DYNASCOPE 8000 Series
Patient Monitor

DS-8007 System

Ver. 03

Operation Manual

* Before using the product, please read this manual thoroughly.
* Store this manual where it can be always referred to.

FUKUDA

This manual is for the DS-8007 System Version 03.

MEDICAL-PATIENT-
MONITORING EQUIPMENT

AS TO ELECTRICAL SHOCK, FIRE AND MECHANICAL HAZARDS ONLY
ANSI/AAMI ES 60601-1 (2005)+AMD1 (2012),
IEC 60601-2-25 (2011), IEC 60601-2-27 (2011),
IEC 80601-2-30 (2009)+AMD1 (2013), IEC 60601-2-34 (2011),
IEC 60601-2-49 (2011), ISO 80601-2-55 (2011),
ISO 80601-2-56 (2009) AND ISO 80601-2-61 (2011).

⚠ CAUTION	Federal Law restricts this device to sale by or on the order of a physician.

CAUTION

- 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

Introduction

Thank you for purchasing this product. Read the "Safety Precautions" thoroughly before use to ensure correct and safe use of the product.

Before using or installing this product, read this manual thoroughly.

Important Notice

For Safe Operation of the Equipment

(1) Before using this equipment, read this operation manual.

(2) Fukuda Denshi cannot predict all the dangers which may be caused by misusage of this product or environmental condition.

(3) For using this equipment, there are many items that "should be performed", "should not be performed", and "cannot be performed". It is not possible to cover all these items in this manual or warning labels. Therefore, it is necessary to also follow the general safety precaution other than the items described in this manual.

(4) To prevent accidents, usage other than intended, or usage, cleaning, and maintenance not described in this manual should not be performed.

(5) When using this equipment, follow the respective regulation to minimize the probability of accidents.

Intended Use of this Equipment

This equipment is designed for the following <Intended Use>.

<Intended Use>

This equipment is intended for patient monitoring in surgery room, ICU, ward, emergency room or during transportation in the medical facility by measuring parameters such as ECG, respiration, NIBP, pulse rate, SpO_2, SpCO, SpMet, SpHb, pulse wave, temperature, BP, CO, respiration gas (CO_2 concentration), BIS, SQI, SR, EMG, EEG, and monitors patient condition by displaying/recording the measurement data on this equipment or central monitor and generates alarm as required.

This equipment is intended for monitoring one patient. It is not intended for monitoring multiple patients.

The 12-lead ECG analysis function is intended for adult and pediatric patients.

For specification of this equipment, refer to "Chapter 14 Specification" of this manual.

This equipment is intended to be used by healthcare professionals. Users should have a thorough knowledge of the function and operation before using this equipment. The maintenance of this equipment should be performed by skilled personnel who received a training of possible hazards and measures to avoid those hazards. Also, your local regulation must be followed. If this equipment is used for the purpose other than intended, or if the user does not follow the safety instructions, the following hazard may result.

- Hazard to the Life and Health of the Patient or the User

- A Problem Related to Medical Practice
- Damage to the Equipment

Copyright

(1) The copyright of this manual is owned by Fukuda Denshi. No part of this document may be copied or transmitted in any form without the prior written permission of Fukuda Denshi Co., Ltd.

(2) This manual includes the description for the optional equipments that can be connected.

(3) The illustration in this manual may differ with the actual equipment.

(4) If you lose or damage this manual, contact your nearest sales representative. Using the equipment without this manual may cause accidents.

(5) When handing over this equipment, make sure to also pass this manual to the next owner.

Maintenance, Repair, Replacement

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 or organization.
- Components are used in accordance with Fukuda Denshi operating instructions.

A full technical description of the DS-8007 System is available from your local Fukuda Denshi sales representative.

Contact

If you need more detailed information, please contact following.

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About This Manual

Expression Used in This Manual

❑Meaning of the Symbols

Type of Precaution	Description
⚠ DANGER	Failure to follow this message may cause immediate threat of death or serious injury.
⚠ WARNING	Failure to follow this message may result in death or serious injury.
⚠ CAUTION	Failure to follow this message may cause injury or failure to the equipment.
NOTE	"Note" is used to emphasize important information.
REFERENCE	"Reference" is used to provide useful information.
☞	Indicates the reference page for the procedure and precaution.
*	Used in a table which indicates that there is detailed explanation outside the table.

❑Indications for the Screens and Keys

The keys displayed on the monitor screen are indicated by [ ].
(Ex.: [Display Config.], [Manual Printing], etc.)

The expressions displayed on the monitor screen are indicated by " " .
(Ex.: "Volume", "Admit/Discharge", etc.)

The messages displayed on the screen are indicated by < >.
(Ex: <Searching>, <Alarm Suspend>, etc.)

REFERENCE

- There are 2 types of menu display for this equipment, menu list and simple menu.
  (☞"Menu Configurations" P1-3)
- In this manual, the operation procedure is explained for the case when menu list is displayed (when simple menu setup is OFF).
  If simple menu is displayed, press [Menu] > [Menu List] to follow the procedure explained in this manual.

Composition of This Manual

The operation manual is composed of the following chapters.

Chapter Title	Description
Preface	Outline and purpose of this manual (Important Notice, About This Manual)
Safety	Warning, Precautions for Safety
1.General Description	Composition, features, menu configuration of this equipment
2.Name of Parts and Their Functions	Name and function of each part, external appearance
3.Operation Procedure and Screen Examples	Operation procedure, home display, window, procedure to return the display, user key setup
4.Preparation	Installing the recording paper, power ON/OFF, time/date, daily checks
5.Admit/Discharge	Entering patient information (name, age, etc.) at admittance, discharging the patient, user mode selection, suspend monitoring
6.Alarm Function	General description of alarm function, alarm-related setups
7.Monitoring	Measurement condition setup of the monitoring parameters, size/scale setup, etc. Setup of the stopwatch, connector
8.Review Function	Arrhythmia analysis, trend, recall, NIBP list, Tabular Trend, ST measurement, hemodynamics, lung function, alarm history, other bed display, full disclosure waveform, MPDR
9. Printing	Recorder output function
10. System Configuration	Setup of the display configuration, tone/volume, color, brightness, night mode
11. Troubleshooting	Message list, maintenance and troubleshooting of this equipment
12. Setup Item/Default Value	Setup item and default value
13. Accessories	List of accessories and optional accessories of this equipment
14. Specification	Specification and performance of this equipment

The maintenance manual is composed of the following chapters.

Chapter Title	Description
Preface	Outline and purpose of this manual (Important Notice, About This Manual)
Safety	Warning, Precautions for Safety
1.Installation of the Unit	Precautions about the operating environment, system construction, power source and ground connection, trolley usage
2.Network System Construction	Network connection and setup
3.Using the External Media	Procedure to use the USB memory and SD card.
4.Connection to the External Devices	External equipment connection and setup
5.Initial Settings	Initial setup, administrator setup, alarm/measurement setup, user I/F, user mode registration
6.Setup Item/Default Value	Default and backup of setup items
7.Replacement Parts	Precautions about the periodic replacement parts, consumable parts
8.Cleaning/Disinfecting/Storing	Procedure to handle, clean, store this equipment
9. Maintenance Check	Daily and periodic checks, self-diagnosis function, software version software install

Safety

Safety

About the Safety Precautions

The Meaning of Each Safety Precaution

Read this manual 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.

Type of Precaution	Description
⚠ DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

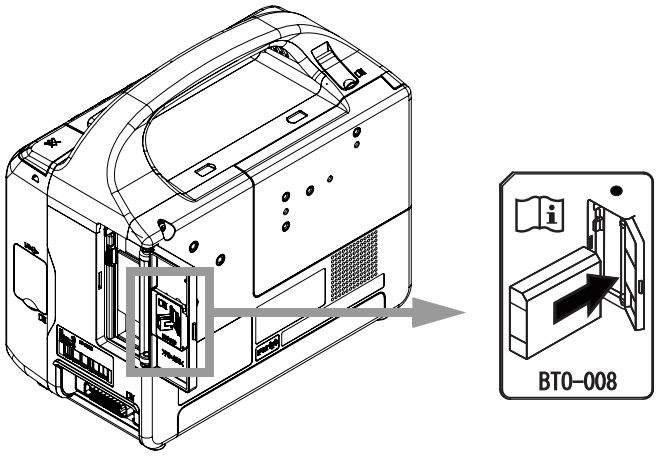
Warning Labels Attached to the Unit

Make sure to read the warning label attached to the equipment and comply with the requirements while operating the equipment.

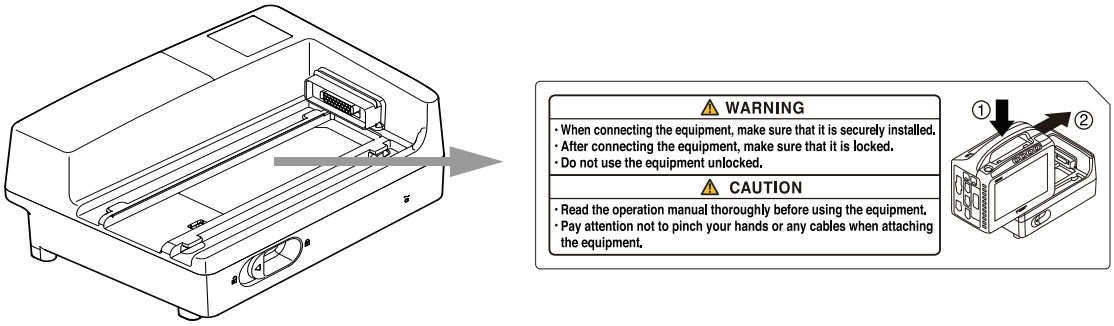
⚠ CAUTION

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

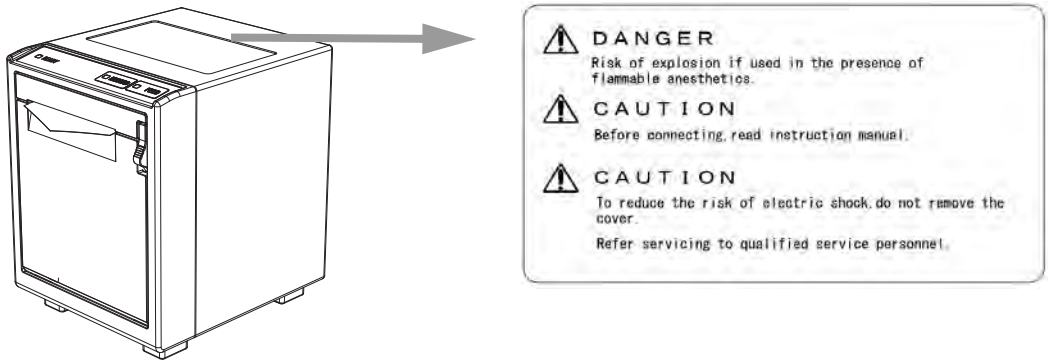
❑DS-8007 System Main Unit



❑DSA-81 AC Unit



❑HR-800 Recorder Unit



Graphic Symbols

Refer to the following for the meaning of the symbol indicated on the equipment.

Symbol	Description
	Follow operating instructions (Warning); indicated in blue. Failure to follow operating instructions could place the patient or operator at risk.
	Follow operating instructions (Information); Indicates the need to refer to the related accompanying documents before operation.
	General precaution
	Caution, refer to accompanying documents Indicates the need to refer to the related accompanying documents before operation.
	Potential Equalization 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)
	Indicates that the equipment is in normal operation.
	Indicates that the equipment is in standby mode.
	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.
	Signal Output
	Signal Input/Output
	GAS Input Part
	GAS Output Part
	Battery
	Alarm Silence
	Name and Address of Manufacturer Indicates the name and address of manufacturer.
	Date of Manufacture Indicates the date of manufacture.
	WEEE (Waste Electrical and Electronics Equipment) Indicates a separate collection for electrical and electronic equipment.
IP32	Dustproof (IP3X): Protection against tips of tools. (Φ2.5 mm or more) Waterproof (IPX2): Protection against water drops falling vertically over 15 degrees range. Only when temperature connector cover, USB memory slot cover, CO_2 I/F connector cover, button cover, or battery connector is attached.
IPX1	Waterproof (IPX1): Protection against water drops.

Precautions for Safe Operation of Medical Electrical Equipment

⚠ WARNING

- Do not disassemble or remodel the equipment.

⚠ CAUTION

- Users should have a thorough knowledge of the operation before using this equipment.
- Do not use the equipment in an environment where protective earth and wiring is questionable.

❑Precautions about the Location of Installation and Storage of the Equipment

- Set the monitor to the user's intended position where the user can easily recognize the visual and audible monitoring conditions. Normally it is recommended to set at a distance of 1m from the user.
- Install or store in a place where the equipment will not be exposed to splashing water.
- Install or store in an area where environmental conditions such as atmospheric pressure, temperature, humidity, ventilation, sunlight, dust, sodium, and sulfur will not adversely affect the system.
- Place the equipment on a stable surface where there is no inclination, vibration, or shock (including during transportation).
- Do not install or store in an area where chemicals are stored or gases are evolved.
- Verify the power frequency, voltage and allowable current (or power consumption).
- Ensure the grounding is proper by connecting the accompanying power cable to the hospital grade outlet.
- Make sure to secure the equipment using a trolley or stand.
- Do not place the equipment or accessories in any position that might cause it to fall on the patient.

❑Precautions Before Using the Equipment

- Verify the power voltage. Charge the battery pack fully before operating the system with the battery pack.
- Check the cable connection and polarity to ensure proper operation of the equipment.
- Make sure the power system has adequate earth ground.
- Ensure that all cables are firmly and safely connected.
- Pay special attention when the equipment is used in conjunction with other equipment as it may cause erroneous diagnosis and danger.

❑Precautions During Using the Equipment

- Always observe the equipment and patient to ensure safe operation of the equipment.
- If any abnormality is found on the equipment or with the patient, take appropriate measures under the safe conditions, such as ceasing operation of the equipment.
- Do not allow the patient to come in contact with the equipment.
- On start-up of the system, verify that the start-up tone generates and alarm indicator lights.
- For the connectors which are not Type BF, CF applied part, do not touch them and the patient at the same time.

❑Precautions After Using the Equipment

- Unplug all the cables from the patient before turning off the power.
- When unplugging the cables, do not apply excessive force by pulling on the cord. Pull by the connector part of the cable.
- Clean the accessories and cables, and keep them together in one place.
- Keep the equipment clean to ensure proper operation for the next use.

❑Precaution when Equipment Failure Occurs

- If the equipment is damaged and in need of repair, the user should not attempt service. Label the unit "OUT OF ORDER" and contact our service representative.

❑Precaution about Disassembling/Remodeling the Equipment

- Do not disassemble or remodel the equipment.
- If water or other liquids enter the equipment, cease using the equipment and contact your nearest service representative.

❑Precautions about Maintenance Check

- Make sure to periodically check the equipment, accessories, and cables.
- Before reusing the equipment that has been left unused for a while, make sure that the equipment operates normally and safely.

❑Precautions when Using with Other Equipment

- To prevent patient from burn injury, verify proper attachment of patient ground plate, ECG electrode type when using the electrosurgical knife, and verify paste volume, output energy when using the defibrillator. Also, verify that each equipment is properly grounded.

Precautions about the Maintenance

⚠ WARNING

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

⚠ CAUTION Precautions about Safety Check

- For safe operation of the equipment, regular inspection and maintenance are 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 for the following case.
  - When the equipment was subjected to extreme mechanical stress, e.g. after a heavy fall.
  - When the equipment was subjected to liquid spill.
  - When the monitoring function is interrupted or disturbed.
  - When parts of the equipment enclosure are cracked, removed, or lost.
  - When any connector or cable shows signs of deterioration.

Precautions about the Network System

Medical Telemetry

⚠ CAUTION Precautions about the Installation

- The medical institution (hereinafter referred as "Institution") must decide the telemetry installation plan for the medical institution in order to prevent interference between transmitters (telemetry based on destination country's radio law). When telemetry has already been installed and been used, radio format, frequency, and antenna power are required to be examined to prevent interference.
- 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 Institution.
- When using telemetry which requires zone location, display and identify each prepared zone in the equipment.
- When laying receiver antenna for each transmitter, the Institution has to examine the installation so that electronic interference does not occur.
- Based on the above examination result, the Institution should place each receiver antenna as required.

⚠ CAUTION Precautions about the Management

- 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 should nominate a person to manage the wireless channels in each zone (a "Coordinator"). However, when using such telemetry in a local medical institution, one person can perform both functions.
- Select a telemetry coordinator who understands the characteristics and functionality of telemetry systems, and is skilled in operating telemetry.
- When installing telemetry, the Coordinators have to understand the precautions for use of the telemetry in advance.
- The Coordinator takes responsibility of wireless channel management and transmitter storage for the whole Institution by giving proper instruction.
- The Coordinator 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 Institution. When changing a wireless channel, register it in the log and give proper instructions to the user.
- The Coordinator assumes responsibility for managing the wireless channels, storing, and managing telemetry.
- The Coordinator assigns the transmitter to the user, and provides enough education for use inside the zone.
- The telemetry user verifies operation of the transmitter/receiver before use.
- The telemetry user, if using the telemetry in a zone location, follows the instructions of the Coordinator for the zone and gives instructions to the patient if required.
- When interference or breakdown occurs in telemetry communication, the user is required to inform the Coordinators of the problems. The Coordinators are to deal with the problem properly and/or contact their nearest Fukuda Denshi representative for service.

Bidirectional Wireless Communications Module (TCON)

⚠ CAUTION Precautions about the Installation

- 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 equipment is installed within the range of radio communication, the communication may not be possible due to noise or multi-path phasing etc. This should be fully considered when using the TCON network.
- If the TCON is installed in a line-of-sight distance where there are no obstacles or on the upper floors, unexpected long distance transmission may occur which may cause interference with nearby medical institution. Before using the TCON system, test the reception to make sure that it does not interfere with other channels. If the channel is used by other medical institution, change the channel ID.
- Do not install the TCON system in an area where it will be subject to splashing water. Water entering the equipment may cause the equipment to malfunction or be damaged.

⚠ CAUTION Precautions about the Management

- The Institution should appoint a person (hereinafter referred as the "Overall Manager" to manage the wireless devices for the whole facility. The ME engineer is appropriate for the Overall Manager.
- When installing 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 Institution. When changing a wireless channel, register it in the log and give proper instructions to the Zone Manager or to the 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 contact the nearest Fukuda Denshi representative for service.

⚠ CAUTION Precautions for Operation

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.The TCON communication status can be verified by the messages and symbols ( ) displayed on the screen. If TCON communication is interrupted by other wireless devices, a mark indicating the communication status and technical messages, <TCON Interference>, <Chk TCON Reception> will be displayed. For details, refer to the HTC-702 (FA) Operation Manual.

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.

- When the patient’s data become mixed with a different patient's data due to interference.
- When there are multiple TCON devices set to the same TCON ID and channel (group).
- When communication failure, unstable communication, or poor reception occur.
- When the radio communication is poor as 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 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.
- When the channel settings for the two TCON groups are close to each other.

⚠ CAUTION Precautions about the Setting

- Follow the instructions from the Overall Manager for the wireless channel when setting the TCON and channel IDs to prevent interference within the same institution.
- If the TCON is set to [OFF], all TCON messages such as <Check TCON Comm.> will not be displayed.
- Even if [ON] is set for "Start NIBP Auto Mode with Start/Stop key" ([Initial Settings]>[User I/F]>[Power ON/Discharge]), "Backup at Discharge (NIBP Auto Mode)" setting will be [ON] since the central monitor will not be in standby mode during TCON communication.
- Make sure that three antenna bar marks ( ) are displayed.
- Make sure that the TCON channels of the bedside monitor and central monitor are the same.
- When using the TCON network, do not move the equipment. The radio waves may not be transmitted.
- There are following restrictions when connecting the DS-8007 System to the TCON network.
  - When the measurement unit of BP is [kPa], the central monitor will not receive the numeric data of NIBP, BP1, and BP2. Also, the alarm setting of NIBP, BP1, and BP2 cannot be changed 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 [5 min] or less, or during the 1-minute or continuous measurement. However, it can be stopped.
  - When the measurement unit of CO_2 concentration is [mmHg], the CO_2 value of 100 mmHg or above will be transmitted as 99 mmHg.

- On the DS-8007 system, the TCON settings are saved on the AC Unit (DSA-81).

Precautions when Using with Other Equipment

Pacemaker

⚠ WARNING

- 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.
- 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.

Reference

"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]

Non-Explosion Proof

⚠ DANGER

- 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.

Defibrillator

⚠ WARNING

- When defibrillating, keep away from the electrodes or medicament applied to the patient chest. If this is not possible, remove the electrodes or medicament before defibrillating.
  If the defibrillator paddles are directly in contact with the electrodes or medicament, an electrical shock may result by the discharged energy.
- When defibrillating, 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 from the discharged energy.
- When defibrillating, do not touch the patient and the metal part of the device or cables.
  Electric shock may result from the discharged energy.
- This equipment will return to standard operating mode within 10 seconds after defibrillating. However, when in diagnosis mode, it may require 10 seconds or more after defibrillation to display the normal ECG waveform as the time constant setting is large.
  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.
- The QRS synchronized signal is not intended to be used as synchronized signal for defibrillator.

Electrosurgical Instrument

⚠ WARNING

- The monitoring system contains protection against interference generated by electrosurgical instruments. However, depending on the operating conditions, surgery site with respect to the location of ECG electrodes, ground plate attachment condition, or the type of instrument used, it may cause burn injury at the electrode site or noise on the ECG. The noise is generated at the tip of the electrosurgical knife and is difficult to completely eliminate because of the frequency components of the ECG. To reduce electrosurgical interference, take the following precautions:

  Location:

  Locate the electrosurgical unit as far as possible from this equipment and the patient cable. This will help reduce interference on the ECG through the monitor or cables.

  Power Supply:

  Connect the electrosurgical unit to a power supply that is different from that of this equipment. This will help prevent interference through the power cable.

  Electrode Placement

  The amount of noise 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.

  Ground Plate

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 from burn at the electrode site.

- The stored data will not be affected. The measurement accuracy will temporarily decrease during electrosurgery, but it will not compromise the safety of patient and the equipment.
- When using the electrosurgery-proof type ECG relay cable, the impedance respiration cannot be measured, and its numeric data and waveform will not be displayed. When measuring in an environment where electrosurgery is not performed, make sure to use the standard ECG relay cable.
- As this equipment utilizes capacitive touch panel, the energy from the electrosurgical knife may pass through the cable to the touch panel causing unintentional touch panel control. Locate the cables as far away as possible from the touch panel.

MRI (Magnetic Resonance Imaging)

⚠ WARNING

MR Unsafe-Keep away from magnetic resonance imaging (MRI) equipment.

- Do not use this equipment in magnetic resonance imaging (MRI) environments.
- When conducting MRI test, remove the electrodes and sensors connected to the patient (test subject). This equipment may be pulled towards the MRI device. Also, the local heating caused by the induced electromotive force may cause burn injury to the patient or performance degradation, failure, damage of this equipment.
  For details, refer to the operation manual for the MRI testing device.

Precautions about Connections to Peripheral Devices

To use the equipment safely and to ensure maximum performance of the equipment, connection of other manufacturer's equipment to this equipment 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.

⚠ WARNING

- When multiple equipments are connected to the patient, it may be necessary to take measures for connection (use of separation device), power supply (use of isolation power), grounding (additional protective earth). If these measures are not properly taken, a leakage current may flow between the equipments, or the total amount of leakage current may exceed the limit specified on IEC 60601-1-1.
- 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.

⚠ CAUTION

- Although the peripheral device connectors on the DS-8007 System are, with some exceptions, isolated from the power supply, the connecting peripheral devices should comply with IEC 60601-1. It is the user's responsibility to verify that the overall system complies with IEC 60601-1-1.
- To prevent danger of electric shock, always position the peripheral devices away from the patient.
- Network equipment including printer and hub should be located outside the "Patient Environment". If located inside the "Patient Environment", it may result in electric shock to the patient or the operator.
- Combinations of medical equipment with non-medical equipment must comply with IEC 60601-1-1 or IEC

60601-1. Never use a multiple portable socket-outlet or extension cable when connecting the equipments unless it is supplied specifically for use with that equipment.

Precautions for Using the Equipment

This System

⚠ DANGER

- When connecting to other equipments, contact your nearest representative.
  Danger such as electric shock may result to the patient and operator.

⚠ WARNING Warnings about the System

- Do not connect any damaged/unspecified equipment or cable to any I/O connector. Otherwise, the equipment cannot deliver its maximum performance and the connected equipments may be damaged, resulting in a safety hazard.
- If this equipment is used under an environment not fulfilling the specified condition, not only that the equipment cannot deliver its maximum performance, the equipment may be damaged and safety cannot be ensured. If using the equipment under condition other than specified, contact your nearest representative.
- Use only the supplied 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 a hospital grade outlet.
- When using multiple ME equipment simultaneously, perform equipotential grounding to prevent potential difference between the equipments. Even a small potential difference may result in electric shock to the patient and the operator.
- Carefully route cables to reduce the possibility of patient entanglement and strangulation.
- When lifting this equipment, hold it by the handle or the bottom part of the main unit.
- When using this equipment, the operator should stay in a distance close enough to recognize an alarm sound. Do not move too far away from the equipment where an alarm sound cannot be recognized.

⚠ WARNING Warnings about the monitoring

- The patient classification selection influences the precision of the QRS detection and NIBP measurement. Make sure the proper selection is made.
- The pacemaker usage setting influences the precision of the QRS detection and arrhythmia analysis. Make sure the correct selection is made.
- If the QRS pace mask function is set to [OFF], [10ms]/[20ms], the pace pulse may be erroneously detected as a QRS complex and HR alarm or asystole alarm may not generate due to incorrect HR (counting pace pulse as QRS complex). Select [OFF], [10ms]/[20ms] only if you are sure that pacing failure will not occur, or when the patient can be constantly monitored.
- When measuring the SpO_2 of patient with high fever or peripheral circulatory insufficiency, check the sensor attachment periodically and change the attachment site. The temperature of the attachment site will rise due to the sensor heat which may result in burn injury.
- For the following case, accurate measurement of SpO_2 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

- When a patient is receiving a photodynamic therapy, measuring SpO_2 on a same site for a long duration may cause blisters from the irradiation light of the SpO_2 sensor. Make sure to periodically change the sensor attachment site.
- Before the measurement, make sure the patient classification (Adult/Child/Neonate) is properly selected. Otherwise, correct measurement cannot be performed, and congestion or other injury may result.
- When the system alarm is suspended, all the alarm will be suspended even if the parameter alarm is set to [ON]. Also, the alarms will not be stored as recall events.
- 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 individual alarm is set to [ON]. Pay attention when setting them [OFF].
- 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 printing, alarm printing and recall waveform for evaluation.
- The RR/APNEA alarm will not be generated unless the numeric data box corresponded to the selected RR/APNEA alarm source is displayed.Make sure to display the numeric data box for the RR/APNEA alarm source.
- The SpO_2 respiration measurement function is not intended for use as an APNEA monitor.
- When selecting [0] for "Volume" or [Timer] for "Display" for the Night Mode, pay attention not to miss any important alarm by simultaneously monitoring the patient on central monitor or other monitors.
- When the alarm sound is suspended, the alarm sound will not generate for the fixed amount of time. Pay attention not to miss any important alarm by simultaneously monitoring the patient on central monitor or other monitors.
- If the safety of the patient cannot be ensured, do not suspend the alarm or decrease the alarm volume.

⚠ WARNING Warnings about the CO_2 Monitoring (HCP-810/HCP-820, HPD-810/HPD-820)

- Only one of either HCP-810/HCP-820/HPD-810/HPD-820 can be connected.
- When using a sampling line for intubated patients with a closed suction system, do not place the airway adapter between the suction catheter and endotracheal tube. This is to ensure that the airway adapter does not interfere with the functioning of the suction catheter.
- To prevent cross-infection, do not allow the sampling gas to return to the breathing system.
- To protect the hospital staffs from unnecessary anesthetic agent when using the HCP-810/HCP-820, it is strongly recommended to connect the exhaust hole to the gas exhaust system in the hospital.
- Loose or damaged connections of the sampling line may compromise ventilation or cause an inaccurate measurement of respiratory gases. Securely connect all components and check connections for leaks according to standard clinical procedures.
- Do not cut or remove any part of the sampling line. It could lead to erroneous readings.
- If too much moisture enters the sampling line (i.e., from ambient humidity or breathing of unusually humid air) when using the HCP-810/HCP-820, <Check Sample Line> will be displayed in the message area. Replace the sampling line once this message is displayed.
- Carefully route the sampling line to reduce the possibility of patient entanglement or strangulation.
- Do not lift the HCP-810/HCP-820 by the sampling line, as the sampling line could disconnect from the equipment, causing the equipment to fall on the patient.
- CO_2 readings and respiratory rate can be affected by sensor application errors, certain ambient environmental conditions, and certain patient conditions.

⚠ CAUTION Precautions for Installing the Monitor

- Make sure to secure the equipment using a specified trolley or stand. Otherwise, the equipment may fall down, resulting in injury to the operator or damage to the equipment.

⚠ CAUTION Precautions about the Trolley

- When attaching the monitor to the specified trolley, make sure that it is securely fixed on. Otherwise, the equipment may fall off from the trolley, resulting in injury to the operator or damage to the equipment.
- Make sure to use only the specified trolley. Otherwise, the trolley may fall down, resulting in injury to the operator or damage to the equipment.
- When using or storing the trolley, make sure that the casters are locked. Otherwise, the trolley may fall down, resulting in injury to the operator or damage to the equipment.
- Do not use or store the trolley where it will be subject to inclination of 10 degrees or more. The trolley or equipment may fall resulting in injury to the operator or damage to the equipment.

⚠ CAUTION Precautions about the System

- Use only the spare parts specified for this equipment. Otherwise, proper function cannot be executed.
- Do not use the touch panel with the film attached. It may cause malfunction or damage the touch panel.
- For quality improvement, specifications are subject to change without prior notice.
- This equipment utilizes LED for the backlight. Since this LED 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.
- This equipment is intended to be used for only one patient.
- The installation of this equipment should be performed by our service representative or a person who is well acquainted with this equipment.
- If not using the equipment for a long period, disconnect the power cable, module connection cable and lithium-ion battery.
- The lithium-ion battery can only be charged in the specified operational temperatures of the equipment. Refer to the operation manual of the lithium-ion battery (BTO-008) for details.

⚠ CAUTION Precautions about the ECG Monitoring

- If any electrodes get detached from the patient after being connected to the lead cable and patient monitor, pay attention that the metal part of the electrode does not get in touch with any metal parts of the bed or any conductive parts. Also, the operator should not touch any conductive parts with bare hands. Otherwise, it may cause electric shock to the patient and/or operator due to excessive leakage current.
- The indication for continuous use of the electrode is about one day.
- Replace the electrode if the skin contact gets loosen due to perspiration, etc.
- When an electrode is attached to the same location for a long period, some patients may develop skin irritation. Check the patient's skin condition periodically and change the electrode site as required.
- For stable arrhythmia detection and ECG monitoring, verify proper electrode placement, lead, waveform size, and filter mode selection. If not properly selected, it may cause erroneous detection.
- The threshold level for arrhythmia detection changes with ECG waveform size. Set a proper waveform size for monitoring.
  - When the ECG waveform size is x1/4, x1/2, or x1, the arrhythmia detection level is 250 μV.
  - When the ECG waveform size is x2 or x4, the arrhythmia detection level is 150 μV.
- The leads for arrhythmia detection, central monitor display, printing are fixed as ECG1 and ECG2. Set the most appropriate leads with high QRS for ECG1 and ECG2, especially for arrhythmia detection. If the QRS amplitude for the set lead is low, it may cause erroneous arrhythmia detection.
- In ESIS Mode, artifacts such as electrosurgical noise or EMG can be largely reduced, but QRS amplitude attenuation, waveform distortion, or ST segment change may occur compared with other filter modes.

- The ESIS mode cannot completely reduce the electrical noise, and may erroneously detect the pacemaker spike. This mode should be selected only when a high frequency noise largely affects the HR measurement.
- There are some cases when the 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 the pacemaker pulse detection.
- 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.
- When a spontaneous QRS and pacemaker pulse overlap (ex. fusion beat, etc.), QRS detection cannot be performed properly. In this case, the heart rate is degraded.
- If a pacemaker pulse is continuously detected due to AC frequency interference, QRS detection will be suspended and the heart rate will be reduced. Arrhythmia will not be detected either.

⚠ CAUTION Precautions about the ST Measurement

- The ST algorithm has been tested for accuracy of the ST segment data. The significance of the ST segment changes need to be determined by a clinician.
- For the lead which the electrode is detached, the reference waveform setup cannot be performed. Check if the electrode is appropriately attached, and perform the setup again.

⚠ CAUTION Precautions about the SpO_2 Monitoring

- Use only the sensor/relay cable specified by Fukuda Denshi. Otherwise, it may cause measurement error.If the sensor is damaged, stop using it.
- If the nail is rough, dirty, or manicured, accurate measurement will not be possible. Change the finger or clean the nail before attaching the sensor.
- If irritation such as skin reddening appears with the sensor use, change the attachment site or stop using the sensor.
- Do not apply the sensor too tight. At the same time, check the blood flow constantly so that congestion is not generated at the peripheral site.
- Do not use tape to attach the sensor.
- Even attachment for a short duration may inhibit the blood flow and generate compression necrosis or burn injury. Also, blood flow inhibition may prevent correct measurements.
- Check the sensor attachment site constantly in every 4 hours when probes or reusable sensor are used, and at least every 8 hours when single patient use sensors are used. Be especially careful of a patient with bad perfusion. If the sensor attachment position is not changed constantly, skin irritation or skin necrosis due to compression may be developed. For the patient with bad perfusion, check the sensor attachment position at least every 2 hours.
- As skin for neonate, premature infant is immature, change the sensor attachment site more frequently depending on the condition.
- Direct sunlight to the sensor area can cause a measurement error.Place a black or dark cloth over the sensor if using in direct sunlight.
- When not measuring, unplug the relay cable and sensor from the SpO_2 connector. Otherwise, the outside light may affect to falsely display measurements.
- The pulse wave is normalized for SpO_2 measurement, and does not indicate perfused blood volume. Check proper probe attachment by observing the pulse wave.
- Precautions for Reusable Sensors
  The light-emitting part of the sensor should be over the root of the fingernail or as instructed per the related sensor instruction manual. Do not insert the finger too far into the sensor as it may hurt the patient. For details, refer to the SpO_2 sensor instruction manual.
- Precautions for Single-Patient-Use Type Sensors
  The sensor can be reused on the same patient as long as the adhesive tape attaches without slippage. But do not reuse on other patients to avoid cross contamination. It is intended for single patient use only. For details, refer

to the SpO_2 sensor instruction manual.

- If "---" is displayed for the SpO_2 numeric data, make sure that the sensor is properly attached.
- Measuring on a limb with NIBP cuff, arterial catheter, or intracatheter may result in incorrect measurement.
- Venous congestion may cause under reading of actual oxygen saturation. Therefore, assure proper venous outflow from monitored site. Sensor should not be below heart level (e.g. sensor on hand of a patient in a bed with arm dangling to the floor).

⚠ CAUTION Precautions about the NIBP Monitoring

- Do not apply the NIBP cuff to site of injury. An injury may be worsened by the measurement.
- Do not apply the NIBP cuff to the arm on side treated axillary lymph nodes dissection. It may lead to lymphatic edema by the cuff pressure.
- Measuring on a limb with SpO_2 sensor, arterial catheter, or intracatheter may result in incorrect measurement.
- An operator must not get away from a patient during the NIBP measurement. However, when getting away from the patient is necessary, do not activate the Alarm Suspend and Silence functions in order not to miss any sudden changes in the patient's condition.
- Pay attention when measuring the NIBP of patient with bleeding disorders or hyper coagulation. The cuff inflation may cause petechia or circulatory failure by the blood clot.
- For the following situation, measurements will be terminated.
  - When the measurement time has exceeded 160 seconds for adult and child, 80 seconds for neonate.
  - When the inflation value has exceeded 300mmHg for adult, 210mmHg for child, and 150mmHg for neonate.
- If used with the incorrect patient classification, 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.
- The continuous measurement and 1-minute interval measurement will automatically stop after 12 minutes (maximum 15 minutes).
- If the mean MAP display is set to OFF, the MAP alarm will not be generated. Also the MAP data will not be displayed for the tabular trend or the NIBP list.

⚠ CAUTION Precautions about the BP Monitoring

- Do not reuse / re-sterilize the disposable type transducers.
- If using a reusable blood pressure transducer, disinfect it according to the manufacturer's guidelines.
- The long-term use of the blood pressure transducer, tube and catheter may increase the risk of infection. Perform periodic replacement with new one. The guidelines of the CDC (Disease Control and Prevention) recommend replacing within 96 hours.
- If the ambient temperature of the blood pressure transducer has changed greatly, the zero balance may cause the drift. Perform the zero balance again.
- An operator must not get away from a patient during the BP measurement. However, when getting away from the patient is necessary, do not activate the Alarm Suspend and Silence functions in order not to miss any sudden changes in the patient's condition.
- Be sure to perform Daily Check. Use of faulty equipment might harm the patient or operator.
- If the Equipment Status Alarm occurs or if you feel the unusual operation of the equipment, perform the inspections to confirm the safety or contact our service representative.
- If the transducer get disconnected, pay attention that the metal part of the transducer does not get in touch with any metal parts of the bed or any conductive parts. Also, the operator should not touch the conductive parts with bare hands. Otherwise, it may result in electric shock to the patient and/or operator.
- When the power is turned ON, the BP value will not be displayed until zero balance is performed. Make sure to perform the zero balance. Once the zero balance is performed, the zero balance information will be maintained, and the BP value will be displayed.
- Each time the blood pressure transducer or tubing is replaced, the zero balance procedure is required to ensure

accurate measurements.

- The zero balance procedure is required for the following case.
  - When starting the measurement.
  - When the position of the heart has changed due to body movement.
  - When the position of the transducer 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.
- Note that Systolic Pressure (SYS) = Peak Systolic Pressure (PSP) for the graphic trend, data base, and alarm setup.
- When ECG is not measured, Peak Diastolic Pressure (PDP) cannot be calculated.
- The undisplayed BP data (SYS/DIA/Mean) will not generate a BP alarm or be displayed in the tabular trend. Select the appropriate display type according to the monitoring purpose.

⚠ CAUTION Precautions about the CO_2 Monitoring (HCP-810/HCP-820)

- Conduct CO_2 calibration for the following case.
  If the CO_2 gas calibration is not performed at a specified interval, CO_2 measurement accuracy may be affected and also subsequent gas calibration may not be possible.
  - When the accumulated measurement time exceeds 1,200 hours from the first use.
    However, if the first calibration was performed before the accumulated measurement time reaches 720 hours, another calibration is required when the accumulated measurement time exceeds 1,200 hours from the first calibration.
  - When 12 months has elapsed or the accumulated measurement time has exceeded 4,000 hours from the previous calibration.
  - When $EtCO_2$ 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 $EtCO_2$ was not measured for a while.
- Perform the calibration 5 minutes after turning ON the power on the HCP-810/HCP-820.
- Do not disconnect the sampling tube during calibration. If disconnected, calibration will cease.
- Dispose of calibration gas according to the regulation of each medical institution.
- Microstream® $EtCO_2$ sampling tubes are designed for single patient use, and are not to be reused. Do not attempt to clean, disinfect, sterilize or flush any part of the sampling tube as this can cause damage to the monitor or lead to cross-infection.
- Dispose of sampling tubes according to standard operating procedures or local regulations for the disposal of contaminated medical waste.
- Before use, carefully read the Directions for Use for the Microstream® $EtCO_2$ sampling tube.
- Only use Microstream® $EtCO_2$ sampling lines to ensure the monitor functions properly.

⚠ CAUTION Precautions about the CO_2 Monitoring (HPD-810/HPD-820)

- The airway adapter should be attached with the thicker side facing to the patient. If attached oppositely, it may damage the CO_2 sensor or airway adapter.
- Dispose of calibration gas according to the regulation of each medical institution.

⚠ CAUTION Precautions about the Alarm

- Alarm messages will be displayed according to the priority. (Level S > Level H > Level M > Level L> Level N)
- For the same alarm level, the alarm message for the newer alarm will be displayed.
- The arrhythmia alarm message other than Tachy, Brady, Ext Tachy, Ext Brady will continue to be displayed for 30 seconds after the alarm is resolved.
- When "LEAD OFF", "Check Electrodes" is displayed, HR alarm or arrhythmia alarm will not function. 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.

- For the HPD-810/HPD-820 and HCP-810/HCP-820, the CO_2 measurement range is 0 to 99 mmHg/0 to 13.3 kPa, and the upper $EtCO_2$ alarm will not generate if the upper alarm limit is set to 100 mmHg/13.4 kPa and above.
- Whether to use the SpO_2 second alarm function and its threshold selection should be based on the patient's clinical indication/portent and medical evaluation.
- If the SpO_2 alarm and second alarm setup is set to [OFF], the second alarm integral value will be set to 0.
- Pay attention not to set the alarm volume too low to avoid missing any important alarms.
- On a wired network, the alarm generated on the bedside monitor will be output to the network with a maximum delay of 1 second, and to the central monitor with a total delay of 2.5 seconds.
- On a wireless network, the alarm generated on the bedside monitor will be output to the network with a maximum delay of 2 seconds, and to the central monitor with a total delay of 3 seconds to 12 seconds.
- If the same or similar equipments with different alarm settings are used in the same facility or same department, pay attention not to misjudge the alarms.

⚠ CAUTION Precautions about the System Setup

- When the waveform and numeric data display for each parameter is set to OFF, the alarm and trend input will be also suspended.
- If the HR/PR source is set to [BP], and if BP waveform/numeric data is set to [Disp. OFF], the PR value will not be displayed.
- If the HR/PR source or RR source is set to [SpO2], and if SpO2 parameter is set to [Disp. OFF], the HR and RR parameter will not be displayed.
- If the RR source is set to [CO_2/GAS], and if CO_2 waveform/numeric data is set to [Disp. OFF], the RR value will not be displayed.
- If the time/date is not correctly set, or changed during monitoring, malfunction may occur with NIBP measurement, periodic printing, trend, NIBP list data, and age calculation from the birth date.

⚠ CAUTION Precautions about the Patient Admit/Discharge

- If monitoring of a new patient is started without discharging the previous patient, data of the new patient will be added to the data of the previous patient which will result in inaccuracy.
- The user mode setting (alarm/display configuration) will remain effective even when the power is turned OFF or when the patient is discharged. Before monitoring, make sure the current user mode is suitable for the patient's condition.
- Resuming monitoring will also resume the alarm in suspension.

⚠ CAUTION Precautions about the SD Card

- Use only the specified SD card.
- Use only the SD card formatted on this equipment.
- Make sure to power cycle the system after the setup data is read from the SD card.
  By power cycling the system, the read data will become effective.
- Do not leave the SD card in reach of patients or infants.

⚠ CAUTION Precautions about the Maintenance

- When cleaning the touch panel, never use strong-acidic cleaning solution.
- To clean the touch panel, use an optional cleaning cloth, eyeglass cleaning cloth, soft cotton cloth, or non-woven cloth (pulp, rayon, polyethylene, etc.).
- Clean the equipment frequently so stains can be removed easily.
- To prevent injury, it is recommended to wear gloves when cleaning the equipment.
- Pay attention not to allow chemical solution to enter the equipment or connectors.

- Do not use organic solvents, thinner, toluene or benzene to avoid damaging the resin case.
- Do not polish the equipment with abrasive or chemical cleaner.
- When disinfecting the entire room using a spray solution, pay close attention not to get any solution into the equipment or connectors.
- Use only neutral detergent to clean the equipment. The surface resin coating may damage, resulting in discoloration, scratches, and malfunction.
  Example:
  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
- Do not open the housing.
- Do not allow alcohol or other liquids to enter the equipment.
- Replace the periodic replacement parts periodically as specified.

Wired Network (DS-LANII/ DS-LANIII)

⚠ WARNING

- Do not connect unspecified device to the wired network.
- 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

- 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.
- On the DS-8007 system, the following settings are saved on the AC Unit (DSA-81).
  Room ID, Bed ID, DS-LAN II/III Setup, Pat. ID Transmission Start Position, Hemodynamic Data Synchronization, CO_2(mmHg) Upper Limit of Transmission
- On the AC Unit (DSA-81), the default setting of Bed ID is "000". If connected to a wired network with the bed ID unchanged, monitoring on the central monitor will not be possible.
- 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.
- When connected to the DS-LAN II network, set the Bed ID in the range from "001" to "048" .
- When connected to the DS-LAN III network, set the Bed ID in the range from "001" to "100" .
- There are following restrictions when connecting the DS-8007 System to the wired network.
  - The BP measurement unit setting should be the same for all central monitors and bedside monitors. If the setting is different among the monitors, data such as BP waveform, BP numeric data, NIBP numeric data, NIBP list will not be transmitted.It will be treated as not measured data, and will not be displayed on the central monitor.The alarm limit setup from the central monitor cannot be performed either.
  - On the DS-LAN II network, the arrhythmia alarm of Tachy, Brady, Couplet, Pause, Trigeminy, ExtTachy, ExtBrady, RR IREG, Prolong RR, Triplet, Multiform, VENT Rhythm, Not Capt, Not Pacing, S Couplet, SVT, SVPC, S Frequent will not be transmitted.
  - On the DS-LAN II network, arrhythmia alarm of "SLOW VT" will be transmitted as "VT" .
  - On the wired network, measurement data and alarm of TEMP3 to 6 will not be transmitted. Also, the displayable waveform, numeric data, alarm differs depending on the connected central monitor.Refer also to the operation manual for the respective central monitor.
  - The PR_IBP alarm will not be transmitted to the central monitor.
  - If the "RR/APNEA alarm source" is other than [Impedance] (or, if [Auto] selects a setting other than [Impedance]), the RESP waveform will not be transmitted on a wired network.

- If the "RR/APNEA Alarm Source" setting is other than [CO_2] (Or, if [Auto] selects a setting other than [CO_2]), the CO_2 waveform will not be transmitted on a wired network.
- For the numeric data displayed as "xxx", maximum or minimum value of measurable range will be transmitted.
- The numeric data displayed as "--- " will be treated as not measured data.
- If the measurement unit of CO_2 concentration is mmHg and [99mmHg] is selected for "CO_2 (mmHg) Upper Limit of Transmission" ([Initial Settings]>[System]>[DS-LAN]), the CO_2 value of 100mmHg or above will be transmitted as 99mmHg.

