60, 120 min.	60 min.	O
	Timer	0:00 to 23:00 (1:00 interval)	none	O
	Rec. Duration	6, 12, 24 sec.	12 sec.	O
Rec. Operation	Paper Feed to Top	ON, OFF	OFF	O
	Paper Feed to End	ON, OFF	ON	O
	QRS Classification	ON, OFF	ON	O
	Print Calibration	Top, Each Page, OFF	OFF	O
Sweep Speed	ECG, BP, SpO <sub>2</sub>	25, 12.5, 6.25mm/s	25mm/s	O
	RESP, CO <sub>2</sub>	25, 12.5, 6.25mm/s	6.25mm/s	O

<b>Item</b>	<b>Selection</b>	<b>Default</b>	<b>Backup</b>
Night Mode	Mode	Manual, Auto	Manual
	Auto Start Time	00:00 to 23:59	22:00
	Auto End Time	00:00 to 23:59	7:00
	Display	Slightly Dark, Dark, Time Only	Dark
	Volume	No change, Quiet, Very quiet, Silence	Very quiet
	Alarm Pole	ON, OFF	OFF
Color	ECG	32 colors	Green
	ST		Green
	VPC		White
	PACE		White
	BP1		Red
	BP2		Cyan
	NIBP		Cyan
	SpO <sub>2</sub>		Yellow
	TEMP		Orange
	RESP		White
	CO <sub>2</sub>		Cyan
Alarm Setup	ST2 (Trend)	Orange	Fixed
	Alarm Suspend	1min, 3min, 5min	3min
	Alarm Silence	1min, 3min, 5min	3min

## ● Hospital Setup

<b>Item</b>	<b>Selection</b>	<b>Default</b>	<b>Backup</b>
AC filter	50, 60Hz	According to Dip_SW	<input type="radio"/>
Date	07/19, Jul.19, 19.Jul	Jul.19	<input type="radio"/>
Alarm Mute	ON, OFF	OFF	<input type="radio"/>
Home Key Function	Home / Enlarge, Home	Home	<input type="radio"/>
Night Mode Cancel	Any Key, Night Mode Key	Any Key	<input type="radio"/>
Asystole, VF, VT	ON, ON/OFF	ON	<input type="radio"/>
DS-LAN Pat. ID Tx	1st to 11th character	1st character	<input type="radio"/>
Password for Alarm Setup	ON, OFF	OFF	<input type="radio"/>
Unit	BP	mmHg, kPa	mmHg
	TEMP	°C, °F	°C
	ST	mm, mV	mV
Telemeter	Channel	Contact our service representative for details.	3400
	Group	00 to 63	00
TCON Setup	TCON	ON, OFF	OFF
	TCON ID	01 to 16	01
	TCON Channel	01 to 60	60