- As the DS-8007 System do not have the arrhythmia template display and 12-lead ST display function, waveforms and other data will not be displayed for these displays on the central monitor connected to the DS-LAN network.
- When connected to the wired network, the time/date will synchronize with the central monitor.Even if the time/date is changed on the DS-8007 System, it will be corrected to the time/date of the central monitor.
- Depending on the central monitor model type, the ST display will be distorted if the ECG lead (ECG1 or ECG 2) is changed on the DS-8007 System system. Redrawing the ST display will return the display to normal.
- On the central monitor, the respiration waveform and RR value based on the "RR/APNEA Alarm Source" selected on this monitor will be displayed. The same parameter for the RR and apnea will be monitored on this monitor and the central monitor. However, the DS-7000 series central monitors do not support RR_SpO_2 measurement, and if RR/APNEA source is set to [SpO_2], RR value and APNEA condition will not be displayed. For details of the central monitor type and software version, refer to your nearest service representative.

Wireless Network System

⚠ 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

- A password can be set to access the channel ID setup menu to allow only the telemetry channel administrator to change the channel ID.
- Some type of wireless combinations may generate interference with other telemetry.
- Before selecting a channel, verify it will not interfere with other channels.
- Inform the supervisor of the use of telemetry channels to avoid interference with other telemetry.
- If transmitters are used in a neighboring medical facility, your facility and the neighboring facility must make agreements on the setting of the telemetry channels to prevent telemetry interference.

⚠ CAUTION Precautions about the Telemetry

- When performing telemetry 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.
- The setup of channel ID and group ID should be performed only by the telemetry channel administrator or our service representative. Users should not perform this procedure as malfunction may occur.
- When the measurement unit of BP is "kPa", corresponding waveform and numeric data will not be transmitted. When using a wireless network, use "mmHg" for the BP measurement unit.
- BP waveform with a scale above the set scale can not be properly transmitted. When transmitting the BP waveform, pay attention to the displayed BP scale.
- If the measurement unit of CO_2 concentration is mmHg and [99mmHg] is selected for "CO_2 (mmHg) Upper Limit of Transmission" ([Initial Settings]>[System]>[Telemeter]), the CO_2 value of 100mmHg or above will be transmitted as 99mmHg.

RTC and Data Backup

⚠ CAUTION

- This equipment is equipped with a built-in clock.When the power of this equipment 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.

Precautions about the Ventilator Monitoring

⚠ WARNING

- The ventilator alarm sound is set to OFF at factory default setting.
  The alarm sound can be turned ON on the Tone/Volume setup screen.
- If the DS-8007 System does not generate an alarm even though the ventilator is generating an alarm, or if any other malfunction occurs, immediately check the ventilator, this equipment, cable, and replace the cable if necessary. If the malfunction persists, stop using the equipment.
- The alarm generation on the DS-8007 System is not guaranteed if the alarm other than the specified one generates at the ventilator.
  (☞Maintenance Manual "Ventilator Alarm Input" P4-1)

⚠ CAUTION

- The ventilator operation should be performed by well-trained and authorized personnel.
- When connecting this equipment and a ventilator, use only the specified connection cable.
- Verify that this equipment and the ventilator are properly connected.
- When connecting the cable, verify that the main power of this equipment and the ventilator are OFF.
- During ventilator monitoring, if the DSA-81 is disconnected from the DS-8007, the ventilator alarm will not generate.

Precautions about the SpO_2 Sensor

⚠ DANGER Danger of Burn Injury Caused by the SpO_2 Sensor

- When monitoring SpO_2, make sure to use only the specified sensor/relay cable. If any other sensor/relay cable is used, a high temperature rise of the sensor may place the patient in danger of burns.
  If there are any questions regarding the sensor/relay cable use for SpO_2 measurements of this equipment, please contact Fukuda Denshi service representative.

Precautions about the NIBP Cuff

⚠ CAUTION

- Some of the NIBP cuffs used for this equipment contain natural rubber latex which may cause allergic reactions.
  (FDA: Medical Alert on Latex Products, "Allergic Reactions to Latex-Containing Medical Devices", Food & Drug Administration, 10903 New Hampshire Avenue, Silver Spring, MD 20993, 1991.)

Precautions about Disposing of the Equipment, Accessories, or Components

⚠ CAUTION

- When disposing of this equipment, accessories, or components, use an industrial waste distributor. Do not dispose of as ordinary waste.
- When disposing of the battery, separate it from other wastes and contact your nearest service representative.

Precautions about Transportation

⚠ CAUTION

- When transporting this equipment, pack it with specified packing materials.
  Also, transport it under appropriate environment condition.
  (☞Operation Manual "Specification" P14-1)

Monitoring after Power Failure

When the power failure is less than 30 seconds, monitoring will resume with the display mode and patient information unchanged. When the power failure is 30 seconds or more, monitoring will resume with the default display mode set by the user, or the display mode which was last set.

HCP-810/HCP-820, HPD-810/HPD-820 will start up from the warm-up mode. The warm-up time differs for each unit.

To Prepare for Emergency Use

Accessories/Optional Accessories

- The ECG electrodes are consumable products. Always prepare extra supplies of electrodes.
- Verify that there is no wire break on the patient cable once a week.

Battery Pack

- Even if the battery pack is not in use, the remaining capacity decreases due to self-discharge.Make sure to verify once a week that the battery pack is fully charged.
- To fully charge the empty battery pack, it takes 8 hours during operation, and 4 hours when the power is OFF and AC cable is connected.
- The performance of the battery deteriorates with repeated use. To ensure performance of the battery, it is recommended to replace it once a year.

Electromagnetic Compatibility

The performance of this equipment under electromagnetic environment complies with IEC 60601-1-2:2007.

⚠ CAUTION

Do not use any unauthorized equipment or cables as they may not comply with the EMC standard.

Precautions for Safe Operation under Electromagnetic Influence

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 electromagnetic influence and take appropriate countermeasures.

The following are examples of the common cause and countermeasures.

⚠ DANGER Static Electricity

In a dry environment (room), static electricity is likely to occur.Take the following countermeasures.

- Both operator and patient should remove any static electricity before entering the room.
- Humidify the room.

⚠ WARNING Cellular Phone

- 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.

⚠ CAUTION Lightning

A lightning nearby may induce excessive voltage to the equipment.If any danger is suspected;

- Use the uninterruptible power supply system.
- Use the battery.

⚠ CAUTION High frequency noise interference from other device through the power outlet

- Check where the noise is originated and remove it using filtering device, etc.
- Stop using the device that is originating the noise.
- Use other power outlet.

EMC Guidance

This device complies with the Safety Standard IEC 60601-1-2:2007. 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.

Also, if this equipment is installed close to, or stacked with other equipment, malfunction may occur. Make sure to verify that the equipment operates properly in a used location.

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 technical engineer.

The following is the information relating to EMC (Electromagnetic Compatibility).

(When using this equipment, verify that it is used within the environment specified below.)

This equipment complies with IEC 60601-1-2:2007 for the following system configuration.

- Main Unit: DS-8007
- AC Unit: DSA-81
- CO_2 Gas Unit: HCP-820 or Gas Unit I/F: HPD-820
- Recorder Unit: HR-800
- BISx I/F Unit: HBX-800
- BISx Module: BISx
- Lithium-Ion Battery Pack: BTO-008

❑Compliance to the Electromagnetic Emissions

The DS-8007 System is intended for use in the electromagnetic environment specified below. The customer or the user of the DS-8007 System should assure that it is used in such an environment.

Guidance and Manufacturer's Declaration - Electromagnetic Emissions		
Emissions Test	Compliance	Electromagnetic Environment - Guidance
RF Emissions CISPR 11	Group 1	The DS-8007 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	The DS-8007 System is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network which supplies buildings used for domestic purposes.
Harmonic Emissions IEC 61000-3-2	Class A	
Voltage Fluctuations/ Flicker Emissions IEC 61000-3-3	Complies	

❑Compliance to the Electromagnetic Immunity (1)

The DS-8007 System is intended for use in the electromagnetic environment specified below. The customer or the user of the DS-8007 System should assure that it is used in such an environment.

Guidance and Manufacturer's Declaration - Electromagnetic Immunity			
Immunity Test	IEC 60601-1-2 Test Level	Compliance Level	Electromagnetic Environment - Guidance
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: power supply lines ±1kV: input/output lines	±2kV: 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_T* (>95% dip in U_T) for 0.5 cycles 40% U_T (60% dip in U_T) for 5 cycles 70% U_T (30% dip in U_T) for 25 cycles <5% U_T (>95% dip in U_T) for 5 sec.	<5% U_T (>95% dip in U_T) for 0.5 cycles 40% U_T (60% dip in U_T) for 5 cycles 70% U_T (30% dip in U_T) for 25 cycles <5% U_T (>95% dip in U_T) for 5 sec.	Mains power quality should be that of a typical commercial or hospital environment. If it is required to continuously operate the DS-8007 System during power failure, it is recommended to operate on an uninterrupted 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.

*: U_T is the AC mains voltage prior to application of the test level.

❑Compliance to the Electromagnetic Immunity (2)

The DS-8007 System is intended for use in the electromagnetic environment specified below. The customer or the user of the DS-8007 System should assure that it is used in such an environment.

Guidance and Manufacturer's Declaration - Electromagnetic Immunity			
Immunity Test	IEC 60601-1-2 Test Level	Compliance Level	Electromagnetic Environment - Guidance
			Portable and mobile RF communications equipment should be used no closer to any part of the DS-8007 System, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended Separation Distance
Conducted RF IEC 61000-4-6	3Vrms 150kHz to 80MHz	3Vrms	$d = 1.2\sqrt{P}$
Radiated RF IEC 61000-4-3	3V/m 80MHz to 2.5GHz	3V/m	$d = 1.2\sqrt{P}$ 80MHz to 800MHz $d = 2.3\sqrt{P}$ 800MHz to 2.5GHz Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey*1, should be less than the compliance level in each frequency range*2. Interference may occur in the vicinity of equipment marked with the following symbol: 

Note 1: At 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.

*1: Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast can not 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-8007 System is used exceeds the applicable RF compliance level above, the DS-8007 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-8007 System.

*2: 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-8007 System

The customer or the user of the DS-8007 System can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the DS-8007 System as recommended below, according to the maximum output power of the communications equipment.

Recommended Separation Distances between Portable and Mobile RF Communications Equipment and the DS-8007 System			
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.			

Chapter 1 General Description

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Composition of the System

The DS-8007 System is composed of the main unit and option unit.

Lineup of Main Unit

Model Type	Fixed Parameter	SpO_2 Unit	Multiparameter Measuring Items	Analog Output
DS-8007N	ECG (Max. 12-lead) , RESPx1, NIBPx1, SpO_2 x1, RR_SpO_2x1, TEMPx2	Covidien	Multiparameter Connector 2 ports TEMPx2 BPx2 COx1 Select from above. TEMP: Max. 6 (including the fixed 2 channels.) BP: Max. 4	Possible
DS-8007M	ECG (Max. 12-lead) , RESPx1, NIBPx1, SpO_2 x1, TEMP x2, PI, SpMet x1*, SpCO x1*, SpHb x1*, SpOC x1*, PVI x1*	Masimo		

*: SpMet, SpCO, SpHb, SpOC, and PVI measurements are optional functions.

[Lineup of Option Unit]

Model Type	Measuring Items	Remarks
DSA-81 (AC Unit)	-	LAN Connection: DS-LAN II, DS-LAN III HR-800 Connection: Possible External Device Connection: Possible
DSA-82 (DS-8007 Adapter)	-	Connects the DS-8007 series to the host monitor.
HR-800 (Recorder Unit)	-	50 mm Roll Paper
HCP-810 (CO_2 Gas Unit)	$EtCO_2$	Sidestream Method Connects to the AUX connector
HCP-820 (CO_2 Gas Unit)	$EtCO_2$	Sidestream Method Connects to the CO_2 I/F connector on the rear side of the DS-8007
HPD-810 (CO_2 Gas Unit I/F)	$EtCO_2$	Mainstream Method Connects to the AUX connector
HPD-820 (CO_2 Gas Unit I/F)	$EtCO_2$	Mainstream Method Connects to the CO_2 I/F connector on the rear side of the DS-8007
HBX-800 (BISx I/F Unit)	BIS	Connects to the BISx Module

Host Monitor that can be Connected

Model Type	Remarks
DS-8400 system	By connecting to the host monitor, this monitor will function as Super Unit. For details, refer to the operation manual of the host monitor.
DS-8500 system	

Features

- By using the multiparameter amplifier, the DS-8007 is capable of monitoring parameters in combination of BP (max. 4 ch.), temperature (max. 6ch.), and CO (max. 1ch.). In addition to ECG, respiration, SpO_2 (pulse wave), BP, NIBP, temperature and CO, the measurement of CO_2 concentration is also available as optional function.
- This system uses pulse oximetry to measure and display functional oxygen saturation in the blood. There are two model types with different built-in SpO_2 modules, which are Covidien/Nellcor and Masimo.
- SpCO, SpMet, SpHb, PVI and SpOC are optional parameters which can be measured on the DS-8007M with the built-in Masimo SpO_2 module.
- RR_SpO_2 can be measured on the DS-8007N with the built-in Covidien SpO_2 module.
- Maximum of 12 waveforms can be displayed. Also, various displays such as enlarged numeric data and trend can be selected according to monitoring conditions.
- The operation can be performed with the touch panel and fixed key. Also, frequently used keys can be programmed as user key.
- Fixed keys are equipped for improved operability during life-threatening situations.
- Option units can be additionally attached to this patient monitor.
- The alarm indicator notifies the alarm with different flashing colors corresponding to the alarm level so that the users can easily identify the alarm level of the generating alarm.
- Battery operation is possible, and can therefore be used as a transport monitor.
- By connecting the ventilator to Status II port on the DS-8007, the ventilator alarm can be notified to the central monitor via telemetry system or wired network. The following ventilators can be connected.
  - SV-300/300A
  - SERVO-i, SERVO-s, SERVO-U/n/air
  - PURITAN-BENNETT Ventilator 740/760, 840
  - Evita 4/Evita XL/Evita 2 dura
  - Velia, Ultra, Astral
- Wired network (DS-LANII/DS-LANIII) construction is possible.
  DS-LAN II is a network based on 10BASE-T with transmission speed of 10 Mbps and maximum transmission distance of 100 m. DS-LANIII is a network based on 100BASE-TX with transmission speed of 100 Mbps and maximum transmission distance of 100 m.
- Wireless network construction is possible using the optional telemetry transmitter unit.
- The following operation is possible by using the optional Bidirectional Wireless Communications Module, TCON (HTC-702 (FA)).
  - Transmits the DS-8007 measurement data to the central monitor.
  - Alarm settings can be synchronized.
  - The NIBP measurement can be started from the central monitor.
- By using the optional Recorder Unit (HR-800), the measurement data can be printed.
- By connecting the Gas Unit I/F (HPD-820) or CO_2 Gas Unit (HCP-820) to the CO_2 I/F connector on the DS-8007, CO_2 concentration can be measured.
  By connecting the Gas Unit I/F (HPD-810) or CO_2 Gas Unit (HCP-810) to the AUX connector, CO_2 concentration can be measured.

- By connecting the BISx I/F Unit and BISx Module to the AUX connector on the DS-8007, BIS data can be measured.
- When connected to the host monitor, this equipment will function as an input module.

Menu Configurations

The menu configuration of the system is as follows.

❑Menu Screen

There are 2 types of menu display, menu list and simple menu.

- Menu List

The menu list is displayed when simple menu display is OFF.
The menu screen is a group of shortcut keys to jump to each menu.
The menu is composed of the following 5 groups and can be accessed from the menu screen.

Function Groups	Displayed Menu
Admit/Discharge	Admit/Discharge
Alarm	Main menu of alarm setup The alarm setup for the followings can be performed: Basic, Circulatory, Resp, Arrhy., ST, List, Detail Setup
Parameter	Main menu of parameter setup The parameter setup for the followings can be performed: ECG, RESP, NIBP, BP, SpO_2, TEMP, CO_2, BIS, Sp* CO_2, BIS, Sp* (DS-8007M) are optional.
Function	Main menu of function setup The function setup for the followings can be performed: Graphic Trend, Tabular Trend, Recall, Full Disc., ST, Zoom Wave, Alarm History, 12-Lead Analysis, ECG Waveform, OCRG, CO, Hemodynamics, Lung Function, Other Bed, MPDR
Setup	Main menu of system configuration setup The detail setup for the followings can be performed: Display Config., Manual Printing, Auto Printing, Tone/Volume, Time/Date, Color, Brightness, Night Mode, Initial Settings, Maintenance

REFERENCE

- Other than the "Initial Settings" and "Maintenance", the items to be displayed on the menu screen can be customized by groups.

- Quick Menu (☞"Quick Menu" P3-20)

The quick menu is displayed when quick menu display is ON.
The quick menu is a group of shortcut keys to jump to each window. 5 shortcut keys can be set.
The [Menu List] key display is fixed. Pressing the [Menu List] key will display the menu list explained above.

REFERENCE

- 5 items to be displayed on the quick menu can be customized.
- In this manual, the operation procedure is explained for the case when menu list is displayed (when quick menu display is OFF). If quick menu is displayed, press [Menu] > [Menu List] to display the menu list and follow the procedure explained in this manual.

❑Admit/Discharge

Admit/Discharge	Mode Selection
	ID, Name, Classification, Sex, Team, Birth Date, Age, Height, Weight, BSA, Blood Type (ABO, Rh), Pacemaker, Impedance Meas., Admit Date/Time
	Full Disclosure Waveform
	Monitor Suspend
	Discharge
	Restore Patient Information

❑Alarm

Basic	The parameters to be displayed are selectable.
	Resume All Alarm Sound, Mode Select, Print Setup, All Auto, Alarm Suspend
Circulatory	Alarm setup for HR, Ext Tachy, Ext Brady, SpO_2, Ext SpO_2, PR_SpO_2, NIBP (S, D, M), PR_IBP, BP1 to BP4 (S, D, M), T1 to T6, Tb, SpCO, SpMet, SpHb, BIS
	Resume All Alarm Sound, Mode Select, Print Setup, All Auto, Alarm Suspend
Respiratory/Gas	Alarm setup for RR, Apnea, $EtCO_2$, $InspCO_2$
	Resume All Alarm Sound, Mode Select, Print Setup, All Auto, Alarm Suspend
Arrhythmia Alarm	Alarm setup for each arrhythmia
ST	ST Alarm Setup, Waveform Review (ST), Update Ref. Wave, Reference Point Setup, Measurement Point Setup
List	Lists alarm ON/OFF status and lower/upper limits for each parameter, Meas. List/All List, Print Setup, Recall Setup
Detail Setup	Alarm Suspend Time, Alarm Silence Time, Alarm Silence, Alarm Sound Suspend, Status Alarm Control, Alarm Limit Display

❑Parameter

ECG			Arrhythmia Learn, Arrhythmia Alarm Setup, ST Setup, Detail Setup
			Size/Lead/Electrode Status, Optimize Size, Alarm Assist, Display ON/OFF, HR/PR, HR
			Detail Setup Filter, Synchronized Mark/Tone, Pacemaker, Pacemaker Pulse, Pace Pulse Mask Time, HR Average, HR Delay, ECG Drift Filter, AC Filter, Auto Lead, 3Lead Override, ST/VPC/ Arrhy. Alarm Display, Analog Output, ECG waveform display during Lead-OFF, Chest Lead-OFF
RESP			Size, Common Setup (RR Synchronized Mark, RR/Apnea Alarm Source), RR, Apnea, Alarm Assist, Display ON/OFF
			Detail Setup CVA Detection, Impedance Measurement, Impedance Detection Lead, Impedance Detection Level
NIBP			NIBP Auto Mode, NIBP S, M, D, Alarm Assist, Cancel Error, Detail Setup
			Detail Setup Patient Classification, Dyna Alert (DS-8007N only), Oscillograph, PR Display, NIBP Erase Time, Measure at Alarm, Quick Measurement, Sight Inflation, Mean BP Display, End Tone, User Interval, Auto Mode with Start/Stop Key, Time Display, Periodic Measurement Starting Time
BP			BP1, BP2, BP3, BP4, PR_IBP Zero Balance, Scale, Label, BP S, M, D Alarm Assist, HR/PR, Display ON/OFF, Detail Setup
			Detail Setup Synchronized Mark/Tone, Display Type, Wave Filter, Mean Wave, Respiration Filter, Analog Output, Alarm during NIBP, ART Catheter Check Message
SpO_2			Size, Alarm Assist, Display ON/OFF, HR/PR, SpO_2, Ext SpO_2, PR_ SpO_2, Detail Setup
	DS-8007N		Detail Setup Alarm during NIBP, Synchronized Mark/Tone, Second Alarm
	DS-8007M		Detail Setup Alarm during NIBP, Synchronized Mark/Tone, SpO_2 Averaging, Pulse Sensitivity, FAST SAT, PI Display, Signal IQ Wave, PI/PVI/SpOC Display Selection
Sp*	DS-8007M	SpCO	SpCO, Alarm Assist
		SpMet	SpMet, Alarm Assist
		SpHb	SpHb, Averaging
	DS-8007N	RR_SpO_2	Common Setup (RR Synchronized Mark, RR/Apnea Alarm Source), Display ON/OFF, Alarm Assist, RR, Apnea
TEMP			T1T2, T3T4, T5T6, Tb, ΔT Label, T1T2, T3T4, T5T6, Tb, Alarm Assist, Display ON/OFF, Tb, ΔT (ΔT Setting)
CO_2 (Sidestream)			Scale, CO_2 Calibration, InspCO_2, EtCO_2, Alarm Assist, Suspend, Display ON/OFF, Detail Setup
			Detail Setup EtCO_2 Peak Duration
CO_2 (Mainstream)			Scale, Airway Adapter Calibration, InspCO_2, EtCO_2, Alarm Assist, Display ON/OFF, Detail Setup
			Detail Setup EtCO_2 Peak Duration, N_2O Compensation, Atmospheric Pressure, O_2 Compensation, Anesthetic Compensation
BIS			Scale, BIS, Common Setup (Short Trend 2nd Parameter, Continuous Impedance Check, Smoothing Rate, EEG Filter, Alarm Assist, Sensor Check, Trend D

SpCO, SpMet, SpHb are optional parameters.

❑Function

Graphic Trend		Latest Data, Alarm Review, Graphic Trend Group, Display Range, Setup, Print
		Setup Time Bar, Background Color, Mark, Alarm Display Selection
Tabular Trend		Latest Data, Alarm Review, Tabular Trend Group, Display Interval, Setup, Print
		Setup Time Bar, Fixed Parameters, Tabular Trend Setup
Recall		Latest Data, Alarm Review, Display Selection, Print, Select All, Setup, Delete Sel.
		Setup Time Bar, Recall Waveform, Recall Factor
Full Disclosure Waveform		Latest Data, Alarm Review, Search, Alarm Display, Setup, Print
		Setup Waveform Quantity, Displaying Waveform, Displaying Time per Line, Size/Scale, Time Bar
ST		ST Waveform, Reference Waveform, Setup, Size, Latest Data, Alarm Review, Print
		Setup Time Bar, ST Waveform
Zoom Wave (when SD card for full disclosure waveform is not inserted)		Latest Data, Alarm Review, Numeric Data, Setup, Print
		Setup Time Bar
Zoom Wave (when SD card for full disclosure waveform is inserted)		Latest Data, Alarm Review, Numeric Data, Size/Scale, User Selection, Setup, Print
		Setup Waveform Quantity, Displaying Waveform, Time Bar
Alarm History		Latest Data, Setup, Print
		Setup Time Bar, Alarm Level, Alarm Type
12-Lead Analysis		Numeric Data, Lead, Print, Setup, Start Analyze, Result
ECG Waveform Display		Numeric Data, Filter, Print, Size/Lead Selection
OCRG		Resp. Wave Size, Print, Resp. Wave (Impedance), Display Duration
CO		Setup, Edit (Hemodynamics, Average CO Input, Delete Sel.), Scale, Start, Print
Hemodynamics		New Regist., Index Display, Print
Lung Function		New Regist., Index Display, Print
Other Bed		Area Selection (All, Area 1 to 5), Alarm Sound, Alarm Display, Area Setup (All, Area 1 to 5), Bed List, Area Name/Color, Select All, Cancel All, Enter, All
		Area Selection (All, Area 1 to 5), Other Bed Alarm Silence, Waveform Selection
MPDR		Search, Graphic Trend, Tabular Trend, Full Disclosure Waveform
	Graphic Trend (MPDR)	Graphic Trend Group, Display Range, Setup, Output, Prev./Next, Edit Patient Information
		Setup Time Bar, Background Color, Mark, Alarm Display Selection
	Tabular Trend (MPDR)	TabularTrend Group, Display Interval, Setup, Output, Prev./Next, Edit Patient Information
		Setup Time Bar, Fixed Parameters, Tabular Trend Setup
	Full Disclosure Waveform (MPDR)	Search, Alarm Display, Setup, Output, Prev./Next, Edit Patient Information
		Setup Waveform Quantity, Displaying Waveform, Displaying Time per Line, Size/Scale, Time Bar
	Enlarged Waveform (MPDR)	Numeric Data, Size/Scale, Setup, Output, Prev./Next, Edit Patient Information, User Selection
		Setup Waveform Quantity, Displaying Waveform, Time Bar

❑Setup

Display Configuration	Layout, Palette, Home Display (Small) Setup, User Key, Numeric Data, Waveform, Short Trend, Detail Setup (Grid, Scale, Thickness, Clip, Fill CO_2 Waveform, BP Overlap, ST/VPC/ Arrhy. Alarm Display, Block Cascade, Alarm Limit Display, At Alarm Occurrence, Short Trend Scale, Display Parameter, Data Resolution, Short Trend Overlap, Display Duration)
Manual Printing	Basic (Printer, Waveform, Print Duration, Delay Time, Factor), 12-Lead (Wave Format, Position, Printer Auto Scale, Print Calibration, 12-Lead Waveform Format, 12-Lead Analysis Format), Other Setup (Graphic Printing, Recall Printing), Common (QRS Classific., Speed, Print Calibration, Print NIBP Data)
Auto Printing	Alarm Printing (Print, Printer, Waveform, Print Duration), Periodic Printing (Print, Printer, Periodic Interval, Waveform, Print Duration), Common (QRS Classific, Speed, Print Calibration, Print NIBP Data)
Tone/Volume	Vital Alarm Sound, Ventilator Alarm Sound, Status Alarm Sound, Tone Source, Key Sound, Other Bed Alarm Sound, Boot/Shutdown, Other
Time/Date	Time, Date
Color	Waveform/Numeric Data, Palette, User Key
Brightness	Brightness
Night Mode	Night Mode (Manual/Timer), Night Mode (ON/OFF), Detail Setup (Volume, Display, Alarm Indicator)
Initial Settings	Opens the initial settings menu. (See below.)
Maintenance	Opens the maintenance menu. (See below.)

❑Initial Settings

Alarm	-	Alarm System, Basic Alarm Parameter, Suspend Arrhy. Analysis during Noise Interference, Auto Alarm Setup, Lower Limit for Alarm Volume, Alarm Mute, Alarm Mute Reminder, HR/PR Lower Limit during Alarm Auto Setting, Alarm Threshold Limit Setup, Alarm Level, Setup, Alarm Indicator, Indicator Test, Synchronize with HR/PR
Measurement	User Label	BP, TEMP
	Unit	CO_2, BP, CVP, TEMP, ST, Height/Weight
	Other	NIBP Start 5min.early, MAP Calculation (ART, NIBP), Arrhythmia Analysis Filter, Synchronized Mark/Tone, HR/PR Source Priority, Catheter Manufacturer for CC Input
User I/F	Display/Print	Date Format, BP Alarm Increment, RR Alarm Increment, Trend Clip, BP Printing Scale, Night Mode Cancel, ST Display Lead Setup, Patient Name on the Information Display Area, Dim All Data Other than Numeric, All Window Opaque, Printer Message, Message Icon, 12-lead Analysis Filter Display, Waveform Size Display, Battery Operation, Time to Dim the Display at Power Saving Mode, Host Monitor Connection Menu, Event Manager Setup, Monitor Suspend Label, Monitor Suspend Timer, Label Setup, Key Group Setup, Shift Time (Day Shift, Twilight Shift, Night Shift), Event Label Setup
	Power ON/ Discharge	Check Discharge at Power ON, Discharge Mode, NIBP Resume Auto Mode by Manual Meas., Backup Setting at Power ON/Discharge
	Shortcut Menu	Items to be displayed on the shortcut menu can be selected.
	Key Mask	Items not to be displayed on the menu screen can be selected, or all selections can be canceled.
	Operation	Auto Hide Window, Auto Hide User Key, Swipe Setup
	Quick Menu	Menu Item Selection, Menu Color, Quick Menu (ON/OFF)
External Device	AC Unit	COM, Status II Ventilator (SV-300, SERVO-i/s, SERVO-U/n/air, PB, Evita, Velia, Ultra, Astral), Other (PC Comm., TCON, Barcode Reader, Magnetic Card Reader, BIS, PC Comm. (DS-5000), HLX)
	Magnetic Card Reader	Data digits for each patient information, Auto Reference to Central Monitor when Reading Patient ID
	Network	Printer (Network Printer), Regist, Cancel, Test Print, Central Monitor
	Status Output	Alarm Output: Alarm Level, Output Logic
	Analog Output	Analog Synchronized Signal Output, Analog Output 1, Analog Output 2, Analog Output 3 Synchronized Signal, Output Signal, Output Logic, Pulse Width
System	DS-LAN	DS-LAN Setup, Room ID, Bed ID, DS-LAN Pat. ID Transmission Start Position, Synchronize Hemodynamic Data with the Central Monitor, CO_2(mmHg) Upper Limit of Transmission
	Telemeter	Telemeter, Channel/Group ID, Telemetry Wave, CO_2(mmHg) Upper Limit of Transmission
	TCON	TCON, ID, Channel
	Other	AC Frequency, Search Patient ID
User Mode Registration		Register Monitor Mode, Register Display Mode, Change, Initialize, Change Mode Name, Set All Modes, Initialize All Modes, Link with Patient Class.
Administrator Setup	Key Lock	Key lock for each function can be set.
	Password Setup	Password for each administrator level can be registered/changed.

❑Maintenance

Maintenance	Program Version, External Media, Parts Usage Time, Install, Module Install, Test Menu

Chapter 2 Name of Parts and Their Functions

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Name of Parts and Their Functions

WARNING

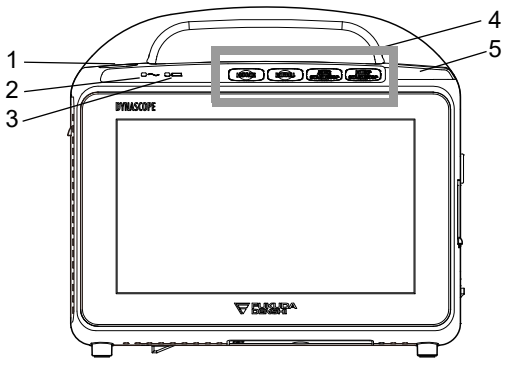
- Do not connect a unit or cable not authorized by Fukuda Denshi to any I/O connector. If done so by mistake, the equipment cannot deliver its maximum performance and the connected units may be damaged, resulting in a safety hazard.

DS-8007 Main Unit

NOTE

- The operation of fixed keys, alarm silence/alarm sound suspend key differ depending on the software version of the host monitor. When the DS-8007 is connected to this equipment via DSA-82, the DS-8007 fixed keys (MENU, PRINT START/STOP, NIBP START/STOP) and alarm silence key are enabled on the host monitor. (☞"Connecting to the Host Monitor via DSA-82" P3-21)
- When the host monitor is connected, the standby switch, HOME key, alarm indicator and alarm sound suspend key on the DS-8007 will not function.

❑Front Side



1 Standby Switch
Sets ON/OFF the standby condition.

2 Power Supply LED
Indicates the power supply status. Light will be off when the AC power is not supplied to the monitor.
Orange: Standby Mode
Green: In normal operation
Light Off: During battery operation (AC power cable is not connected.)

3 Battery Charging LED
Indicates the battery-charging status. During battery operation, the LED will not light.
Orange: Charging is in process
Green: Charging is complete
Light Off: During battery operation, or when battery is not installed, or when battery charging is ceased (due to temperature, etc.)
Flash: Battery charging error

NOTE

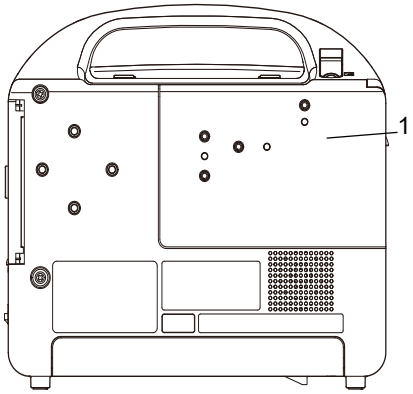
- If the battery charging LED flashes, battery charging error is occurring. Remove the battery and install it again. If the error persists, contact your nearest service representative.

4 Fixed Key
HOME Key
MENU Key
PRINT START/STOP Key
NIBP START/STOP Key

5 Alarm Indicator, Alarm Silence Key/Alarm Sound Suspend Key
Lights/blinks when the alarm generates.
Red: Level H (Urgent Alarm, Alarm Priority/High)
Yellow: Level M (Cautionary Alarm, Alarm Priority/Medium)
Blue: Level L (Status Alarm, Alarm Priority/Low)
By pressing this key during alarm generation, the alarm will temporarily silence.
When "Alarm Sound Suspend" setting is ON, the alarm sound can be suspended by holding down this key.
(☞"Detail Setup" P6-5)

❑Rear Side

1 CO_2 I/F Connector
Attaches the Gas Unit I/F (HPD-820) or CO_2 Gas Unit (HCP-820).

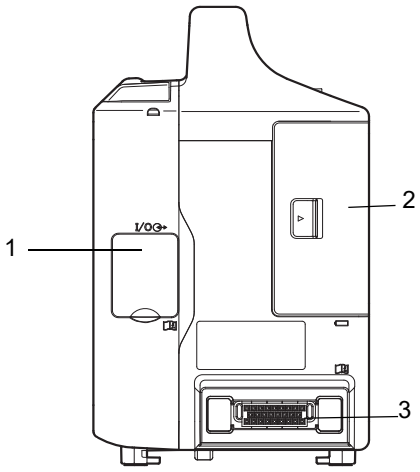


❑Right Side

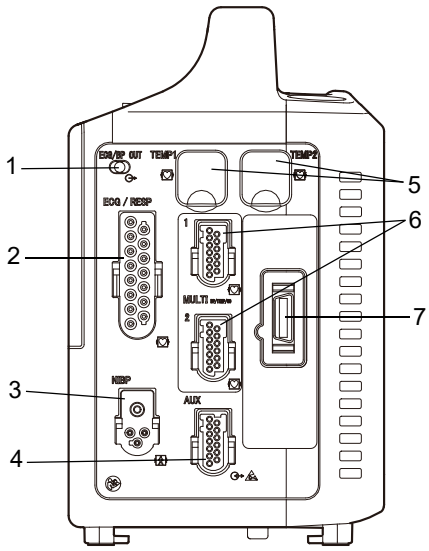
1 USB Memory Slot
Insert a USB memory.

2 Battery Cover
Stores the specified lithium-ion battery.

3 DS I/F Connector
Connects to the DSA-81 AC Unit, DSA-82 DS-8007 Adapter, or DSC-8410.



❑Left Side



1 Analog Output Connector
Outputs the ECG, BP, synchronized signal.

2 ECG Connector
Connects the specified ECG relay cable.

3 NIBP Connector
Connects the NIBP air hose.

4 AUX Connector
Connects the Gas Unit I/F (HPD-810), CO_2 Gas Unit (HCP-810), BISx I/F Unit (HBX-800).

5 Temperature Connector
Connects the TEMP sensor cable.

6 Multiparameter Connector
Connects the input cables for BP, TEMP or CO.

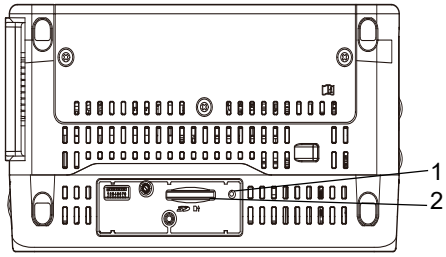
7 SpO_2 Connector
Connects the SpO_2 sensor, or relay cable (patient cable).

NOTE

- When operating as an input module by connecting to the rear side of the host monitor (DS-8400 system), standby switch, fixed key, alarm indicator will not function..

❑Bottom Side

The illustration shown on right is when the cover is removed.



1 SD Card Indicator
Lights when the SD card is accessed.

2 SD Card Slot
Card slot for the specified SD card

NOTE

- When saving the full disclosure waveform data, insert the SD card and format it. If the SD card is not inserted, the full disclosure waveform data cannot be saved.

Adapter for DS-8007: DSA-82

1 DS I/F Connector

Connects the DSA-82 to the DS-8007.

2 DS-8007/HS-8000 Switch

This is a switch to change between DS-8007 and HS-8000.The selected unit and the host monitor will communicate.The LED for the selected unit will light in green.Switching to the left will communicate with the DS-8007.Switching to the right will communicate with the HS-8000.

3 Lock Lever

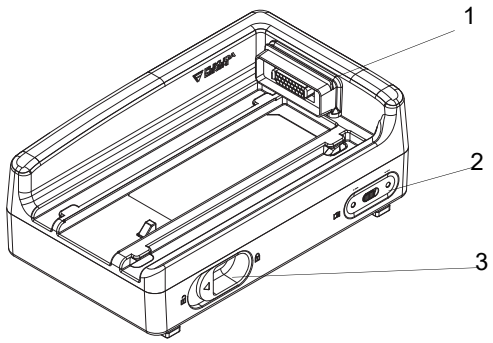
Lever to release the DS-8007 series from the DSA-82

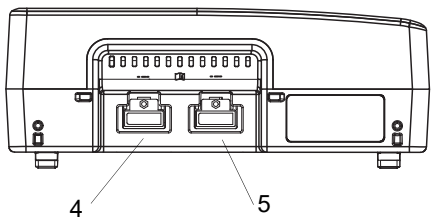
4 Host Monitor Connector

Connects the host monitor.

5 HS-8000 Connector

Connects the HS-8000 via HSA-80.





Recorder Unit: HR-800

❑Front Side

1 Power Supply LED

Indicates the power ON/OFF status.

2 Printing Indicator

Lights during printing.

3 Print Key

Starts/stops the printing.

4 Paper Feed Indicator

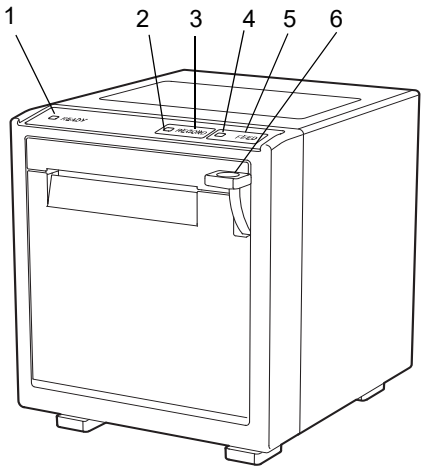
Lights during paper feeding.

5 Paper Feed Key

Feeds the paper.

6 Open/Close Lever

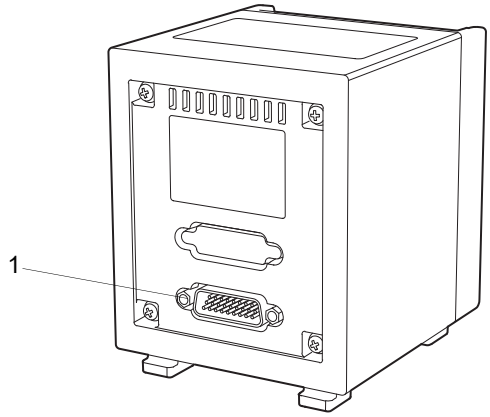
Press the lever to open the paper holder.



❑Rear Side

1 Connector

Connects to the DSA-81.



AC Unit: DSA-81

❑Front Side

1 DS-IF Connector

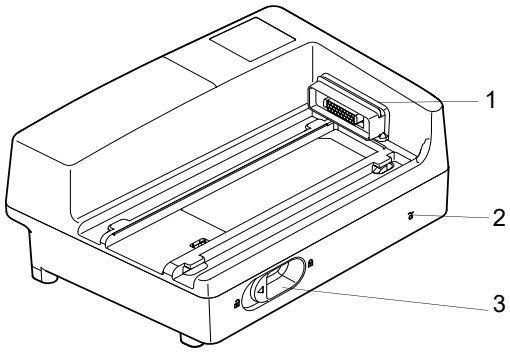
Connects the DS-8007.

2 Power Supply LED

Green: In normal operation
Light Off: During battery operation (AC power cable is not connected.)

3 Release Lever

Slide the lever to the left to remove the DS-8007.



❑Rear Side

1 U-LINK Connector

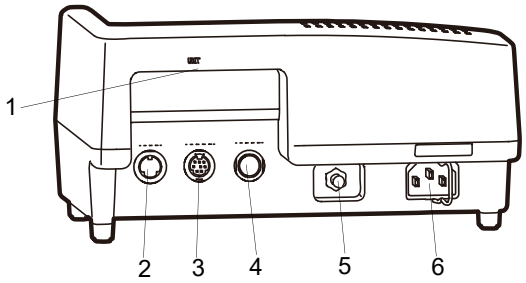
Connects the Recorder Unit (HR-800).

2 Serial Connector

Connects the specified equipment.

3 Status Input/Output Connector

Connects the specified equipment.



4 DS-LAN Connector

Connects to the wired network using the branch cable (CJ-520/CJ-522).

5 Potential Equalization Terminal

Used for equipotential connection.

6 Power Supply Connector

Connects the power cable.

CO_2 Gas Unit: HCP-810

❑Front Side

1 Power Supply LED

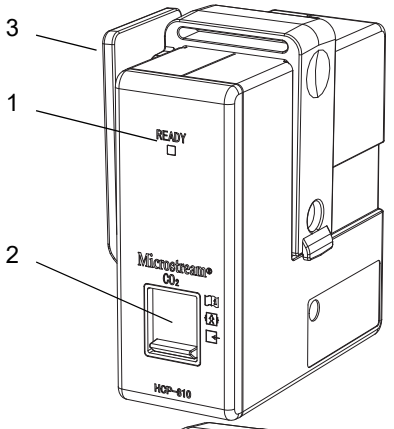
Indicates the power ON/OFF status. It will light in green while the power is ON.

2 Sampling Tube Connector

Connects the sampling tube manufactured by Covidien.

3 Clip

Attaches to the bedside rail or headboard for bedside use.



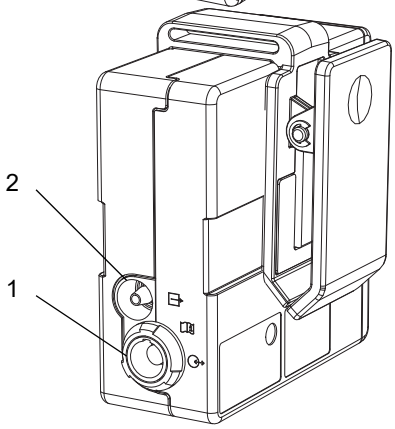
❑Rear Side

1 AUX Connector

Connects to the AUX connector of DS-8007 with AUX connection cable.

2 Exhaust Hole

Connects the gas exhaust system and exhausts sampling gas.



NOTE

- The usable AUX connection cable differs depending on the connecting equipment. For the combination of the AUX connection cable and the connecting equipment, refer to the section on "Optional Accessories".

⚠ CAUTION

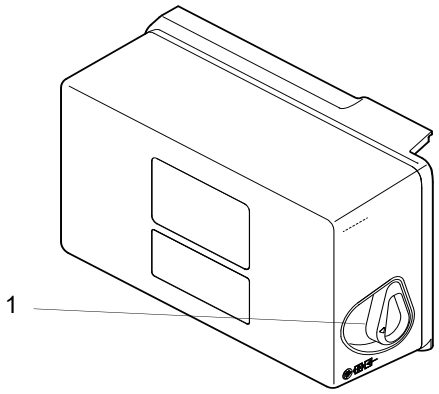
- Do not block the exhaust hole as it may cause damage to the equipment.

CO_2 Gas Unit: HCP-820

❑Front Side

1 Sampling Tube Connector

Connects the sampling tube manufactured by Covidien.



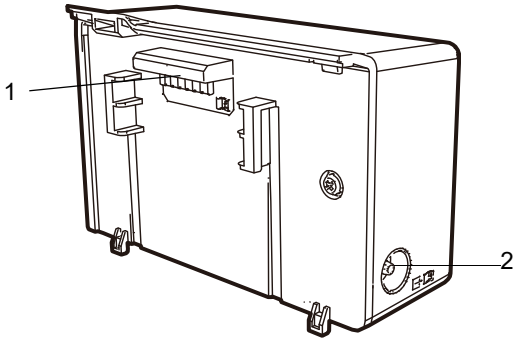
❑Rear Side

1 Gas Unit Connector

Connects to the CO_2 I/F connector of the DS-8007.

2 Exhaust Hole

Connects the gas exhaust system and exhausts sampling gas.



⚠ CAUTION

- Do not block the exhaust hole as it may cause damage to the equipment.

Gas Unit I/F: HPD-810

❑Front Side

1 Power Supply LED

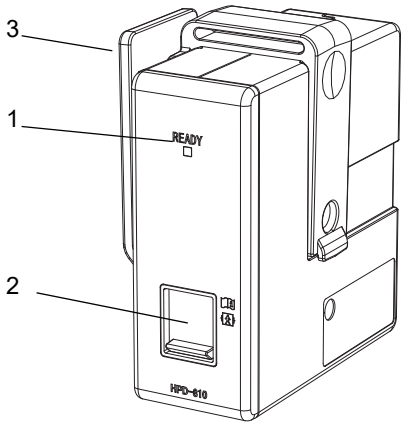
Indicates the power ON/OFF status. It will light in green while the power is ON.

2 CO_2 Connector

Connects to the Capnostat 5 (Philips).

3 Clip

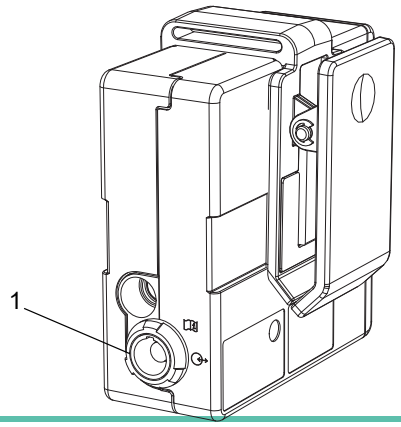
Attaches to the bedside rail or headboard for bedside use.



❑Rear Side

1 AUX Connector

Connects to the AUX connector of DS-8007 with AUX connection cable.



NOTE

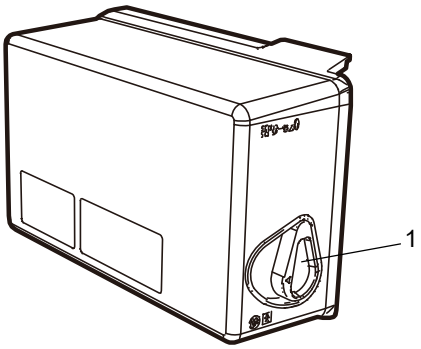
- The usable AUX connection cable differs depending on the connecting equipment. For the combination of the AUX connection cable and the connecting equipment, refer to the section on "Optional Accessories".