## ●Ward Setup

<b>Item</b>	<b>Selection</b>	<b>Default</b>	<b>Backup</b>
Trend Clip	ON, OFF	ON	<input type="radio"/>
BP Record Scale	20, 40mm	40mm	<input type="radio"/>
Suspend Arrhy. Analysis during Noise	ON, OFF	OFF	<input type="radio"/>
HR Low Limit for VT	120, 140bpm	120bpm	<input type="radio"/>
Password	ON, OFF	OFF	<input type="radio"/>
Discharge Mode	Admit, Monitor Suspend	Admit	<input type="radio"/>
Event Key	ON, OFF	ON	<input type="radio"/>
MEAN Calculation	Waveform, Calculation	Waveform	<input type="radio"/>
Admit/Discharge Key Setup	Full, Light	Full	<input type="radio"/>
Record Key Display	ON, OFF	OFF	<input type="radio"/>
R.C. Setup	ID	R.C. OFF, 1 to 8	<input type="radio"/>
	Section	1 to 4	<input type="radio"/>
	Key	ECG1 Size, ECG2 Size, ECG1 Lead, ECG2 Lead, BP1 Scale, BP2 Scale, NIBP Measure, Monitor Resume, Alarm Suspend, Print, Night Mode, Graphic Trend, Tabular Trend, NIBP List, OCRG, Recall, ST, BP Zero, OFF	F1: ECG1 Size F2: ECG1 Lead F3: NIBP Measure F4: Print F5: Night Mode F6: Tabular Trend F7: NIBP List F8: BP Zero
			<input type="radio"/>
Key Mask	Menu	All Key (excluding system config.)	All Key <input type="radio"/>
	System Config.	All Key (excluding pre-set)	All Key <input type="radio"/>
	Pre-Set Menu	All Key (excluding ward setup)	All Key <input type="radio"/>
User Key	Selection	Rec. START/STOP, Alarm Silence, Alarm, Key Lock, NIBP List, Graphic Trend, Tabular Trend, Recall, OCRG, Freeze, NIBP Auto Mode, Size/Lead, HR/PR Source, BP Zero, Admit/Discharge, Night Mode, Display Config., Record, Tone/Volume, Other Bed, ST Display, Monitor Suspend, Enlarged Display, Suspend CO <sub>2</sub> , OFF	Alarm Silence, Rec. START/STOP, Size/Lead, Admit/Discharge (from left of display) <input type="radio"/>
Serial Comm. Setup	Serial Port	OFF, SV-300/Servo-i/-s, PB, Evita, Savina, PC Comm., TCON	OFF <input type="radio"/>
	Status Port	OFF, SV-300/Servo-i/-s, PB	OFF <input type="radio"/>
Alarm Pole	Sync. with Alarm	ON, OFF	ON <input type="radio"/>
	Alarm Type	Level 1, Level 1 and 2, Level 1, 2, and 3	Leve1 <input type="radio"/>
	Ventilator Alarm	ON, OFF	ON <input type="radio"/>
	Pattern Setup	Pattern 1 to 10	Level 1: Pattern 1 Level 2: Pattern 10 Level 3: Pattern 4 <input type="radio"/>
	Sync. with HR	ON, OFF	OFF <input type="radio"/>
NIBP Data Erase Time		10, 30, 60min, 24hour	60min <input type="radio"/>

## ●Monitor Setup

<b>Item</b>	<b>Selection</b>	<b>Default</b>	<b>Backup</b>
Battery Operation	Normal, Power Save	Normal	<input type="radio"/>
Message Icon	ON, OFF	OFF	<input type="radio"/>
Parameter Key Frame	ON, OFF	ON	<input type="radio"/>
Wide AC Filter	ON, OFF	OFF	<input type="radio"/>
Check Discharge at Power ON	ON, OFF	ON	<input type="radio"/>
Backup at Discharge	ON, OFF	OFF	<input type="radio"/>
HR/PR Source	ECG/SpO <sub>2</sub> , ECG/SpO <sub>2</sub> /BP1	ECG/SpO <sub>2</sub>	<input type="radio"/>
Backup at Discharge (NIBP Auto Mode)	ON, OFF	OFF	<input type="radio"/>
Built-in Rec. Status Display	ON, OFF	OFF	<input type="radio"/>
DS-LAN Mode	DS-LANII (10Mbps), DS-LANIII (100Mbps)	DS-LANII (10Mbps)	<input type="radio"/>
Vent. Alarm Input Setup	OFF, SV-900, SV-300/Servo-i/-s, PB, Evita, Savina	OFF	<input type="radio"/>
Alarm System	FUKUDA DENSHI, IEC	FUKUDA DENSHI	<input type="radio"/>
Level 3 Alarm Sound	One time, 15s interv.	One time	<input type="radio"/>
Low Limit Alarm Vol.	16 levels	Level 1 from left	<input type="radio"/>
Status Output Setup	Sync. Signal Output	HR, RR	<input type="radio"/>
		Positive Logic, Negative Logic	<input type="radio"/>
	Alarm Output	OFF, APNEA, Level 1, Level 1 and 2, Level 1, 2 and 3	<input type="radio"/>
		Positive Logic, Negative Logic, Pulse	<input type="radio"/>

## Display Mode Setup

<b>Item</b>	<b>Default</b>	<b>Backup</b>
Mode Selection	1	<input type="radio"/>
Mode 1	No. of Waveforms	3 Waveforms
	No. of Numeric Data	4 Numeric Data
	Displayed Waveforms	ECG1, SpO <sub>2</sub> , RESP
	Displayed Numeric Data	HR, NIBP, SpO <sub>2</sub> , RR
	Enlarged Display	OFF
	Short Trend	OFF
	Comment	CONFIG. 1
Mode 2	No. of Waveforms	3 Waveforms
	No. of Numeric Data	4 Numeric Data
	Displayed Waveforms	ECG1, SpO <sub>2</sub> , RESP
	Displayed Numeric Data	HR, NIBP, SpO <sub>2</sub> , RR
	Enlarged Display	ON
	Short Trend	OFF
	Comment	CONFIG. 2
Mode 3	No. of Waveforms	4 Waveforms
	No. of Numeric Data	6 Numeric Data
	Displayed Waveforms	ECG1, BP1/2 (overlap), SpO <sub>2</sub> , RESP
	Displayed Numeric Data	HR, BP1, BP2, NIBP, SpO <sub>2</sub> , TEMP, RR
	Enlarged Display	OFF
	Short Trend	OFF
	Comment	CONFIG. 3
Mode 4	No. of Waveforms	4 Waveforms
	No. of Numeric Data	6 Numeric Data
	Displayed Waveforms	Cascade, BP1/2 (overlap), SpO <sub>2</sub> , RESP
	Displayed Numeric Data	HR, BP1, BP2, NIBP, SpO <sub>2</sub> , TEMP, RR
	Enlarged Display	OFF
	Short Trend	OFF
	Comment	CONFIG. 4
Mode 5	No. of Waveforms	6 Waveforms
	No. of Numeric Data	7 Numeric Data
	Displayed Waveforms	ECG1, BP1/2 (overlap), SpO <sub>2</sub> , CO <sub>2</sub>
	Displayed Numeric Data	HR, BP1, BP2, NIBP, SpO <sub>2</sub> , TEMP/ RR, CO <sub>2</sub>
	Enlarged Display	OFF
	Short Trend	OFF
	Comment	CONFIG. 5

## Alarm Mode Setup

<i>Item</i>	<i>Default</i>	<i>Backup</i>
Alarm Mode	1	<input type="radio"/>
HR	ON 40–120	<input type="radio"/>
AYSTOLE	ON 5 sec.	<input type="radio"/>
VF	ON	<input type="radio"/>
VT	ON	<input type="radio"/>
SLOW_VT	ON	<input type="radio"/>
RUN	ON 3 beats	<input type="radio"/>
COUPLET	OFF	<input type="radio"/>
PAUSE	OFF 2 sec.	<input type="radio"/>
BIGEMINY	OFF	<input type="radio"/>
TRIGEMINY	OFF	<input type="radio"/>
FREQUENT	OFF 10 beats	<input type="radio"/>
TACHY	ON	<input type="radio"/>
BRADY	ON	<input type="radio"/>
HR Low Limit for VT	120	<input type="radio"/>
HR Low Limit for RUN	40	<input type="radio"/>
ST	OFF	<input type="radio"/>
BP1 (mmHg)	ON SYS 80–180 DIA OFF-OFF MEAN OFF-OFF	<input type="radio"/>
BP1 (kPa)	ON SYS 10.0–24.0 DIA OFF-OFF MEAN OFF-OFF	<input type="radio"/>
BP2 (mmHg)	OFF SYS OFF-OFF DIA OFF-OFF MEAN OFF-OFF	<input type="radio"/>
BP2 (kPa)	OFF SYS OFF-OFF DIA OFF-OFF MEAN OFF-OFF	<input type="radio"/>
APNEA	ON 15 sec.	<input type="radio"/>
SpO <sub>2</sub>	ON 90–OFF	<input type="radio"/>
NIBP (mmHg)	ON SYS 80–180 DIA OFF-OFF MEAN OFF-OFF	<input type="radio"/>
NIBP (%)	ON SYS 10.0–24.0 DIA OFF-OFF MEAN OFF-OFF	<input type="radio"/>
EtCO <sub>2</sub> (mmHg)	ON 30–45	<input type="radio"/>
EtCO <sub>2</sub> (kPa)	ON 4.0–6.0	<input type="radio"/>
EtCO <sub>2</sub> (%)	ON 4.0–6.0	<input type="radio"/>
InspCO <sub>2</sub> (mmHg)	ON 3	<input type="radio"/>
InspCO <sub>2</sub> (kPa)	ON 0.4	<input type="radio"/>
InspCO <sub>2</sub> (%)	ON 0.4	<input type="radio"/>

## External Connection

## Pin Assignments

This section explains the connector pin assignments.