Gas Unit I/F: HPD-820

❑Front Side

1 CO_2 Connector

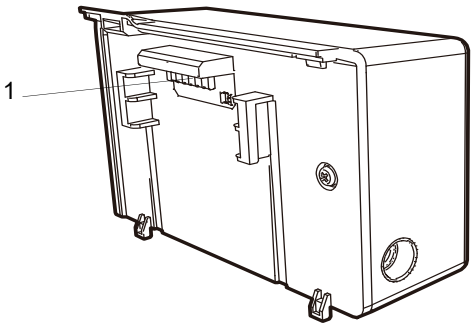
Connects to the Capnostat 5 (Philips).



❑Rear Side

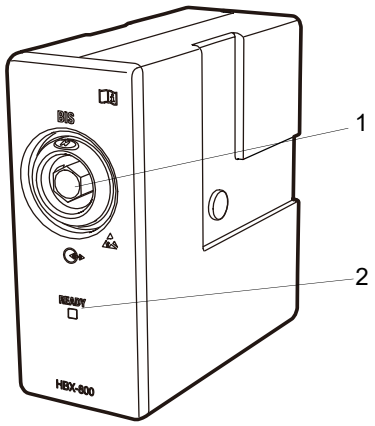
1 Gas Unit Connector

Connects to the CO_2 I/F connector on the DS-8007.



BISx I/F Unit: HBX-800

❑Front Side



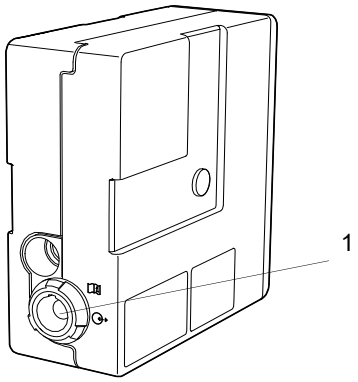
1 BISx Module Connector

Connects the BISx (Covidien).

2 Power Supply LED

Indicates the power ON/OFF status.
Lights in orange when the power is ON, and BISx is not connected.Lights in green when the BISx is connected.

❑Rear Side



1 AUX Connector

Connects to the AUX connector of DS-8007 with AUX connection cable.

NOTE

- The usable AUX connection cable differs depending on the connecting equipment. For the combination of the AUX connection cable and the connecting equipment, refer to the section on "Optional Accessories".

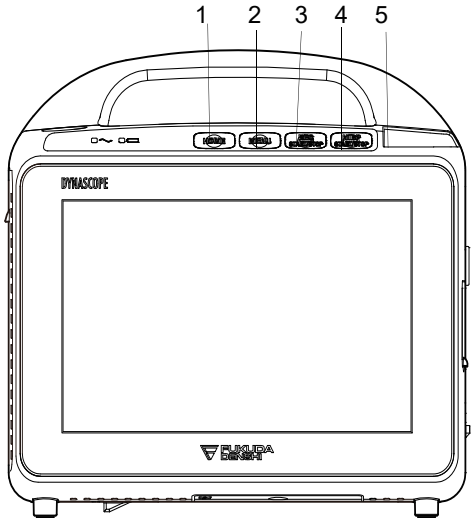
Chapter 3 Operation Procedure and Screen Examples

Chapter 3 Operation Procedure and Screen Examples

Operation Procedure

Operation of this equipment is performed using fixed keys and touch keys.

Fixed Keys



1 HOME Key

The home display will be displayed.

2 MENU Key

The menu screen will be displayed.

3 PRINT START/STOP Key

The numeric/waveform data will be saved as recall data, and the event will be transmitted by HLX-801 if HR-800 is not connected.

If HR-800 is connected, the data will be printed.

4 NIBP START/STOP Key

Starts/stops the NIBP measurement.

If pressed during the measurement, the measurement will cease.

5 Alarm Silence Key/Alarm Sound Suspend Key

When pressed during alarm generation, the alarm sound will temporarily silence.
When "Alarm Sound Suspend" setting is ON, the alarm sound can be suspended by holding down this key.
(☞"Detail Setup" P6-5)

NOTE

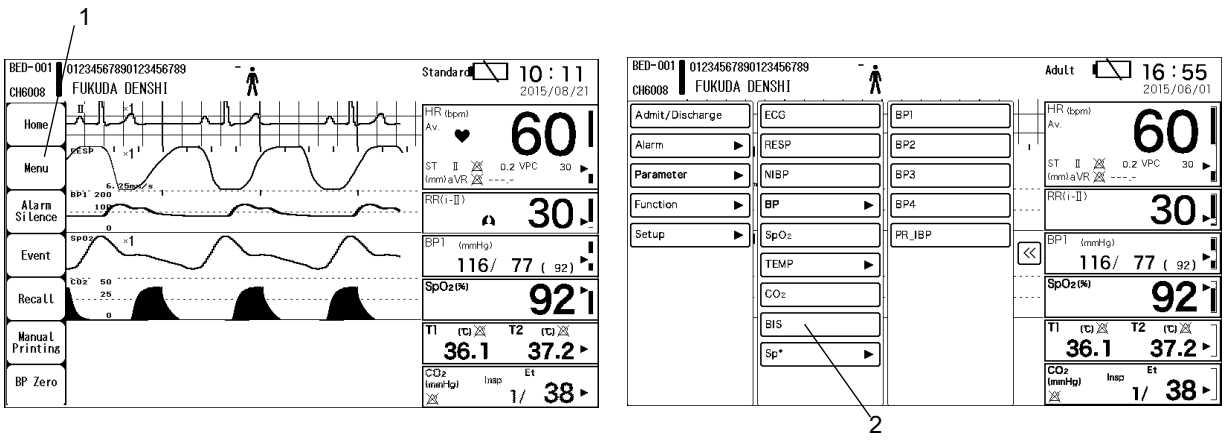
- When operating as an input module by connecting to the rear side of the host monitor (DS-8400 system), standby switch, fixed key, alarm indicator will not function..

Touch Key

⚠ CAUTION

- Do not use the touch panel with the film attached. It may cause malfunction or damage the touch panel.

❑General Key Control



1 Pressing the [Menu] key or MENU (fixed key), or swiping from left to right will switch the screen with a pip sound.
The following screen will be displayed by the swipe operation.

- Left to Right: Menu
- Right to Left: Trend
- Up to Down: NIBP Auto Mode
- Down to Up: User Key (When "Auto Hide User Key" is set. ☞Maintenance Manual "Operation Related Setup" P5-21)

2 The touch key will respond by pressing any part of the key.

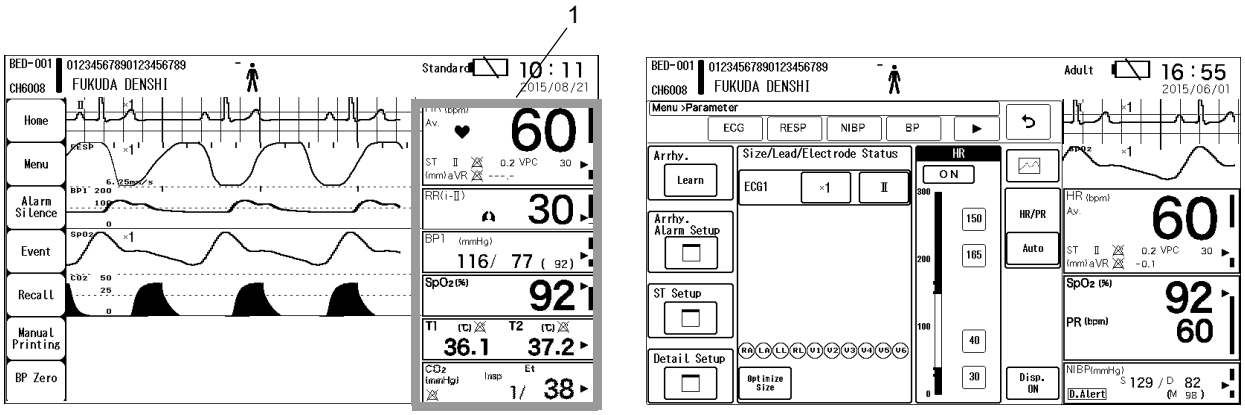
3 The display will return to the home display by pressing the HOME key (fixed key).

4 When the numeric data box is located at right or bottom, and when a window or tool is displayed, swipe operation from right to left will return the display to the home display.
In the same way, when the numeric data box is located at left, swipe operation from left to right will return the display to the home display.

REFERENCE

- The above is an example of the screen. The user keys can be customized and can be placed to any position. (☞"To Configure the Display" P10-4)
- The screen to be displayed by swipe operation (up to down, right to left) can be selected under [Menu>Setup>Initial Settings>User I/F]. (☞Maintenance Manual "Operation Related Setup" P5-21)

❑Key Control for Each Parameter



1 Press the numeric data box area. The setup window will be displayed.
The touch key will respond by pressing any part of the numeric data box.

2 The display will return to the home display by pressing the HOME key (fixed key).

REFERENCE

- Frequently used touch keys can be programmed as user key. (☞"For Easier Use" P3-19)

Home Display

About the Home Display

The display can be configured according to the monitoring purpose.

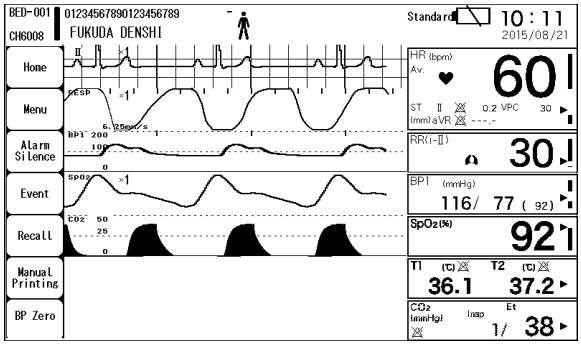
There are 2 types of basic display layouts, which are "Numeric Data/Side" and "Numeric Data/Bottom". "Numeric Data/Side" is the most basic layout.For the "Numeric Data/Side", the numeric data box can be arranged also to the bottom to increase the displaying parameters.
For the "Numeric Data/Bottom", the numeric data box will be arranged to the bottom.

The numeric data box layout can be selected from "Right", "Bottom/Right", "Left", "Bottom/Left", "Bottom", "Left (2 columns)", "Right (2 columns)".

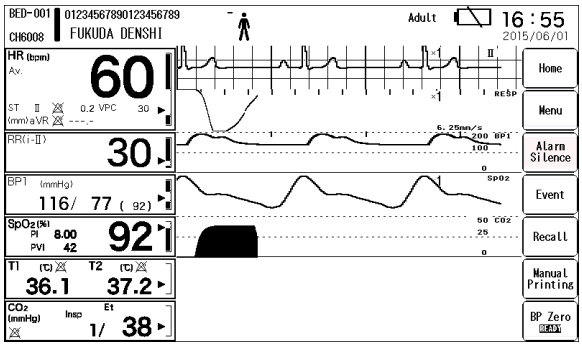
REFERENCE

- The display layout can be configured and registered as necessary.
(☞"To Configure the Display" P10-4)

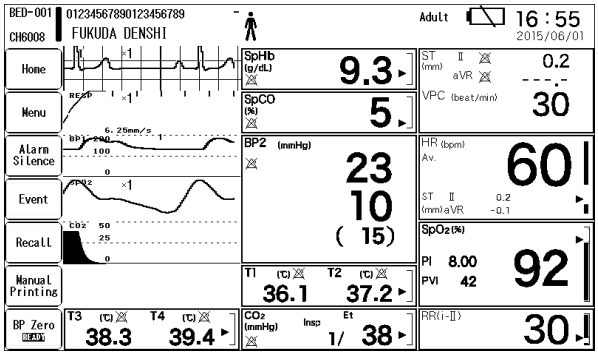
Display Example



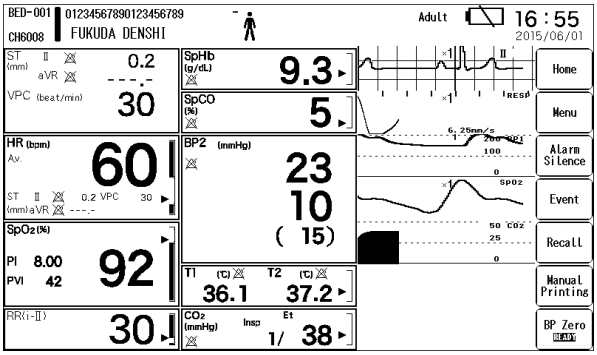
Numeric Data: Side/Right



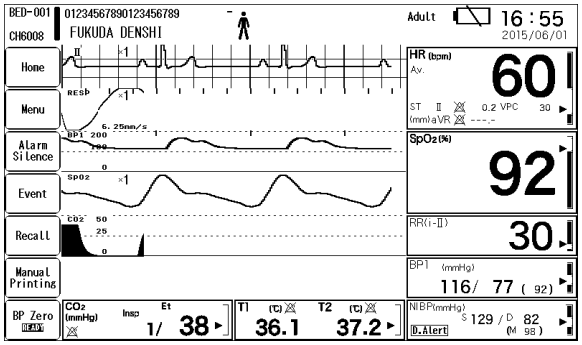
Numeric Data: Side/Left



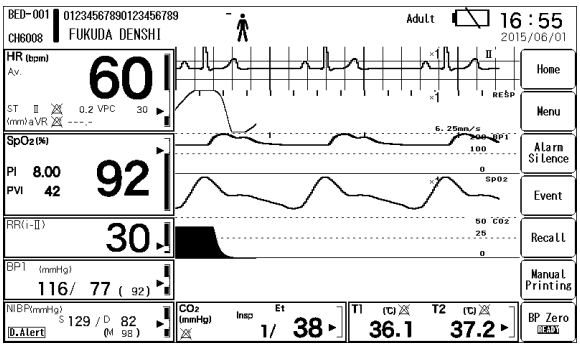
Numeric Data: Side/Right (2 columns)



Numeric Data: Side/Left (2 columns)



Numeric Data: Side/Right, Bottom

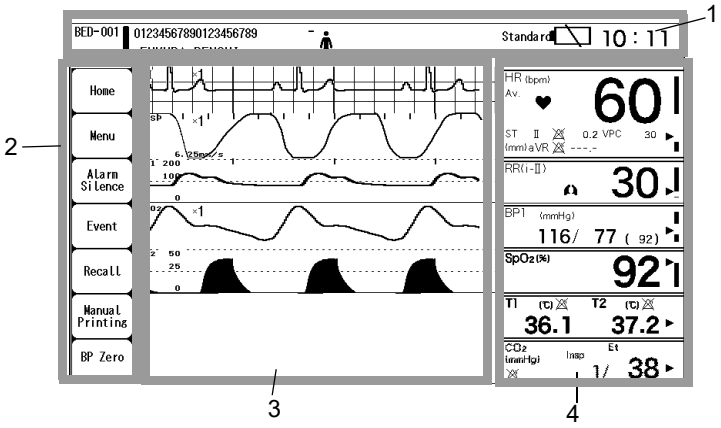


Numeric Data: Side/Left, Bottom

Displayed Items

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

❑Numeric Data, Waveform, Patient Name, etc.



1 Information Display Area

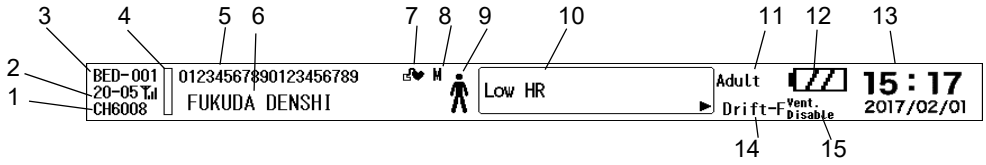
Room/Bed ID, Patient Name, Patient Class., current time, messages, etc., will be displayed.

2 User Key Area

3 Waveform Area

4 Numeric Data Area

❑Information Display Area



1 Telemetry Channel ID

Displays the telemetry channel ID.

2 TCON Status

Displays the TCON connection status, TCON channel, ID, etc. (Only when DSA-81 is connected)

3 Room/Bed ID

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

4 Nurse Team Color

Displays the color of the nurse team set on the "Admit/Discharge" menu.

5 Patient ID

The patient ID set on the "Admit/Discharge" menu will be displayed.

6 Patient Name

The patient name set on the "Admit/Discharge" menu will be displayed.

7 Pacemaker Usage

When [Used] is set for "Pacemaker" on the "Admit/Discharge" menu, a pacemaker icon will be displayed.

8 Gender

"M" (Male) or "F" (Female) will be displayed.

9 Patient Classification

The patient classification (Adult, Child, Neonate) set on the "Admit/Discharge" menu will be displayed.

10 Message Area

When an alarm generates, a message will be displayed.

By pressing the message display area, the alarm message history can be verified.

11 Set Mode

The currently selected monitor mode will be displayed.

12 Battery

The icon indicating the remaining battery level will be displayed. While charging, the icon will flash.

13 Date/Time

The current date (year, month, day) and time (hour, minute) will be displayed.

14 Drift Filter/Other Bed Alarm (When other bed alarm is generated)

When "ECG Drift Filter" is set to [ON], <Drift-F> will be displayed.
When other bed alarm generates, <Other Bed> will be displayed. When <Drift-F> is also displayed, these will be displayed alternately.

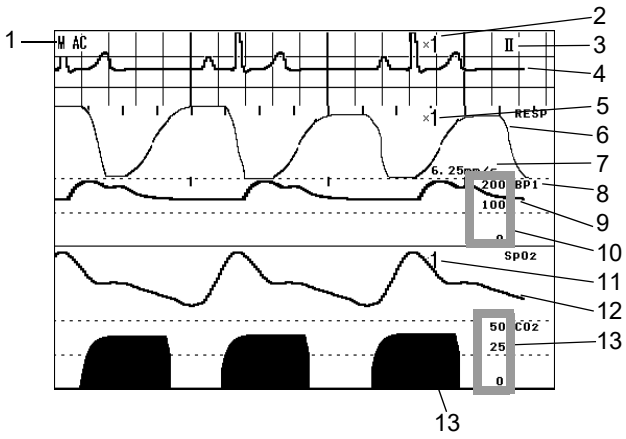
15 Ventilator Connection Status/Battery Remaining Time (Only when AC power is not connected)

Displays the connection status of the ventilator. (Only when DSA-81 is connected)
<Vent. Comm.>: Communication with the ventilator is in progress.
<Vent. Offline>: Communication with the ventilator is interrupted.
<Vent. Disable.>: Communication with the ventilator is disabled.
When AC power is not connected, the remaining battery operation time (approximate) will be displayed.These will be displayed alternately with the ventilator connection status.

⚠ CAUTION

- The actual battery operation time differs depending on the optional unit composition, NIBP measurement interval, recorder operating condition, etc. When <Charge the battery.> message is displayed, charge the battery.

❑Waveform Area



1 ECG Drift Filter/AC Filter Display

AC: AC Filter ON, DF: Drift Filter ON
M: Monitor Mode, E: ESIS Mode, D: Diagnosis Mode

2 ECG Size

The waveform size display of ECG, RESP, SpO_2 can be selected from [Numeric]/[Bar]/[Bar (10 mm)].
(☞Maintenance Manual "Display/Print Setup" P5-12)

3 ECG Lead

4 ECG

5 RESP Size

6 Respiration Waveform

7 Respiration Waveform Sweep Speed

Displays the sweep speed for the impedance respiration waveform.

8 BP Label

9 BP Waveform

10 BP Scale

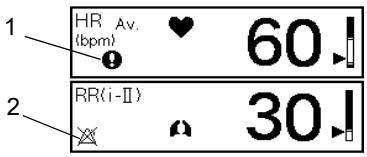
11 SpO_2 Size

12 SpO_2 Waveform

13 CO_2 Scale

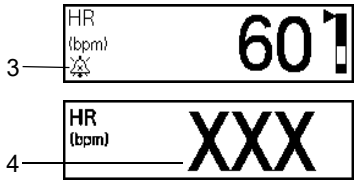
14 CO_2 Waveform

❑Numeric Data Box Display (for all parameters)



1 Message Icon

When the numeric data box size is too small to display the message inside, a message icon will be displayed instead to indicate that message is present.
(☞Maintenance Manual "Display/Print Setup" P5-12)



2 Alarm OFF Icon

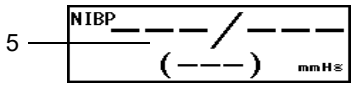
Indicates that the alarm is set to OFF.

3 Alarm Silence Icon

Indicates that the alarm is silenced.

4 Out of Measurement Range (xxx)

Indicates that the measurement is out of range.



5 Measurement Error (---)

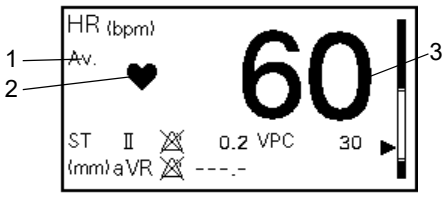
Indicates that the NIBP measurement ended erroneously.

❑ Numeric Data Box Display (for each parameter)

REFERENCE

- The following numeric data box is displayed when the corresponding parameter is selected on the "Numeric Data Selection" window under "Display Config.". (☞"Numeric Data Selection" P10-3)

HR, HR/PR



1 HR Average (Instant / Average, or no display)

Displays the averaging method of HR. ("HR Average" setting on ECG setup.)
When the patient classification is [Adult] or [Child], and "HR Delay" is set to [ON], "Inst." or "Av." will not be displayed.

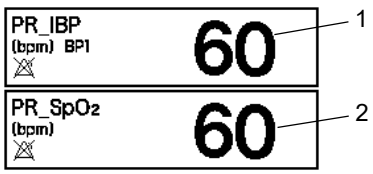
2 HR/PR Synchronization Mark

When HR or PR according to the setting of "Synchronized Mark/ Tone" is detected, HR/PR synchronized mark will be displayed inside the corresponding numeric data box.

3 HR/PR Value

The HR/PR value will be displayed. When the value exceeds the measurable range, "xxx" will be displayed.

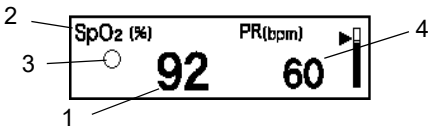
PR_IBP, PR_SpO_2



1 Pulse Rate (BP)

2 Pulse Rate (SpO_2)

SpO_2



1 SpO_2 Value

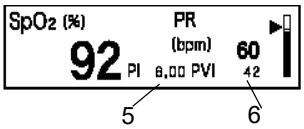
The arterial oxygen saturation will be displayed.

2 SpO_2 Label

The label set for SpO_2 will be displayed.

3 Second Alarm Indicator

When the second alarm is set, the second alarm indicator is displayed. The second alarm function is available only for the DS-8007N.



4 Pulse Rate

The pulse rate is displayed. When the value exceeds the measurable range, "xxx" will be displayed.

5 PI Value (DS-8007M only)

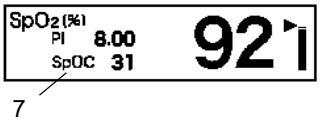
The perfusion index will be displayed.

6 PVI Value (DS-8007M only, optional)

The pleth variability index will be displayed.

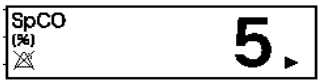
7 SpOC Value (DS-8007M only, optional)

The arterial oxygen content will be displayed.



SpCO (DS-8007M only, optional)

SpCO Value: The carboxyhemoglobin concentration will be displayed.



SpMet (DS-8007M only, optional)

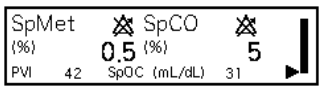
SpMet Value: The methemoglobin concentration will be displayed.

SpHb (DS-8007M only, optional)

SpHb Value: The total hemoglobin concentration will be displayed.

Sp* (DS-8007M only, optional)

SpMet, SpCO/SpHb, SpOC, PVI will be displayed. The parameter will not be displayed if the optional function is not enabled. SpCO and SpHb cannot be displayed at the same time.



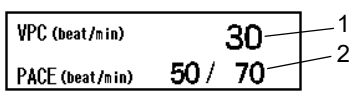
RR SpO_2 (DS-8007N only)

RR SpO_2 value: The respiration rate will be displayed.

VPC

1 VPC (1 min)

The VPC rate for the last 1 minute will be displayed. " ---" will be displayed during arrhythmia learning.

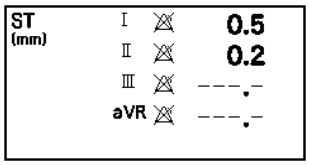


2 Pace Beats (1 minute) / Total Beats (1 minute)

Pace beats and total beats for the last 1 minute will be displayed. <---> will be displayed during arrhythmia learning.

ST

ST Level



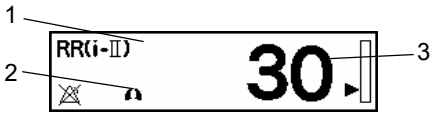
The ST value for 4 leads can be displayed in the ST data box.
3 groups (A, B, C) of lead combination can be programmed.
For the following case, "---" will be displayed.

- During arrhythmia learning
- During lead-off condition
- When "N" or "S" is not detected for QRS within 30 seconds.
- When reference waveform is not set for ST measurement.

REFERENCE

- The leads displayed inside the ST level box can be changed.
  (☞Maintenance Manual "Display/Print Setup" P5-12)

Respiration Rate



1 RR Source

The RR measurement source will be displayed in accordance with the "RR/APNEA Alarm Source" setting. "i" for the impedance measurement, "GAS" for the CO_2/GAS measurement, and "SpO_2" for the SpO_2 measurement will be displayed. A detection lead (I/II) will also be displayed for the impedance measurement.

2 RR Synchronized Mark

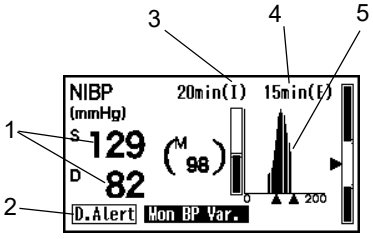
When the respiration of the set RR source is detected, a synchronized mark will be displayed inside the corresponding numeric data box.

3 Respiration Rate

The impedance RR, CO_2 RR, and SpO_2 RR will be displayed. When the value exceeds the measurable range, "xxx" will be displayed.

When the impedance measurement is set to OFF, impedance RR will not be displayed.

NIBP



1 NIBP Value/Cuff Pressure

The NIBP measurement value (SYS / DIA / MAP) will be displayed.

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

During measurement, a cuff pressure will be displayed.

2 Dyna Alert Message (DS-8007N only)

This message will be displayed when the Dyna Alert is effective.

3 NIBP Measurement Interval

The NIBP measurement interval will be displayed.

4 Elapsed Time/Measured Time

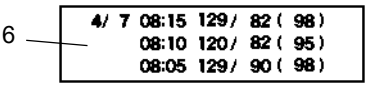
The elapsed time or measured time will be displayed.
The display can be selected under [Menu>Parameter>NIBP>Detail Setup>Time Display].

5 Oscillation Graph

The horizontal axis in the graph shows the cuff pressure, and vertical axis shows the pulse amplitude with reference to maximum pulse amplitude.

6 NIBP List

The NIBP list of the latest 3/6/9/12/18 data and measured date/ time will be displayed. The number of displaying data depends on the size of numeric data box.



Blood Pressure

1 BP Label

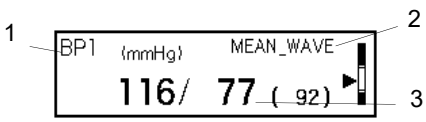
The label set for the blood pressure will be displayed.

2 "MEAN_WAVE"

<MEAN_WAVE> is displayed when [ON] is set for "Mean Wave" under [Menu>Parameter>BP>Detail Setup].

3 Blood Pressure

The BP measurement value (SYS/DIA/MEAN) will be displayed. On the BP setup menu, the display type (S/ D/M, S/D, M) can be selected. When the value exceeds the measurable range, "xxx" will be displayed. If BP zero balance is not performed, "---" will be displayed, and if transducer is not connected, nothing will be displayed.



PAP/ IAP/ ICP

1 PCWP Value, PCWP Measured Time

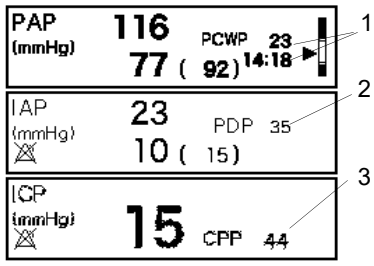
When the BP label is PAP, PCWP (Pulmonary Capillary Wedge Pressure) and measured time can be displayed.

2 PDP Value

When the BP label is IAP, PDP (Peak Diastolic Pressure) of IABP can be measured. Note that Systolic Pressure (SYS) = Peak Systolic Pressure (PSP).

3 CPP Value

When the BP label is ICP, labeling the artery pressure as ART will allow measuring the CPP (Cerebral Perfusion Pressure). CPP = Mean Arterial Pressure – Mean Intracranial Pressure If the CPP value is negative value, or zero balance has not been performed for ICP or ART, "---" will be displayed, and if ICP or ART has not been measured, nothing will be displayed. Also, alarm cannot be set for CPP.



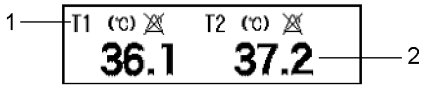
Temperature

1 TEMP Label

The label set for the temperature will be displayed.

2 TEMP Value

The temperature will be displayed.The 400 series temperature probes can be used. When the value exceeds the measurable range, "xxx" will be displayed. The 700 series temperature probes cannot be used, and "---" will be displayed when connected.



Blood Temperature

By using the thermodilution catheter for the CO measurement, blood temperature can be displayed. When the value exceeds the measurable range, "xxx" will be displayed.

$EtCO_2$/ $InspCO_2$

$EtCO_2$ Value/ $InspCO_2$ Value

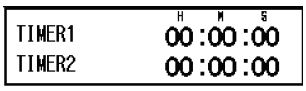
The end-tidal CO_2 concentration and inspiratory CO_2 concentration measurement value will be displayed.

The measurement unit can be selected from mmHg / kPa / % under the "Initial Settings" menu.

TIMER

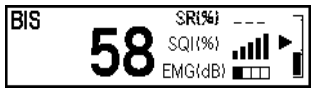
Stopwatch Key

Functions as stopwatch.



BIS

BIS Value



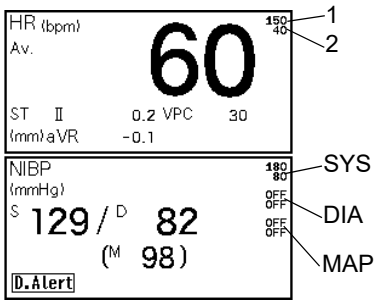
By connecting the BISx module through the HBX-800, or by connecting the BIS monitor to the serial connector or status output connector on the DSA-81, BIS data (BIS, SQI, EMG, SR) will be displayed.

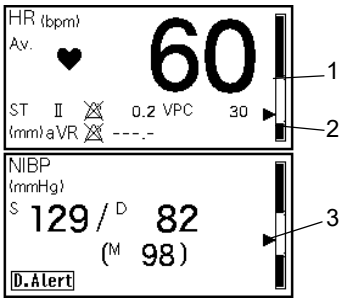
If SQI value is below 50%, the background color will turn gray.

If SQI value is below 15%, the BIS value and SR value will disappear.

When the BIS monitor is connected, the alarm cannot be set.

❑Alarm Limit Display





The alarm limit can be displayed beside each numeric data. The display type can be selected from [Graph]/[Numeric]/[OFF] ("Alarm Limit Display") under [Menu>Alarm>Detail Setup].

If ON is selected for the individual alarm, the alarm limit will be displayed.

The upper and lower limit will be displayed at upper and lower row respectively.

For BP/NIBP, each alarm limit of systolic BP (SYS), diastolic BP (DIA), mean BP (MEAN/MAP) will be displayed from the top.

1 Upper Alarm Limit

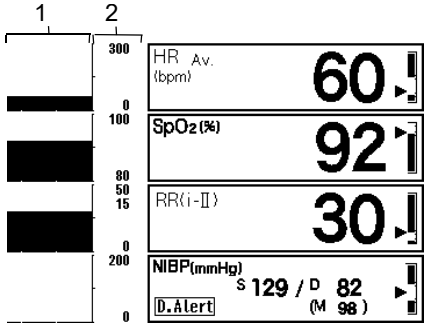
2 Lower Alarm Limit

3 Current Measurement Value (SYS)

NOTE

- If the alarm limit display for BP is [Graph], systolic value will be displayed.
- Depending on the numeric data box type, alarm limit may not be displayed.

❑Short Trend Display



1 Short Trend Display

Short trend will be displayed beside the numeric data.

Pressing the waveform display area will change the displayed trend time to the pressed position. The trend display is in 10-minute increment from 0 minute to 60 minutes, 30-minute increment from 0 minute to 180 minutes, 60-minute increment from 0 minute to 360 minutes.

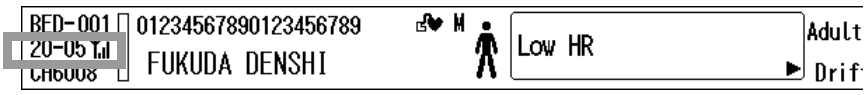
A red vertical bar indicates the alarm occurrence. Pressing the short trend for the parameter which is set as recall factor will display the "recall" screen.

2 Trend Scale

The short trend scale will be displayed between the short trend and numeric data. The displayed scale will be in accordance with the scale set on the "Trend" screen.

❑ Bidirectional Wireless Communication Display

This section explains about the message displayed on the home display while in a bidirectional wireless communication.



- Indicates that bidirectional wireless communication is performed.
- 05: Indicates TCON ID set on this equipment. (1 to 16)
- 20: Indicates the TCON channel number. (1 to 60)
- ; Indicates the current communication status.

Display				
Communication Condition	Good	Moderately Good	Bad	Cannot Communicate

❑Displayed number of waveform and numeric data

Display	Maximum Displayed Waveform Quantity	Display Duration (25mm/s)		Maximum Displayed Numeric Data Boxes
		User Key Not displayed	User Key Displayed	
Numeric Data/Side (Right/Left)	14	4.1 sec.	3.5 sec.	7
Numeric Data/Side&Bottom (1 row) (Right/Left)	12	4.1 sec.	3.5 sec.	9
Numeric Data/Side&Bottom (2 rows) (Right/Left)	10	4.1 sec.	3.5 sec.	11
Numeric Data/Side (2 columns) (Right/ Left)	14	2.3 sec.	1.7 sec.	14
Numeric Data/Side (2 columns) & Bottom (1 row) (Right/Left)	12	2.3 sec.	1.7 sec.	15
Numeric Data/Side (2 columns) & Bottom (2 rows) (Right/Left)	10	2.3 sec.	1.7 sec.	16
Numeric Data/Bottom (1 row)	12	6 sec.	5.4 sec.	3
Numeric Data/Bottom (2 rows)	10	6 sec.	5.4 sec.	6
Numeric Data/Bottom (3 rows)	8	6 sec.	5.4 sec.	9
Numeric Data/Bottom (4 rows)	6	6 sec.	5.4 sec.	12
Numeric Data/Bottom (5 rows)	4	6 sec.	5.4 sec.	15
Numeric Data/Bottom (6 rows)	2	6 sec.	5.4 sec.	18
Numeric Data/Bottom (7 rows)	0	-	-	21

NOTE

- The maximum number of displayed boxes differ based on the waveforms and numeric data to be displayed.

Description of the Display

Refer to the following for the meaning of the symbols used on this equipment.

Symbol	Description
	Alarm OFF Indicates the alarm is OFF.
	Alarm Suspend Indicates the alarm is suspended.
	Alarm Mute Indicates the alarm is silenced. (“Alarm Mute” is set to [ON].)
	Alarm Silence Indicates the alarm is silenced for preprogrammed duration.(“Alarm Silence” key is pressed.)
	HR Synchronized Mark This mark flashes synchronizing to the heartbeat.
	RR Synchronized Mark This mark flashes synchronizing to the inspiration.
	Message Icon Indicates that an alarm message is present for that parameter. Whether or not to display this icon can be selected under "Initial Settings".
	TCON Displays the Bidirectional Wireless Communication (TCON) connection status while in communication.
	Key Lock Mark Indicates that the item requires a password to change the setting.
	Key Unlocked Mark Indicates that the key is unlocked
	Indicates the remaining battery level. This icon (full green) indicates that the battery is fully charged. While charging, the corresponding battery level icon flashes.
	This icon (2/3 green) indicates that the battery is less than full, but still usable.
	This icon (1/3 yellow) indicates that the battery level is low and needs to be charged. Technical alarm will generate.
	This icon (1/3 red) indicates that the battery level is very low and flashes to alert the low battery status. Immediate battery charge is required. Technical alarm will generate.
	This icon (red frame) indicates that the battery is almost depleted and it flashes to alert that charging is necessary. Make sure to charge the battery immediately. Technical alarm will generate.
	This icon (black frame with a slash) indicates that the battery is not installed. Pay attention as power will not be supplied if AC power cable is disconnected during this state.

Messages and 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 at the top of the home display.

The alarms are classified to Level S (top priority), Level H (high priority, urgent), Level M (medium priority, caution), Level L (low priority, status), and Notification, and the message will be displayed according to the priority of Level S > Level H > Level M > Level L > Notification.

Alarm Priority, Level		Description	Tone/Volume	Displayed Color
Top Priority	S	Top Priority Alarm	Continuous	Flashes in red and white
High Priority	H	Life Threatening Alarm	Continuous	Red Background/White Text
Medium Priority	M	Cautionary Alarm	5 seconds interval	Yellow Background/White Text
Low Priority	L	Status Alarm	15 seconds interval	Blue Background/White Text
Notification	N	Notification Alarm	Display Only	White Text

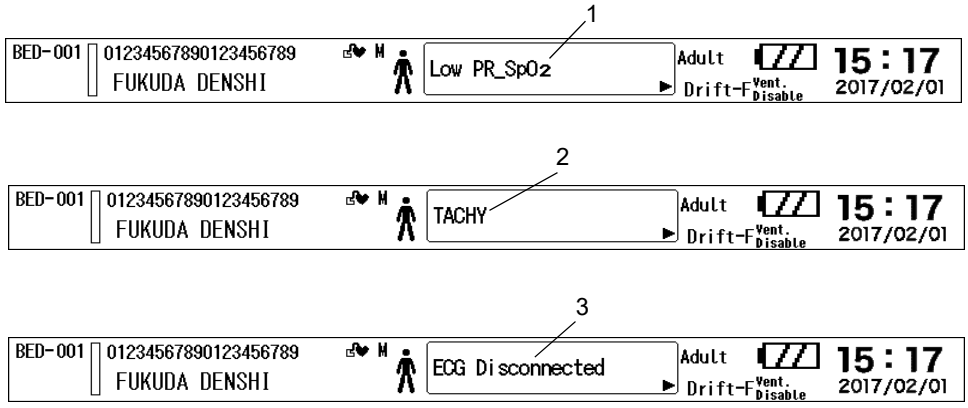
CAUTION

- When multiple alarms of the same priority are generated, the newer alarm message will be displayed.

❑Vital Alarm Message/Equipment Status Alarm Message

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

The equipment status alarm message will be displayed when proper monitoring cannot be performed. The alarm messages will be displayed according to the priority. If the priority level is the same, the newer alarm message will be prioritized.



1 Numeric Data Alarm Message

2 Arrhythmia Alarm Message

3 Equipment Status Alarm Message

There are 2 types of vital alarm messages; numeric data alarm and arrhythmia alarm. If both alarms occur at the same time, the numeric alarm message and arrhythmia alarm message will be displayed alternately in 2 seconds interval. The alarm messages will be displayed according to the priority. If the priority level is the same, the newer alarm message will be prioritized.

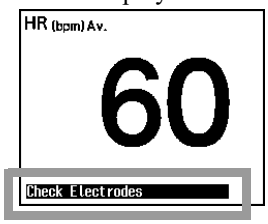
If vital alarm and equipment status alarm occur at the same time, the numeric/arrhythmia alarm and equipment status alarm will be displayed alternately in 2-seconds intervals.

⚠ CAUTION

- The arrhythmia alarm message other than Tachy, Brady, Ext Tachy, Ext Brady will continue to be displayed for 30 seconds after the alarm is resolved.

❑Numeric Data Box Message

The measurement status of each parameter will be displayed inside the corresponding numeric data box.

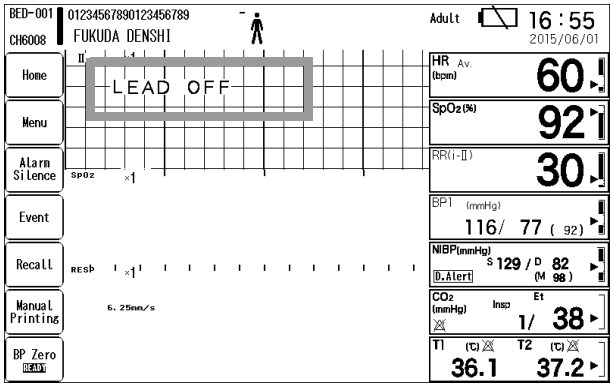


❑Lead-Off Message

When the ECG electrodes used for HR measurement or arrhythmia analysis are detached, it will be notified by "LEAD OFF" message display.

⚠ WARNING

- When <Lead Off> is displayed, HR alarm or arrhythmia alarm will not generate. 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.



❑Ventilator Alarm Message

When a ventilator is connected to this equipment, ventilator alarm and connection status alarm will be displayed on the equipment status alarm message area.

The alarm message with the higher alarm level will be displayed.

⚠ WARNING

- The ventilator alarm sound is set to OFF (factory default).
- The alarm sound can be turned ON under [Menu>Tone/Volume]. (☞"Tone/Volume" P10-15)

❑Ventilator Alarm Factor Message

For the SV-300, SERVO-i, SERVO-s, SERVO-U/n/air, ventilator alarm factor, if specified, will be notified and displayed on the central monitor.

⚠ CAUTION

- For the ventilators other than SV-300, SERVO-i, SERVO-s, SERVO-U/n/air, ventilator alarm factor will not be notified to the central monitor.
- Depending on the central monitor type and software version, ventilator alarm factor may not be displayed. For details of the central monitor type and software version, refer to your nearest service representative.
- The ventilator alarm factors are displayed only on the central monitor. These will not be displayed on the bedside monitor.

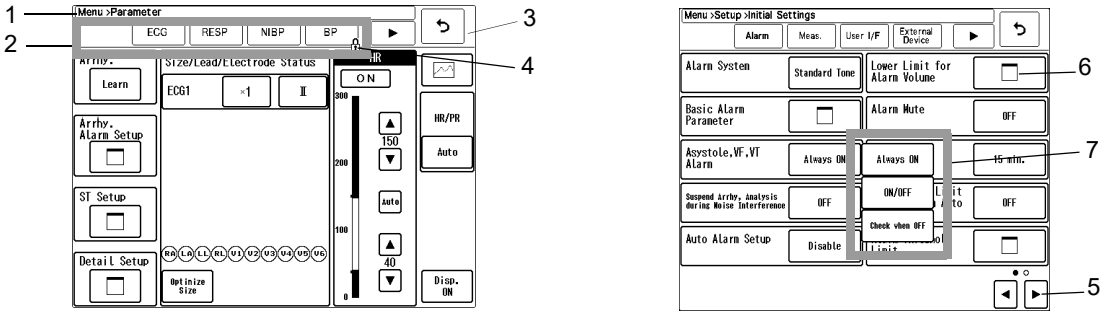
Window Display

About the Window Display

The setup windows will be displayed during the operation of this equipment.
To display the setup window, select from the menu, or press the numeric data area or user key.

Display

The common items on the window are explained below.



1 Hierarchical Level Display

The hierarchical level of the current window is displayed. The level is expressed using the ">" symbol.

2 Tab Display Area

These are the tabs to display the screens under the same menu level.The screens under the same menu level can be switched by one-touch operation of these tabs without returning to the main menu.

For example, to change the blood pressure scale after changing the ECG waveform size, it is not necessary to return to the main menu.
For the review screens, the date/time of each review data are linked and allows to switch the display of the tabular trend, graphic trend, waveform of the same date/time in one-touch operation.

3 Upper Level Key

Returns to the upper level display.

4 Key Lock Icon

Key lock icon will be displayed for the setup item that is locked.

To unlock the setup item, enter the password.

It will return to locked condition after 30 seconds if no key operation is performed.

- : Locked
- : Unlocked

NOTE

- The color of each key lock icon indicates its administrative level, and a higher level password must be entered to unlock it.
  (☞Maintenance Manual "Password Setup" P5-3)

5 Page Switch Key

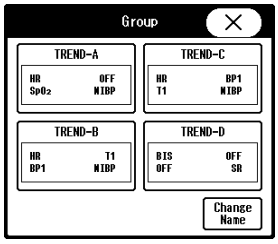
This key will appear when the setup items or display data are on multiple pages. The currently displayed page is indicated by "●".

6 Setup Item

Most of the setups can be performed by selecting from the dropdown list.
The dropdown list will close when a selection has been made.
Pressing the item again or selecting a different item will also close the dropdown list.

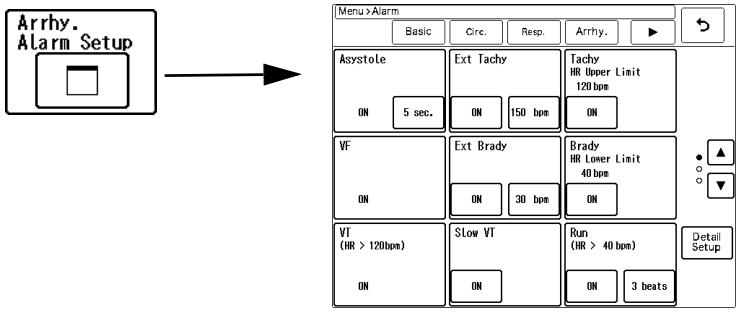
Some menu may display a subwindow to perform the setup.
To close the subwindow, press either the (X) key, [Home] or [Prev. Disp.] key.

- Example of Subwindow



Pressing the key with the "□" icon will display another window.To return to the upper level, press the ↩ key.

- Example of an item which displays another screen

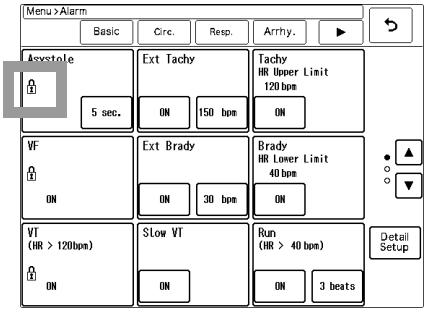


7 Dropdown List

Select one from the displayed selection list.

Operation Restriction

To restrict the operator to change the setup items, key lock function can be used.
(☞Maintenance Manual "Key Lock" P5-2)
For the items that are key locked, the settings cannot be changed unless the password is entered.
The unlocked condition will return to locked condition if operation has not been performed for about 30 seconds.
For the key locked item, 🔒 icon will be displayed.
When the password is entered and key is unlocked, the icon will change to 🔓.



NOTE

- There are 3 key lock levels.
- The level is distinguished by the color of 🔒 which are "Red (Manager) > "Yellow (Administrator)" > "Green (User)", and the upper level password can unlock the lower level key lock.

Procedure to Return the Display

❑To Return to Home Display

The display will return to the home display by pressing the HOME key (fixed key).

❑To Return to Upper Level Menu

The display will return to upper level menu by pressing the [⮌] key displayed on each setup window.
Or, it may return to the menu list depending on the setup window.

To Enter Characters

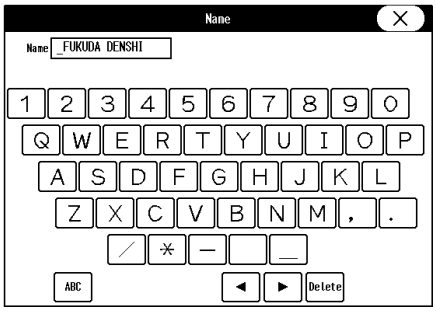
Alphanumeric characters and symbols can be entered using the displayed keyboard.
The procedure to enter characters is explained below using the example of patient admit menu.

❑Entering Alphanumeric Characters

Enter alphabets, numerics, or symbols.

1 Press [ABC] or [QWERTY] to switch the displayed keyboard.
Enter the alphanumeric characters.

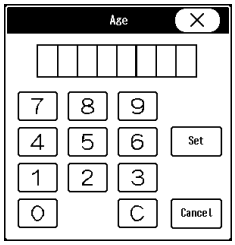
2 To display the flick keyboard, press the [Flick] key.



❑Entering Numerics

For age, telemetry channel ID, etc., only numbers can be entered.

Enter the numbers using the numeric keypad.



For Easier Use

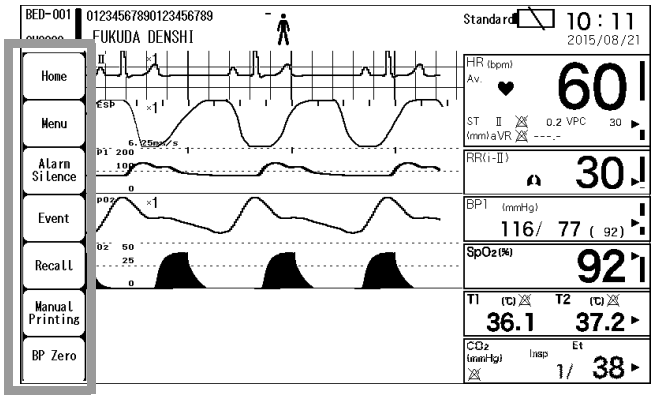
The user keys and menu can be customized according to the monitoring purpose.

REFERENCE

- From the preprogrammed user mode, the display configuration and alarm settings can be selected according to the monitoring purpose.
  (☞Maintenance Manual "User Mode Registration" P5-23)

User Key

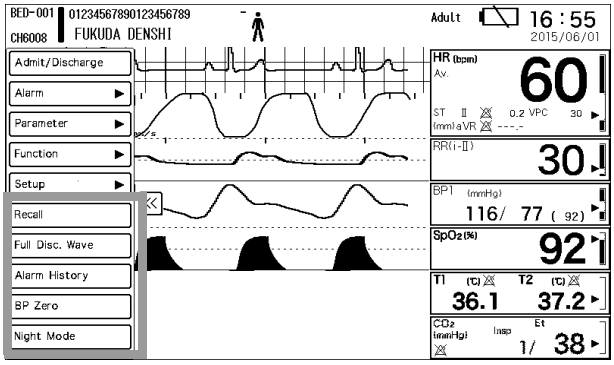
The user keys can be customized according to the monitoring purpose.
(☞"To Configure the Display" P10-4)



Maximum of 7 user keys can be set.

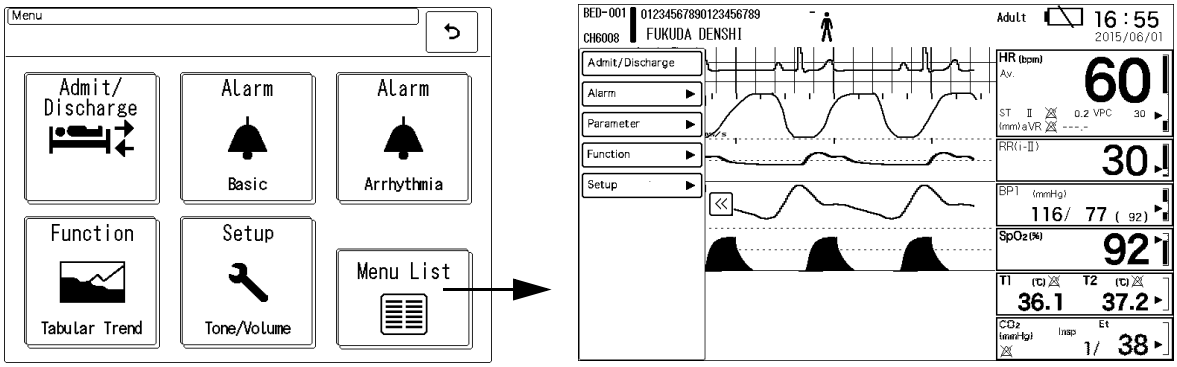
Shortcut Menu

5 shortcut keys can be set on the menu list.
(☞Maintenance Manual "Shortcut Menu" P5-19)
The frequently used functions and settings can be set as shortcut keys so that they can be quickly accessed from the menu list.



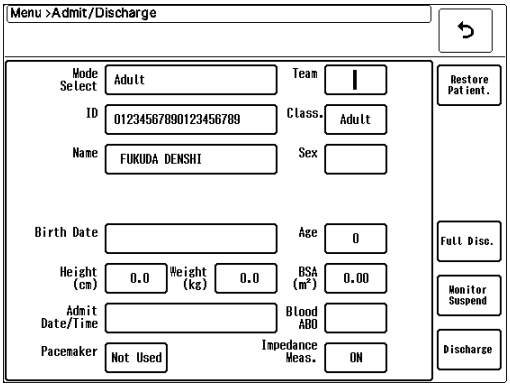
Quick Menu

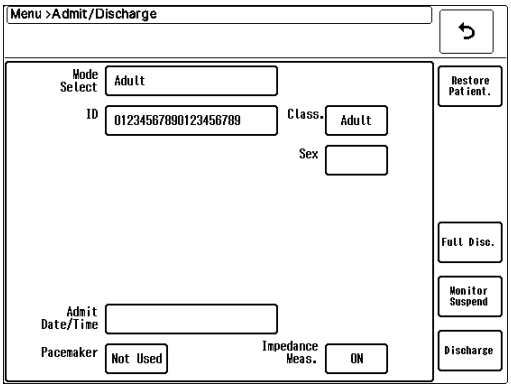
5 frequently used menu keys can be displayed large with icons.
ON/OFF of Quick Menu display and the menu keys to be displayed on the Quick Menu can be set under [Initial Settings>User I/F].
(☞Maintenance Manual "Quick Menu Setup" P5-22)
Pressing the [Menu List] key will display the menu list.



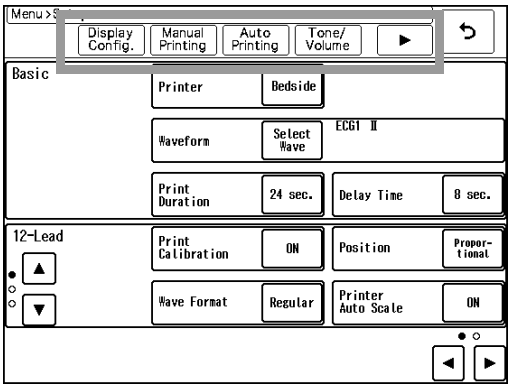
To Delete the Unnecessary Keys (Key Mask)

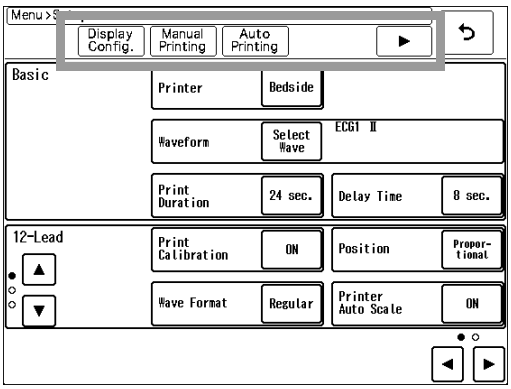
Unused keys, items, tabs can be masked.
(☞Maintenance Manual "Key Mask" P5-19)





Example on "Admit/Discharge" Screen





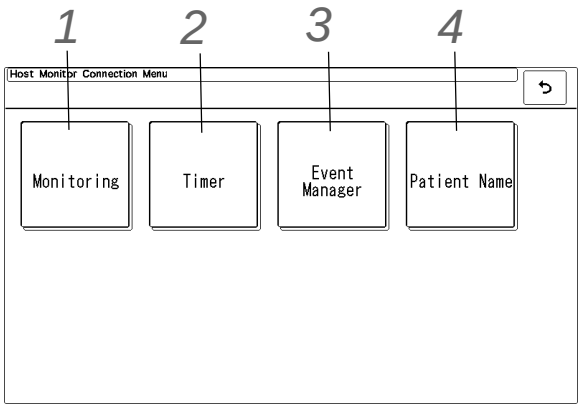
Example on Tab Display

Connecting to the Host Monitor via DSA-82

The display and operation procedure when the host monitor is connected via DS-8007 Adapter (DSA-82) is explained below.

The host monitor connection menu can be selected from the following.

- Monitoring (Home Display)
- Timer
- Event Manager
- Patient Name



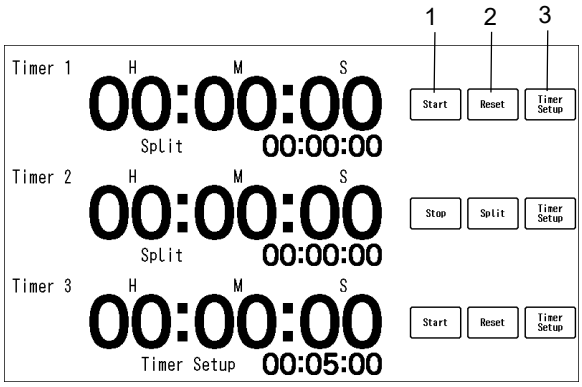
The selection of which screen to be displayed can be made on the "Initial Settings" menu.
(☞Maintenance Manual "User I/F" P5-12)
Or, pressing the MENU key (fixed key) when connected to the host monitor will display the "Host Monitor Connection Menu" where the selection can be made.
The selection on the "Initial Settings" menu and "Host Monitor Connection Menu" is linked with each other.

1 Monitoring

- Monitoring will be started on the home display.

2 Timer

- Stopwatch/Timer will be displayed.



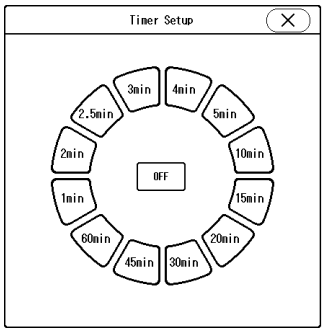
1 [Start]/[Stop] key will switch by toggling.

- When the timer is not started, [Start] will be displayed.
- The [Start] key will change to [Stop] key when the timer is started. Pressing the [Stop] key will stop the timer.

2 [Reset]/[Split] key will switch by toggling. When the timer is not started, [Reset] is displayed, and when the timer is started, [Split] is displayed.

- [Reset]: The timer and split time will be reset to 0.
- [Split]: The time when this key is pressed will be displayed as split time on each timer. Each time the [Split] key is displayed, the split time will be updated.

3 The timer setup window will be displayed.Select the time. An alarm sound will generate when the set time elapses.



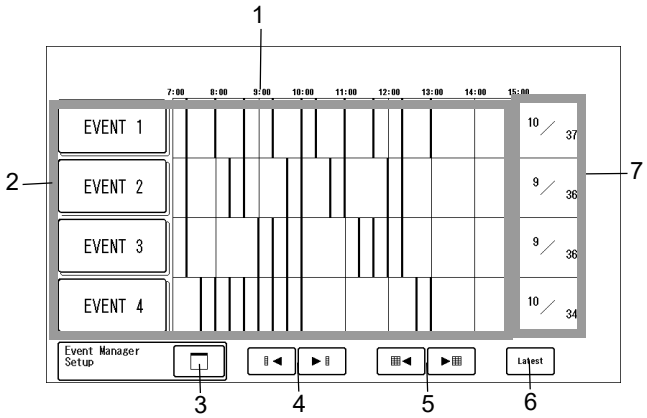
- Depending on the timer setup, stopwatch/timer function will be switched.
- [OFF]: Stopwatch function will be enabled.
- Settings other than [OFF]: Timer function will be enabled. Pressing the [Start] key will start the timer, and when the selected time (1 min., 2 min., 2.5 min., 3 min., 4 min., 5 min., 10 min., 15 min., 20 min., 30 min., 45 min., 60 min.,) is elapsed, alarm sound will generate. The timer will continue to count even after the alarm sound generates.

NOTE

- When the MENU key (fixed key) is pressed while the stopwatch or timer is operating, a confirmation window will be displayed. Pressing the [OK] key will reset the timer.
- When disconnected from the host monitor while the stopwatch or timer is operating, the time will reset.

3 Event Manager

- The event marks of 24 hours will be displayed.



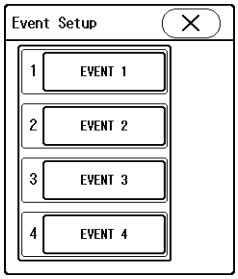
1 Displayed Time

- The display will be in 8 hours range.
- The display will be updated every hour.

2 Event Manager

- Pressing the event key will display the event mark at the point of the pressed time.
- For one second after the event key is pressed, the key will be displayed in gray and acts as a cancel key.

3 Event Manager Setup



- The label of the event key can be changed.
- When the label is changed, the event for the previous label will be deleted.
- This setting links with "Event Manager Setup" under [Initial Settings>User I/F>Display/Print].

4 The displayed time will shift by one hour.

5 The displayed time will shift by eight hours.

6 The latest time will be displayed.

7 The displayed number of events/total number of events of 24 hours will be displayed.

NOTE

- The event will be deleted when the patient is discharged or the event label is changed.

4 Patient Name Enlarged Display

- The patient ID/name will be displayed.

❑Fixed Keys when Connected to the Host Monitor

When connected to the host monitor via DS-8007 Adapter (DSA-82), the fixed keys other than the HOME key are enabled.

HOME:	Disable
MENU:	The "Host Monitor Connection Menu" will be displayed. Pressing the key again will close the menu.
PRINT START/STOP:	The recording/printing will start according to the host monitor settings.
NIBP START/STOP:	The NIBP measurement will start/stop.
Alarm Silence/Alarm Sound Suspend:	The alarm generated on the host monitor will be silenced.Pressing down this key cannot suspend the alarm sound on the host monitor.

Chapter 4 Preparation

Chapter 4 Preparation

Daily Check

Before using the equipment, perform the daily check.
Take necessary measures for the items with the "NG" judgment, and use the equipment only if the judgments for all the items are "OK".

To Start Monitoring

This section explains about the procedure to turn the power ON and start monitoring.

⚠ CAUTION

- If not using the equipment for a long period, disconnect the power cable and lithium-ion battery pack.
- During transportation, firmly grasp the handle and make sure that the equipment does not fall. Otherwise, it may cause injury to the operator or damage to the equipment.

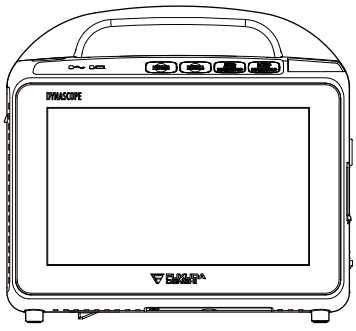
1 If operating with AC power supply, verify that the power supply cable is properly connected to the AC Unit.
If operating with battery, verify that the lithium-ion battery (BTO-008) is properly installed in the main unit.
(☞Maintenance Manual "Power Connection of the Main Unit" P1-8)
(☞Maintenance Manual "Installing the Lithium-Ion Battery Pack (BTO-008)" P1-9)

▸ When connected to the AC power source with battery installed, charging will automatically start.
1 Rapid Charge (when the equipment is not in operation): 4 hours
2 Normal Charge (when the equipment is operating): 8 hours

⚠ WARNING

- Do not connect a battery other than the lithium-ion battery (BTO-008).

2 Press the standby switch on the main unit.



▸ The system will turn ON and monitoring will start.

▸ The power supply LED on the front side of the main unit will light.
1. Power Supply LED
Green: Power ON
Orange: Standby Mode
Light Off: During battery operation
2. Battery Charging LED
Green: Charging is complete
Orange: Charging is in process
Light Off: During battery operation, or when battery is not installed, or when battery charging is ceased (due to temperature, etc.)
Flash: Battery charging error

NOTE

- If the battery charging LED flashes, battery charging error is occurring. Remove the battery and install it again. If the error persists, contact your nearest service representative.

NOTE

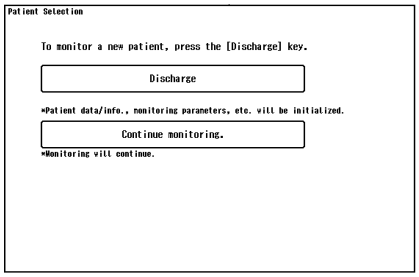
- The operation after the power is turned ON will be according to the setting made on [Initial Settings] > [User I/F] > [Power ON/Discharge]. However, if the power was turned OFF for less than 30 seconds, the setting before the power was turned OFF will remain.

REFERENCE

- The power ON/OFF operation of the main unit, recorder unit, CO_2 gas unit and option unit synchronizes with the standby switch operation (ON/OFF) on the main unit.

Check Discharge When Start Monitoring a New Patient

The full disclosure waveform, graphic trend, tabular trend, recall, ST measurement, OCRG data will be stored even after the monitoring is ceased by pressing the standby switch. If the previous data is remained when the monitoring is started by pressing the standby switch, a discharge confirmation window will be displayed.



❑Check Discharge

1 Select from [Discharge] / [Continue monitoring].

- [Discharge]: The previous data will be deleted.
- [Continue monitoring]: The monitoring will start with the previous data retained.

NOTE

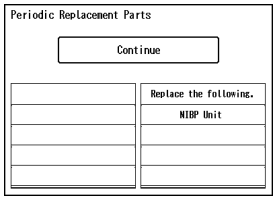
- If the standby condition was less than 30 seconds, the discharge confirmation window will not be displayed. To perform the discharge procedure, press the [Discharge] key on the "Admit/Discharge" screen.
  (☞"Discharge" P5-6)
- To start monitoring a new patient, select [Discharge] and enter the new patient information on the "Admit/Discharge" screen.

REFERENCE

- Whether or not to display the discharge confirmation window can be selected.
  (☞Maintenance Manual "Power ON/Discharge" P5-16)

❑Periodic Replacement Message

When the periodic replacement period approaches for each part, a message will be displayed on the discharge confirmation window to notify the user.



REFERENCE

- The parts which the replacement periods are notified on the discharge confirmation window are NIBP unit and CO_2 unit (HCP-810/HCP-820).
  (☞Maintenance Manual "Periodic Replacement" P7-1)
- Even if the discharge confirmation window display is set to OFF, it will be displayed when

the replacement period approaches.

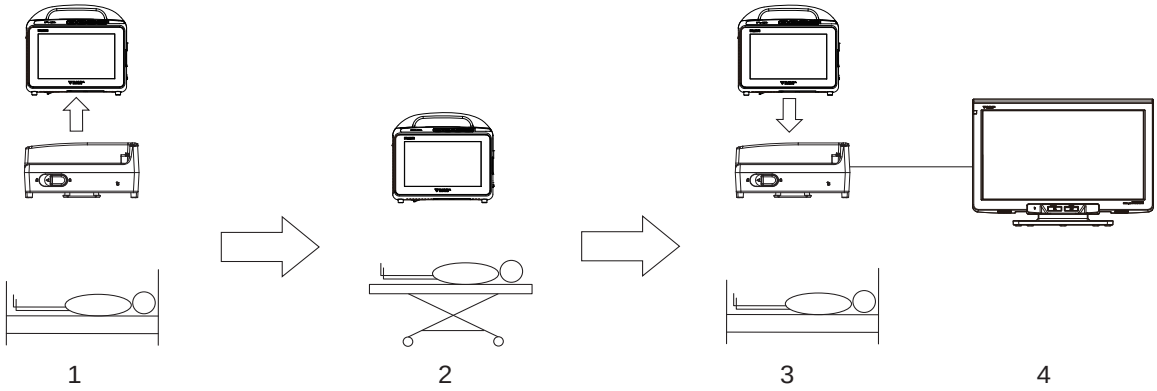
Data Transfer Function

The DS-8007 system can transmit the patient data and settings saved while in transport to the central monitor.

⚠ CAUTION

- This function can be used only when the monitoring system is constructed with the DS-8007, DS-8400, DS-8500, DS-8900. To use this function, refer also to the DS-8900 Operation Manual.

<General Description of Data Transfer Function>



1 While Monitoring on the Bedside Monitor
Remove the DS-8007 from the DSA-81.

2 While Leaving the Bed
During transfer or examination, monitoring on the DS-8007 will continue. The monitoring data will be saved on the DS-8007.

3 Resume Monitoring on the Bedside Monitor
When the patient returns to bed, attach the DS-8007 to the DSA-81.

4 Uploading to the Central Monitor
The data will be automatically uploaded to the central monitor.

❑Condition to Use the Data Transfer Function

To use the data transfer function, the following conditions need to be satisfied.

- On the DS-8007, full disclosure waveform recording on the SD card is required.
- The software version of the DS-8007 should be V03-01 and newer.

For uploading to the central monitor, the following additional conditions needs to be satisfied.

- The central monitor needs to be compatible with the data transfer function.
- The bed is registered on the central monitor.

For uploading to the central monitor via host monitor, the following additional conditions needs to be satisfied.

- The host monitor needs to be compatible with the data transfer function.

❑Precautions when Starting the Data Transfer

- The data transfer process will not start for approximately 60 seconds after the DS-8007 is connected to the DSA-81. Do not disconnect or turn OFF the power of the DS-8007 during this time.

❑Cancellation of Uploading

The uploading will be canceled under the following condition. Once canceled, the uploading will not resume.
<Cancellation of Uploading to the Central Monitor>

- The DS-8007 was disconnected from the DSA-81 during uploading.
- The patient was discharged during uploading.
- On the central monitor, discharge process or bed transfer was performed, or bed registration was canceled for the uploading bed.
- The power of the DS-8007 or central monitor was turned OFF.
- DS-LAN cable was disconnected.

<Cancellation of Uploading to the Host Monitor>

- The DS-8007 was disconnected from the host monitor during uploading.
- The patient was discharged on the host monitor during uploading.
- The power of the host monitor was turned OFF.
- Uploading to the central monitor was canceled.

❑About the Uploading Process

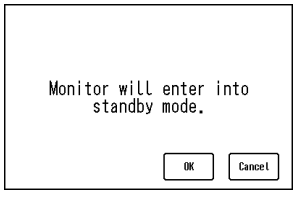
- Uploading the transferred data to the central monitor will take almost the same duration as the transferred duration.
- Uploading the other bed/transferred data to the host monitor will take 1/3 of the other bed/transferred duration.
- The uploading process is performed one at a time within one DS-LAN network. If the DS-8007 is connected while uploading for other bed is in process, <Upload Standby> will be displayed until the uploading can be started. When the uploading completes for the other bed, uploading for the connected bed starts, and the displayed message will change to <Uploading>.If the DS-8007 is disconnected from the DSA-81, or bed transfer/exchange is performed on the central monitor during the standby condition, uploading will not be performed.
- If the MPDR function of the DS-8007 is used, and uploading data to the central monitor is selected, the data will be uploaded in the following order.
  - Selected data on the MPDR data list (Upload 1) (Upload to the central monitor)
  - Selected data on the MPDR data list (Upload 2) (Upload to the central monitor)
  - Transferring data (Upload to the central monitor)
  - Transferring data (Upload to the bedside monitor)
  - Other bed data (Upload to the bedside monitor)

To Stop Monitoring

This section explains about a procedure to stop monitoring.

1 Press the standby switch on the main unit.

▸ A standby confirmation message will appear.



2 Press the [OK] key.

▸ The display will turn OFF and monitoring will stop. The operation of the recorder unit and AC port unit will

also stop.

⚠ CAUTION

- If the remaining battery capacity becomes extremely low during battery operation, monitoring will automatically stop.
- If not using the equipment for a long period, disconnect the power cable and lithium-ion battery.
- If the lithium-ion battery is not installed, do not perform the following as it may cause data loss.
  Remove from AC Unit.
  Disconnect the power supply cable.

Clock Setup

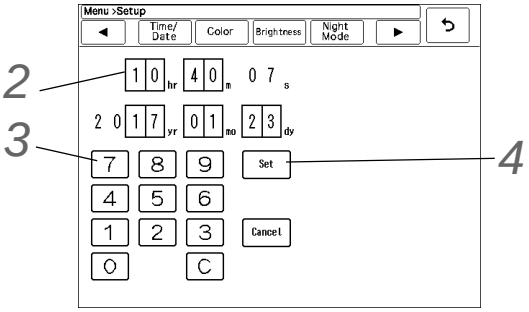
This section explains about the time/date setup procedure.

⚠ CAUTION

- If the time/date is not correctly set, or changed during monitoring, malfunction may occur with the NIBP measurement, periodic printing, graphic/tabular trend data, and age calculation from the birth date.
- The time/date cannot be set while connected to a wired network system or TCON system. The time/date will synchronize with the central monitor.
- If the time/date is changed, the time/date for all the saved patient data (trend, list, recall, etc.) will also change.
  The printed time/date before changing and the displayed time/date after changing will differ.

1 Press the [Menu], [System Config.], [Time/Date] keys.
Or, press the time/date on the information display area at the upper part of the screen.

▸ The Time/Date setup window will be displayed.



2 Press on the area to perform the setup.

▸ A blue frame will be displayed on the selected area.

3 Use the numeric keys to enter the numerics.

▸ The blue frame will automatically move to the next item.

4 Enter the current time/date and press the [Set] key.

▸ The entered time/date will be set. The number of seconds will be set to "00" sec.

▸ Press [Cancel] to cancel the time/date setup.

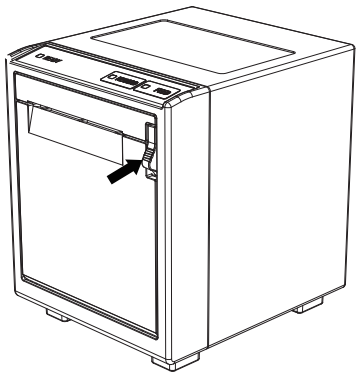
Installing the Recording Paper

⚠ CAUTION

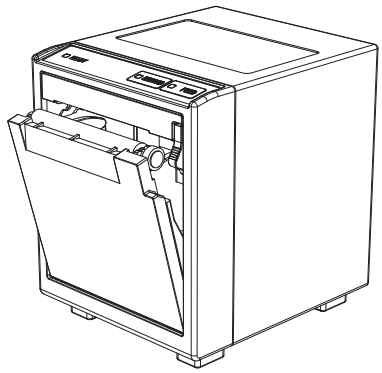
- About the Recording Paper
  - Use only "OP050-01TDR" for the recording paper.
    If the surface treatment and thickness of the recording paper are different, it may result in poor print quality.
- Storing the Recording Paper
  Since the recording paper is thermal type, inappropriate storage may change the quality of the printed content, and make it illegible.
  When storing the recording paper, 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/122 °F and above).
  - Do not store the paper in a polyvinyl chloride bag.
  - Do not superpose the papers until the diazo copy is completely dried.
  - Do not expose the paper to alcohol, hydrochloric acid, or ester ketone.
  - Avoid using adhesive agents other than water based glue.
- Installing the Recording Paper
  - When installing the recording paper, pay attention not to touch the thermal head or sensor. The temperature of those parts rises immediately after printing and may cause burn injury. Also, it may cause failure to the thermal head and sensor.
  - Do not operate the equipment with wet hand. Doing so may short the thermal head.

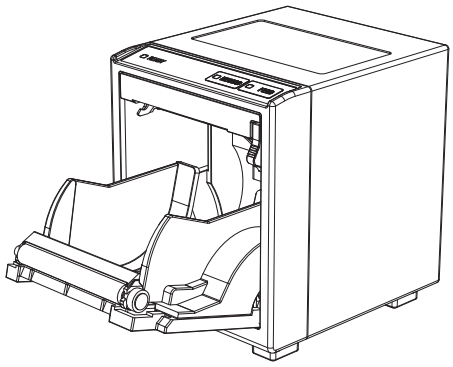
Install the recording paper with the following procedure.

1 Press the Open/Close Lever.



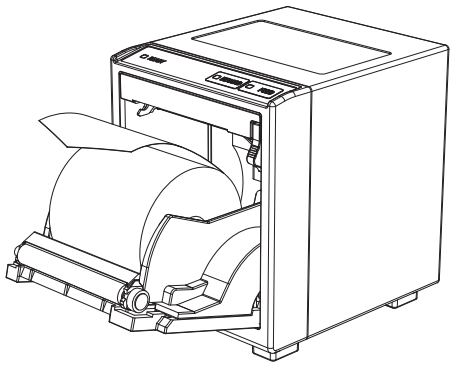
▸ The paper holder will open.





2 Set the Paper.

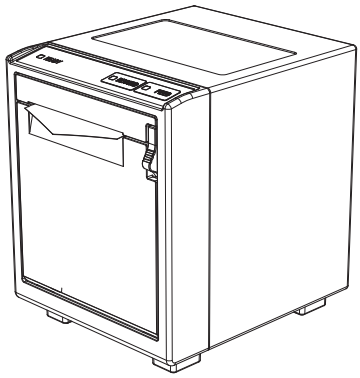
The outside surface of the paper is heat-sensitive. Make sure to place the outside surface of the paper facing up.



NOTE

- Place the paper so that the "FUKUDA DENSHI" logo is outside and facing up.

3 Close the paper holder.



NOTE

- Push until it locks into place with a click sound.

Chapter 5 Admit/Discharge

Chapter 5 Admit/Discharge

On the "Admit/Discharge" menu, patient admit/discharge process and monitoring suspend setup can be performed.

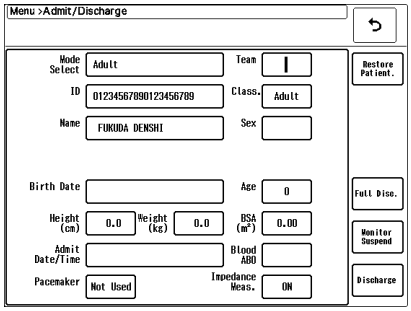
CAUTION

- Make sure to discharge the previous patient before admitting a new patient. Otherwise, monitoring data of new patient will be added to that of the previous patient which will result in inaccurate monitoring.

To Display the "Admit/Discharge" Screen

1 Press the MENU (fixed key) > [Admit/Discharge] key.
Or, press the patient information area (nurse team, patient ID, patient name, patient classification) on the upper part of the home display.

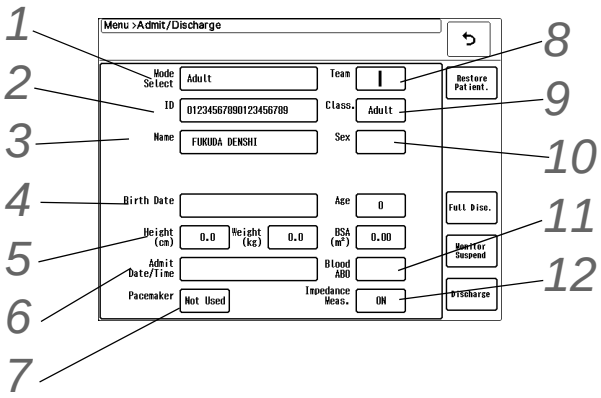
▸ The "Admit/Discharge" screen will be displayed.



Admit

This section explains the admit procedure.
This menu allows entering of patient's name, ID, age, and selection of patient classification (adult, child, neonate) and pacemaker usage (used, not used) which affects the monitoring accuracy.

Entering the Patient Information



1 Monitoring Mode

Select the preconfigured monitoring mode.

(☞"User Mode" P5-8)

2 Patient ID

Up to 20 characters of alphabets, numbers, or symbols can be used.

After entering the ID, press the [Set] key. If the [Set] key is not pressed, the entered ID will not be finalized.

(☞"To Enter Characters" P3-18)

NOTE

- Enter the ID according to the monitoring purpose.
- On a wired network (DS-LANII), up to 10 digits of ID can be transmitted. (☞Maintenance Manual "DS-LAN Setup" P2-2)

3 Patient Name

Up to 16 characters of alphabets, numbers, or symbols can be used. The entered name will be displayed on the home display.

4 Birth Date/Age

There are two ways to enter the 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 for patient classification, age will be displayed in days.

5 Height/Weight/BSA

The BSA (Body Surface Area) will be automatically calculated from the height and weight.

6 Admit Date/Time

The patient's admit date/time will be displayed.

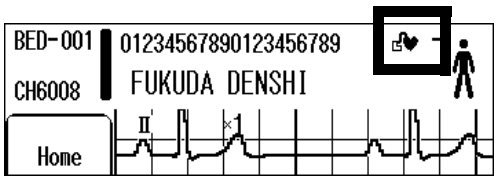
7 Pacemaker

Select from [Used] / [Not Used].

⚠ WARNING

- The pacemaker usage setting influences the precision of the QRS detection and arrhythmia analysis.Make sure the correct selection is made.

- When [Used] is selected, the monitor will identify the pacemaker pulse and insert an artificial pulse onto the ECG waveform for easy identification. When pacing waveform does not appear (pacing failure), erroneously detecting the pacemaker pulse as QRS will be prevented.
- When [Used] is selected, a pacemaker icon will be displayed on the home display. (shown on right)
- The arrhythmia analysis will detect pacing beat as P (Pacemaker Beat) or F (Fusion Beat) to prevent erroneous judgment of VPC.



8 Nurse Team

Select the color of the nurse team.

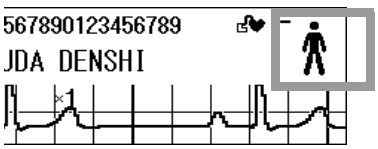
9 Patient Classification

- The patient classification affects the accuracy of NIBP measurement, HR measurement, and RR measurement. It also affects the delay time to generate the measurement data alarm.
- The alarm delay time is the function to prevent frequent generation of the measurement data alarm by holding the alarm generation for fixed duration.
  The alarm delay occurs for HR/PR, BP, RR, SpO_2, TEMP, $EtCO_2$/$InspCO_2$, Tachy, Brady, Ext Tachy, Ext Brady.

		Adult	Child	Neonate
NIBP Measurement Range	SYS	30 mmHg to 280 mmHg	30 mmHg to 180 mmHg	30 mmHg to 130 mmHg
	MAP	15 mmHg to 235 mmHg	15 mmHg to 160 mmHg	15 mmHg to 100 mmHg
	DIA	10 mmHg to 200 mmHg	10 mmHg to 150 mmHg	10 mmHg to 90 mmHg
HR		0 bpm, 12 bpm to 300 bpm		0 bpm, 30 bpm to 300 bpm
Filter Mode	Monitor	0.5 Hz to 40 Hz		1.6 Hz to 40 Hz
	ESIS	1.6 Hz to 15 Hz		1.6 Hz to 15 Hz
	Diagnosis	0.05 Hz to 150 Hz		
Impedance Respiration		0.1 Hz to 1.5 Hz		0.1 Hz to 2.5 Hz
Alarm delay time		5 sec.		0 sec.

WARNING

- The patient classification selection influences the precision of the QRS detection and NIBP measurement. Make sure the correct selection is made.
- To perform correct NIBP measurement, appropriate NIBP air hose corresponded to the set patient classification must be used. (However, if the patient classification is child, NIBP air hose for adult can be used.)



Patient Classification Icon: Adult, Child, Neonate from left

CAUTION

- When "Link with Patient Class." is set to [ON], and patient classification is changed, the monitor mode will change to the selected mode on the "Link Settings". (☞Maintenance Manual "To Program the User Mode" P5-24)

10 Sex

Select [Male] or [Female].

11 Blood Type

Select the blood type.

12 Impedance Measurement

- [ON]: Standard impedance respiration measurement will be performed.
- [OFF]: Impedance respiration measurement will not be performed and impedance respiration waveform and RR data will not be displayed. A high-frequency current which is a measurement signal will not be conducted.

WARNING

- If a patient is using an adaptive (minute ventilation) pacemaker, "Impedance Measurement" should be set to OFF.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.

Entering Patient Information from the Magnetic Card

By using the magnetic card reader, patient information can be entered from the magnetic card. The admittance process will speed up compared to manually entering each information.

NOTE

- To automatically enter the patient information from the magnetic card or barcode, it is necessary to perform the setup in advance.
  (☞Maintenance Manual "Using the Magnetic Card Reader" P4-9)

1 Read the data from the magnetic card or barcode.

- The acquired data will be displayed.

2 Press the [Change only patient info.]/[Cancel] key.

- [Change only patient info.] : Replaces the current patient information with the newly acquired information.
- [Cancel] : Cancels the acquired information.

NOTE

- Make sure the patient is discharged before replacing the patient information.
- The item which the information was not acquired from the magnetic card or barcode will be left blank. For the blank item, manually enter the information.

Entering Patient Information from the Patient Data Server (When DS-LANIII, TCON is used)

When the central monitor is connected to the patient data server, and the DS-LANIII or TCON network is used, patient information can be automatically entered by searching on the patient data server.

NOTE

- When a DS-LAN II network is used, patient information cannot be entered from the patient data server.

⚠ CAUTION

- When "Link with Patient Class." is set to [ON], and patient classification is changed by acquiring patient information from the patient data server, the Monitor Mode will change to the selected mode on the "Link Settings". (☞Maintenance Manual "To Program the User Mode" P5-24)

❑When Using the Patient Data Server and Magnetic Card Reader (or Bar Code Reader)

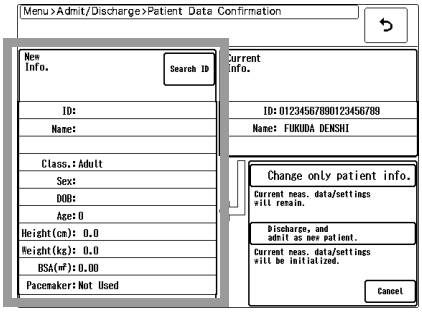
NOTE

- Select [ON] for "Auto Reference to Central Monitor when Reading Patient ID" under [Initial Settings>Magnetic Card Reader] in advance.
  (☞Maintenance Manual "Connecting the Magnetic Card Reader" P4-9)

1 Read the data from the magnetic card or barcode.

2 The acquired patient information from the patient data server via DS-LAN III network will be displayed in the "New Information" area.

If there is no applicable patient information, current patient information will be displayed in the "New Information" area.



3 Select whether or not to enter the searched patient information.

[Select from [Change only patient info.] / [Discharge and admit as new patient.] / [Cancel].

[Change only patient info.] will replace the current patient information to the newly acquired information.

[Discharge and admit as new patient.] will initialize the current patient data/monitoring condition and admit the searched patient as new patient.

[Cancel] will invalidate the acquired data.

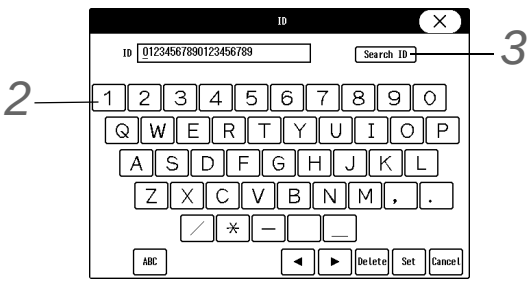
NOTE

- The item not acquired from the patient data server will be left blank.
- For the blank item, manually enter the information.

❑When Magnetic Card Reader (or Barcode Reader) is not Used

1 Press the MENU (fixed key), [Admit/Discharge], "ID" edit box.

"ID" window will be displayed. (shown on right)

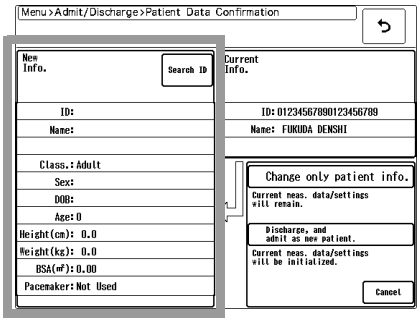


2 Enter the patient ID.

3 Press the [Search ID] key and start searching on the patient data server.

▸ Based on the entered patient ID, patient information will be searched on the patient data server through the DS-LANIII or TCON network.

The searched patient information will be displayed under "New Information" .



4 Select whether or not to enter the searched patient information.

Select from [Change only patient info.] / [Discharge and admit as new patient.] / [Cancel]. [Change only patient info.] will replace the current patient information to the newly acquired information. [Discharge and admit as new patient.] will initialize the current patient data/monitoring condition and admit the searched patient as new patient. [Cancel] will invalidate the acquired data.

The item not acquired from the patient data server will be left blank. For the blank item, manually enter the information.

NOTE

- The item not acquired from the patient data server will be left blank.
- For the blank item, manually enter the information.

⚠ CAUTION

- When "Link with Patient Class." is set to [ON], and patient classification is changed after "Search ID" function is used, the monitor mode will change to the selected mode on the "Link Settings". (☞Maintenance Manual "To Program the User Mode" P5-24)

Discharge

This section explains about the discharge process.
This procedure will erase the patient name, ID, age, and past measurement data such as tabular / graphic trend, and recall.
By pressing the [Rapid Discharge] key preprogrammed as user key, a discharge process can be performed.

Discharging Procedure

⚠ CAUTION

- If monitoring of new patient is started without discharging the previous patient, the measurement data of the previous and new patient will become mixed up on the recall and trend data.
- When the discharge process is performed, patient data such as recall and trend will be initialized. The parameter and alarm settings will be backed up or initialized according to the settings made under [Menu>Setup>Initial Settings>User I/F>Power ON/Discharge). When the discharge process is performed on the central monitor, alarm will be reset according to the setting on "Admit Setup" of the central monitor.
  (☞Maintenance Manual "Power ON/Discharge" P5-16)
- If the SD card for full disclosure waveform recording is used, graphic/tabular trend data, full disclosure waveform data of the discharged patient can be reviewed using the MPDR

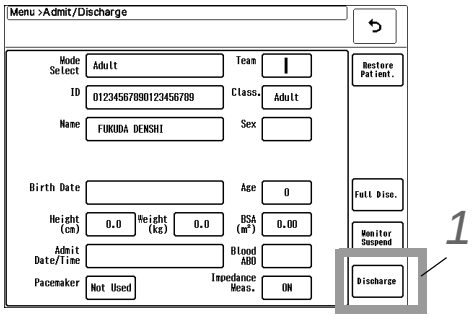
function. (☞"MPDR" P8-51)

NOTE

- If the discharge procedure is performed during stopwatch operation, the counting will stop and will be reset to "00:00:00" .

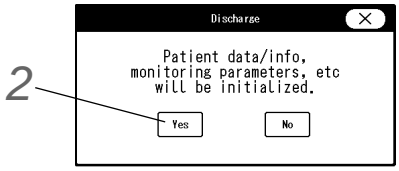
1 Press the [Discharge] key on the [Menu>Admit/Discharge] screen.

- The discharge confirmation window will be displayed.
- To cancel the discharge process, press the [No] key or close the discharge confirmation window.



2 Press the [Yes] key.

- The patient data, patient information will be initialized.
- The screen will return to the home display with the selected monitoring mode.



Data	Description
Patient Data	Data for graphic trend, tabular trend, recall, ST, OCRG, CO, hemodynamics, lung function, full disclosure waveform will be erased. The setup condition of recall, tabular trend, graphic trend, vigilance list will remain.
Patient Information	Erases the data of patient name, ID, sex, age. The patient classification will not be initialized.
Measurement Condition	The learned arrhythmia waveform data will be deleted. The BP zero-balance condition will be initialized.

REFERENCE

- For details, refer to [Initial Settings>User I/F>Power ON/Discharge].
  (☞Maintenance Manual "Power ON/Discharge" P5-16)

Canceling of Discharge Process

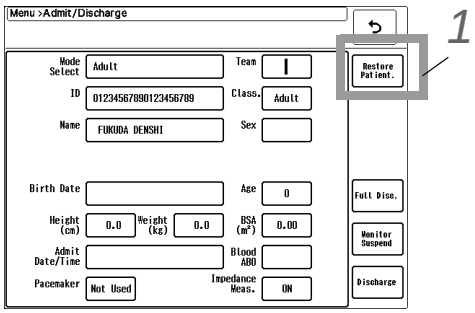
The patient information can be restored after the discharge process.

NOTE

- The trend data on the central monitor will not be restored.
- The MPDR data until the discharge process is stored.
- For the MPDR function, restoring the patient information will create two data of before and after restoring.

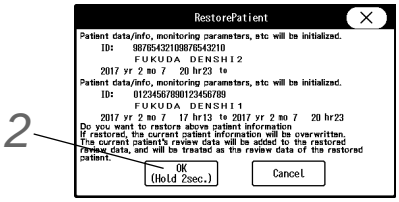
1 Press the [Restore Patient Info.] key on the [Menu>Admit/Discharge] screen.

- The "Restore Patient Information" window will be displayed.
- Make sure the patient to restore the information is displayed.
- To cancel the restore process, press the [No] key or close the window.



2 Press the [OK] key for 2 seconds.

- The patient information will be restored.
- The patient review data such as trend will also be restored.
- The current settings for display configuration, alarm, monitoring condition, etc. will be applied.



CAUTION

- When "Link with Patient Class." is set to [ON], and patient classification is changed by restoring the patient information, the monitor mode will change to the selected mode on the "Link Settings". (☞Maintenance Manual "To Program the User Mode" P5-24)

User Mode

This section explains about the user mode selection.
From the preprogrammed user mode, an appropriate user mode can be selected according to the monitoring purpose.

CAUTION

- The selected user mode will be stored even after the power is turned OFF or discharge process is performed.
  Before monitoring, make sure the current user mode is suitable for the patient's condition.
  (☞Maintenance Manual "User Mode Registration" P5-23)

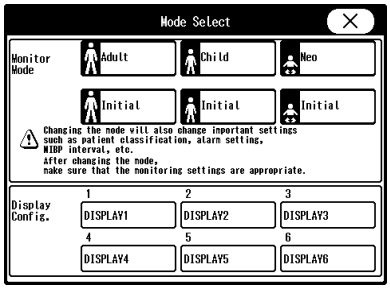
REFERENCE

- For the user mode, up to 6 monitor modes and 6 display modes of different alarm settings and display configurations according to the patient's age and monitoring purpose can be registered.
  (☞Maintenance Manual "User Mode Registration" P5-23)

To Select the User Mode

1 Press the key for "Mode Select" on the [Menu>Admit/Discharge] screen.

▸ The "Mode Select" window will be displayed.