### Serial Connector Output Signal

No.	Signal Type	Description	Signal Level
1	RESET	Port Reset	TTL Hi Level Reset
2	RSV	Reserved	—
3	TxD	Serial Transmit Data Output	RS232C
4	SG	Signal GND	—
5	RxD	Serial Receive Data Input	RS232C
6	+5V	+5V	+5V power supply (150mA)
7	RSV	Reserved	—
8	NC	No Connection	—

### Status I/O Signal

No.	Signal Type	Description	Signal Level
1	QRS SYNC	QRS SYNC Output	Logic TTL
2	ALM_OUT+	Alarm Output + (Isolation)	Photo MOS Relay Contact
3	RSV	Reserved	—
4	RSV	Reserved	—
5	RSV	Reserved	—
6	RSV	Reserved	—
7	+5V	+5V	+5V power supply (150mA)
8	ALM_OUT-	Alarm Output - (Isolation)	Photo MOS Relay Contact
9	GND	Power Supply Digital GND	—

※ As the serial connector and status I/O connector uses the same isolation power supply, the total power supply capacity for +5V should be up to 200mA.



- QRS synchronizing signal is a delay output.  
(95 to 140msec for 100msec width)  
Do not use the QRS synchronizing signal for the defibrillator.
- Make sure the delay time of QRS synchronizing signal fulfills the specifications of the connected device.

## Analog Signal Output

### WARNING

- Analog signal is a delay output. (about 35ms for ECG, BP)  
When connecting to a device using vital signs as trigger signals (ex. IABP), make sure the delay time fulfills the specifications of the connected device.
- The delay time may differ depending on the waveform shape or artifact interference.

## Cable Connection

- 1 Connect the analog output cable to the analog output connector located at the rear side of the DS-7100.

## Analog Output Waveform and Sensitivity

### 【Analog Output Connector 1】

ECG Waveform Output :

The selected lead will be used if ECG1 lead is I, II, or III. Lead II will be used for other leads.

The frequency characteristic of the filter is fixed as 0.5 to 20Hz, and sensitivity is fixed as 1V/mV.

Accuracy of ECG Output Sensitivity :

within 1V/mV $\pm$ 10%

Output Impedance : 100Ω  $\pm$ 5%

Load Impedance : 1kΩ to  $\infty$

### 【Analog Output Connector 2】

BP Waveform Output :

The waveform will be output from the BP input connector or from BP-1 of CF-7546 2ch BP conversion cable.

If the cable is not connected to the BP input connector, BP waveform cannot be output.

The sensitivity is fixed as 1V/100mmHg.

Accuracy of BP Output Sensitivity :

within 1V/100mmHg $\pm$ 10%

Output Impedance : 100Ω  $\pm$ 5%

Load Impedance : 1kΩ to  $\infty$

### 【Sensitivity and Output Range of Analog Signal】

	Output Sensitivity	Output Range
ECG	1V/mV	-5 to +5V
BP	1V/100mmHg	-0.5 to +3V

(0mmHg = 0V)

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## Chapter 12

# Accessories

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## Accessories

This section lists the accessories for the DS-7100 system.

 CAUTION

- Use only the accessories specified for this device. Otherwise, proper function cannot be executed.
- For quality improvement, specifications are subject to change without prior notice.

## Accessories

**This Operation Manual**

## Optional Accessories

The following products are available as optional accessories for the DS-7100 system. Purchase them as required.



- Use only the accessories specified for this device. Otherwise, proper function cannot be executed.
- For quality improvement, specifications are subject to change without prior notice.