WARNING

- After changing the mode, make sure that the monitoring setting is appropriate. When the mode is changed, patient classification, alarm settings, etc. will be changed.

2 Select the monitor mode appropriate for the patient.

REFERENCE

- The selected monitor mode will be stored even after the power is turned OFF. If a new patient is admitted without changing the monitor mode, the monitoring will start with the previous monitor mode.
- The mode after the discharge process can be set under the [Setup>Initial Settings>User I/F>Power ON/Discharge].
- Refer to "Setup Item/Default Value" for the default setting of each mode. (☞Maintenance Manual "Initial Settings" P6-1)

Suspend Monitoring

This section explains about the monitoring suspend/resume function.
Monitoring suspend function can be used when a patient temporarily leaves the bed. If the monitoring is ceased by turning the power OFF, recall and ST data will be erased.
By using the monitoring suspend function, measurement, alarm, printing will be suspended but data and settings will remain, which allows to resume monitoring smoothly.

By using the monitor suspend label function, different labels in different colors according to the patient's destination can be displayed during the monitoring suspended condition.
To remind the user to resume monitoring, alarm will generate after the preprogrammed duration (15 min./30 min./1 hr/1.5 hr/2 hr) for "Monitor Suspend Timer".

REFERENCE

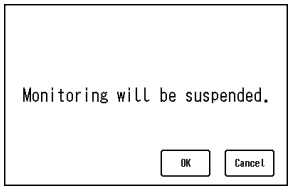
- The monitor suspend label can be set on the Initial Settings menu. (☞Maintenance Manual "Monitor Suspend Setup" P5-14)

To Suspend Monitoring

❑When "Monitor Suspend Label" is not set:

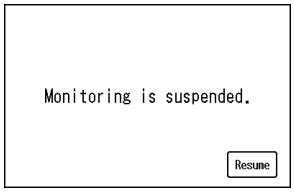
1 Press the [Menu], "Admit/Discharge" icon, [Monitor Suspend] keys.

- The monitor suspend confirmation window will be displayed.
- If [Cancel] is pressed, monitoring will not be suspended and the confirmation window will close.



2 Press the [OK] key.

- The screen will automatically return to the home display with "Monitoring is suspended" message and [Resume] key.
- On the home display, numeric data and waveform display will be suspended.



REFERENCE

- When the monitoring is suspended, telemetry transmission will cease. Note that the square wave will be displayed on the central monitor indicating the too far condition of the telemetry.
- The stopwatch counting will continue even when the monitoring is suspended.
- The setting can be changed even when the monitoring is suspended.

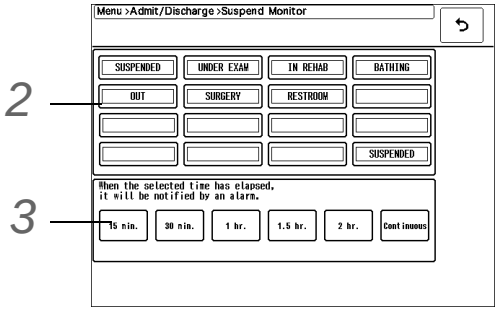
❑When Both "Monitor Suspend Label" and "Monitor Suspend Timer" are set

1 Press the [Menu], "Admit/Discharge" icon, [Monitor Suspend] keys.

- The "Monitor Suspend" screen will be displayed.

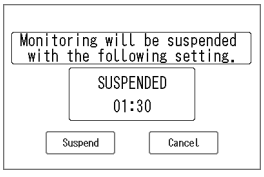
2 Select the label to be displayed during the monitoring suspended condition.

- The monitoring suspend duration selection will be displayed after selecting the monitoring suspend label.



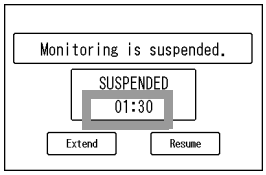
3 Select the monitoring suspend duration from [15Min.]/[30Min.]/[1Hr.]/[1.5Hr.]/[2Hr.]/[Continuous].
[Continuous] will start to suspend monitoring without setting the duration.

- Confirmation window to suspend monitoring will be displayed. (shown on right)
- Pressing the [Suspend] key will suspend the monitoring.



4 Verify that the monitoring is suspended on the home display.
The selected label with the set color will be displayed on the home display.

- On the home display, the time will start counting for the set duration.
- When the set duration completes, alarm sound will generate (5 sec. interval), and alarm indicator will light.



REFERENCE

- To extend the monitoring suspended duration, press [Extend] to display the timer selection.

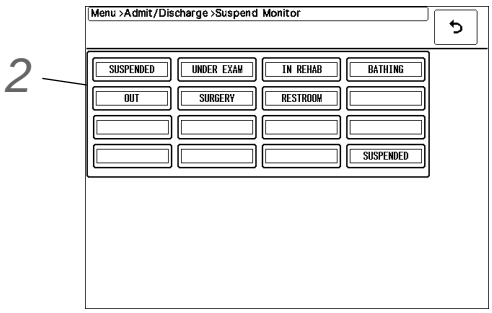
❑When "Monitor Suspend Label" is set, but "Monitor Suspend Timer" is not set:

1 Press the [Menu], "Admit/Discharge" icon, [Monitor Suspend] keys.

- The "Suspend" screen will be displayed.

2 Select the label to be displayed during the monitoring suspended condition.

- A confirmation message will be displayed.
- Pressing the [Suspend] key will suspend the monitoring.
- The selected monitor suspend label with the set color will be displayed on the home display.



To Resume Monitoring

CAUTION

- Resuming monitoring will also resume the suspended alarm.

1 Press the [Resume] key.

- The "Monitoring is suspended" message will disappear and monitoring will resume.

Chapter 6 Alarm Function

Chapter 6 Alarm Function

Alarm

To Set the Arrhythmia Alarm

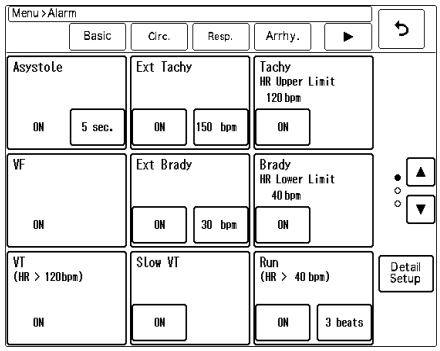
The arrhythmia alarm can be turned ON or OFF, and arrhythmia detection level can be set.

WARNING

- Set the appropriate upper and lower alarm limit for each parameter according to the monitoring condition.
- When the system alarm is suspended, all the alarms will be suspended even if the parameter alarm is set to ON. Also, the alarms will not be stored as recall events.
- If the upper/lower alarm limit of the parameter is set to OFF, or if arrhythmia alarm is set to OFF, alarm will not function even if the alarm for that parameter is set to ON. Pay attention when setting them OFF.

1 Press the [Menu], [Alarm], [Arrhy.] keys.

▸ The arrhythmia alarm setup screen will be displayed.



2 Set ON/OFF of each arrhythmia.

▸ [ON]: Arrhythmia alarm will generate.

▸ [OFF]: Alarm will not generate.

NOTE

- The <ARRHY OFF> message will be displayed when the Slow_VT, Tachy, Brady, Ext Tachy, Ext Brady, and HR alarm is OFF.

REFERENCE

- The arrhythmia detection level for tachycardia (Tachy), bradycardia (Brady), extreme tachycardia (Ext Tachy), extreme bradycardia (Brady) alarms link with the upper and lower alarm limit for HR/PR.
  - The tachycardia (Tachy) alarm generates when the value exceeds the HR/PR upper alarm limit. When the upper alarm limit is OFF, alarm will not generate.
  - For the Ext Tachy alarm, the alarm threshold level cannot be set below that of Tachy alarm.

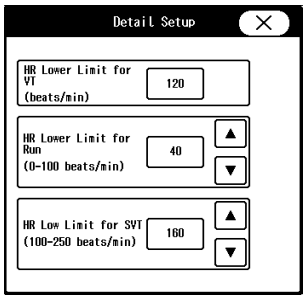
- The bradycardia (Brady) alarm generates when the value exceeds the HR/PR lower alarm limit. When the lower alarm limit is OFF, alarm will not generate.
- For the Ext Brady alarm, the alarm threshold level cannot be set above that of Brady alarm.

3 Select the level to detect each arrhythmia.

Item	Description
Asystole	3 sec. to 10 sec.
Run	2 beats to 8 beats
Pause	1.5 sec. to 5 sec.
Frequent	1 bpm to 50 bpm
Ext Tachy	22 beats to 300 beats
Ext Brady	20 beats to 295 beats

Item	Description
R on T	200 ms to 600 ms
SVT	2 beats to 10 beats
Irregular RR	10, 15, 20%
S Frequent	1 bpm to 50 bpm
Pacer Not Capture	80 ms to 480 ms
Pacer Not Pacing	20 bpm to 200 bpm

4 Press the [Detail Setup] key, and set the HR Lower Limit for VT, RUN and SVT.



1 Set the "HR Lower Limit for VT" .
   - Select the lower limit of HR value from 120 bpm / 140 bpm to generate VT.
   - If the HR is below the selected value, Slow_VT will generate.

2 Set the "HR Lower Limit for RUN" .
   - If the HR is same or above the selected value, RUN will generate.

3 Set the "HR Lower Limit for SVT".
   - If the HR is same or above the set value, SVT alarm will generate.

SpO_2 Second Alarm Setup

NOTE

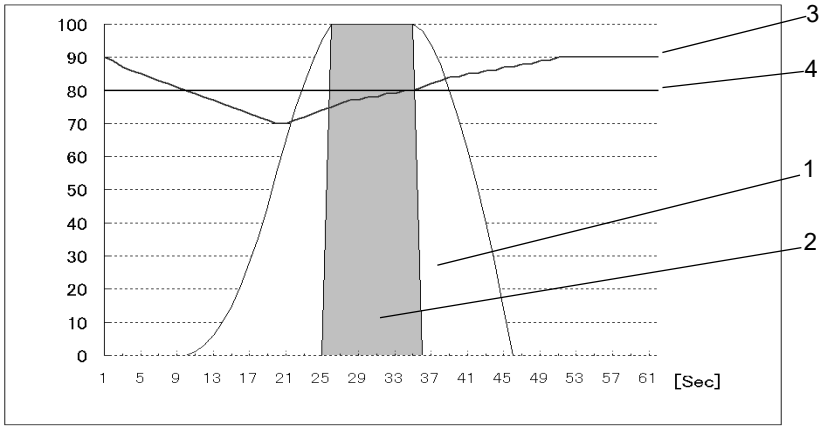
- The SpO_2 second alarm function utilizes SatSeconds™ technology of Covidien. SatSeconds™ is a trademark of Covidien.

The SpO_2 second alarm function is available for the DS-8007N.

When the SpO_2 value is unstable around the lower alarm limit, the frequently generated alarm may be bothersome. The second 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_2 value at every second) reaches the preprogrammed second alarm threshold value.

The integral value of the second alarm is calculated as follows.



1 Integral Value

2 Alarm Generation

3 SpO_2 Value

4 Alarm Limit

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

The SpO_2 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_2 value) is accumulated each second.

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

The SpO_2 value begins to fall below the alarm limit at approximately 36 seconds. At the same time, the integral value begins to decrease. [(Alarm limit) – (SpO_2 value)]x 2 is subtracted each second.

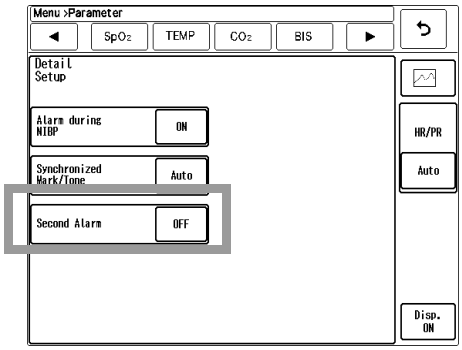
Also, there is a safety net when setting the second alarm function. This safety net is for the case when the SpO_2 value frequently falls below the alarm limit but does not last long enough to reach the second alarm threshold.

If the SpO_2 value falls below the limit 3 times or more during the last 60 seconds, an alarm will be generated even if the second alarm threshold is not reached.

⚠ CAUTION

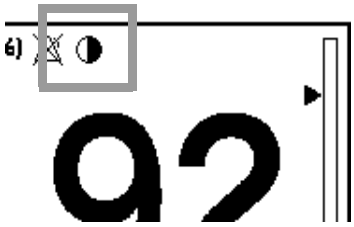
- Whether to use the second alarm function and its threshold selection should be based on the patient's clinical indication portent and medical evaluation.
- If the SpO_2 alarm and second alarm setup is set to [OFF], the second alarm integral value will be set to 0.

1 Press the [Menu], [Parameter], [SpO_2], [Detail Setup] keys.



2 For "Second Alarm", select from [OFF]/ [10]/ [25]/ [50]/ [100].

- Settings other than [OFF]: A circular second alarm indicator will be displayed inside the numeric data box.
- [OFF]: Second alarm indicator will not be displayed.
- As the integral value increases, the indicator will begin to fill, and when it is completely filled, an alarm will be generated.

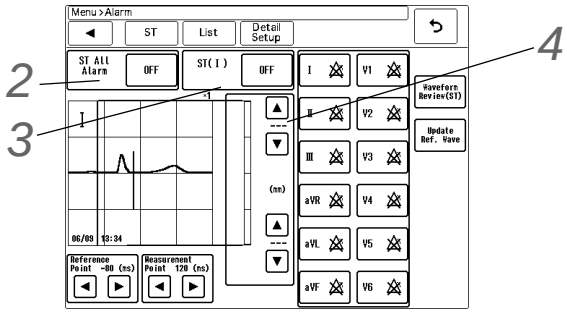


ST Alarm Setup

Set the ST upper limit and lower limit for the reference waveform.
The alarm limit should be set for each measurement unit (mm/mV). The upper and lower limit can be set in 1 mm / 0.1 mV increment.

1 Press the [Menu], [Alarm], [ST] keys.

- The ST alarm setup screen will be displayed.



2 Select [ON]/[OFF] for "ST All Alarm" .

- [OFF]: Alarms will not generate even if the alarm for each lead is set to ON.

3 Select [ON]/[OFF] of ST alarm for each lead.

4 Press the ▲/▼ keys and set the upper, lower limit (±20 mm / ±2.0 mV) .

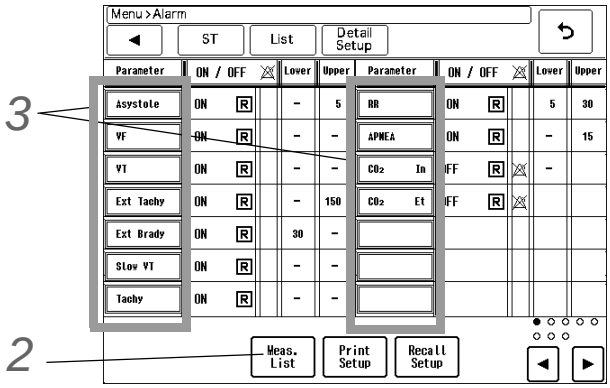
- Alarm will be set to OFF if the value –20mm / –2.0mV or lower is selected.
- Alarm will be set to OFF if the value +20mm / +2.0mV or above is selected.

List of Alarm Settings

The alarm settings can be verified in list format.
The alarm settings for each parameter can be changed on this list.

1 Press the [Menu], [Alarm], [List] keys.

- The alarm settings list will be displayed.



2 Select from [All List] / [Meas. List].

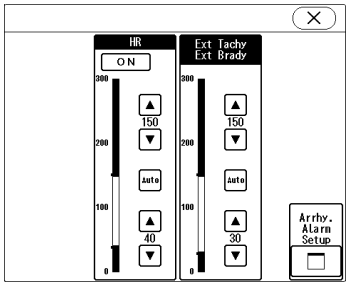
- [All List]: The settings for all the parameters will be displayed.
- [Meas. List]: The settings for only the measured parameters will be displayed.

3 Change the alarm threshold.

1 Select a parameter.

▸ The alarm setup window will be displayed.

2 Press ▲/▼ to set the threshold level.

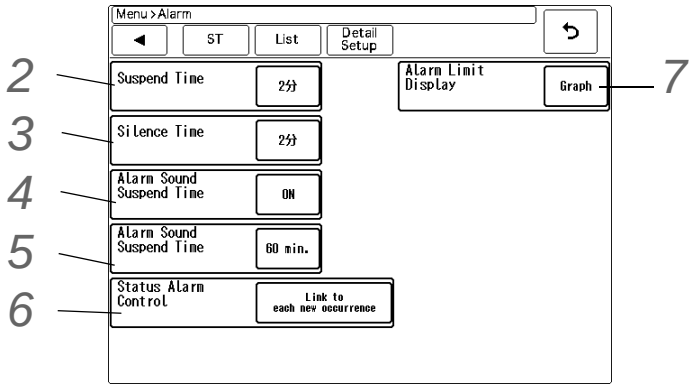


Detail Setup

The alarm-related setup such as alarm suspend duration and alarm silence duration can be performed.

1 Press the [Menu], [Alarm], [Detail Setup] keys.

▸ The alarm detail setup screen will be displayed.



2 Alarm Suspend Time

▸ Select from [1 min.] / [2 min.].

3 Alarm Silence Time

▸ Select from [1 min.] / [2 min.].

4 Alarm Sound Suspend

▸ [ON]: The alarm sound suspend function will turn ON.

▸ [OFF]: The alarm sound suspend function will turn OFF.

5 Alarm Sound Suspend Time

▸ Select from [1 min.] / [2 min.] / [5 min.] / [10 min.] / [30 min.] / [60 min.] / [90 min.] / [120 min.] / [240 min.] / [360 min.].

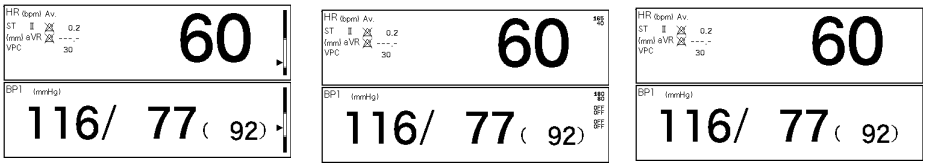
6 Status Alarm Control

▸ The alarm silence time for the level L equipment status alarm ("Check electrodes", "NIBP Check patient type, air hose", etc.) can be set.
(☞"Equipment Status Alarm Message" P11-6)

- [Link to Alarm Silence Time]: When the [Alarm Silence] key is pressed at occurrence of equipment status alarm, alarm will be silenced for fixed amount of time set for "Silence Time".
  If the alarm factor 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 a new alarm occurs during the alarm silence time, the alarm sound for the new alarm will generate.
- [Link to each new occurrence]: When the [Alarm Silence] key is pressed at occurrence of equipment status alarm, the alarm will be silenced as long as the alarm factor remains regardless of the "Silence Time" setting.
  While the same equipment status alarm is generated, the alarm will remain silenced.
  If the alarm factor is resolved during the alarm silence time, the alarm will be canceled.
  If the same alarm generates again during the alarm silence time, the alarm sound will generate.

7 Alarm Limit Display

- Select from [Graph] / [Numeric]/ [OFF].



Graph *Numeric* *OFF*

NOTE

- The alarm limit for the parameter with the alarm turned OFF will not be displayed regardless of this setup.
- If the alarm limit display for BP is [Graph], systolic value will be displayed.
- Depending on the numeric data box type, alarm limit may not be displayed.

Alarm Limit Setup

This section explains the procedure to enable/suspend the system alarm, and to set the upper/lower alarm limit for each parameter.
On this system, 6 modes can be preprogrammed according to the monitoring purpose. By preprogramming the alarm setting to each mode, the alarm setups at admittance of patient can be simplified by just selecting a mode.It is recommended to program the mode in rough classification such as patient's age, monitoring purpose, and change the mode for each patient as necessary.

To Set the System Alarm (ON or Suspend)

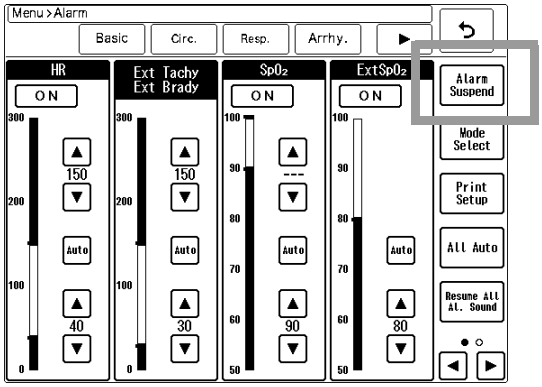
The system alarm can be enabled or suspended.
The system alarm enabled condition is when the alarm suspended condition is canceled, and alarm limit and alarm ON/OFF setting for each parameter are effective. The system alarm cannot be disabled.

⚠ WARNING

- When the system alarm is suspended, all the alarms will be suspended even if the parameter alarm is set to ON. Also, the alarms will not be stored as recall events.
- If the upper/lower alarm limit of the parameter is set to OFF, or if arrhythmia alarm is set to OFF, alarm will not function even if the system alarm is enabled. Pay attention when setting them OFF.

1 Press the [Menu], [Alarm], [Basic] (or [Circulatory], [Respiratory]) keys.

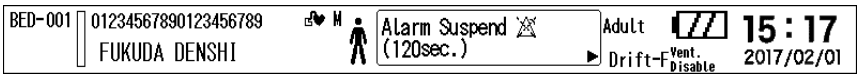
- The alarm setup screen will be displayed.



2 Select whether to enable or suspend the alarm.

1 To suspend the alarm, press the [Alarm Suspend] key.

- The key will change to blue.
- The alarm will suspend temporarily.
- <Alarm Suspend (xxx sec.)> will be displayed. (xxx sec.) indicates the remaining time. The system alarm will be enabled when the suspended time completes.



2 To set the alarm ON, press the [Alarm Suspend] key while in alarm suspended condition.

- The key will change to gray.
- The alarm limits and ON/OFF settings for each parameter will become effective.
- The alarm suspended condition will be canceled.

To Silence or Suspend the System Alarm Sound

The alarm sound can be suspended for fixed amount of time. There are two ways to suspend the alarm sound, which are "Alarm Silence" and "Alarm Sound Suspend".
The "Alarm Silence" function suspends the alarm sound for fixed amount of time (1 min. / 2 min.).
The "Alarm Sound Suspend" function suspends the alarm generation in advance when the alarm generation is expected. Alarm monitoring will continue even while the alarm sound is suspended. The alarm sound suspend duration can be selected from 1 min., 2 min., 5 min., 10 min., 30 min., 60 min., 90 min., 120 min., 240 min., 360 min..

1 To silence the alarm, press the [Alarm Silence] key (fixed key).

- The alarm sound will be silenced for fixed amount of time.
- If the alarm factor still remains at completion of silence time, the alarm sound will generate again.
- The [Alarm Silence] key can also be set as user key.

2 To suspend the alarm sound, press the Alarm Silence key (fixed key) for more than 3 seconds.

- The alarm sound will be suspended for fixed amount of time.
- During the alarm sound suspended duration, the alarm sound will not generate.

NOTE

- If the [Alarm Silence] key is pressed while the alarm sound is generated, it will bring the system to "Alarm Silence" condition and not the "Alarm Sound Suspend" condition.
- During the "Alarm Sound Suspend" duration, other bed alarm sound will not generate.

❑Precautions about Silencing the Alarm

The alarm silence function is effective for each parameter. Once the alarm cause is resolved, the alarm silence condition for that parameter will be canceled.

When [Fukuda Tone] is set for "Alarm System" under [Menu>Setup>Initial Settings], and if another alarm with the lower priority occurs during the alarm silence duration, alarm sound will not generate. The recall and alarm printing will function.

When [Fukuda Tone] is set for the "Alarm System" and equipment status alarm is silenced, the alarm sound for the lower priority numeric and arrhythmia alarm will generate.

When [Melodic Tone] or [Standard Tone] is set for the "Alarm System" and if another alarm with lower priority occurs, the alarm sound will generate.

If the [Alarm Silence] key is pressed for the alarm of another parameter which occurred during the alarm silence condition, the alarm silence duration for the first alarm will not be extended.

The alarm silence condition for all parameters will be canceled for the following case.

- When the power is turned ON.
- When the system alarm status (enable/suspend) is changed.
- When the monitoring is suspended on the "Admit/Discharge" screen.
- When the user mode is changed.
- When the patient is discharged.
- When [Resume All Al. Sound] key on the alarm setup screen is pressed.

The alarm silence condition for each parameter will be canceled for the following case.

- When the alarm cause is resolved for that parameter.
- When the alarm silence time for the parameter is completed.
- When automatic alarm is set for the parameter.
- When the alarm is turned OFF for the parameter.

If [Link to each new occurrence] is set for "Status Alarm Control" (Menu>Alarm>Detail Setup), the alarm sound will not generate until the alarm condition changes even the set alarm silence duration completes.

❑Precautions about Suspending the Alarm Sound

During the alarm sound suspended duration, recall and alarm printing will function.

The alarm sound suspended condition will cease in the event of any of the following.

- Discharge
- When OFF is set for "Alarm Sound Suspend".
- When the ventilator alarm is generated.
- When resumed from monitor suspend condition.
- When the [Alarm Silence] key is pressed.

❑About the Alarm Mute Function

When "Alarm Mute" is set to [ON], all the alarms will be silenced.

- "Alarm Mute" function can be turned ON/OFF under the "Initial Settings" menu. (☞Maintenance Manual "Alarm Related Setup" P5-5)
- By using the "Alarm Mute Reminder" function, a reminder message, <Alarm is silenced.>, and a reminder sound can be displayed/generated after preprogrammed duration.
- During the alarm mute duration, recall and alarm printing will function.

⚠ WARNING

- During the alarm mute duration, alarm sound will not generate. Pay attention not to miss any important alarm by simultaneously monitoring the patient on central monitor or other monitors.

Alarm Limit Setup for Each Parameter

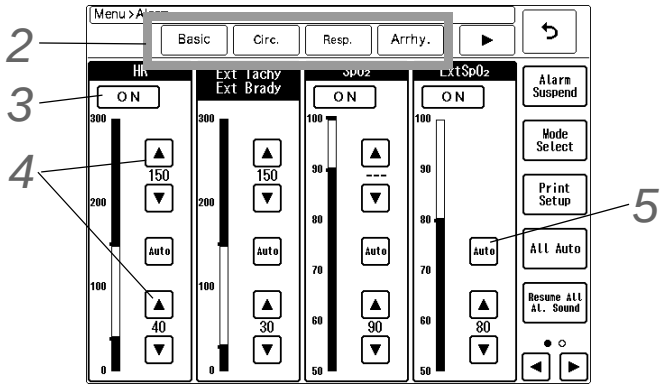
The alarm for each parameter can be turned ON or OFF, and upper and lower alarm limit can be set.

⚠ WARNING

- Set the appropriate upper and lower alarm limit for each parameter according to the monitoring condition.
- When the system alarm is suspended, all the alarms will be suspended even if the parameter alarm is set to ON. Also, the alarms will not be stored as recall events.
- If the upper/lower alarm limit of the parameter is set to OFF, or if arrhythmia alarm is set to OFF, alarm will not function even if the alarm for that parameter is set to ON. Pay attention when setting them OFF.

1 Press the [Menu], [Alarm], [Basic] keys.

▸ The alarm setup menu will be displayed.



2 Select the parameter group from the tab.

REFERENCE

- The standard parameters will be displayed on the Menu screen. The parameters to be displayed here are selectable.
  (☞Maintenance Manual "Alarm Related Setup" P5-5)

3 Select ON/ OFF for the individual alarm.

- [ON]: Alarm of the corresponding parameter will generate.
- [OFF]: Alarm of the corresponding parameter will not generate.

4 Press ▲/▼ to set the upper/lower limit.

5 Use the auto setup function.

- Auto :Sets the upper and lower alarm limit automatically.

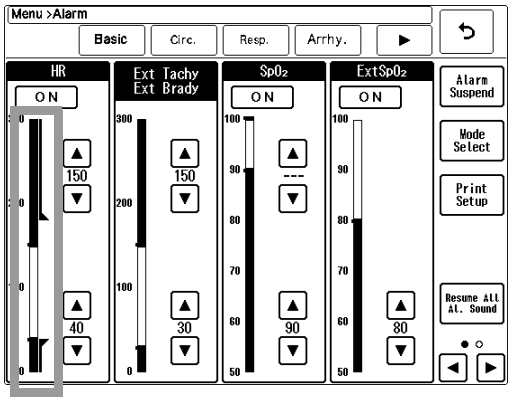
REFERENCE

- [Auto] key will be displayed only when [ON] is set for "Auto Alarm Setup" under "Initial Settings".
- To maintain the alarm setting even after the power is turned OFF or after the discharge procedure, store the setting to one of the alarm modes, or select "Backup" for "Alarm" on the "Backup at Discharge" menu (Monitor Setup).
  (☞Maintenance Manual "Display/Print Setup" P5-12)

For the alarm limit range for each parameter, refer to ☞"Alarm" P12-1.

About the Alarm Threshold Limit

By setting the alarm threshold limit ("Initial Settings") in advance, the alarm threshold can be limited within the preprogrammed range. When the alarm threshold limit function is enabled, threshold limit will be displayed beside the alarm bar.
(☞Maintenance Manual "Alarm Related Setup" P5-5)



Above is an example of alarm threshold limit setting where HR is set to [Enable], and upper and lower limits are set to 180 bpm and 40 bpm respectively.

NOTE

- The alarm threshold limit can be set for each parameter. When enabling this function, make sure the upper and lower limits are set appropriately.
- When the alarm threshold limit function is enabled, pressing the [Auto] key for alarm settings will set the alarm threshold within the limit range.

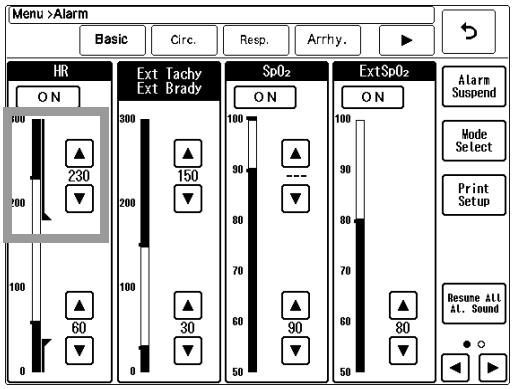
❑Limit Deactivating Mode

Even when the alarm threshold limit function is enabled, the alarm threshold outside the limit can be temporarily set. This is called the "Limit Deactivating Mode."

By pressing the up arrow key ▲ for 2 seconds at the upper threshold limit, the limit can be deactivated. The arrow keys will turn to blue indicating that the upper threshold limit can be exceeded.

In the same way, by pressing the down arrow key ▼ for 2 seconds at the lower threshold limit, the limit can be deactivated. The arrow keys will turn to blue indicating that the lower threshold limit can be exceeded.

When the alarm threshold is set within the limit range, the limit deactivating mode will end.



Above is an example of HR upper threshold limit being deactivated. The upper limit keys are turned to blue indicating that the upper limit 180 bpm can be exceeded.

NOTE

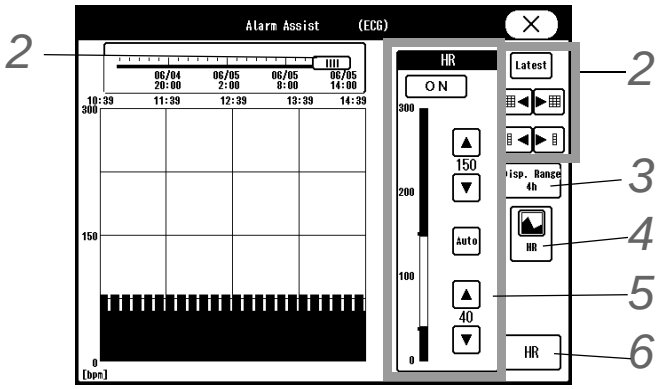
- If the alarm threshold set on the central monitor exceeds the threshold limit set on the bedside monitor, the alarm threshold set on the central monitor will be applied.In such case, the threshold limit is deactivated.
- If the alarm threshold of the transport monitor exceeds the alarm threshold limit of the DS-8400, the exceeded alarm threshold will be applied to the DS-8400. Make sure to check the alarm setting on the DS-8400 as the alarm threshold limit status will be changed to "Limit Deactivating Mode".
- If the alarm threshold of "Setup at Discharge" exceeds the alarm threshold limit, the exceeded alarm threshold will be applied. Make sure to check the alarm setting at admittance as the alarm threshold limit status will be changed to "Limit Deactivating Mode".
- If the monitor mode is changed, and the alarm threshold of the current monitor mode exceeds the threshold limit, this alarm threshold will be applied.In such case, the threshold limit is deactivated.

Alarm Assist Screen

On the alarm assist screen, maximum of 24 hours of trend data for the corresponding parameter will be displayed. Alarm limit can be set by using the past trend data as reference.

1 Press the [Menu], [Parameter], select a parameter, and press the alarm assist icon . Or, press the numeric data box, and then, alarm assist icon.

- The alarm assist screen will be displayed.



2 Select the time range on the time bar.

- Scroll the slider left and right.
  Right: Scrolls to the newer data.
  Left: Scrolls to the older data.
- Pressing / will switch the display by one page each.
- Pressing / will switch the display by one-fourth page each.

3 Select the display interval.

- Select from [24h]/ [16h]/ [12h]/ [8h]/ [4h]/ [2h]/ [1h]/ [5min].

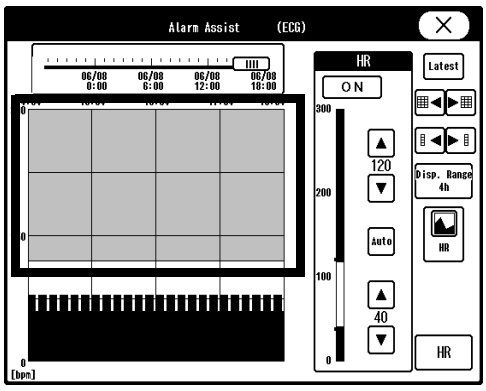
4 Select the trend display type from , , , etc.

5 Set the upper and lower alarm limit.

1 Press the / keys.

- Alarm zone (gray part shown on right) will be displayed on the trend.

2 Set the alarm limit by using the alarm trend as reference.



6 Switch the parameter for the displayed alarm bar.

- If there are multiple parameters, select the parameter to display the alarm bar.

Chapter 7 Monitoring

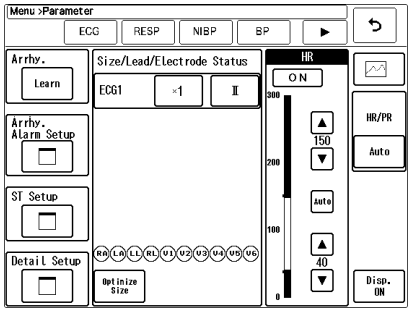
Chapter 7 Monitoring

To Display the Parameter Setup Screen

This section explains how to display the setup menu for the monitoring parameters.

1 Press the [Menu], [Parameter], and then select the parameter to perform the setup.
Or, press the numeric data box on the home display.

- The "Parameter" menu will be displayed.
- The settings for the following parameters can be performed.
  ECG, RESP, NIBP, BP, SpO2, TEMP, CO2, BIS, Sp*



ECG

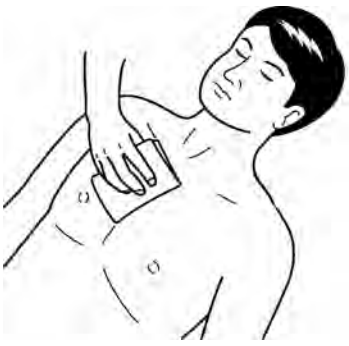
This section explains the procedure for ECG measurement preparation and monitoring condition setup.

Before Attaching the Electrodes

⚠ CAUTION

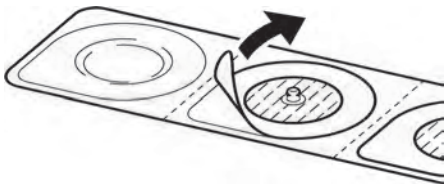
- Make sure to use electrodes of the same type.
  If different types of electrodes are used at the same time, the difference between the polarization potential from each electrode may interfere monitoring.
- ECG measurement part is Type CF applied part, but it is not intended to directly apply on patient's heart.

1 If necessary, shave the electrode sites to remove excessive hair.



2 Clean the electrode sites with an alcohol swab or other skin preparation.

3 Peel off the backing of electrode, and attach to the patient.



NOTE

- Pay attention not to touch the electrode gel.

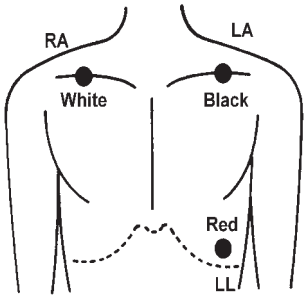
Electrode Placement

Depending on the lead cable type, 3-electrode/4-electrode/5-electrode/10-electrode placements are available. Using the 4-electrode, 5-electrode or 10-electrode application allows simultaneous monitoring of 2 ECG waveforms, and high accuracy of arrhythmia analysis can be attained. (1 to 12 waveforms can be displayed depending on the number of electrodes.)
Also, the displayed lead type can be changed.

❑For 3-electrode lead cable (1 waveform monitoring)

Lead Type: [I]/[II]/[III]

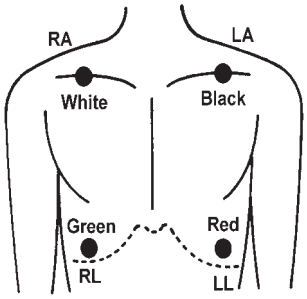
Symbol	Color	Electrode Site
RA	White	On the right infraclavicular fossa
LA	Black	On the left infraclavicular fossa
LL	Red	On the left midclavicular line, near the supracrestal line.



❑For 4-electrode lead cable (Maximum 6 waveforms monitoring)

Lead Type: [I]/[II]/[III]/[aVR]/[aVL]/[aVF]

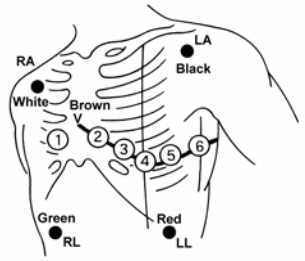
Symbol	Color	Electrode Site
RA	White	On the right infraclavicular fossa
LA	Black	On the left infraclavicular fossa
LL	Red	On the left midclavicular line, near the supracrestal line.
RL	Green	On the right midclavicular line at the same height as LL.



❑For 5-electrode lead cable (Maximum 7 waveforms monitoring)

Lead Type: [I]/[II]/[III]/[aVR]/[aVL]/[aVF]/[V]

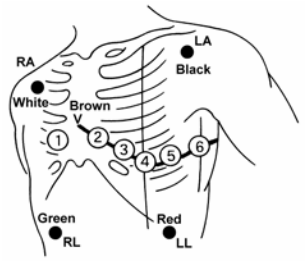
Symbol	Color	Electrode Site
RA	White	On the right infraclavicular fossa
LA	Black	On the left infraclavicular fossa
LL	Red	On the left midclavicular line, near the supracrestal line.
RL	Green	On the right midclavicular line at the same height as LL.
V	Red/Brown	Chest electrodes (V1 to V6)



❑For 10-electrode lead cable (Maximum 12 waveforms monitoring)

Lead Type: [I]/[II]/[III]/[aVR]/[aVL]/[aVF]/[V1]/[V2]/[V3]/[V4]/[V5]/[V6]

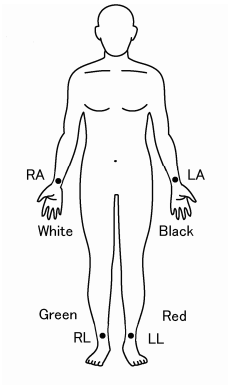
Symbol	Color	Electrode Site
RA	White	On the right infraclavicular fossa
LA	Black	On the left infraclavicular fossa
LL	Red	On the left midclavicular line, near the supracrestal line.
RL	Green	On the right midclavicular line at the same height as LL.
V	Red/Brown	The fourth intercostal space at the right sternal border.
V2	Yellow/Brown	The fourth intercostal space at the left sternal border.
V3	Green/Brown	On the midway between V2 and V4.
V4	Blue/Brown	The fifth intercostal space on the left midclavicular line.
V5	Orange/ Brown	On the left anterior axillary line at the same horizontal level as V4.
V6	Violet/Brown	On the left midaxillary line at the same horizontal level as V4.

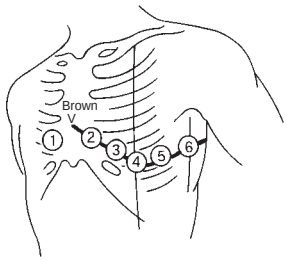


NOTE

- Electrode Placement for 12-Lead ECG Analysis
  When acquiring 12-lead ECG signals, Fukuda Denshi recommends placing the limb electrodes anywhere along the arms and legs as shown below.
  However if it is difficult, use the Mason-Likar 12-lead system.
  To reduce the waveform differences from the standard 12-lead, Fukuda Denshi recommends that the torso placement of the RA and LA electrodes be near as possible to each arm, in the infraclavicular fossae, within the area unaffected by myoelectricity.)

Symbol	Color	Electrode Site
RA	White	On the right arm
LA	Black	On the left arm
LL	Red	On the left leg.
RL	Green	On the right leg.
V	Red/Brown	The fourth intercostal space at the right sternal border.
V2	Yellow/Brown	The fourth intercostal space at the left sternal border.
V3	Green/Brown	On the midway between V2 and V4.
V4	Blue/Brown	The fifth intercostal space on the left midclavicular line.
V5	Orange/ Brown	On the left anterior axillary line at the same horizontal level as V4.
V6	Violet/Brown	On the left midaxillary line at the same horizontal level as V4.





Type of Electrodes and Lead Cable

There are various types of disposable electrodes for ECG measurement depending on the connection method with the lead cable and materials which the electrodes are made of. Make sure to use the appropriate electrodes which will make full use of the characteristics.
Do not reuse/resterilize the disposable electrodes.
For details of usable lead cables, refer to ☞"ECG, Impedance Respiration Measurement (Manufactured by Fukuda Denshi)" P13-1

Connection to the Patient Monitor

⚠ CAUTION

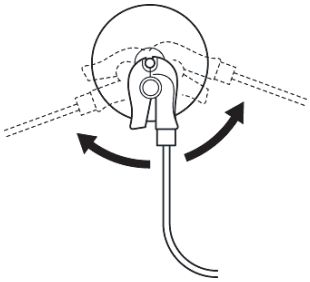
- The indication for continuous use of the electrode is about one day.
- Replace the electrode if the skin contact gets loosen due to perspiration, etc.
- When an electrode is attached to the same location for a long period, some patients may develop skin irritation. Check the patient's skin condition periodically and change the electrode site as required.
- When using the electrosurgery-proof type ECG relay cable, the impedance respiration cannot be measured, and its numeric data and waveform will not be displayed. When measuring in an environment where electrosurgery is not performed, make sure to use the standard ECG relay cable.

NOTE

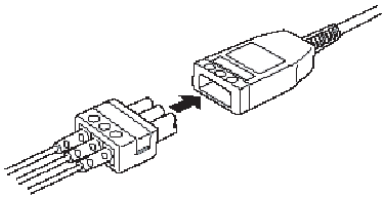
- Use only the specified relay cables, lead cables, and electrodes.
- The conductive parts of electrodes and associated connectors for applied parts, including the neutral electrode, should not contact other conductive parts including earth.

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

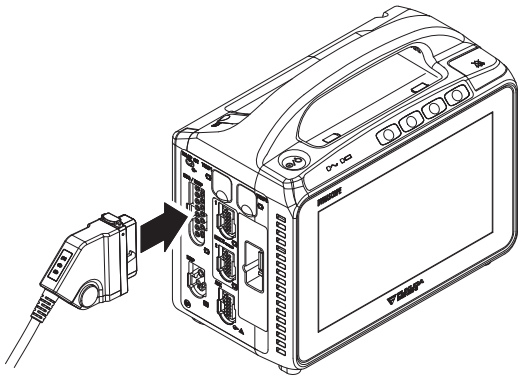
2 Turn right and left to verify that it is securely connected.



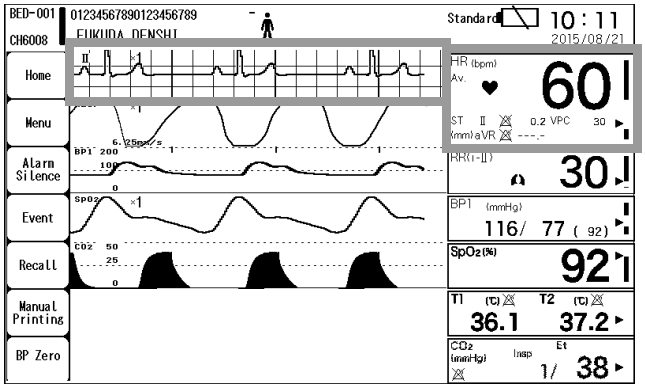
3 Connect the lead cable to the relay cable.



4 Plug in the relay cable to the ECG input connector (green) of the DS-8007.



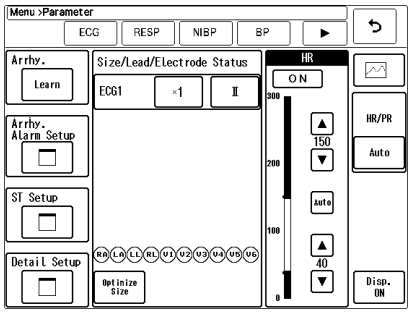
▸ ECG waveform and HR data will be displayed on the monitor.



5 Adjust the waveform size and position, and change the monitoring lead as necessary.
(☞"ECG Parameter Setup" P7-6)

ECG Parameter Setup

Press the [Menu], [Parameter], [ECG] keys to display the "ECG" setup menu.



❑Adjustment of Waveform Size and Baseline Position

Adjust the waveform size and baseline position.

⚠ CAUTION

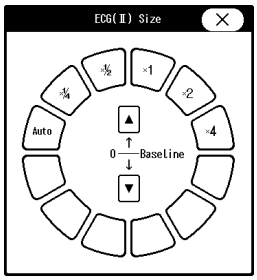
- The threshold level for arrhythmia detection changes with ECG waveform size. Set a proper waveform size for monitoring. When the ECG waveform size is x1/4, x1/2, or x1, the arrhythmia detection level is 250 μV. When the ECG waveform size is x2 or x4, the arrhythmia detection level is 150 μV.
- Automatic size/position of the ECG is effective only at the time the [Auto] key is pressed. This does not continuously adjust the size and position.
- The waveform size and position cannot be set if the waveform is not displayed. Refer to ☞"To Configure the Display" P10-4, and change the display configuration as necessary.
- The threshold level for HR detection changes with ECG waveform size. Set a proper waveform size for monitoring.

REFERENCE

- By setting the [ECG Size (All Leads)] key as user key, ECG size for all leads can be changed at once. (☞"User Key Selection" P10-12)

1 Press the key for "ECG1" to "ECG12".

▸ The "Size" menu will be displayed. (shown on right)



2 Select the waveform size for displaying/printing.

▸ [Auto]: ECG amplitude will be automatically adjusted to a value close to 10 mm.
The automatic adjustment is effective only when the [Auto] key is pressed.

Waveform Size	x1/4	x1/2	x1	x2	x4
Voltage (10 mm)	4 mV	2 mV	1 mV	500μV	250μV

3 Use the ▲/▼ keys to adjust the baseline position.

If the waveform is difficult to see due to ECG amplitude, set the baseline position to 0 mV.
The baseline position for the waveform display and printing will be adjusted.

❑Lead Selection

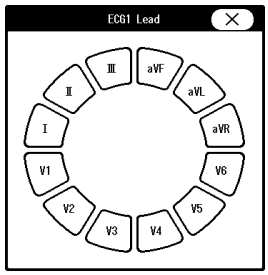
Set the monitoring lead.

⚠ CAUTION

- The leads for arrhythmia detection, central monitor display, printing are fixed as ECG1 and ECG2. Set the most appropriate leads with high QRS for ECG1 and ECG2, especially for arrhythmia detection.
- The alarms for HR, Tachy, Brady, Ext Tachy, Ext Brady will not be generated when the electrode for ECG1 or ECG2 lead is detached, and for 30 seconds after the electrode is reattached.
- If the T wave is large and QRS wave is small, T wave may be erroneously detected as QRS wave. Change the lead or electrode site to increase the QRS wave and decrease the T wave.

1 Press the key for "ECG1" to "ECG12".

▸ The "Lead" selection window will be displayed.



2 Select the ECG monitoring lead.

❑HR Alarm Setup

Set the HR alarm.
(☞"Alarm Limit Setup for Each Parameter" P6-9)

NOTE

- When Ext Tachy or Ext Brady alarm is ON, alarm threshold of Ext Tachy, Ext Brady will be displayed on the HR alarm bar. To change the threshold, press the alarm bar and display the alarm setup window.
- Set the upper limit in the range of 22 bpm to 300 bpm. The upper limit alarm will become OFF if the value exceeds 300 bpm.
- Set the lower limit in the range of 20 bpm to 295 bpm. If a value below 20 bpm is set, the lower alarm will turn OFF.
- Ext Tachy alarm threshold cannot be set below HR upper alarm limit, and Ext Brady alarm threshold cannot be set above HR lower alarm limit.

REFERENCE

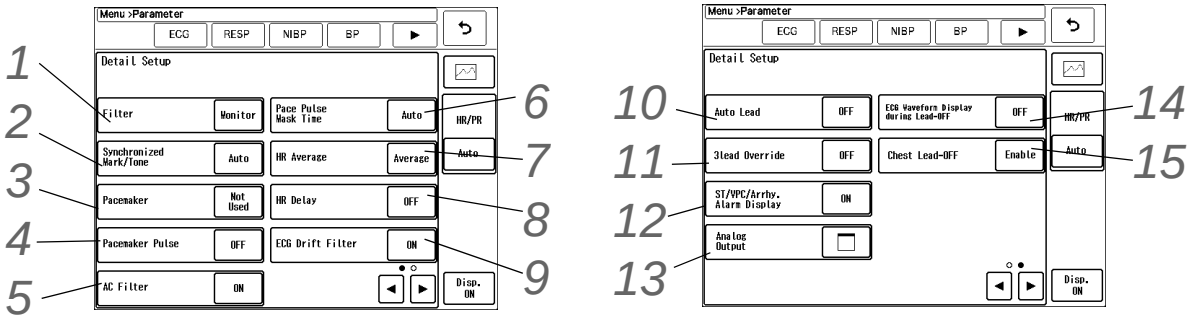
- To use the auto setting, [Enable] should be selected for "Alarm Auto Setup" under "Initial Settings". (☞Maintenance Manual "Alarm Related Setup" P5-5)
- When [Auto] is set for HR alarm, the upper and lower limit will be automatically set to +40 bpm and -40 bpm to the current value respectively. The lower limit will be clipped to the setting made for "HR/PR Lower Limit during Alarm Auto Setting" (Menu>Initial Settings>Alarm).
- When [Enable] is set for "Alarm Threshold Limit" under "Initial Settings", and auto setting is used, the upper and lower alarm limit will be clipped to the set limit.
  However if "HR/PR Lower Limit during Alarm Auto Setting" is also set, HR lower alarm limit will be clipped to the larger value.
- Ext Tachy will be set to HR upper limit+10 bpm, Ext Brady will be set to HR lower limit-10 bpm. When the set value exceeds 300 bpm for the upper limit and 20 bpm for the lower limit, the setting will be clipped to 300 bpm and 20 bpm respectively.
- When [Auto] is set for Ext Tachy, Ext Brady, the same setting, HR upper limit+10 bpm, HR lower limit-10 bpm, will be set respectively.
- [Auto] key will be displayed only when [ON] is set for "Auto Alarm Setup" under "Initial

Settings".

❑Arrhythmia Alarm Setup

Set the arrhythmia alarm.
(☞"To Set the Arrhythmia Alarm" P6-1)

❑Detail Setup



1 Set the filter mode.

- Select from [Monitor]/[ESIS]/[Diag.]. Each mode has different frequency characteristic.
- The selected filter mode will be printed along with other data.
- On the waveform area, "M" (Monitor), "E" (ESIS), or "D" (Diagnosis) will be displayed.

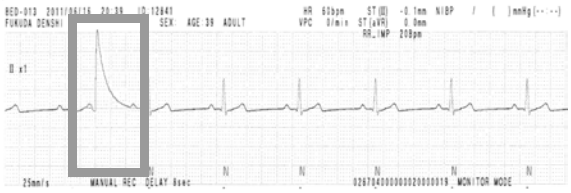
⚠ CAUTION

- The ESIS mode cannot completely reduce the electrical noise, and may erroneously detect the pacemaker spike.
- The ESIS mode should be selected only when a high frequency noise largely affects the HR measurement.

Monitor Mode (Frequency Characteristic: Adult/Child 0.5 Hz to 40 Hz, Neonate 1.6 Hz to 40 Hz)	This is the standard mode for ECG monitoring. The highest frequency is set to 40 Hz to reduce the artifact caused by EMG, etc.
ESIS Mode (Frequency Characteristic: Adult/Child/Neonate 1.6 Hz to 15 Hz)	By selecting this mode during electrosurgery, noise can be largely reduced.
Diagnosis Mode (Frequency Characteristic: Adult/Child/Neonate 0.05 Hz to 150 Hz)	Select this mode if ST measurement or high frequency ECG monitoring is performed. As the lowest frequency is set to 0.05 Hz, ST level can be accurately measured.

NOTE

- When the filter mode is changed, a notch will appear on the ECG waveform due to the change in frequency characteristic as shown below.



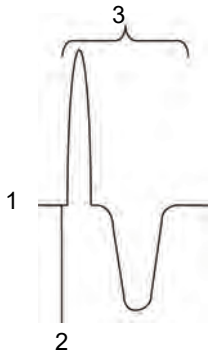
2 Set the "Synchronized Mark/Tone".

- [OFF]: Synchronized mark will not be displayed.
- [Auto]: The priority will be according to the setting of "Synchronized Mark/Tone Priority" under [Menu>Setup>Initial Settings>Meas.>Other].
  (☞Maintenance Manual "Other Setup" P5-10)
  [ECG]: The synchronizing priority will be set in the order of ECG>SpO_2>BP. The synchronized tone will turn ON.
  [SpO_2]: The synchronizing priority will be set in the order of SpO_2>ECG>BP. The synchronized tone will turn ON.
- [ECG]: HR synchronized mark will be displayed inside the HR numeric data box. The synchronized tone will turn ON.
- [SpO_2]: PR_SpO_2 synchronized mark will be displayed inside the PR_SpO_2 numeric data box. The synchronized tone will turn ON.
- [BP]: PR_IBP synchronized mark will be displayed inside the PR_IBP numeric data box. The synchronized tone will turn ON.

3 Select [Used]/[Not Used] for "Pacemaker".

- [Used]: Pacemaker pulse will be detected and pace pulse mask function will be performed for set duration.
- [Not Used]: Pacemaker pulse will not be detected.

4 Set the "Pacemaker Pulse".



1 ECG Signal Input
ECG signal will be input.

2 Pacemaker Pulse Detection and Suspension of QRS Detection
Detects the high frequency and large amplitude signal as pacemaker pulse. When pacemaker pulse is detected, QRS detection will be suspended for fixed amount of time to avoid erroneous detection of pacemaker pulse as QRS.

3 Canceling of Arrhythmia Detection
Arrhythmia detection of the waveform following the pacemaker pulse will be canceled.

⚠ CAUTION

- Precautions about Pacemaker Pulse Detection
  - There are some cases when the 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 the pacemaker pulse detection.
  - 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.
  - When a spontaneous QRS and pacemaker pulse overlap (ex. fusion beat, etc.), QRS detection cannot be performed properly. In this case, the heart rate is degraded.
  - If a pacemaker pulse is continuously detected due to AC frequency interference, QRS detection will be suspended and the heart rate will be reduced. Arrhythmia will not be detected either.

- [ON]: The pacemaker artificial pulse will be displayed on to the ECG waveform with a different color. "Pacemaker Pulse" will be automatically set to [ON] when [Used] is selected for "Pacemaker" on the "Admit/Discharge" screen.
- [OFF]: The pacemaker artificial pulse will not be displayed.

5 Set the "AC Filter".

- If the ECG waveform is interfered with AC noise, the AC filter cuts off the frequency component (50 Hz/60 Hz).
- [ON]: AC filter which attenuates the AC noise of 50 Hz to 60 Hz will be set. "AC" will be displayed in the waveform area.
- [OFF]: AC filter will not be set.

6 Set the "Pace Pulse Mask Time".

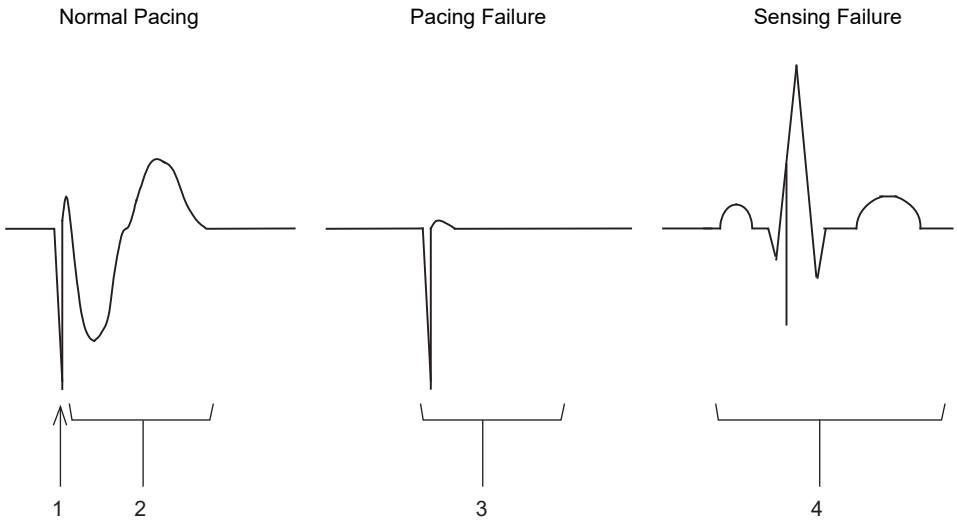
- Select the mask time depending on the pace spike amplitude or presence of fusion beat.
- [Auto]: Pace pulse mask time will be automatically set according to the pace pulse amplitude.
- [OFF]: Pace pulse mask time will be set to 0 ms.

WARNING

- If the QRS pace mask function is set to [10ms]/[20ms]/[OFF], the pace pulse may be erroneously be detected as a QRS complex and HR alarm or asystole alarm may not generate due to incorrect HR (counting pace pulse as QRS complex). Select [10ms]/[20ms]/[OFF] only if you are sure that pacing failure will not occur, or when the patient can be constantly monitored.

REFERENCE

- For the 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". To avoid detecting pacemaker pulses as a QRS complex, this 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 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]/[20ms] for correct measurement of the heart rate. (Default: Auto)



1 Pacemaker Pulse

2 Pacing waveform caused by pacemaker pulse

3 No waveform in spite of pacing stimulus

4 Pacemaker pulse and spontaneous heartbeat occurring at the same time

7 Set the "HR Average".

- [Instant]: HR measured from RR interval of each heartbeat will be displayed.
- [Average]: HR measured from 6 seconds of heartbeat for adult and child, and 3 seconds of heartbeat for neonate will be displayed.

8 Set the "HR Delay".

- [OFF]: HR will be calculated based on the "HR Average" setting.
- [ON]: HR will be calculated based on the arrhythmia analysis. 5 seconds delay will occur compared to when [OFF] is selected.It may improve the HR detection when T wave or noise is interfering.
  When two ECG waveforms (ECG1 and ECG2) are measured, HR will be calculated by merging ECG1 and ECG2.
  If artifact is present on one of the waveforms, HR will be calculated using only the stable ECG waveform.
  If artifact is present on both of the waveforms, HR value will be displayed as "---".
  When ECG electrodes are detached, arrhythmia analysis cannot be performed, and <Lead OFF> message will be displayed. Alarm sound will be also generated.

NOTE

- When the patient classification is set to [Neonate], "HR Delay" will be set to [OFF].
- When the patient classification is set to [Adult] or [Child], and "HR Delay" is set to [ON], "Inst." or "Av." will not be displayed inside the HR or HR/PR numeric data box.

9 Set the "Drift Filter".

- [ON]: Only the amplitude with frequency component under 1 Hz will be attenuated to prevent the ECG baseline drift.
  The patient signal display will delay about 0.5 seconds.
  On the home display, "Drift-F" will be displayed in the information area, and "DF" will be displayed in the waveform area.

- [OFF]: ECG drift filter will not be set.

10 Set the "Auto Lead".

- [ON]: When lead-off condition occurs, "LEAD OFF" message will be displayed and a new ECG lead will be automatically set.
  The automatic lead switching will be performed for ECG 1 and ECG 2.

During Lead OFF

Lead Cable Type	Detached Electrode	Auto Lead Selected	
		ECG1	ECG2
4-electrode	RA	III	III
	LA	II	II
	F	I	I
5-electrode	RA/RA+V	III	III
	LA/LA+V	II	II
	F/F+C	I	I
	V	II	aVR
10-electrode	RA/RA+V	III	III
	LA/LA+V	II	II
	V,V2 to V6	II	aVR

- [OFF]: The lead will not automatically switch even when lead-off condition occurs.

11 Set the "3lead Override".

- Select from [ON] or [OFF].

NOTE

- When a relay cable for 5-lead is used with a 3-lead cable, it will be judged as lead-off condition and <LEAD OFF> message will be displayed.
  If a 3-lead cable is intentionally used, select [ON] for "3lead Override" to avoid displaying the <LEAD OFF> message.
- If [ON] is selected for "3lead Override" even though 4, 5, 10-electrode relay cable is used with all the lead cables and electrodes connected, it will be acknowledged as only 3 electrodes are used and only one waveform will be displayed.
  Also, artifact may interfere to the waveform or lead-off information may become incorrect.
  When using the "3lead Override" function, use only 3 electrodes of LA, RA and LL.

12 Set the "ST/VPC/Arrhy. Alarm Display".

- [ON]: If 2 or more boxes are used for ECG numeric data display, ST level, VPC, arrhythmia alarm factor will be displayed inside the ECG numeric data box.
- [OFF]: ST level, VPC, arrhythmia alarm factor will not be displayed inside the ECG numeric data box.

13 Set the "ECG Analog Output".

- [Disp. Lead]: The lead of the displayed waveform will be output.
- [Selected Lead]: The lead selected on "Output Lead Sel." window will be output.
- [Sync. Signal]: A pulse wave synchronized with the selected signal will be output with the selected output logic pulse width.

14 Set the "ECG Waveform Display during Lead-OFF".

When the lead-OFF condition is detected, whether or not to display the waveform for detached lead can be selected.

- [ON]: The input waveform will be displayed even during lead-off condition.
- [OFF]: Baseline will be displayed during lead-off condition.

15 Set the "Chest Lead-OFF".

Whether or not to detect the chest lead OFF condition can be selected. If set to [Enable], chest lead OFF condition will be notified by an alarm generation.

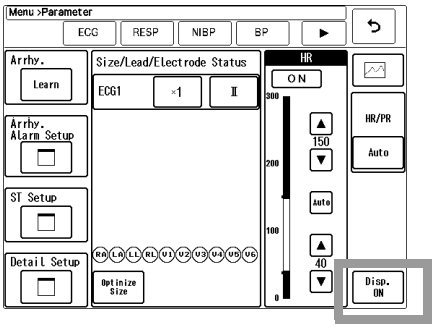
- [Enable]: Chest lead OFF condition will be notified by an alarm generation.
- [Disable]: Chest lead OFF condition will not be notified by an alarm generation.

❑ON/OFF of Parameter Display

Select ON/OFF for parameter display.

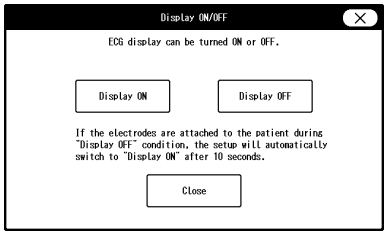
CAUTION

- When the waveform and numeric data display is set to OFF, the alarm generation and tabular trend input will also cease.



1 Press the [Disp. ON] key.

- The "Display ON/OFF" confirmation window will be displayed. (shown on right)



2 Select from [Display ON] or [Display OFF].

- [Display ON]: Waveform and numeric data will be displayed.
- [Display OFF]: Waveform and numeric data will not be displayed.
- 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.

Respiration

This section explains about the respiration measurement by the impedance, CO_2, or SpO_2 method and the measurement condition settings.

WARNING

- The SpO_2 respiration measurement function is not intended for use as an APNEA monitor.

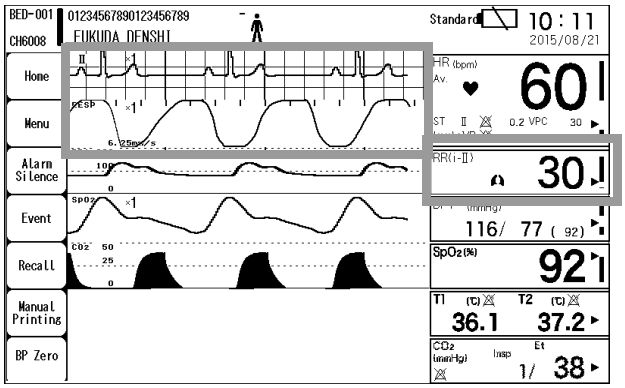
CAUTION

- 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.
- When using the electrosurgery-proof type ECG relay cable, the impedance respiration cannot be measured, and its numeric data and waveform will not be displayed. When measuring in an environment where electrosurgery is not performed, make sure to use the standard ECG relay cable.
- The SpO_2 respiration measurement function is available only on the DS-8007N.

Respiration Monitoring (Impedance Method)

The respiration waveform is detected from ECG II or ECG I lead explained in the previous section. Therefore, a stable ECG waveform is necessary to acquire respiration waveform.

1 Verify that the ECG waveform is stable, and respiration waveform and respiration rate are displayed.



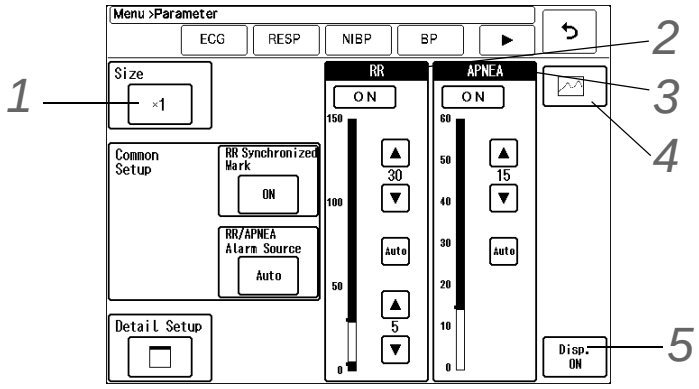
NOTE

- Adjust the detection lead, waveform size, baseline position, and sweep speed for optimum waveform display. (☞"To Configure the Display" P10-4)

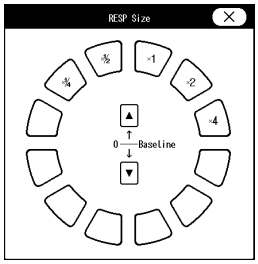
RESP Parameter Setup

Press the [Menu], [Parameter], [RESP] keys to display the "RESP" setup menu.

❑RESP Parameter Setup



1 Waveform Size, Baseline Position



- Select the waveform size from [x1/4]/[x1/2]/[x1]/[x2]/[x4].
- Use the ▲/▼ keys to adjust the baseline position.If the waveform is difficult to see due to impedance waveform amplitude, set the baseline position to 0Ω. The baseline position for displaying/printing will change.

2 RR Alarm

(☞"Alarm Limit Setup for Each Parameter" P6-9)

- The adjustable range differs depending on the "RR/APNEA Alarm Source" setting (SpO_2 or Impedance/CO_2).
- When [Impedance] or [CO_2] is set for "RR/APNEA Alarm Source", the adjustable alarm limit range is as follows. The alarm will turn OFF if a value outside this range is set.
  The adjustable increment depends on the setting for "RR Alarm Increment" under "Initial Settings".

	Upper Limit	Lower Limit	Alarm Increment (Initial Settings > User I/F)	
			Normal	Small
Adult	10 Bpm to 150 Bpm	5 Bpm to 145 Bpm	5 Bpm increment	1 Bpm increment
Child/Neonate	4 Bpm to 150 Bpm	2 Bpm to 148 Bpm	2 Bpm increment	1 Bpm increment

- When [Auto] is set, the upper and lower limit will be automatically set to +20 Bpm and -20 Bpm to the current value respectively.
- When [SpO_2] is set for "RR/APNEA Alarm Source", the adjustable alarm limit range is as follows. The alarm will turn OFF if a value outside this range is set. The adjustable increment depends on the setting for "RR Alarm Increment" under "Initial Settings".

	Upper Limit	Lower Limit	Alarm Increment (Initial Settings > User I/F)	
			Normal	Small
Adult	10 Bpm to 35 Bpm	5 Bpm to 30 Bpm	5 Bpm increment	1 Bpm increment
Child/Neonate	8 Bpm to 34 Bpm	6 Bpm to 32 Bpm	2 Bpm increment	1 Bpm increment

- When [Auto] is set, the default setting will be applied.
  Adult: Upper Limit 30 Bpm, Lower Limit 5 Bpm
  Child/Neonate: Upper Limit 30 Bpm, Lower Limit 6 Bpm

REFERENCE

- To use the auto setting, [Enable] should be selected for "Alarm Auto Setup" under "Initial Settings". (☞Maintenance Manual "Alarm Related Setup" P5-5)
- When [Enable] is set for "Alarm Threshold Limit" under "Initial Settings", and auto setting is used, the upper and lower alarm limit will be clipped to the set limit.

3 APNEA Alarm

(☞"Alarm Limit Setup for Each Parameter" P6-9)

- Set the upper limit in the range of 10 sec. to 60 sec. If a value above 60 sec. is set, the upper alarm will turn OFF.
- The upper limit can be set in 1 second increment. There is no lower limit.
- When [Auto] is set, the apnea alarm setting registered for the currently selected mode will be applied.

NOTE

- The same RR alarm/APNEA alarm setting will be applied for impedance waveform, CO_2 waveform and SpO_2.
- When [SpO_2] is set for "RR/APNEA Alarm Source", APNEA alarm will turn OFF.
- For the RR value, APNEA time measured from CO_2 waveform, RR alarm and APNEA alarm will not generate unless 2 or more respiration is detected within 30 seconds after the power is turned ON, monitoring is resumed, CO_2 unit is connected, or a patient is discharged.
- For the impedance respiration, RR alarm and APNEA alarm will not generate when the electrode of detection lead is detached and for 30 seconds after the electrode is reattached.
- When Capnostat 5 is used, RR alarm and APNEA alarm will not generate unless 2 or more respiration is detected after completion of the airway adapter calibration.

REFERENCE

- To use the auto setting, [Enable] should be selected for "Alarm Auto Setup" under "Initial Settings". (☞Maintenance Manual "Alarm Related Setup" P5-5)
- When [Enable] is set for "Alarm Threshold Limit" under "Initial Settings", and auto setting is used, the upper alarm limit will be fixed to the set limit.

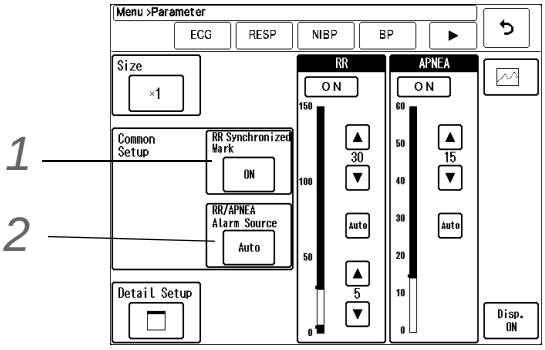
4 Alarm Assist

(☞"Alarm Assist Screen" P6-12)

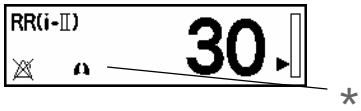
5 Display ON/OFF

(☞"ECG Parameter Setup" P7-6)

❑Common Setup



1 RR Synchronized Mark



- [ON]: The RR mark synchronized to impedance respiration or CO_2 waveform will be displayed. (* shown on right)
- [OFF]: Synchronized mark will not be displayed.

2 RR/APNEA Alarm Source

The parameter to display the RR synchronized mark and to generate the RR/APNEA alarm can be selected from impedance, CO_2, and SpO_2.

⚠ WARNING

- The RR/APNEA alarm will not be generated unless the numeric data box corresponded to the selected RR/APNEA alarm source is displayed.Make sure to display the numeric data box for the parameter set as the RR/APNEA alarm source.
- The SpO_2 respiration measurement function is not intended for use as an APNEA monitor.

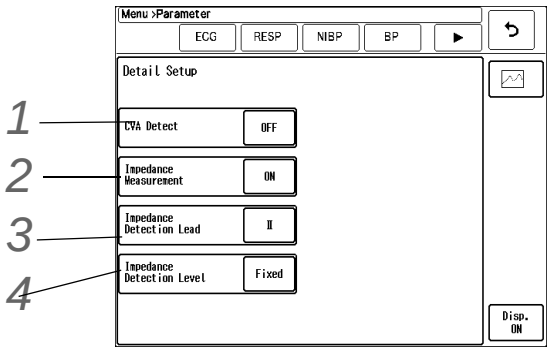
⚠ CAUTION

- If the "RR/APNEA Alarm Source" setting is other than [Impedance] (or, if [Auto] selects a setting other than [Impedance]), the RESP waveform will not be transmitted on a wired network.
- When [SpO_2] is set for "RR/APNEA Alarm Source", APNEA alarm will turn OFF.
- RR_SpO_2 measurement is a parameter available on DS-8007N only.

- [Impedance]: RR alarm will be generated based on the impedance respiration curve. The RR synchronized mark based on impedance respiration will be displayed.
- [CO_2]: RR alarm will be generated based on the RR measured by the HPD-810/HPD-820 (Capnostat 5) or HCP-810/HCP-820. The RR synchronized mark based on CO_2 waveform will be displayed.
- [SpO_2]: RR alarm will be generated based on the RR measured by the SpO_2 pulse wave analysis.
- [Auto]: The measurable parameter will be automatically selected in the priority of CO_2>Impedance>SpO_2, and generates the alarm if the corresponding numeric data box is displayed on the home display.

❑Detail Setup

Press [Detail Setup] on the "RESP" menu to display the "Detail Setup" menu.



1 CVA Detect

- [ON]: When CVA is detected, alarm will generate and message will be displayed.
- [OFF]: CVA detection will not be performed.

REFERENCE

- 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.
- This function will be effective only when [Impedance] is set as the "RR/APNEA Alarm Source" or, when [Auto] selects impedance respiration.
- If the ECG waveform is superimposed on to the respiration waveform with HR (RR) of 30 Bpm or above for 20 seconds (10 seconds for neonates) or more and if the "CVA Detect" is set to [ON], the <CVA detected> message will be displayed, and an alarm sound will be generated.

2 Impedance Respiration Measurement

- [ON]: Standard impedance respiration measurement will be performed.
- [OFF]: Impedance respiration measurement will not be performed and impedance respiration waveform and RR data will not be displayed. A high-frequency current which is a measurement signal will not be conducted. "Suspended" will be displayed inside the numeric data box.

⚠ WARNING

- If a patient is using an adaptive (minute ventilation) pacemaker, "Impedance Measurement" should be set to OFF.
  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.

3 Impedance Detection Lead

- Select the respiration detection lead from [I] or [II].

NOTE

- If TCON is set, the lead will be fixed to [II].

4 Impedance Detection Level

- [Fixed]: The respiration detection level will be set according to the displayed waveform size. By increasing the displayed waveform size, low amplitude will become more detectable.
- [Auto]: The respiration detection level will be automatically set according to the current respiration amplitude.

BP

This section explains about the procedure of BP1 to BP 4 measurement preparation and measurement condition setup.

⚠ CAUTION

- Do not reuse / re-sterilize the disposable type transducers.
- If using a reusable blood pressure transducer, disinfect it according to the manufacturer's guidelines.
- The long-term use of the blood pressure transducer, tube and catheter may increase the risk of infection. Perform periodic replacement with new one. The guidelines of the CDC (Disease Control and Prevention) recommend replacing within 96 hours.
- If the ambient temperature of the blood pressure transducer has changed greatly, the zero balance may cause the drift. Perform the zero balance again.
- An operator must not get away from a patient during the BP measurement. However, when getting away from the patient is necessary, do not activate the Alarm Suspend and Silence functions in order not to miss any sudden changes in the patient's condition.
  (☞"To Set the System Alarm (ON or Suspend)" P6-6)
  (☞"To Silence or Suspend the System Alarm Sound" P6-7)
- Be sure to perform Daily Check. Use of faulty equipment might harm the patient or operator.
  (☞"Daily Check" P4-1)
- If the Equipment Status Alarm occurs or if you feel the unusual operation of the equipment, perform the inspections to confirm the safety or contact our service representative.
  (☞"Equipment Status Alarm Message" P11-6)
- The BP value will not be displayed until zero balance is performed after the power is turned ON. Make sure to perform the zero balance.
  Once the zero balance is performed, the zero balance information will be maintained, and the BP value will be displayed.

BP Monitoring

The DS-8007 utilizes multiparameter amplifier input method which allows monitoring of 2 channels of BP through the 2ch BP conversion cable, CJO-P01B-DJ0.5. The BP relay cable can be directly connected to the multiparameter connector.
(☞"Multiparameter Connector Setup for BP, TEMP, CO Measurement" P7-84)

REFERENCE

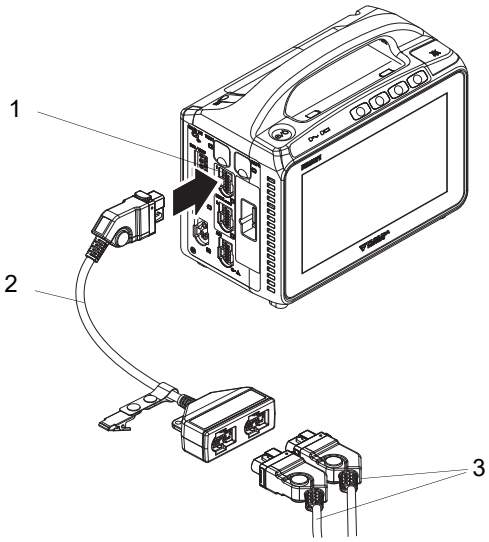
- For details of the usable transducers, refer to the section on "Optional Accessories"(☞"Invasive Blood Pressure Measurement (Manufactured by Fukuda Denshi)" P13-2).

1 Connect the BP interface cable to DS-8007.

For Connection via 2ch BP Conversion Cable (CJO-P01B-DJ0.5):

1 Connect the interface cable to the multiparameter connector via 2ch BP conversion cable (CJO-P01B-DJ0.5).

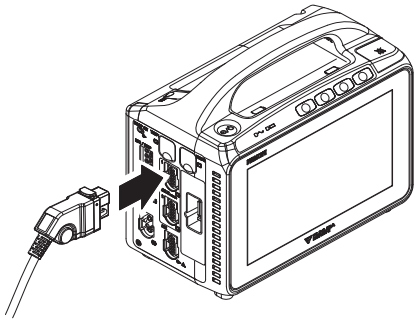
1 Multiparameter Connector
2 2ch BP Conversion Cable CJO-P01B-DJ0.5
3 1ch BP Relay Cable CJO-P01B-S**



For Direct Connection:

1 Connect the BP relay cable directly to the multiparameter connector.

1 Multiparameter Connector
2 1ch BP Relay Cable CJO-P01B-S**
or
2ch BP Conversion Cable CJO-P01B-DJ0.5



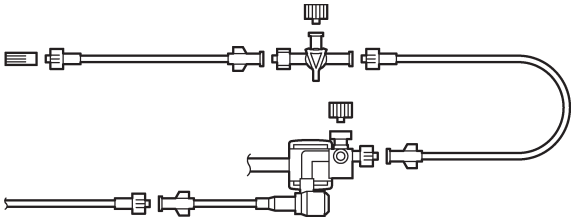
2 Assemble the BP measurement device.

REFERENCE

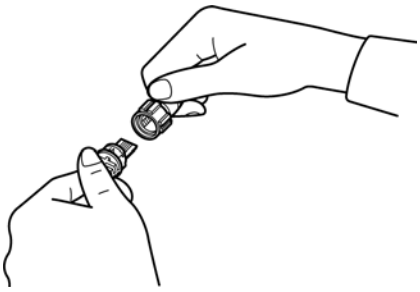
- The following procedure explains the case when a BP transducer (LS575 series) is used. If using other transducers, refer to the operation manual for the corresponding transducer.

1 Inspect transducer packaging for damage prior to opening.

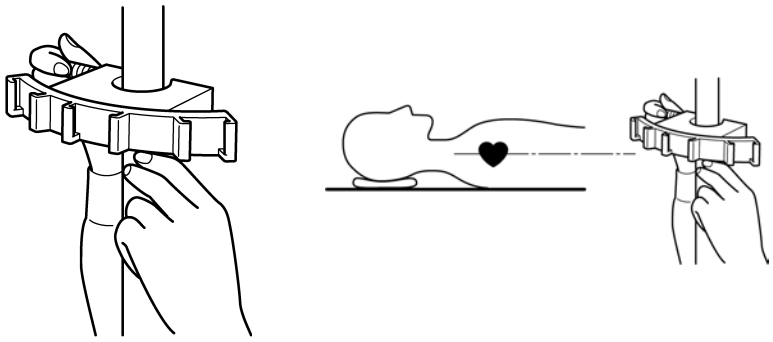
2 Verify that each connector is securely connected.



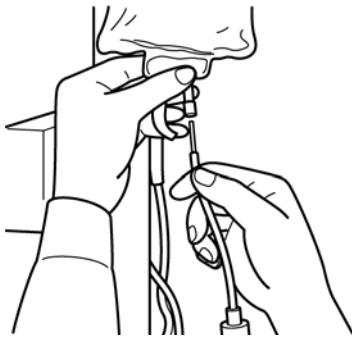
3 Connect the BP relay cable to the transducer.



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

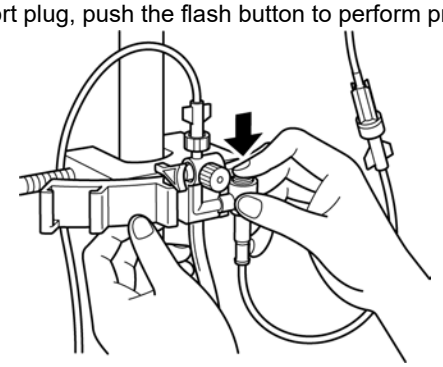


5 Inject 1000 units of heparin into the saline bag, mix thoroughly and puncture the infusion line through the same hole.

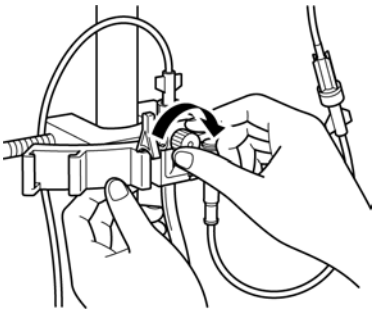


6 Set the saline bag to pressure bag, and hang from the infusion device. Fill saline to about 1/3 of the drip.

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



8 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 valve.

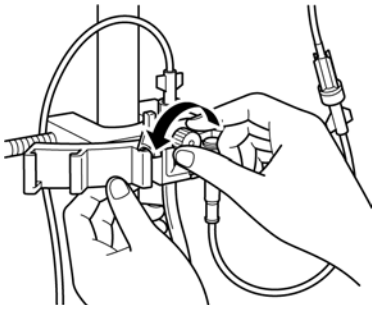


9 Inflate the pressure bag to 300 mmHg.

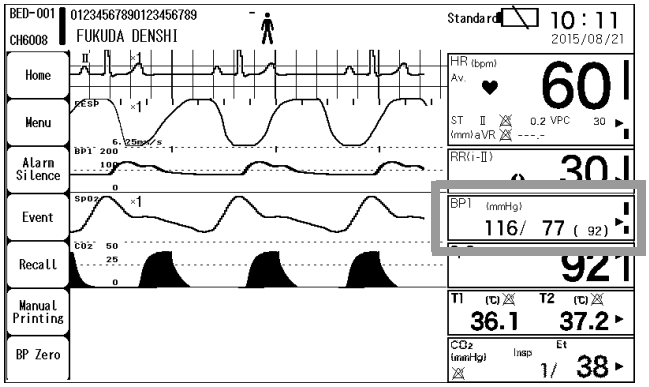
10 Set the BP device and wait for about 5 minutes.

3 Perform zero balance.

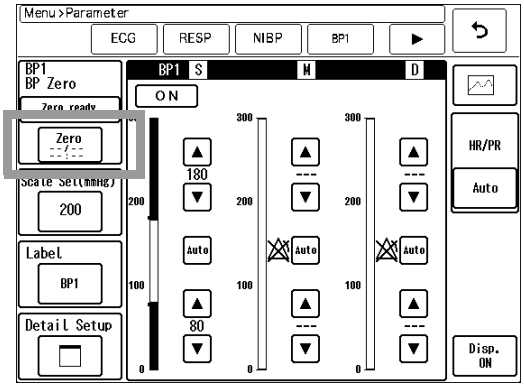
1 Loosen the zero-port plug on open-air three-way valve one-half turn.



2 Press the BP numeric data box (parameter key) on the home display.

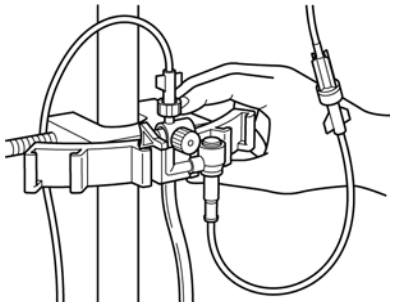


3 Press the [Zero] key on the BP setup menu.

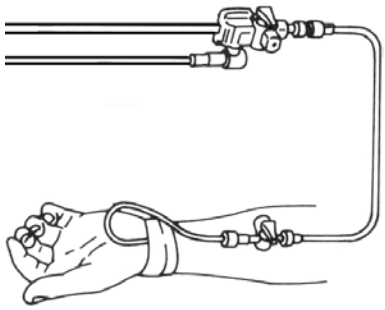


- Zero balance will start.
- When the BP zero balance is complete, the completed date/time will be displayed inside the [Zero] key.

4 Turn off the zero-port plug side of the open-air three-way valve.



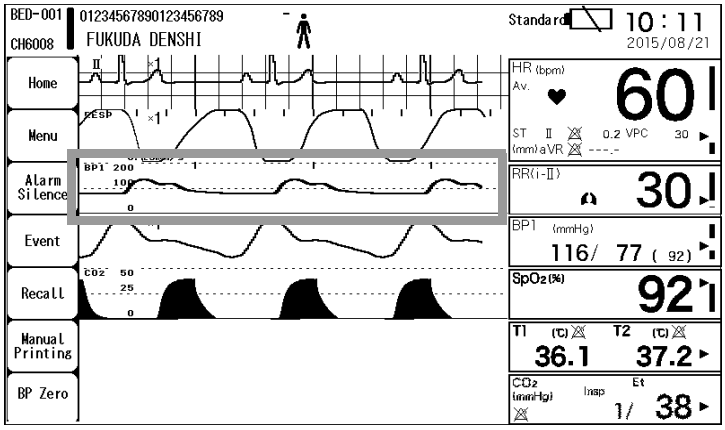
5 Connect the catheter to the end of monitoring line.



- The measurement preparation is completed, and BP measurement will start.

4 Press the [Home] key (user key) or HOME key (fixed key).

5 Verify that the BP waveform and numeric data is displayed on the home display.



CAUTION

- The zero balance procedure is required for the following case.
  - When starting the measurement.
  - When the position of the heart has changed due to body movement.
  - When the position of the transducer 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.

Zero Balance of All Pressure Lines (User Key)

The zero balance for all the displayed BP can be performed using the user key.
If any of the BP is in progress of measurement, perform the zero balance on each BP parameter setup screen.

REFERENCE

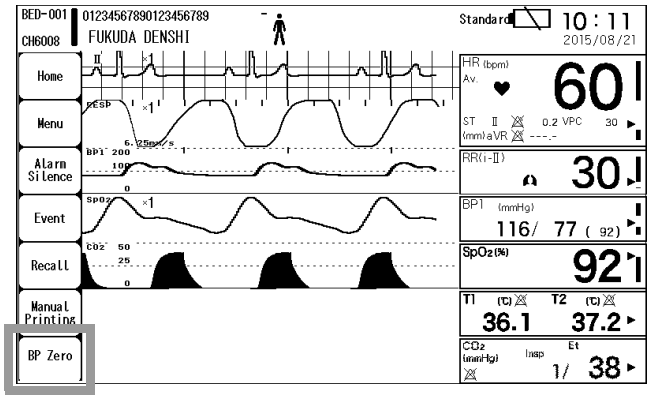
- It is necessary to assign [BP Zero] key as user key in advance.
  (☞"User Key Setup" P10-9)

1 Open the three-way valve of all the pressure transducers to air.

▸ <READY> will be displayed inside the user key.

2 Press the [BP Zero] key on the user key.

3 Verify the BP waveform is positioned at zero, and "0" is displayed for the BP value.



▸ <COMPLETE> will be displayed when the procedure is complete.

▸ <FAILED> will be displayed when the process fails.

▸ <DRIFT> will be displayed when the BP relay cable is not connected.

NOTE

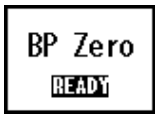
- If <FAILED> is displayed, the three-way valve may not be opened to air, artifact is present, or the transducer may be defective. Check the cause and try the zero balance procedure again.
- If <DRIFT> is displayed, verify that all the connections are secure.

4 Close the three-way valve when the zero balance is complete.

⚠ CAUTION

- When the transducer or tubing is replaced, make sure to perform the zero balance. Otherwise, accurate measurement will not be performed.
- <READY> will not be displayed unless the three-way valves of all pressure transducers are opened to air. If the status is not displayed, or if <MEASURE> is displayed, check if the three-way valve of pressure transducers are opened to air.

BP zero status displayed inside the user key



Not displayed	: Open transducer to air
MEASURE	: Open transducer to air
READY	: Ready to perform zero balance.
BP ZERO	: BP zero in progress
FAILED	: Zero failed
COMPLETE	: Zero complete
DRIFT	: Zero drift

Zero Balance for Each Pressure Line

1 Open the three-way valve of the pressure transducer to air.

2 Verify that "Zero ready" is displayed on the BP parameter setup screen for BP1 to BP4, and press the [Zero] key.

3 Verify the BP waveform is positioned at zero, and "0" is displayed for the BP value.

- A message, "Zero complete" will be displayed when the procedure is complete.
  When the BP zero balance is complete, the completed date/time will be displayed at the lower part of the [Zero] key.
- A message, "Zero failed" will be displayed when the process fails.
- A message, "Zero drift" will be displayed when the BP relay cable is not connected.

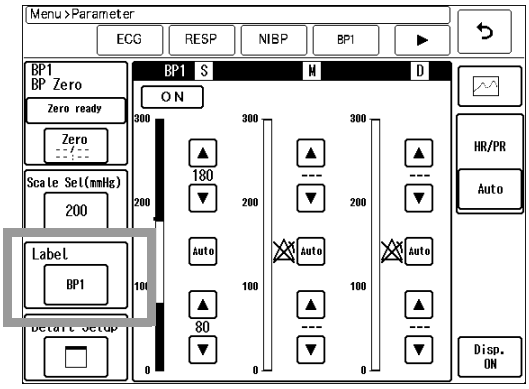
NOTE

- If a message, "Zero failed" is displayed, the three-way valve may not be opened to air, artifact is present, or the transducer may be defective. Check the cause and try the zero balance procedure again.
- If a message, "Zero drift" is displayed, verify that all the connections are secure.

4 Close the three-way valve when the zero balance is complete.

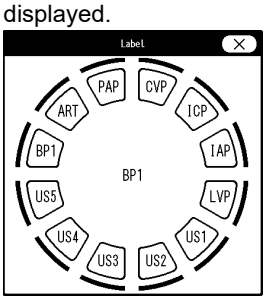
BP Parameter Setup

❑Label Setup



1 Press key for "Label".

▸ The "Label" selection window will be displayed.



2 Select from [BPx]/[ART]/[PAP]/[CVP]/[ICP]/[IAP]/[LVP]/[USx].

REFERENCE

- Description of Each Label:
  ART (Arterial Pressure)
  PAP (Pulmonary Artery Pressure)
  CVP (Central Venous Pressure)
  ICP (Intra-cranial Pressure)
  IAP (Intra-aortic Balloon Pumping Pressure)
  LVP (Left Ventricular Pressure)
  US1 to US5: User labels (3 characters) which can be set on the "Initial Settings".
  (☞Maintenance Manual "User Label Setup" P5-8)

NOTE

- US3 to US5 cannot be selected for the equipment connected to DS-LANII/III.