### ECG, Impedance Respiration Measurement

Item	Model Type	Q'ty	Description
ECG Lead Cable	3380.0648.13	1	3-electrode AAMI
ECG Lead Cable	500398800	1	4-electrode AAMI
ECG Lead Cable	3380.0661.13	1	5-electrode AAMI, 60cm
ECG Lead Cable	3380.0661.15	1	5-electrode AAMI, 90/150cm
ECG Relay Cable	CI-700D-3 (FA)	1	3-electrode (defibrillation-proof)
ECG Relay Cable	CI-700E-3 (FA)	1	3-electrode (defibrillation and electrosurgery-proof) *
ECG Relay Cable	CI-700D-4 (FA)	1	4-electrode (defibrillation-proof)
ECG Relay Cable	CI-700E-4 (FA)	1	4-electrode (defibrillation and electrosurgery-proof) *
ECG Relay Cable	CI-700D-5 (FA)	1	5-electrode (defibrillation-proof)
ECG Relay Cable	CI-700E-5 (FA)	1	5-electrode (defibrillation and electrosurgery-proof) *



\* Fukuda Denshi recommends using the defibrillation and electrosurgery-proof type ECG relay cable during electrosurgery. However, when using the defibrillation and electrosurgery-proof type ECG relay cable, respiration measurement cannot be performed.

### Invasive Blood Pressure Measurement

Item	Model Type	Q'ty	Description
Interface Cable (for CDX III / Press)	CJ-369	1	For use with Argon Medical Devices CDX III / Press Disposable Pressure Transducers
Interface Cable (for DTX Plus)	CJ-410	1	For use with Becton-Dickinson DTX Plus Disposable Pressure Transducers
Interface Cable (for TruWave)	CJ-428	1	For use with Edwards TruWave Disposable Pressure Transducers
2ch BP Conversion Cable	CJ-7546	1	

### Non-Invasive Blood Pressure Measurement

Item	Model Type	Q'ty	Description
Adult Cuff (Large)	CUF-7101	1	
Adult Cuff (Medium)	CUF-7102A	1	
Adult Cuff (Small)	CUF-7103	1	
Pediatric Cuff	CUF-7104	1	
Infant Cuff	CUF-7105	1	
NIBP Air Hose (1.5m)	OA-7109A	1	
NIBP Air Hose (3.5m)	OA-7109B	1	
NIBP Extension Hose (1.5m)	OA-7110A	1	
NIBP Extension Hose (3.5m)	OA-7110B	1	
BP Conversion Socket	CUFJ-NO1	1	for connection to neonate cuff

## Temperature Measurement

Item	Model Type	Q'ty	Description
Rectal Temperature Probe (for adult)	401J	1	
Rectal Temperature Probe (for pediatric)	402J	1	
Body Surface Temperature Probe	409J	1	
Probe Cover	70 14 616	10	

## SpO<sub>2</sub> Measurement

(For Nellcor® SpO<sub>2</sub> Unit; DS-7141, DS-7101L, DS-7101LT)

Item	Model Type	Description
Durasensor®	DS-100A	
OxiMax®	MAX-N	MAXN (Box of 24)
OxiMax®	MAX-I	MAXI (Box of 24)
OxiMax®	MAX-P	MAXP (Box of 24)
OxiMax®	MAX-A	18" cable, MAXA (Box of 24)
OxiMax®	MAX-R	MAXR (Box of 24)
OxiMax®	MAX-FAST	MAXFAST (Box of 24)
SpO <sub>2</sub> Relay Cable	DOC-10	

## SpO<sub>2</sub> Measurement

(For Masimo® SpO<sub>2</sub> Unit; DS-7141M, DS-7101LM, DS-7101LTM)

Item	Model Type	Description
Masimo SET Sensor	LNOP® DCI	
Masimo SET Sensor	LNOP® NeoPt	
Masimo SET Sensor	LNOP® NeoPt-L	
Masimo SET Sensor	LNOP® Inf-L	
Masimo SET Sensor	LNOP® Neo	
Masimo SET Sensor	LNOP® Neo-L	
Masimo SET Sensor	LNOP® Pdt	
Masimo SET Sensor	LNOP® Adt	
Masimo SET Sensor	LNOP® Adt Long	
SpO <sub>2</sub> Patient Cable	PC04	1.2m
SpO <sub>2</sub> Patient Cable	PC08	2.4m
SpO <sub>2</sub> Patient Cable	PC12	3.6m