❑When the BP Label is ART

By selecting [ON] for "ART Catheter Check Message" (Menu>Parameter>BP1 (ART)>Detail Setup), an alarm will be generated when the catheter is disconnected.
(☞"Set the "ART Catheter Check Message"." P7-31)

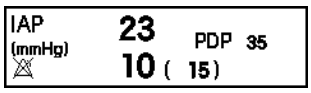
⚠ CAUTION

- The default setting of “ART Catheter Check Message” is [OFF].
- When “ART Catheter Check Message” is set to [ON], an alarm will be generated at zero

balance.

❑When the BP Label is IAP

PDP (Peak Diastolic Pressure) of IABP can be displayed in addition to systolic, diastolic, and mean pressure. Note that Systolic Pressure (SYS) = Peak Systolic Pressure (PSP).

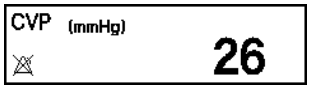


⚠ CAUTION

- Note that Systolic Pressure (SYS) = Peak Systolic Pressure (PSP) when reviewing graphic trend, data base, or when setting the alarm.
- When ECG is not measured, PDP cannot be calculated.

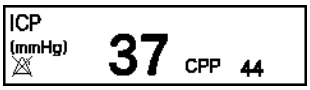
❑When the BP Label is CVP

The measurement unit can be selected from "mmHg", "kPa" or "cmH_2O".
The measurement unit can be selected on the "Initial Settings" menu.The selected unit will be displayed on the BP numeric data box.
(☞Maintenance Manual "Measurement Unit" P5-8)



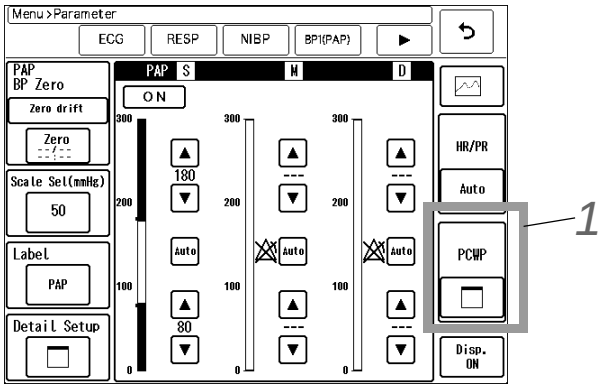
❑When the BP Label is ICP

CPP (Cerebral Perfusion Pressure) can be measured.
CPP = Mean Arterial Pressure – Mean Intracranial Pressure
If the CPP value is negative, the data will not be displayed. Also, alarm cannot be set for CPP.



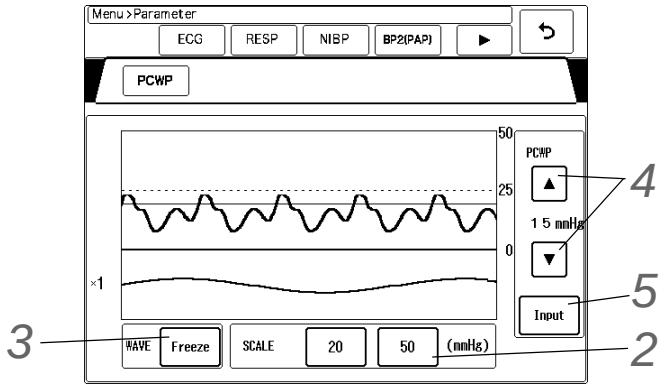
❑PCWP Measurement

When PAP is set as BP label, the mean value can be displayed as PCWP (Pulmonary Capillary Wedge Pressure).
On the PCWP screen, the current BP waveform and RESP waveform will be displayed.



1 Press the key for "PCWP".

▸ PCWP measurement screen will be displayed.



2 Select the waveform scale from [20]/[50] as necessary.

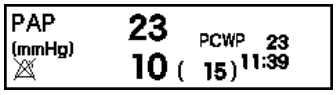
3 Press the [Freeze] key.

▸ The displayed waveform will freeze and cursor will be displayed. The cursor point indicates the current mean pressure.

4 Use the ▲ / ▼ keys to set the PCWP value.

5 Press the [Input] key after setting the PCWP value.

▸ The PCWP value will be displayed inside the PAP (BP label) numeric data box with the measurement time. It will be also displayed on the trend data.



❑Scale Setup

⚠ CAUTION

- When wireless network is used, BP waveform with a scale above the set scale will not be properly transmitted. The displayed BP scale should be within the set scale.

NOTE

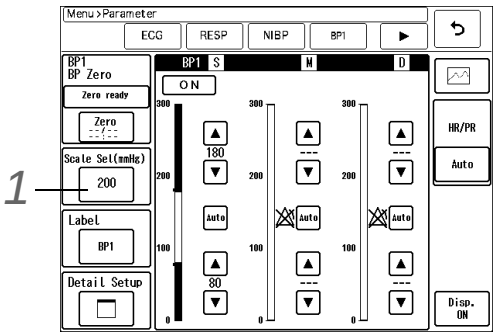
- Select the full scale for displaying and printing.
- The scale selection will differ depending on the label as shown below.
- Change the scale before the freeze operation, as the waveform will be deleted if the scale is changed after the freeze operation.

BP Label	Scale															
	5	10	15	20	30	40	50	75	100	150	200	250	300	mmHg		
	1	2	3	4	5	6	8	12	16	20	24	32	40	kPa		
														20	40	cmH_2O
BP1 to BP4 User Label				○			○	○	○	○	○	○	○			
ART, IAP, LVP							○	○	○	○	○	○	○			
PAP				○		○	○	○	○	○	○	○	○			

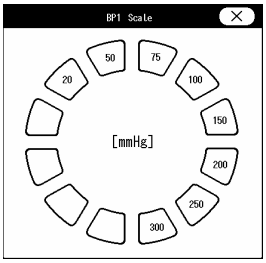
CVP		○		○	○	○	○	○	○	○	○	○	○	○	○	
ICP	○	○	○	○			○	○	○	○	○	○	○			

1 Press the key for "Scale".

- The scale selection window will be displayed.
- The scale selection can be also displayed by pressing the BP scale on the home display.



2 Select the scale from the displayed selection.



❑Alarm Settings

1 Set the BP alarm.

(☞"Alarm Limit Setup for Each Parameter" P6-9)

NOTE

- Set the upper limit in the range of 2 mmHg to 300 mmHg / 0.2 kPa to 40.0 kPa. If a value above 300 mmHg / 40.0 kPa is set, the upper alarm will turn OFF.
- Set the lower limit in the range of 0 mmHg to 295 mmHg / 0 kPa to 39.5 kPa. If a value below 0 mmHg / 0 kPa is set, the lower alarm will turn OFF.
- Alarm will not generate until 30 seconds has passed after the zero balance or after the transducer has been opened to air.

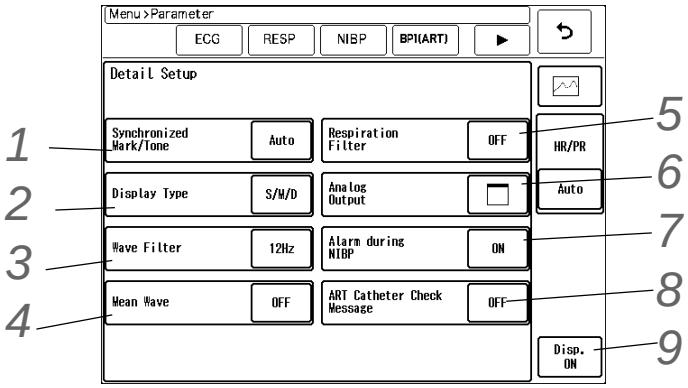
REFERENCE

- 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 limit should be set for each unit (mmHg/kPa).
- The adjustable increment will be according to the "BP Alarm Increment" setting. (Normal/Small).
  (☞Maintenance Manual "Display/Print Setup" P5-12)
- The adjustable increment for upper and lower limit changes from 50 mmHg / 7 kPa.
- When [Auto] is set for the BP label of BP1/ART, the upper and lower limit will be automatically set to +40 mmHg / +5 kPa and -20 mmHg / -3 kPa respectively to the current value.
- When [Auto] is set for the BP label other than BP1/ART, the upper and lower limit will be automatically set to +20%, –20% respectively to the current value.
- To use the auto setting, [Enable] should be selected for "Alarm Auto Setup" under "Initial Settings". (☞Maintenance Manual "Alarm Related Setup" P5-5)
- When [Enable] is set for "Alarm Threshold Limit" under "Initial Settings", and auto setting is used, the upper and lower alarm limit will be clipped to the set limit.

	"BP Alarm Increment" Setup	
	If [Normal] is selected;	If [Small] is selected;
0 mmHg to 50 mmHg	2 mmHg increment	1 mmHg increment
50 mmHg to 300 mmHg	5 mmHg increment	
0 kPa to 7 kPa	0.2 kPa increment	0.1 kPa increment
7 kPa to 40.0 kPa	0.5 kPa increment	

❑Detail Setup

Press the [Menu], [Parameter], [BP], [Detail Setup] keys to display the "Detail Setup" menu.



Display Example when BP Label is BP1/ART:

1 Set the "Synchronized Mark/Tone Priority". (BP1/ART)

The parameter to display the HR synchronized mark can be selected from ECG, SpO_2, and BP (BP1 or ART).If BP1 and ART are measured simultaneously, ART will be prioritized.

- [Auto]: The synchronized mark will be displayed in the priority of "ECG>SpO_2>BP".
- [ECG]: HR synchronized mark will be displayed.
- [SpO_2]: SpO_2 pulse wave synchronized mark will be displayed.
- [BP]: BP synchronized mark will be displayed.
- [OFF]: Synchronized mark will not be displayed.

NOTE

- If the corresponding BP (BP1/ART) is not measured, PR (BP) will be displayed as "---".

2 Set the "Display Type".

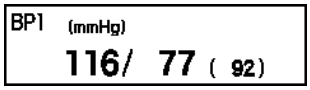
⚠ CAUTION

- The undisplayed BP data will not generate a BP alarm or be displayed in the tabular trend. Select the appropriate display type according to the monitoring purpose.

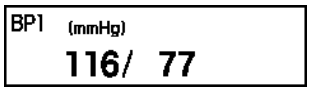
NOTE

- The display type of BP numeric data can be selected from [S/M/D]/[S/D]/[M]. The undisplayed BP data will not generate a BP alarm.
- If the BP label is CVP, IAP, PAP, ICP, the display type is fixed.

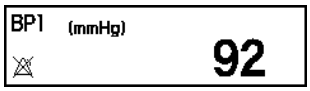
- [S/M/D]: The systolic/mean/diastolic BP value will be displayed.



- [S/D]: The systolic/diastolic BP value will be displayed.



- [M]: The mean BP value will be displayed.

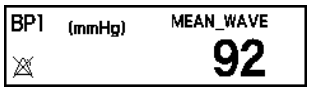


3 Set the "Wave Filter".

- Select an appropriate low-pass filter from [6Hz]/[8Hz]/[12Hz]/[40Hz].
  An artifact may interfere on the BP waveform depending on the combination of BP measurement circuit.

4 Set the "Mean Wave".

- [ON]: The mean BP waveform will be displayed and <MEAN_WAVE> will be displayed inside the numeric data box.



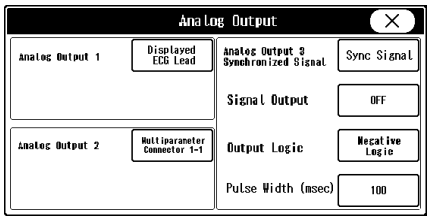
5 Set the "Respiration Filter".

The BP waveform baseline drift caused by the respiration influence can be prevented by setting ON the respiration filter.

- [ON]: Respiration Filter will turn ON.
- [OFF]: Respiration Filter will turn OFF.

6 Set the "IBP Analog Output".

- Select the signal to output.
  To output the BP signal, select from [Multiparameter Connector 1-1]/[Multiparameter Connector 1-2]/ [Multiparameter Connector 2-1]/[Multiparameter Connector 2-2].



7 Set the "Alarm during NIBP".

- [ON]: BP alarm will generate even during NIBP measurement.
- [OFF]: BP alarm will not generate during NIBP measurement and for 30 seconds after the measurement.

8 Set the "ART Catheter Check Message".

- [ON]: When the BP label is "ART" and the catheter is disconnected, check message will be displayed.
- [OFF]: ART catheter check message will not be displayed.

⚠ CAUTION

- The setting is common for all BP channels. When setting is changed for BP1, the same setting will be applied for BP2 to 4.
- The default setting of "ART Catheter Check Message" is [OFF].

- When "ART Catheter Check Message" is set to [ON], an alarm will be generated at zero balance.

9 Select ON/OFF for parameter display.
(☞"ECG Parameter Setup" P7-6)

⚠ CAUTION

- When the waveform and numeric data display is set to OFF, the alarm generation and tabular/graphic trend input will also cease.
- If the display of waveform/numeric data labeled as BP1/ART is set to OFF, the BP pulse rate will not be displayed.

Pulse Oximetry

This section explains the procedures and settings of SpO_2 measurement for DS-8007N (Nellcor) and DS-8007M (Masimo).

SpO_2 Monitoring

⚠ WARNING

- When measuring the SpO_2 of patient with high fever or peripheral circulatory insufficiency, check the sensor attachment periodically and change the attachment site.The temperature of the attachment site will rise due to the sensor heat which may result in 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
- When a patient is receiving a photodynamic therapy, measuring SpO_2 on a same site for a long duration may cause blisters from the irradiation light of the SpO_2 sensor. Make sure to periodically change the sensor attachment site.
- Do not connect unspecified sensor or cable to any I/O connector. If done so by mistake, not only that the equipment cannot deliver its maximum performance, the equipment may be damaged and safety cannot be ensured.
- If any measurement seems questionable, first check the patient's vital signs by alternate means and then check the pulse co-oximeter for proper functioning.
- For the following case, accurate measurement of SpO_2 may not be possible.
  - Improper sensor application
  - Elevated levels of COHb or MetHb: High levels of COHb or MetHb may occur with a seemingly normal SpO_2. When elevated levels of COHb or MetHb are suspected, laboratory analysis (CO-Oximetry) of a blood sample should be performed.
  - Elevated levels of bilirubin

- Elevated levels of dyshemoglobin
- Vasospastic disease, such as Raynaud's, and peripheral vascular disease
- Hemoglobinopathies and synthesis disorders such as thalassemias, Hb s, Hb c, sickle cell, etc.
- Hypocapnic or hypercapnic conditions
- Severe anemia
- Very low arterial perfusion
- Extreme motion artifact
- Abnormal venous pulsation or venous constriction
- Severe vasoconstriction or hypothermia
- Arterial catheters and intra-aortic balloon
- Intravascular dyes, such as indocyanine green or methylene blue
- Externally applied coloring and texture, such as nail polish, acrylic nails, glitter, etc.
- Birthmark(s), tattoos, skin discolorations, moisture on skin, deformed or abnormal fingers. etc.

- Dyes or any substance containing dyes that change usual blood pigmentation may cause erroneous readings.
- The SpO_2 data should not be used as the sole basis for diagnosis or therapy decisions. It must be used in conjunction with clinical signs and symptoms.
- Do not use the SpO_2 data to monitor apnea condition.
- This equipment may be used during defibrillation, but this may affect the accuracy or availability of the SpO_2 parameters and measurements.
- This equipment may be used during electrocautery, but this may affect the accuracy or availability of the SpO_2 parameters and measurements.
- The SpO_2 data cannot be used for arrhythmia analysis.
- SpO_2, SpCO, SpMet, and SpHb are empirically calibrated in healthy adult volunteers with normal levels of carboxyhemoglobin (COHb) and methemoglobin (MetHb).

⚠ CAUTION

- If irritation such as skin reddening appears with the sensor use, change the attachment site or stop using the sensor.
- When attaching the sensor with tape, do not wrap the tape too tight. At the same time, check the blood flow constantly so that congestion is not generated at the peripheral site.
- Even attachment for a short duration may inhibit the blood flow and generate compression necrosis or burn injury. Also, blood flow inhibition may prevent correct measurements.
- If SpO_2 values indicate hypoxemia, a laboratory blood sample should be taken to confirm the patient's condition.
- If the <SpO_2 Low Perfusion> message is frequently displayed, find a better perfused monitoring site. In the interim, assess the patient and, if indicated, verify oxygenation status through other means.
- Change the application site or replace the sensor and/or patient cable when a <Replace Sensor>, <Replace Cable>, <Low Signal IQ> is displayed on the monitor. These messages may indicate that patient monitoring time is exhausted on the patient cable or sensor.
- Replace the cable or sensor when a <Replace Sensor> or <Low Signal IQ> message is consistently displayed while monitoring consecutive patients after completing troubleshooting steps listed in this manual.

- If using pulse oximetry during full body irradiation, keep the sensor out of the radiation field. If the sensor is exposed to the radiation, the reading might be inaccurate or the device might read zero for the duration of the active irradiation period.
- The device must be configured to match your local power line frequency to allow for the cancelation of noise introduced by fluorescent lights and other sources.
- Variation in hemoglobin measurements may be profound and may be affected by sampling technique as well as the patient's physiological conditions. Any results exhibiting inconsistency with the patient's clinical status should be repeated and/or supplemented with additional test data. Blood samples should be analyzed by laboratory devices prior to clinical decision making to completely understand the patient's condition.
- Check the sensor attachment site constantly in every 4 hours when probes or reusable sensor are used, and at least every 8 hours when single patient use sensors are used.Be especially careful of a patient with bad perfusion. If the sensor attachment position is not changed constantly, skin irritation or skin necrosis due to compression may be developed. For the patient with bad perfusion, check the sensor attachment position at least every 2 hours.
- As skin for neonate, premature infant is immature, change the sensor attachment site more frequently depending on the condition.
- Direct sunlight to the sensor area can cause a measurement error. Place a black or dark cloth over the sensor if using in direct sunlight.
- When not measuring, unplug the relay cable and sensor from the SpO_2 connector.Otherwise, the outside light may affect to falsely display measurements.
- If "– – –" is displayed for the numeric data, make sure that the sensor is properly attached.
- Before bathing the patient, make sure to remove the sensor and equipment from the patient.

❑Preparation for Monitoring

NOTE

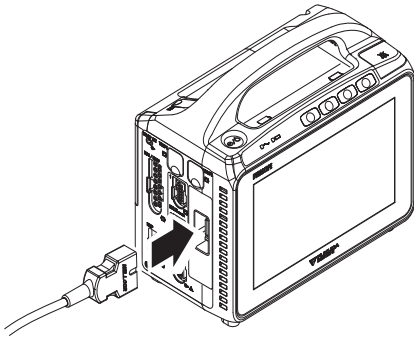
- SpCO, SpMet, SpHb, PI, PVI, and SpOC are parameters which can be measured only on the DS-8007M.

1 Prepare an appropriate probe or sensor for the patient.

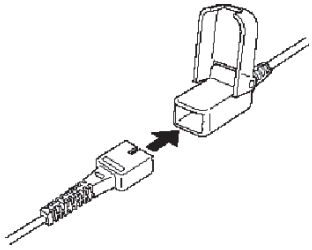
2 Connect the sensor to DS-8007.

In Case of Nellcor Unit:

1 Connect the DOC-10 SpO_2 Relay Cable to the SpO_2 connector on the DS-8007N.
The illustration is example of connection with DS-8007.



2 Insert the sensor into the SpO_2 relay cable connector, and lock it with the transparent cover.



In Case of Masimo Unit:,

1 Connect the SpO_2 patient cable (RD®, LNOP®, LNCS®, M-LNCS™, Rainbow®) to the SpO_2 connector on the DS-8007M.

2 Connect the patient cable and the sensor.
Face the metallic side of the sensor upward and align the logo with that of the patient cable. Then, insert the sensor connector to the patient cable until a click sound is heard.

⚠ CAUTION

- The SpO_2 patient cables (LNOP®, LNCS®, M-LNCS™, Rainbow®) are for Masimo SET and Rainbow SET sensors only. Connect them only to the DS-8007M. Otherwise, the equipment will not properly function.

NOTE

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

3 Attach the sensor to the patient.

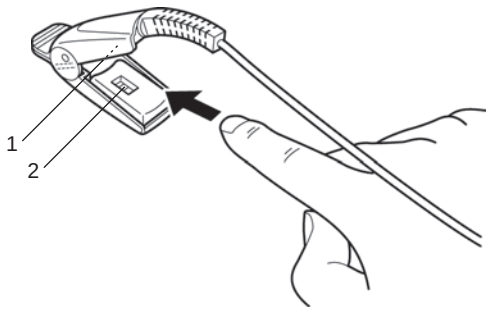
⚠ CAUTION

- If the nail is rough, dirty, or manicured, accurate measurement will not be possible. Change the finger or clean the nail before attaching the probe or sensor.

Probe Type Sensor

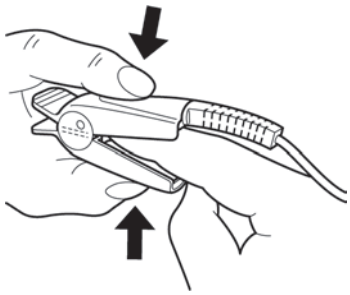
1 As shown below, the probe cable should be on the nail side.

1 Light Emitting Part
2 Light Receiving part



2 Adjust the sensor so that the light-emitting part (on cable side) is over the nail, or as instructed per the related sensor instruction manual.

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.



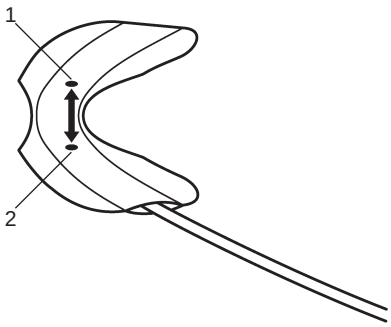
Single-use Type

1 Clean the attachment site with alcohol, etc, and allow to dry.

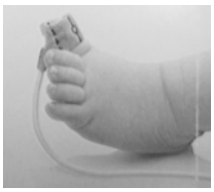
2 Align the light emitting element and light receiving element of the sensor with the measuring site in between when attaching the sensor to patient.

1 Light Emitting Element

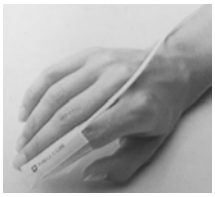
2 Light Receiving Element



3 Secure the cable with surgical tape so that the sensor does not come off when the cable is pulled.

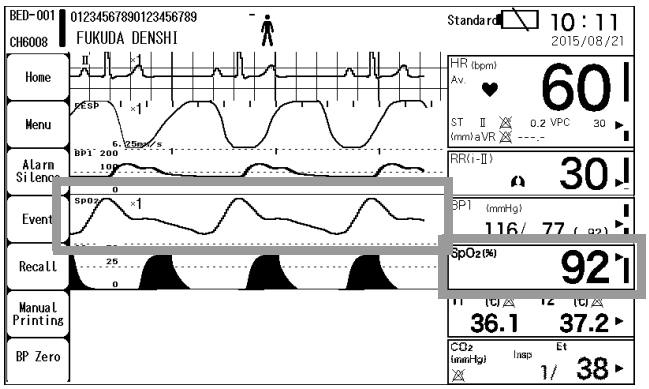


Attachment to the toe



Attachment to the finger

4 Verify that the SpO_2 measurement and SpO_2 waveform are displayed on the home display.



SpCO, SpMet, SpHb, SpOC Measurement (Masimo)

This section explains the SpCO, SpMet, SpHb, SpOC measurement procedure when using the DS-8007M.

⚠ CAUTION

- The SpCO, SpMet, SpHb, SpOC measurements are provided only with specific rainbow sensors supporting specific parameter combinations. SpHb/SpOC/SpMet and SpCO/SpMet are each valid sensor combinations which also support PVI.
  SpHb/SpCO is not a valid sensor combination.
- For details, contact your nearest service representative.

REFERENCE

- SpCO, SpMet, SpHb, SpOC measurements are optional function.

1 Select the Rainbow sensor for the patient.
(☞"Pulse Oximetry Measurement (Manufactured by Masimo)" P13-4)

2 The measurement procedure is the same with that of the SpO_2.
Verify that the SpCO, SpMet, SpHb, SpOC value is displayed on the monitor.
(☞"SpO_2 Monitoring" P7-32)

Precautions about the Masimo Sensors and Cables

A technology called X-Cal for patient safety and reinforcement of efficiency in a clinical site is implemented for Masimo sensors and cables.
X-Cal is designed to address the following three common factors that can impact measurement accuracy and patient safety due to reliability risks.

1 Imitation Masimo sensors and cables

2 Cables and sensors used far beyond their expected life

3 Third-party reprocessed pulse oximetry sensors

If a sensor or cable that does not support X-Cal is used with an X-Cal enabled device, SpO_2 measurement will not be available.
Even if Masimo sensors or specified sensors and cables are used, SpO_2 measurement may not be available if the sensors and cables are used beyond their expected life.

❑About the Expected Life of Sensors and Cables

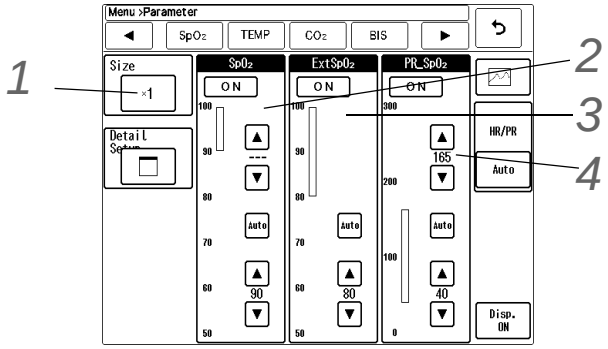
- The X-Cal function automatically monitors the Active Monitoring Time (actual time of SpO_2 monitoring) for each sensor and cable.If the sensors and cables are used beyond the expected life, the message, <Replace Cable> or <Replace Sensor> will be displayed.
- The measurement will not cease until it is completed even if the cable or sensor has reached end of life during the measurement.
- When a measurement with cable or sensor that has reached end of life is suspended for certain amount of time, and resumed with the same cable or sensor, a message to replace the sensor or cable will be displayed.
- The sensor or cable that has reached end of life needs to be replaced before resuming monitoring.
- The following table shows the expected life of cable and sensor. The indication of usage hours per day (24 hours/12 hours/8 hours) are also shown.

Active Monitoring Time (actual time of monitoring)

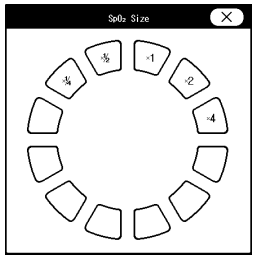
Sensors or Cables	Expected Life	When monitoring 24 hours/day	When monitoring 12 hours/day	When monitoring 8 hours/day
Single Patient Use SpO_2 "L" Sensor with replaceable tape	336 hours	14 days	28 days	42 days
Single Patient Use SpO_2 Sensor	168 hours	7 days	14 days	21 days
Reusable SpO_2 Sensor (DCI, DCIP, YI, TF-I, DBI)	8,760 hours	12 months	2 years	3 years
Patient Cable	17,280 hours	24 months	4 years	6 years

SpO_2Parameter Setup (Nellcor)

This section explains the measurement procedure when using the DS-8007N.
Press the [Menu], [Parameter], [SpO_2] keys to display the "SpO_2" setup screen.



1 Press the key for "Size", and set the waveform size.



▸ Select from [x1/4] / [x1/2] / [x1] / [x2] / [x4].

2 Set the SpO_2 alarm.

(☞"Alarm Limit Setup for Each Parameter" P6-9)

NOTE

- Whether to use the second alarm function and its threshold selection should be based on the patient's clinical indication portent and medical evaluation.
- Set the upper limit in the range of 51%SpO_2 to 100%SpO_2. If a value above 100%SpO_2 is set, the upper alarm will turn OFF.
- Set the lower limit in the range of 50%SpO_2 to 99%SpO_2. If a value below 50%SpO_2 is set, the lower alarm will turn OFF.

REFERENCE

- Also, when the SpO_2 value is unstable around the lower alarm limit, the frequently generated alarm can be corrected by setting the second alarm function. (☞"SpO_2 Second Alarm Setup" P6-2)
- When [Auto] is set, the upper limit will be turned OFF and the lower limit will be set to 90%SpO_2.
- To use the auto setting, [Enable] should be selected for "Alarm Auto Setup" under "Initial Settings". (☞Maintenance Manual "Alarm Related Setup" P5-5)
- When [Enable] is set for "Alarm Threshold Limit" under "Initial Settings", and auto setting is used, the upper and lower alarm limit will be clipped to the set limit.
- The upper/lower limit can be set in 1%SpO_2 increment.
- The following delay occurs for the SpO_2 alarm depending on the patient classification and second alarm setting. (For Nellcor)

	Second Alarm Setup	Patient Classification	
		Adult/Child	Neonate
SpO_2 Alarm Condition Delay	For all settings	About 7 sec. to 9 sec.	About 7 sec. to 9 sec.
SpO_2 Alarm Signal Generation Delay	OFF	About 5 sec.	0 sec.
	10	About 5 sec. to 7 sec.	About 5 sec. to 7 sec.
	25	About 11 sec. to 13 sec.	About 11 sec. to 13 sec.
	50	About 19 sec. to 22 sec.	About 19 sec. to 22 sec.
	100	About 36 sec. to 38 sec.	About 36 sec. to 38 sec.

3 Set the ExtSpO_2 alarm.

(☞"Alarm Limit Setup for Each Parameter" P6-9)

NOTE

- Set the lower limit in the range of 50%SpO_2 to 98%SpO_2. If a value below 50%SpO_2 is set, the lower alarm will turn OFF.
- The lower limit of ExtSpO_2 cannot be set above the lower limit of SpO_2.

REFERENCE

- When [Auto] is set, the lower limit will be set to "SpO_2 lower limit - 10%SpO_2".
- The lower limit can be set in 1%SpO_2 increment.

- ▶ indicates the current measurement value.
- The following delay occurs for the ExtSpO_2 alarm depending on the patient classification and second alarm setting. (For Nellcor)

	Patient Classification	
	Adult/Child	Neonate
SpO_2 Alarm Condition Delay	About 7 sec. to 9 sec.	About 7 sec. to 9 sec.
SpO_2 Alarm Signal Generation Delay	About 5 sec.	0 sec.

4 Set the PR alarm.
(☞"Alarm Limit Setup for Each Parameter" P6-9)

NOTE

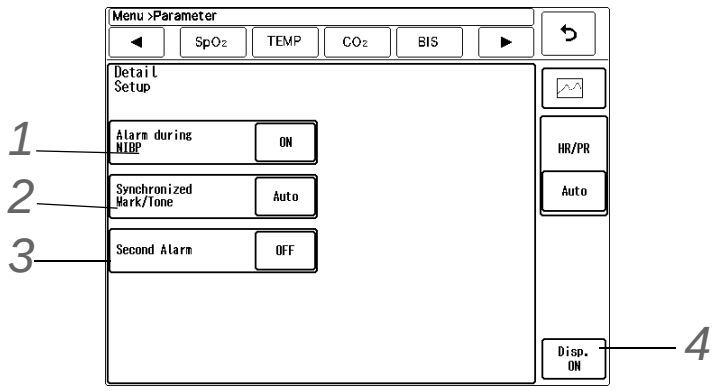
- Set the upper limit in between 22 bpm to 300 bpm. The upper limit alarm will become OFF if the value exceeds 300 bpm.
- Set the lower limit in between 20 bpm to 295 bpm. The lower limit alarm will turn OFF if the value below 20 bpm is set.

REFERENCE

- When [Auto] is set, the upper and lower limit will be automatically set to +40 bpm and -40 bpm to the current value respectively.
- To use the auto setting, [Enable] should be selected for "Alarm Auto Setup" under "Initial Settings". (☞Maintenance Manual "Alarm Related Setup" P5-5)
- When [Enable] is set for "Alarm Threshold Limit" under "Initial Settings", and auto setting is used, the upper and lower alarm limit will be clipped to the set limit.
- The upper and lower limit can be set in 5 bpm increments.
  It can be set in 1 bpm increment if 25 bpm or below.
- The following delay occurs for the PR alarm depending on the patient classification. (For Nellcor)
  - PR Alarm Condition Delay: <Adult/Child/Neonate> About 5 sec. to 6 sec.
  - PR Alarm Signal Generation Delay: <Adult/Child> About 5 sec., <Neonate> 0 sec.

❑Detail Setup

Press the [Menu], [Parameter], [SpO_2] keys to display the "SpO_2" setup screen.



1 Set the "Alarm during NIBP". This setup can be used when the SpO_2 sensor and the NIBP cuff is placed on the same limb for measurement.

NOTE

- During the NIBP measurement, the cuff inflation restricts the blood flow which disables the correct detection of the SpO_2 and PR, and may generate an improper alarm.
- Selecting [OFF] for "Alarm during NIBP" will not generate the SpO_2, Ext SpO_2, PR, SpCO (Masimo only), SpMet (Masimo only), SpHb (Masimo only) alarm until the NIBP measurement is complete.

▸ [ON]: Alarm will be generated even during NIBP measurement.

▸ [OFF]: will not generate the SpO_2/ PR alarm during NIBP measurement.

2 Set the "Synchronized Mark/Tone".
(☞"Set the "Synchronized Mark/Tone"." P7-9)

3 Set the “Second Alarm”.
(☞"SpO_2 Second Alarm Setup" P6-2)

4 Select ON/OFF for parameter display.
(☞"ECG Parameter Setup" P7-6)

⚠ CAUTION

- When the waveform and numeric data display is set to OFF, the alarm generation and tabular/graphic trend input will also cease.
- When the waveform and numeric data display is set to OFF, the pulse rate measured by SpO_2 will not be displayed either.

REFERENCE

- When SpO_2 sensor is attached to the patient with the SpO_2 display set to OFF, and SpO_2 is measured for 10 seconds, the pulse wave and numeric data will be automatically displayed.

RR_SpO_2 Parameter Setup (Nellcor)

This section explains the RR_SpO_2 measurement procedure when using the DS-8007N.

⚠ CAUTION

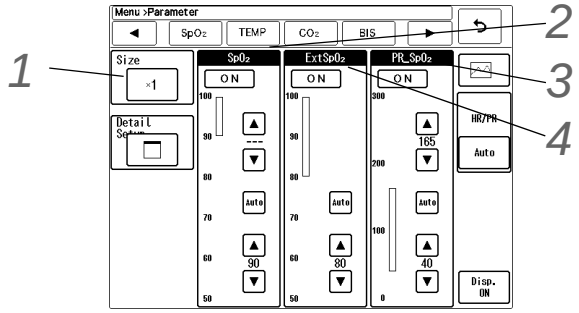
- The RR_SpO_2 can be measured only when using the Nellcor Respiratory Sensor.
- For details, contact your nearest service representative.

1 Prepare the sensor.
(☞"Pulse Oximetry Measurement (Manufactured by Covidien)" P13-3)

2 The measurement procedure is the same with that of the SpO_2.
Verify that the RR_SpO_2 value is displayed on the monitor.
(☞"SpO_2 Monitoring" P7-32)

SpO_2 Parameter Setup (Masimo)

This section explains the measurement procedure when using the DS-8007M. Press the [Menu], [Parameter], [SpO_2] keys to display the "SpO_2" setup screen.



REFERENCE

- This setting is available when using the DS-8007M. PVI, SpCO, SpMet, SpHb, SpOC measurements are optional function.

1 Select the waveform size.

(☞"SpO_2Parameter Setup (Nellcor)" P7-38)

2 Set the SpO_2 alarm.

(☞"SpO_2Parameter Setup (Nellcor)" P7-38)

REFERENCE

- The following delay occurs for the SpO_2 alarm depending on the patient classification and SpO_2 averaging duration setting. (For Masimo)

	SpO_2 Averaging	Patient Classification	
		Adult/Child	Neonate
SpO_2 Alarm Condition Delay	For all settings	About 7 sec. to 9 sec.	About 7 sec. to 9 sec.
SpO_2 Alarm Signal Generation Delay	For all settings	About 5 sec.	0 sec.

3 Set the ExtSpO_2 alarm.

(☞"Alarm Limit Setup for Each Parameter" P6-9)

NOTE

- Set the lower limit in the range of 50%SpO_2 to 98%SpO_2. If a value below 50%SpO_2 is set, the lower alarm will turn OFF.
- The lower limit of ExtSpO_2 cannot be set above the lower limit of SpO_2.

REFERENCE

- When [Auto] is set, the lower limit will be set to "SpO_2 lower limit - 10%SpO_2".
- The lower limit can be set in 1%SpO_2 increment.
- ▶ indicates the current measurement value.
- The following delay occurs for the ExtSpO_2 alarm depending on the patient classification

and second alarm setting.

	Patient Classification	
	Adult/Child	Neonate
SpO_2 Alarm Condition Delay	About 7 sec. to 9 sec.	About 7 sec. to 9 sec.
SpO_2 Alarm Signal Generation Delay	About 5 sec.	0 sec.

4 Set the PR alarm.

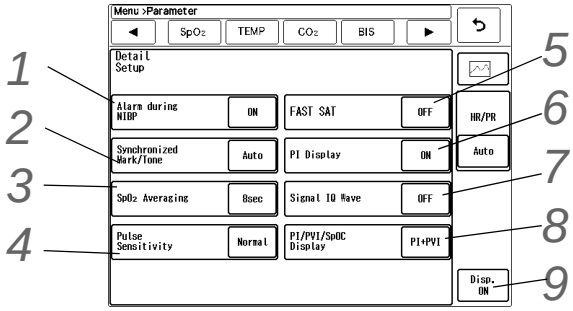
(☞"SpO_2Parameter Setup (Nellcor)" P7-38)

REFERENCE

- The following delay occurs for the PR alarm depending on the patient classification. (For Masimo)
  - PR Alarm Condition Delay: <Adult/Child> About 8 sec. to 10 sec. <Neonate> About 7 sec. to 9 sec.
  - PR Alarm Signal Generation Delay: <Adult/Child> About 5 sec., <Neonate> 0 sec.

❑Detail Setup

By pressing the key for "Detail Setup" on the SpO_2 setup screen, further settings can be performed.



1 Set the "Alarm during NIBP".

(☞"SpO_2Parameter Setup (Nellcor)" P7-38)

NOTE

- Selecting [OFF] for "Alarm during NIBP" will not generate the SpO_2, PR, SpCO, SpMet, SpHb alarm until the NIBP measurement is complete.

2 Set the "Synchronized Mark/Tone".

(☞"Set the "Synchronized Mark/Tone"." P7-9)

3 Set the "SpO_2 Averaging".

⚠ WARNING

- Be careful when setting the "SpO_2 Averaging" duration as the SpO_2 alarm is based on the displayed SpO_2 value which is averaged from the duration set in "SpO_2 Averaging". The alarm occurrence time will be affected or may not occur for the transient value of SpO_2 depending on the set duration.

▸ Select from [2-4sec.]/[4-6sec.]/[8sec.]/[10sec.]/[12sec.]/[14sec.]/[16sec.].

4 Set the "Pulse Sensitivity".

- Select from [High]/[Normal]/[APOD].

⚠ CAUTION

- If [High] is selected for pulse sensitivity, probe-off detection will become somewhat inaccurate.

NOTE

- To improve the low perfusion condition, or to perform fast tracking when the SpO_2 value changes abruptly, select [High].
- For standard use, select [Normal].
- If there is a high possibility of sensor getting disconnected, select [APOD].

5 Set the "FAST SAT".

- [ON]: Abrupt change of the SpO_2 value can be monitored.
- [OFF]: FAST SAT mode will turn OFF.

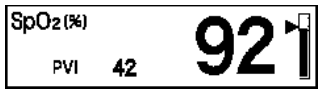
6 Set the "PI (Perfusion Index) Display" .

NOTE

- The perfusion index is calculated by pulsatile signal divided by apulsatile signal times 100, and indicates patient's circulation condition at the monitoring site.
- 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.

- [ON]: PI will be displayed.

- [OFF]: PI will not be displayed.



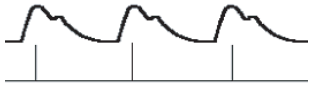
7 Set [ON]/[OFF] of "Signal IQ Wave".

NOTE

- The signal IQ wave cannot be printed.

REFERENCE

- The signal IQ wave indicates the signal confidence and pulse beat. The vertical length indicates the signal confidence. A low vertical line indicates a lower signal confidence.



8 Set the "PI/PVI/SpOC Display".

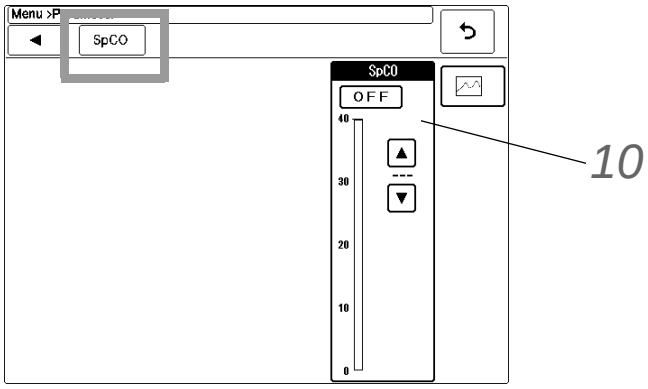
REFERENCE

- Perfusion Index (PI) is a relative assessment of the pulse strength at the monitoring site. It is a ratio of the pulsatile and the non-pulsatile blood flow at the monitoring site. It can be used to find the most appropriate sensor application site by finding the site with the highest PI. Perfusion Index (PI) is displayed in the range from 0.02% to 20%, and the recommended value is 1% or above.
- Pleth Variability Index (PVI) is an index of the change in PI that occurs during the respiratory cycle. It is calculated by measuring the changes in PI over a time interval where one or more complete respiratory cycles have occurred. Pleth Variability Index (PVI) is displayed in the range from 0% to 100%.
- Arterial oxygen content (SpOC) is calculated with the following equation.
  SpOC (mL/dL*)=1.31 (mL O_2/g Hb) x Hb (g/dL) x SpO_2 +0.3 mL/dL
  * When mL O_2/g Hb is multiplied by g/dL of SpHb, the gram unit in the denominator of mL/g cancels the gram unit in the numerator of g/dL resulting in mL/dL (mL of oxygen in one dL of blood) as the measurement unit for SpOC.

▸ Select from [PI+PVI]/[PI+SpOC]/[PVI+SpOC].

9 Select ON/OFF for parameter display.
(☞"SpO_2Parameter Setup (Nellcor)" P7-38)

10 Set the SpCO alarm.
Press the [▶], [Sp*] keys, and select [SpCO] from the dropdown list to display the SpCO alarm setup screen.

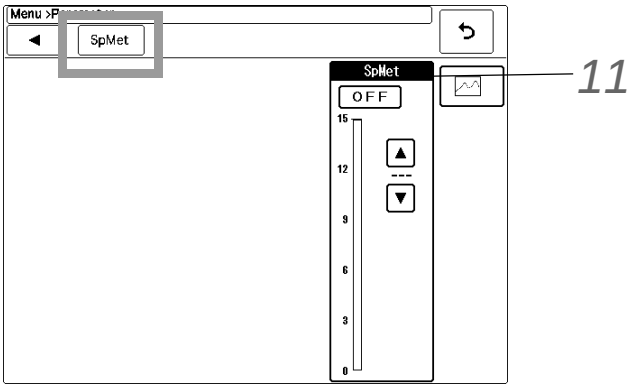


CAUTION

- Set the upper limit in the range of 1%SpCO to 40%SpCO. If a value above 40%SpCO is set, the upper alarm will turn OFF.
- The lower limit cannot be set.
- The automatic alarm cannot be set.

11 Set the SpMet alarm.

Press the [SpMet] key to display the SpMet alarm setup screen. Set the alarm in the same procedure as SpCO.
[Press the [▶], [Sp*] keys, and select [SpMet] from the dropdown list to display the SpMet alarm setup screen.

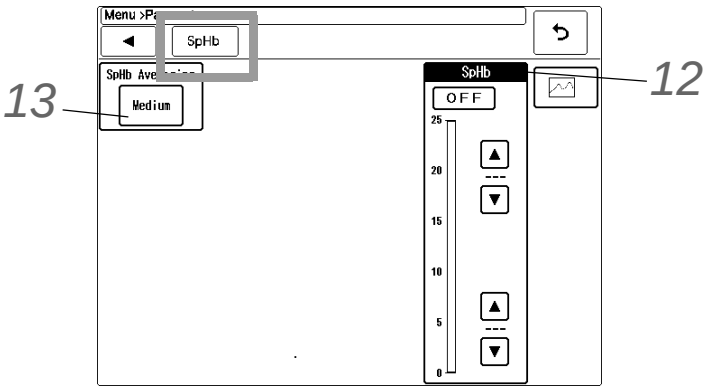


⚠ CAUTION

- Set the upper limit in the range of 1%SpMet to 15%SpMet. If a value above 15%SpMet is set, the upper alarm will turn OFF.
- The lower limit cannot be set.
- The automatic alarm cannot be set.

12 Set the SpHb alarm.

Press the [SpHb] key to display the SpHb alarm setup screen. Set the alarm in the same procedure as SpCO.
[Press the [▶], [Sp*] keys, and select [SpHb] from the dropdown list to display the SpHb alarm setup screen.



⚠ CAUTION

- Set the upper limit in the range of 2.0 g/dL to 24.5 g/dL. If a value above 24.5 g/dL is set, the upper alarm will turn OFF.
- Set the lower limit in the range of 1.0 g/dL to 24.0 g/dL. If a value below 1.0 g/dL is set, the lower alarm will turn OFF.
- The automatic alarm cannot be set.

13 Set the "SpHb Averaging".

Select the SpHb averaging duration from [Short]/[Medium]/[Long].

Non-Invasive Blood Pressure

The procedure of NIBP measurement and measurement condition setup are explained.

CAUTION

- For the following situation, measurements will be terminated.
  - When the measurement time has exceeded 160 seconds for adult and child, 80 seconds for neonate.
  - When the inflation value has exceeded 300 mmHg for adult, 210 mmHg for child, and 150 mmHg for neonate.
- If used with the incorrect patient classification, 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.
- The following factors may affect the NIBP value.
  - Body motion, arrhythmia, convulsion, low pulse pressure, slow pulse
  - Continuous noise such as cardiac massage
  - Noise from the electrosurgical instrument

Lineup of Cuffs

REFERENCE

- According to the AHA (American Heart Association) guideline, the appropriate cuff width is 40% of the arm circumference.Prepare an appropriate cuff for the patient. For details of the usable cuffs, refer to ☞"Non-Invasive Blood Pressure Measurement (Manufactured by Fukuda Denshi)" P13-2.

NIBP Monitoring

WARNING

- Before the NIBP measurement, make sure the patient classification ([Adult]/[Child]/[Neonate]) is properly selected on the "Admit/Discharge" menu. Otherwise, correct measurement cannot be performed, and congestion or other injury may result.