## CO<sub>2</sub> Concentration Measurement

<i>Item</i>	<i>Oridion P.N.</i>	<i>Description</i>
<b>Intubated EtCO<sub>2</sub></b>		
Filterline® H Set (Adult/Pediatric)	XS04624	with Nafion, adapter
Filterline® H Set (Infant/Neonate)	006324	with Nafion, adapter
Filterline® Set (Adult/Pediatric)	XS04620	with adapter
<b>Non-Intubated O<sub>2</sub> and EtCO<sub>2</sub></b>		
Smart CapnoLine® Plus (Adult/Intermediate)	009822	for oral/nasal, with oxygen delivery
Smart CapnoLine® (Pediatric)	007269	for oral/nasal, with oxygen delivery
CapnoLine H (Adult)	008180	for nasal, with Nafion, oxygen delivery
CapnoLine H (Pediatric)	008181	for nasal, with Nafion, oxygen delivery
<b>Non-Intubated EtCO<sub>2</sub></b>		
Smart CapnoLine Plus (Adult/Intermediate)	009818	for oral/nasal
Smart CapnoLine (Pediatric)	007266	for oral/nasal
CapnoLine H (Adult)	008177	for nasal, with Nafion
CapnoLine H (Pediatric)	008178	for nasal, with Nafion
CapnoLine H (Infant/Neonate)	008179	for nasal, with Nafion
NIV Line (Adult)	008174	for nasal
NIV Line (Pediatric)	008175	for nasal

### Calibration Accessories

<i>Item</i>	<i>Model Type</i>	<i>Description</i>
Calibration kit	0304653ORFBD	The calibration kit includes: 1. Calibration Gas Canister (5%CO <sub>2</sub> , 21% O <sub>2</sub> , Bal.N <sub>2</sub> ) 2. T-piece connector 3. Calibration FilterLine®



There are various types of sampling products available. For details, refer to our service representative.

## Others

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<b>Item</b>	<b>Model Type</b>	<b>Description</b>
Ground Cable	CE-12	
Battery Pack	T4UR18650F-2-4644	
DS-7100 Mount Kit	OA-451	
HTC-702 Attachment	OA-471	
2ch BP Conversion Cable Holder	OA-474	
Recording Paper	OP-124TE	
Cleaning Cloth	OA-57	
Accessory Kit (5-lead)	ASM-E5BNP	
Power Cable	CS-34 (3m)	
ECG Lead Cable (5-lead)	#3380.0661.13	AAMI, 60cm
ECG Lead Cable (5-lead)	#3380.0661.15	AAMI, 90cm, 150cm
ECG Relay Cable (5-lead)	CI-700D-5 (FA)	
2ch BP Conversion Cable	CJ-7546	
NIBP Air Hose	OA-7109B (3.5m)	
Adult Cuff (Medium)	CUF-7102A	
Accessory Kit (3-lead)	ASM-E3NP	
Power Cable	CS-34 (3m)	
ECG Lead Cable (3-lead)	#3380.0648.13	AAMI
ECG Relay Cable (3-lead)	CI-700D-3 (FA)	
NIBP Air Hose	OA-7109B (3.5m)	
Adult Cuff (Medium)	CUF-7102A	
SV-900 Cable	Serial Connector	CJ-500
	Status Connector	CJ-400RI-70SV9
SV-300 Cable	Serial Connector	CJ-501
	Status Connector	CJ-401RI-70SV3
Servo-i/s Cable	Serial Connector	CJ-502
	Status Connector	CJ-402RI-70SVI
PB740/760/ 840 Cable	Serial Connector	CJ-504
	Status Connector	CJ-403RI-70PB
Evita/Savina Cable	Serial Connector	CJ-502
		Evita 4 / Evita XL / Evita 2 dura / Savina
Ethernet Branch Cable (For DS-LANII/III)	CJ-522A	Length 1m
	CJ-522B	Length 2m
	CJ-522C	Length 4m
	CJ-522D	Length 10m
	CJ-522E	Length 20m
Connection Cable (For DS-LANII/III)	CJ-530A	Length 2.5m
	CJ-530B	Length 5m
	CJ-530C	Length 10m

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