CAUTION

- Correct NIBP measurement cannot be performed if oxygenator 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 constricting the arm may cause petechia or circulatory failure with 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.
- 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 a long period of time with interval of 2.5 minutes or less. Also, periodically check the blood circulation while performing periodic measurement over a long period of time. Congestion or rash may occur at the measuring site.
- Make sure to check the patient's condition constantly when repeatedly using continuous measurement as it may cause dysfunction of patient's circulation.
- 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.
- The following factors may affect the NIBP value.
  - Body motion, arrhythmia, convulsion
  - Continuous noise such as cardiac massage
  - Periodic electromagnetic noise
- If the cuff inflation may adversely affect the patient's blood flow or wound, attach the cuff to an appropriate position under physician's instruction.
- Do not apply the NIBP cuff to the arm of the mastectomized side. It may cause swelling or other circulatory failure.
- It is not intended for measuring the NIBP of pregnant patient, including pre-eclamptic. It may cause incorrect NIBP measurement.
- Pay attention when measuring the NIBP of pregnant (including pre-eclamptic) patient. It may affect the NIBP value.

NOTE

- When the [NIBP Start/Stop] key is pressed or when the NIBP measurement interval is changed, the standby mode will be canceled and the NIBP periodic measurement will start.

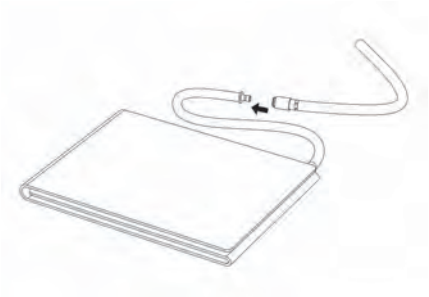
1 Select the appropriate cuff type for the patient.

(☞"Non-Invasive Blood Pressure Measurement (Manufactured by Fukuda Denshi)" P13-2)

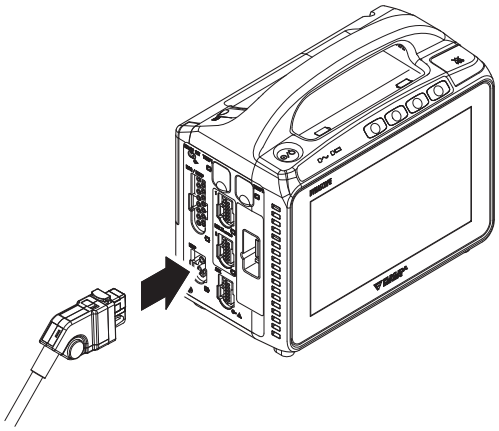
⚠ CAUTION

- 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.

2 Connect the cuff to the air hose.



3 Connect the air hose to the NIBP connector on the DS-8007.



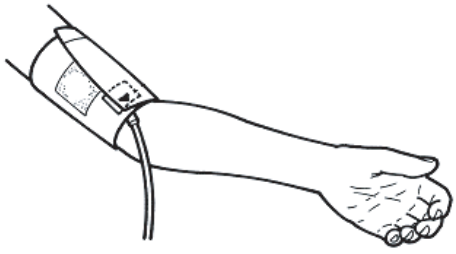
⚠ CAUTION

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

NOTE

- The neonate cuff should be connected to air hose for neonate. Other cuffs should be connected to air hose for general use.
  The DS-8007 automatically determines the patient classification (neonate or adult/child) according to the connected air hose. (If the connected air hose does not match the set patient classification, a confirmation window to change the patient classification will be displayed.) If the air hose is not connected to the cuff connection connector, the measurement will not start.

4 Apply cuff to the patient.

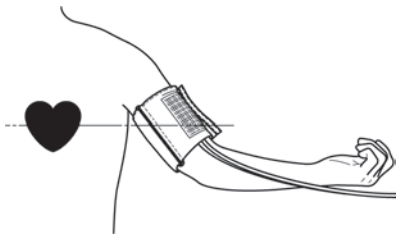


NOTE

- Position the ARTERY▼ mark over the artery on the patient's arm and wrap the cuff around.
- One or two fingers should just fit in between the cuff and arm.

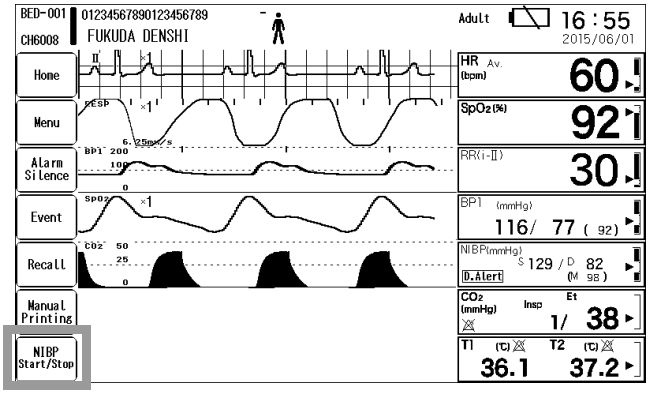
REFERENCE

- 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 Press the [NIBP Start/Stop] key (user key or fixed key).

- Cuff inflation and measurement will start.
- Upon completion, a sound to notify the completion will be generated, and the measured value will be displayed inside the NIBP numeric data box.



REFERENCE

- About the Oscillometric Method
- The oscillometric method measures the blood pressure by detecting the pulse oscillation change by the cuff pressure. The cuff connects to the NIBP connector via the air hose. The air pressure inside the cuff is converted to voltage by the pressure sensor, converted to digital signal (A/D conversion), and transmitted to the CPU.
  The measurement is performed with the following process.
  - The cuff inflates to the set value and inhibits the arterial blood flow at the measured site.
  - The cuff gradually deflates.
  - The arterial blood flow of the patient will return when the cuff pressure is decreased sufficiently.
  - The oscillation (pulse signal) caused by the restricted blood circulation is transmitted to the pressure sensor via the air hose, and converted to an electric signal.
  - From the pulse signal and cuff pressure detected at the pressure measurement circuit, the systolic, diastolic, average blood pressure and pulse rate will be measured at the CPU.
- The systolic, diastolic, mean blood pressure will be displayed on the monitor. The measurement will start with the following factor.
  - When the [NIBP Start/Stop] key (fixed key or user key) is pressed.
  - At the selected measurement interval.
  - For fixed amount of time after the NIBP Cont. key (user key) is pressed. (Max. 15 min.)
  - If "NIBP Measurement at Alarm Occurrence" is set ON, and the set parameter generates an alarm.
  - When the change in patient's circulation condition is detected from the time difference of ECG and SpO_2 waveform.

Inflation Mode Setup

The maximum inflation value and measurement duration needs to be changed according to the patient classification. The inflation mode will automatically change according to the patient classification setting. Set the appropriate patient classification on "Admit/Discharge" menu or "Detail Setup" menu under NIBP parameter setup.

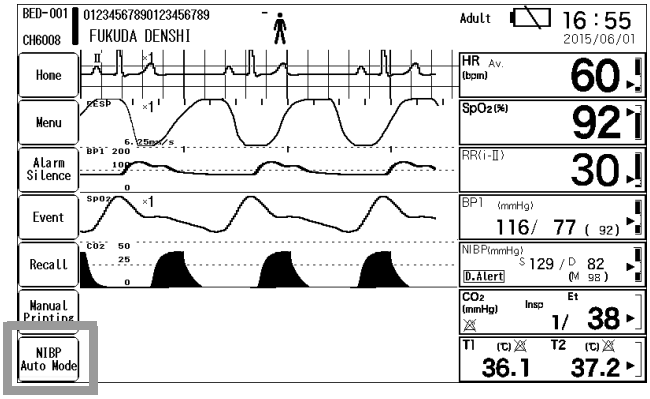
The NIBP measurement on this equipment is provided with forced exhaust system for safety purpose. When the maximum inflation value is reached or when the fixed measurement duration is exceeded, the system will automatically start to exhaust. The maximum inflation value, maximum measurement duration, initial inflation value, measurement range, and alarm limit range for this exhaust system is set according to the patient classification setting.

Patient Classification	Initial Inflation Value	Maximum Inflation Value	Maximum Measurement Duration
Adult	180 mmHg	300 mmHg	160 sec.
Child	140 mmHg	210 mmHg	160 sec.
Neonate	110 mmHg	150 mmHg	80 sec.

NIBP Auto Mode Setup

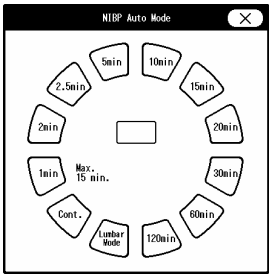
Non-invasive blood pressure can be measured automatically at selected time intervals.

If continuous measurement is started during the NIBP auto mode, the auto mode will automatically resume when the continuous measurement completes.



1 Press the [NIBP Auto Mode] key on the home display or NIBP setup menu.

▸ The "NIBP Auto Mode" window will be displayed.



2 Select the measurement interval from the displayed selection.

⚠ CAUTION

- When [1min] is selected, the 1-minute interval measurement will start from the time the selection is made.

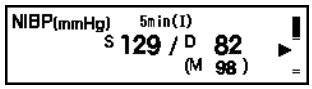
- The 1-minute interval measurement will automatically stop after 12 minutes (maximum of 15 minutes when re-measured), and 2.5-minutes interval measurement will start.
- The continuous mode will continuously measure for 12 minutes (maximum of 15 minutes when re-measured). When the measurement completes, 2.5 minute interval measurement will start. The measurement will start at the time the continuous mode is selected.
- When using the continuous mode or Lumbar mode for measurement, make sure that the setting is according to the intended purpose. (☞"About the Lumbar Mode" P7-53)
- The Lumbar mode is recommended for use during spinal anesthesia. It should be used with sufficient safety measures.

NOTE

- If [1min] is selected, 1-minute interval measurement cannot be stopped by pressing the [NIBP Start/Stop] key (fixed key or user key). To stop the measurement, select [OFF] or other interval on "NIBP Auto Mode" window.
- When the NIBP auto mode interval is [Cont.]/[1min]/[2min]/[2.5min]/[5min]/[Lumbar Mode], NIBP measurement cannot be started from the central monitor.
- When the [NIBP Start/Stop] key is pressed or when the NIBP measurement interval is changed, the standby mode will be canceled and the NIBP periodic measurement will start.

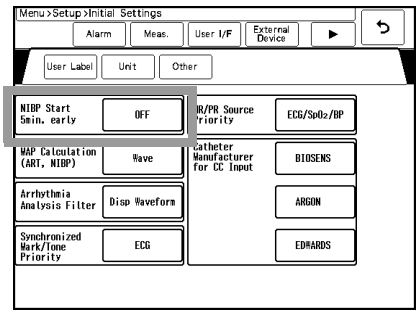
▸ The measurement will automatically start at selected interval.

▸ The selected interval will be displayed inside the numeric data box.



REFERENCE

- Select [OFF] if not performing the auto mode measurement.
- The measurement time will be integral multiple of the selected interval starting from 0 minute.
  Ex.) If the current time is 13:14, the measurement time will be as follows for each interval.
  2 min.: 13:16, 13:18, 13:20, ...
  2.5 min.: 13:15, 13:17:30, 13:20, ...
  5 min.: 13:15, 13:20, 13:25,...
  120 min.: 14:00, 16:00, 18:00, ... (The measurement will start at every even hours.)
- When [60min]/[120min] is selected for the measurement interval, the measurement will start 5 minutes before the set time. If outputting the data to PC or other external device using the PC communication function of this system, an error may be generated to the NIBP measurement time depending on the input interval of the external device.This system outputs the data at completion of NIBP measurement, and if the external device inputs the data at 60 minutes interval, 60 minutes time lag will occur. By starting the measurement 5 minutes early, this time lag between the external device can be minimized.

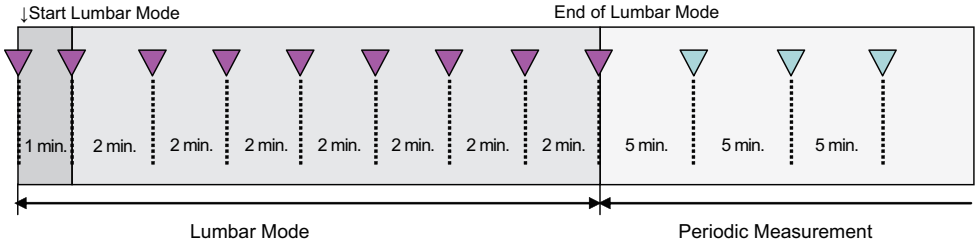


- On the "Initial Settings", whether or not to backup the NIBP measurement interval at discharge/power ON can be selected. (OFF/Backup/OFF→2.5min./OFF→5min.)

❑About the Lumbar Mode

The Lumbar mode is intended for use during spinal anesthesia.

The Lumbar mode performs the measurement as follows.



If [Lumbar] is selected when the measurement is not performed, the first measurement will start.
If [Lumbar] is selected during the measurement, the current measurement will be counted as the first measurement. The second measurement will start after 1 minute, and after 7 times of 2-minute interval measurement, the Lumbar mode will end. The Lumbar mode can be manually stopped by selecting other interval or selecting [Lumbar] again.

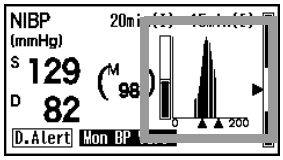
When the Lumbar mode ends, 5-minute interval measurement will automatically start.

⚠ CAUTION

- Pressing the [NIBP Start/Stop] key during measurement will only stop the measurement and not the Lumbar mode. To stop the Lumbar mode, select other interval or select [Lumbar] again.
- The manual measurement can be performed in between the Lumbar mode measurement. The Lumbar mode measurement will not start if the manual measurement is still in progress when the next Lumbar mode measurement time arrives.

Oscillation Graph Display

When the NIBP numeric data box size is 2-box size or larger, and "Oscillograph" is set to ON on the "NIBP" setup screen, the oscillation graph will be displayed inside the NIBP numeric data box.
(☞"NIBP Parameter Setup" P7-55)



The description of the oscillation graph is as follows.

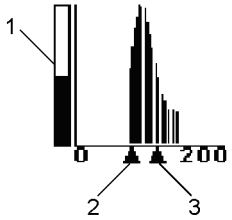
The horizontal axis shows the cuff pressure, and vertical axis shows the pulse amplitude with reference to maximum pulse amplitude.

The bar graph shown at left indicates the size of maximum pulse amplitude compared with the reference value. For example, if the maximum pulse amplitude is 1/2 of the reference value, the bar graph will be half filled in.

1 Bar Graph

2 DIA Value

3 SYS Value



Dyna Alert Function Status

The Dyna Alert function is a technology to prevent accidents which may occur by sudden BP change during the non-measured duration by estimating the variation of circulatory dynamics.
This function is available for the DS-8007N with the Nellcor SpO_2 module.

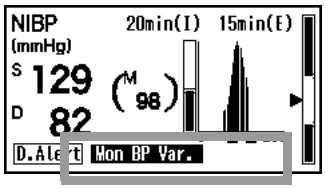
When [ON] is selected for "Dyna Alert", NIBP measurement will automatically start when the Dyna Alert estimated value exceeds the alarm limit. The function will activate with the following condition.
(☞"NIBP Parameter Setup" P7-55)

- Patient Classification: Adult (20 kg or above)
- Cuff Applied Site: Upper Arm
- SpO_2 Sensor Attachment Site: Fingertip
- NIBP Measurement Interval: 5 minutes to 60 minutes

⚠ CAUTION

- When the SpO_2 sensor is applied to the toe or forehead, the circulatory dynamics variation monitoring by the Dyna Alert may not properly function.
- The circulatory dynamics variation monitoring by the Dyna Alert is effective only on the DS-8007N with the Nellcor SpO_2 module.

In the NIBP numeric data box, the following mark and message indicating the status of the Dyna Alert function will be displayed.



D.Alert Color of Mark	Message	Status	Dyna Alert Function Status[*1]
Gray	DA Setup: OFF	Dyna Alert (DA) is set to OFF.	Disable
	Patient: Child	NIBP measurement is performed on child.	Disable
	Patient: Neonate	NIBP measurement is performed on neonate.	Disable
	Pacemaker: ON	Pacemaker setting is set to ON.	Disable
	Interv.: <5min.	NIBP interval is set to Cont., 1min, 2min, or 2.5min.	Suspended
	Interv.: >60min.	NIBP interval is set to 120min.	Suspended
	Interv.: OFF	NIBP interval is set to OFF.	Suspended
	Measuring BP[*2]	Invasive blood pressure is measured.	Suspended
Yellow	Measure NIBP	Initialization of Dyna Alert is complete, and the NIBP measurement has not been performed since the power is turned ON.	Suspended
	Poor ECG Signal	ECG signal failure due to lead-off, noise, etc.	Disable
	Poor PTG Signal	PTG (Photoplethysmograph) signal failure due to sensor off, noise, severe low perfusion, etc.	Disable
	DA-NIBP Suspended	Within 2.5 minutes from previous Dyna Alert NIBP measurement.	Suspended
	Measuring NIBP	NIBP measurement other than Dyna Alert is in progress.	Disable
	Initializing	Waiting for stable signal after starting Dyna Alert.	Disable

D.Alert Color of Mark	Message	Status	Dyna Alert Function Status*1
Green	PTG Low Perfusion	PTG amplitude is 200unit or above, and below 800unit.	Enable
	Mon. BP Var.	Dyna Alert is properly monitoring circulatory dynamics variation.	Enable
Pink	Measuring DA-NIBP	Dyna Alert NIBP measurement is in progress.	Disable

*1: Disable: Circulatory dynamics variation is not monitored.

Suspended: Circulatory dynamics variation is monitored. But the display suspends the measurement when NIBP measurement is requested. When the suspending factor is resolved, the measurement will resume as quickly as possible.

Enable: Circulatory dynamics variation is monitored. The display control software responds to NIBP measurement request as quickly as possible.

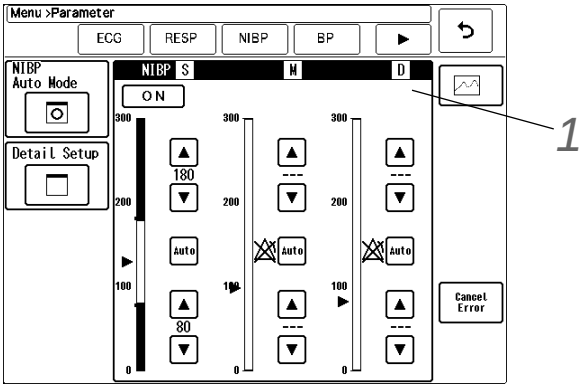
*2: "Measuring BP" indicates the status when IBP (BP1 or ART) measurement is possible and can be displayed on the monitor.

⚠ CAUTION

- When using the Dyna Alert function, be aware of these risks and do not increase the NIBP interval time by relying only on the Dyna Alert function.
- After the Dyna Alert NIBP measurement, the next Dyna Alert NIBP measurement cannot be performed for 2.5 minutes.
- The Dyna Alert will not properly function for the following cases.
  - If peripheral circulatory insufficiency or very low BP is developed.
  - If highly-frequent arrhythmia is generated.
  - If an oxygenator is used.
  - If a large noise from body movement or electric surgery equipment is interfering.
  - If autonomic nerve or circulatory dynamics is largely affected by medication.

NIBP Parameter Setup

Press the [Menu], [Parameter], [NIBP] keys to display the "NIBP" setup menu.



1 NIBP Alarm

(☞"Alarm Limit Setup for Each Parameter" P6-9)

NOTE

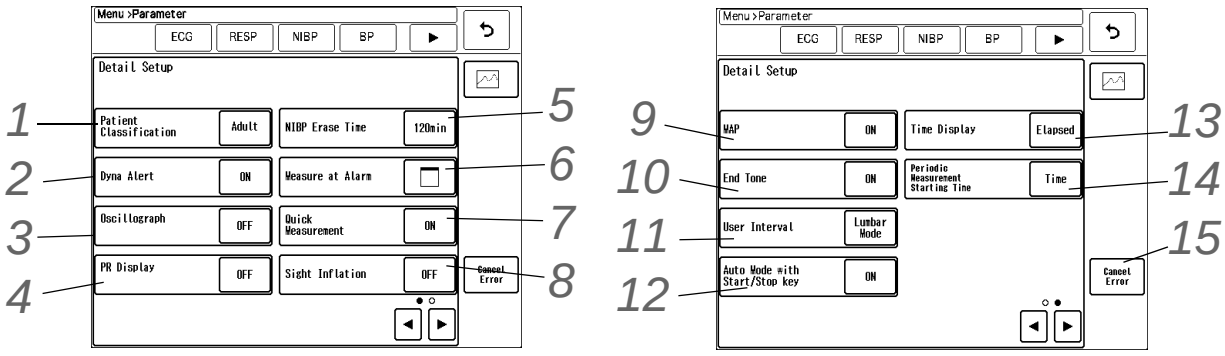
- Set the upper limit in the range of 15 mmHg to 300 mmHg / 2.0 kPa to 40.0 kPa. If a value above 300 mmHg / 40.0 kPa is set, the upper alarm will turn OFF.
- Set the lower limit in the range of 10 mmHg to 295 mmHg / 1.5 kPa to 39.5 kPa. If a value below 10 mmHg / 1.5 kPa is set, the lower alarm will turn OFF.

REFERENCE

- Set ON/OFF of NIBP alarm, upper and lower alarm limits of systolic (S), diastolic (D), mean (M) NIBP.
- When [Auto] is set, the upper and lower limit will be automatically set to +40 mmHg / +5 kPa and -20 mmHg / -3 kPa respectively to the current value.
- To use the auto setting, [Enable] should be selected for "Alarm Auto Setup" under "Initial Settings". (☞Maintenance Manual "Alarm Related Setup" P5-5)
- When [Enable] is set for "Alarm Threshold Limit" under "Initial Settings", and auto setting is used, the upper and lower alarm limit will be clipped to the set limit.
- The alarm limit should be set for each unit (mmHg/kPa).
- The upper/lower limit can be set in 5 mmHg / 0.5 kPa increment.

❑Detail Setup

Press the [Menu], [Parameter], [NIBP], [Detail Setup] keys to display the NIBP detail setup menu.



1 Patient Classification

The patient classification setting is linked with that on the "Admit/Discharge" screen. The inflation value and measurement duration will differ according to the patient classification setting.

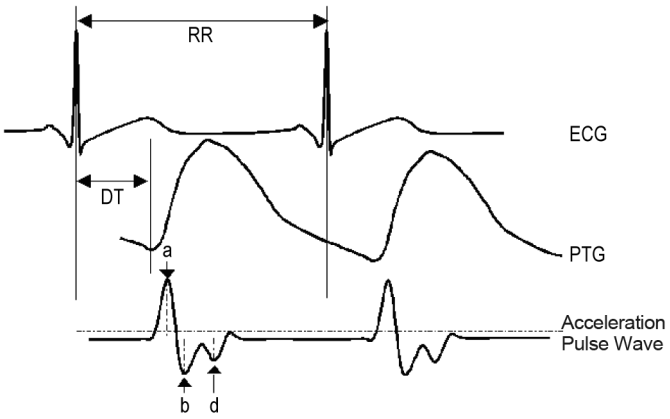
(☞"Inflation Mode Setup" P7-51)

WARNING

- The patient classification selection influences the precision of the QRS detection and NIBP measurement. Make sure the correct selection is made.
- To perform correct NIBP measurement, appropriate NIBP air hose corresponded to the set patient classification must be used. However, if the patient classification is child, NIBP air hose for adult can be used.

2 Dyna Alert

[ON]: Dyna Alert function will turn ON when DS-8007N is used.



Parameters used for Dyna Alert Function

⚠ CAUTION

- When the PTG (SpO_2) sensor is applied to the toe or forehead, the circulatory dynamics variation monitoring by the Dyna Alert may not properly function.
- The circulatory dynamics variation monitoring by the Dyna Alert is effective only on the DS-8007N with the Nellcor SpO_2 module.

REFERENCE

- About the Dyna Alert:
  Using a cuff allows to measure the blood pressure noninvasively, but on the other hand, there is a demerit of not being able to perform the measurement continuously.Therefore, there is always a risk of sudden blood pressure change in between the periodic measurements.

3 Oscillation Graph Display/Print

[ON]: Oscillation graph will be displayed inside the numeric data box.
[Oscill. Print] key will be also displayed.

[Oscill. Print]: Oscillation graph will be output on the Recorder Unit.

[OFF]: Oscillation graph will not be displayed.

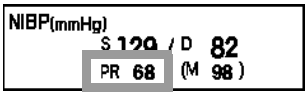
[Real Time]: Oscillation graph will be updated during the measurement.

NOTE

- The oscillation graph can be displayed when the NIBP numeric data box size is 2-box size or larger, and "Oscillograph" is set to [ON] on the "NIBP" setup screen.

4 PR Display

[ON]: PR will be displayed.



NOTE

- PR will be displayed only. It will not generate alarm, or be displayed for the tabular trend.

5 NIBP Erase Time

NIBP data will be erased after the set duration (60min/120min).

6 Measure at Alarm

NIBP measurement will start at alarm generation.

Select [ON] for "NIBP Measurement at Alarm Occurrence", and select the alarm factor to start the NIBP measurement.Multiple parameters can be selected.

⚠ CAUTION

- If the NIBP measurement has not been performed since the power was turned ON, NIBP measurement at alarm occurrence will not be performed.

7 Quick Measurement

[ON]: NIBP measurement will be performed in duration of about 20 seconds to 25 seconds in case of adult patient.

NOTE

- The quick measurement can be performed only if the patient classification is adult or child. For neonate, normal measurement will be performed regardless of this setting.

8 Sight Inflation

[ON]: Sight inflation function will turn ON.
The inflation target level will be automatically estimated during the inflation, and starts to deflate after the target level is reached.
If [ON] is selected for "Sight Inflation", the target inflation value will be increased in case such as sudden increase of blood pressure to prevent the re-inflation.

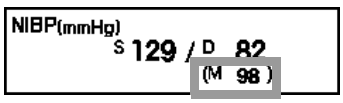
[OFF]: Sight inflation function will turn OFF.
It will inflate to the target level set according to the previous measurement result.

NOTE

- The sight inflation function can be used only during the NIBP auto mode measurement.
- The sight inflation function cannot be used when the patient classification is "Neonate".
- The sight inflation function cannot be used when performing the 1-minute interval measurement or continuous measurement.
- When performing manual measurement/measurement at alarm occurrence, it will inflate to the fixed value (Adult: 180 mmHg, Child: 140 mmHg, Neonate: 110 mmHg) regardless of the sight inflation setting.

9 MAP

[ON]: Mean BP (MAP) value will be displayed.



⚠ CAUTION

- If the mean BP (MAP) value is not displayed, the mean BP (MAP) alarm will not be generated.

10 End Tone

[ON]: A buzzer tone will be generated when the NIBP measurement completes.

11 User Interval

The interval is fixed as "Lumbar Mode".

(☞"About the Lumbar Mode" P7-53)

12 Auto Mode with Start/Stop key

NIBP measurement will be performed automatically at selected time intervals.

- [OFF]: When the power is turned ON, NIBP auto mode will resume even when the new patient is not admitted.
- [ON]: When the power is turned ON, NIBP auto mode will resume by starting a manual measurement for the newly admitted patient. Until the NIBP auto mode is resumed or the interval is changed, "Standby" will be displayed inside the NIBP numeric data box.

NOTE

- When the [NIBP Start/Stop] key is pressed or when the NIBP measurement interval is changed, the standby mode will be canceled and the NIBP periodic measurement will start.

13 Time Display

The time for the NIBP measurement will be displayed.

- [Elapsed]: The elapsed time from the previous NIBP measurement will be displayed.
- [Meas.]: The NIBP measured time will be displayed.

14 Periodic Measurement Starting Time

The starting time of periodic measurement can be set.

- [Time]: The periodic measurement will start from the integral multiple of the selected interval starting from 0min.
- [Meas.]: The periodic measurement will start from the actual starting time.

	Measurement time when [Time] is selected:	Measurement time when [Meas.] is selected:
When interval is [15min.] and measurement is started on 15:11:15	15:11:15, 15:15:00, 15:30:00, 15:45:00	15:11:15, 15:26:15, 15:41:15, 15:56:15
When interval is changed to [30min.] on 15:58	16:00:00, 16:30:00, 17:00:00	16:26:15, 16:56:15, 17:26:15

15 Cancel Error

By pressing [Cancel Error] , the measurement error can be canceled.

⚠ CAUTION

- When <NIBP Unit Error (Exx-xx)> is displayed, make sure that the congestion is not generated, and remove the cuff if necessary.

NOTE

- Make sure that the NIBP measurement can be properly performed after solving the cause of the error message.

- If the same message is repeatedly displayed, a failure of the equipment can be considered. Cease the measurement and contact your nearest service representative.

Temperature

This section explains the measurement procedure and measurement condition setup of temperature (T1 to T6).

TEMP Monitoring

1 Select the appropriate probe for the patient. (☞"Temperature Measurement (Manufactured by Fukuda Denshi)" P13-3)

⚠ CAUTION

- Before the measurement, make sure that the specified probe/relay cable is used. If unspecified probe/relay cable is used, measurement error may occur.
- Stop using the probe if it is damaged..

NOTE

- 700 series temperature probe cannot be used.

2 Connect the probe to DS-8007.

REFERENCE

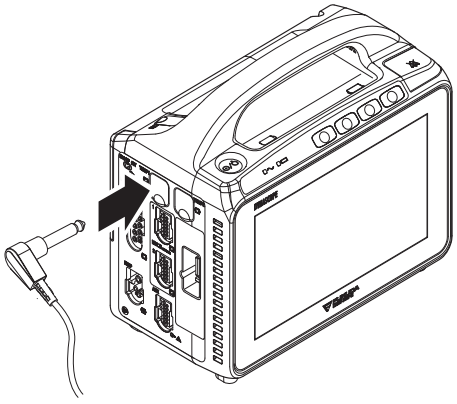
- The DS-8007 is provided with 2 temperature connectors. T1, T2 will be assigned to these temperature connectors. To measure 4 channels of temperature, 2 channels can be added by using the multiparameter connector via 2ch temperature relay cable (CJO-P01T-DA**).

NOTE

- Connect the temperature probe all the way in to the temperature connector on the DS-8007 until it is securely connected. If the connection is unsecure, the measurement data may not be displayed.

<2ch (T1, T2) Temperature Monitoring>

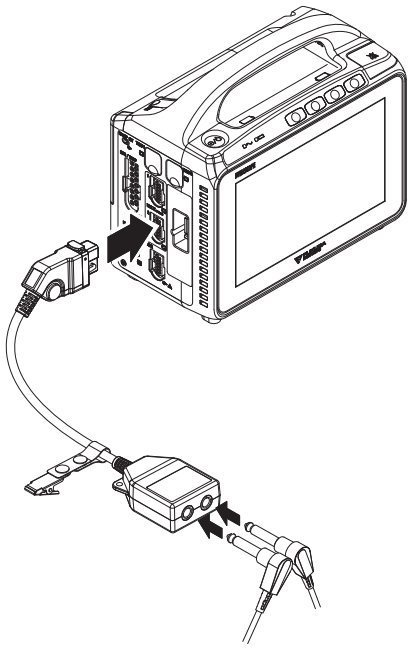
1 Connect the temperature probe to temperature connector (Temp1, Temp2) on the DS-8007.



<4ch Temperature Monitoring (When T3/T4 or T5/T6 are added)>

1 Connect the 2ch temperature relay cable (CJO-P01T-DA**).

2 Connect the temperature probe to the 2ch temperature relay cable.



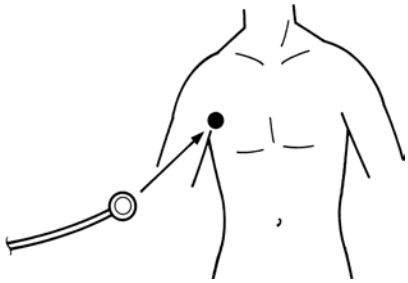
NOTE

- T5, T6 will be assigned if connected to multiparameter connector 1, and T3, T4 will be assigned if connected to multiparameter connector 2.

3 Attach the probe to the patient.

In Case of Body Surface Probe 409B:

1 Attach the probe to the body surface, and secure with surgical tape.



NOTE

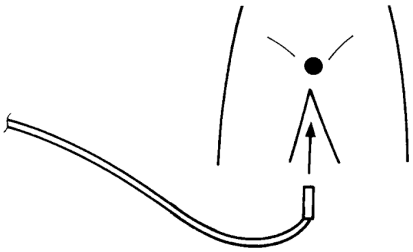
- The probe location shown above is an example. Adjust the probe location according to the patient's condition.

In Case of Rectal Temperature Probe 401, 402:

1 Clean/Disinfect/Sterilize the probe according to the guidelines provided with the probe product.

2 Insert the probe into the rectum about 3 cm to 7 cm deep.

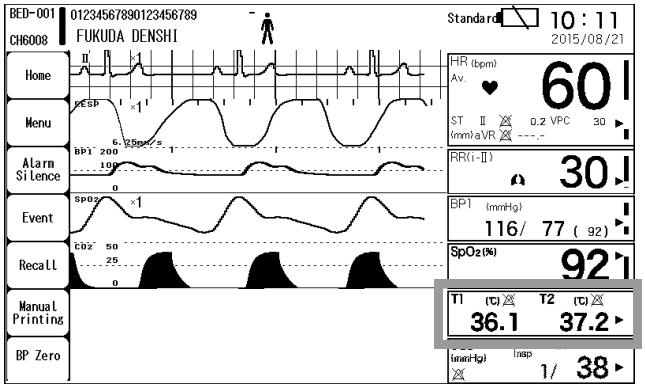
3 Secure the probe to inner thigh with surgical tape.



4 Check that the temperature is displayed.

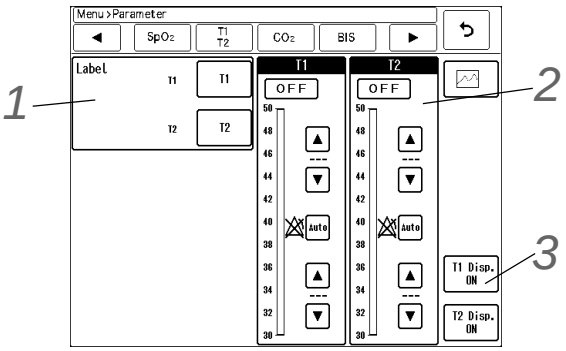
1 Press the [Home] key (user key) or HOME key (fixed key).

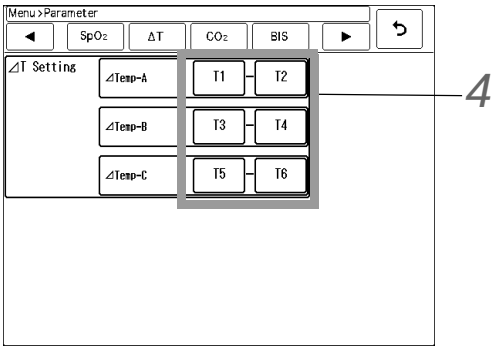
2 Verify that the measured data is displayed on the home display.
If the measured data is not displayed during the 1 channel temperature measurement, the temperature probe may be connected to incorrect channel. Connect the probe to the correct channel and verify that the measured data is displayed.



TEMP Parameter Setup

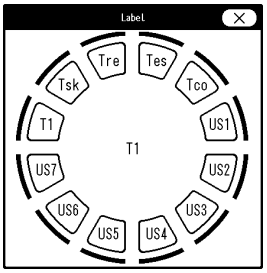
Press the [Menu], [Parameter], [TEMP] keys, and select the parameter from the dropdown list to display the "TEMP" setup menu.





1 Temperature Label

Select the label from [Tx] to [US7].



REFERENCE

- Description of Each Label:
  T1-T6 (Default)
  Tsk (Skin Temperature)
  Tre (Rectal Temperature)
  Tes (Esophageal Temperature)
  Tco (Core Temperature))
  US1 to US7: User labels (3 characters) which can be set on the "Initial Settings".
  (☞Maintenance Manual "User Label Setup" P5-8)

NOTE

- US3 to US7 cannot be selected for the equipment connected to DS-LANII/III.

2 Temperature Alarm

(☞"Alarm Limit Setup for Each Parameter" P6-9)

NOTE

- Set the upper limit in the range of 31.0°C to 45.0°C/88.0°F to 113.0°F. If a value above 45.0°C/113.0°F is set, the upper alarm will turn OFF.
- Set the lower limit in the range of 30.0°C to 44.0°C/86.0°F to 111.0°F. If a value below 30.0°C/86.0°F is set, the lower alarm will turn OFF.

REFERENCE

- The upper and lower limit can be set in 0.5°C/1.0°F increments.
- When [Auto] is set, the upper and lower limit will be automatically set to +2.0°C/+4.0°F and -2.0°C/-4.0°F to the current value respectively.
- To use the auto setting, [Enable] should be selected for "Alarm Auto Setup" under "Initial Settings". (☞Maintenance Manual "Alarm Related Setup" P5-5)
- When [Enable] is set for "Alarm Threshold Limit" under "Initial Settings", and auto setting is used, the upper and lower alarm limit will be clipped to the set limit.

3 Display ON/OFF

(☞"ECG Parameter Setup" P7-6)

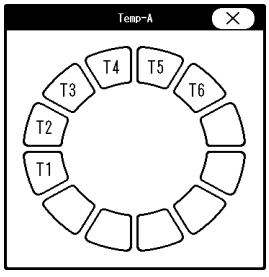
⚠ CAUTION

- When the parameter display is set to OFF, the alarm generation and tabular/graphic trend input will also cease.

4 ΔT Display

[ΔT]: ΔT setup menu will be displayed.

Select the parameter for each ΔT.



REFERENCE

- For ΔT, the difference of temperature will be displayed.
- Maximum of 2 types of ΔT (ΔTemp-A, ΔTemp-B) can be registered and displayed.

NOTE

- To display on the home display, the setup on the "Display Config." is necessary. (☞"To Configure the Display" P10-4)
- The alarm cannot be set for ΔT.

Cardiac Output and Blood Temperature

When thermodilution catheter is used to measure the cardiac output, the blood temperature (Tb) can be monitored. The CO measurement can be performed using the multiparameter connector on the DS-8007.
(☞"Cardiac Output (CO)" P8-43)

Connection to the Patient Monitor

1 Select the catheter relay cable.

NOTE

- The usable catheter relay cable depends on the injectate temperature measurement method. Select the appropriate cable according to the method.
- Only one catheter relay cable can be connected.
- When using the extension tube, use the in-line sensor. Otherwise, it may result in CO measurement error due to injectate temperature rise.

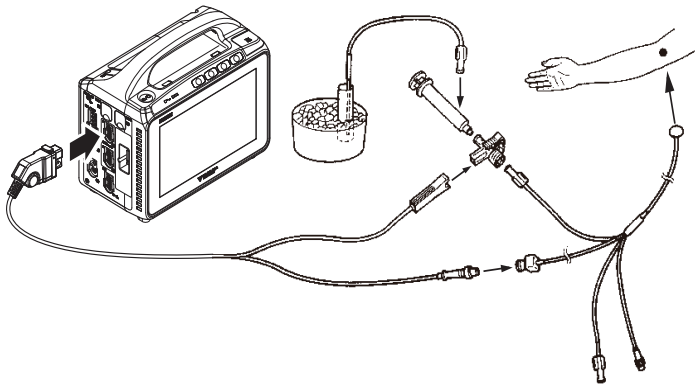
Injectate Temperature Measurement Method	Catheter Relay Cable
0°C/24°C (32°F/75.2°F) Temperature	CJO-P01C-C2.4
Flow-through Sensor	CJO-P01C-F2.4
In-line Sensor	CJO-P01C-L2.4
Injectate Temperature Probe	CJO-P01C-T2.4

REFERENCE

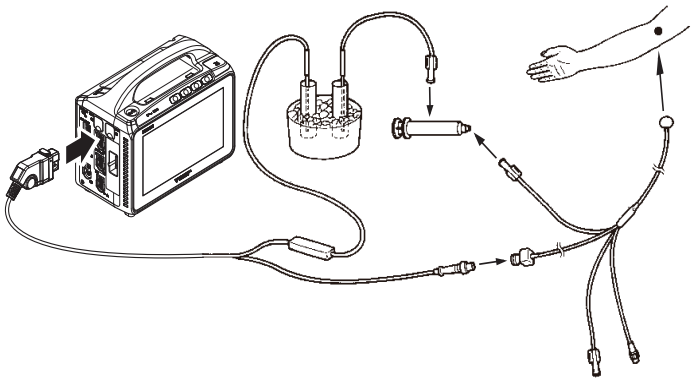
- The appropriate injectate temperature and injectate volume differs depending on the used catheter. Refer to the operation manual of the corresponding catheter.

2 Connect the catheter relay cable to the multiconnector on the DS-8007, and connect the catheter to the catheter relay cable.

Example of In-line Sensor



Example of Injectate Probe



NOTE

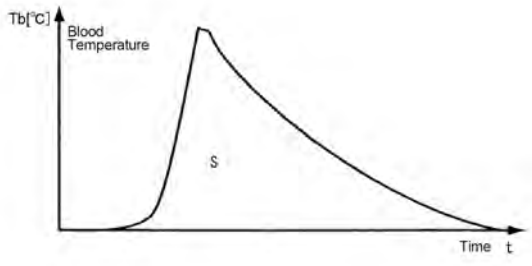
- If the injection is performed in room temperature, the blood temperature difference may not be large enough for the CO measurement of low cardiac output patient.

Cardiac Output Measurement Algorithm

Cardiac output is measured using the thermodilution method.

❑Thermodilution Method

The thermodilution catheter is inserted from the vein through the right atrium, right ventricle, and pulmonary artery. From the side hole near the catheter tip, injectate is injected quickly to the right atrium. At this time, the heart contraction and heat diffusion mixes the injectate with blood, and causes blood temperature fall.
Variable initiated by these effects are measured as time function at the pulmonary artery, and the following thermodilution curve can be drawn.
Cardiac output is calculated by applying this to the Stewart-Hamilton formula shown below.



$$CO = 60 \cdot Vi \cdot \frac{Si \cdot Ci}{Sb \cdot Cb} \cdot \frac{Ct(Tb-Ti)}{S} = CC \cdot \frac{Tb-Ti}{S}$$

CO : Cardiac Output [L/min]
Vi : Injectate Volume [L]
Tb : Blood Temperature [°C]
Ti : Injectate Temperature [°C]
Ct : Correction coefficient for injectate temperature rise inside catheter
60 : seconds
S : Area of thermodilution curve $\int_0^\infty \Delta Tb(t)dt$[°C sec]
ΔTb(t) : Temperature change of Tb after "t" seconds. [°C]
CC : Catheter Constant (Computation Constant: CC value)
Si : Specific Gravity of Injectate [g/cm^3]
Sb : Specific Gravity of Blood [g/cm^3]
Ci : Specific Heat of Injectate [cal/(g/°C)]
Cb : Specific Heat of Blood [cal/(g/°C)]

As shown above, cardiac output is directly proportional to the Injectate Volume (Vi) and the difference between Blood Temperature and Injectate Temperature (Tb - Ti), and is inversely proportional to the area of the thermodilution curve (S).

❑Hematocrit Value

Hematocrit value of 45%, (Si*Ci)/(Sb*Cb) = 1.08 is programmed for this equipment.

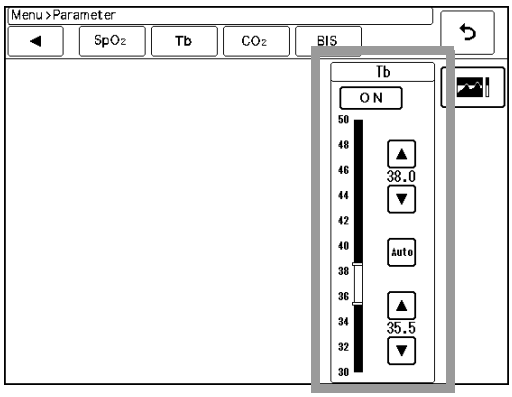
NOTE

- If the hematocrit value is different, an error may be caused in cardiac output measurement.

Blood Temperature Alarm Setup

1 Press the [TEMP], [Tb] keys.
(☞"To Display the Parameter Setup Screen" P7-1)

▸ The alarm setup menu will be displayed.



2 Select ON/OFF of blood temperature alarm and set the upper and lower alarm limits.
(☞"Alarm Limit Setup for Each Parameter" P6-9)

NOTE

- Set the upper limit in the range of 31.0°C to 45.0°C/88.0°F to 113.0°F. If a value above 45.0°C/113.0°F is set, the upper alarm will turn OFF.
- Set the lower limit in the range of 30.0°C to 44.0°C/86.0°F to 111.0°F. If a value below 30.0°C/86.0°F is set, the lower alarm will turn OFF.

REFERENCE

- The upper and lower limit can be set in 0.5°C/1.0°F increments.
- When [Auto] is set, the upper and lower limit will be automatically set to +2.0°C/+4.0°F and -2.0°C/-4.0°F to the current value respectively.
- [Auto] key will be displayed only when [ON] is set for "Auto Alarm Setup" under "Initial Settings".

CO_2 Concentration (Mainstream Method)

This section explains about the CO_2 concentration measurement procedure and measurement condition setup when using the Philips Capnostat 5 (Mainstream Method, Gas Unit I/F HPD-810/HPD-820) .

Patient Application and Display

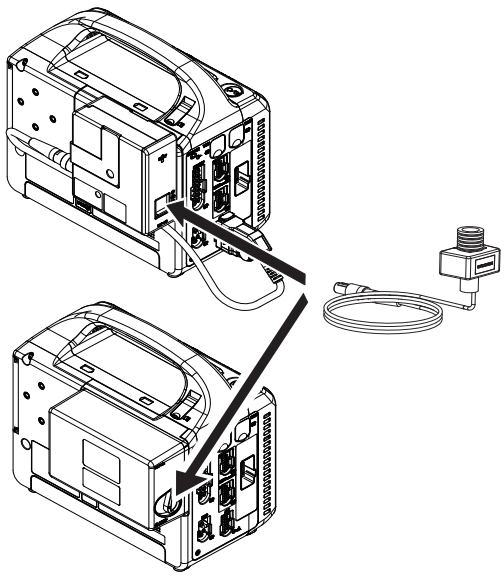
By using the HPD-810/HPD-820 Gas Unit I/F, CO_2 measurement by the Philips Capnostat 5 (Mainstream Method) can be performed.

⚠ WARNING

- Only one of either HPD-810 or HPD-820 can be connected.

1 Connect the HPD-810 Gas Unit I/F to the AUX connector on the DS-8007 and the CO_2 sensor (Capnostat 5) to the CO_2 connector on the HPD-810/HPD-820.

- The CO_2 sensor will automatically begin warming up.
  The CO_2 sensor requires a warming up process to achieve stable operating temperature. Warm up process will require minimum of 2 minutes.
- During the warm up period, <CO_2 Warm Up> message will be displayed on the monitor.
- When the warm up completes, the message will disappear.



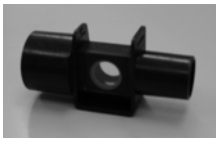
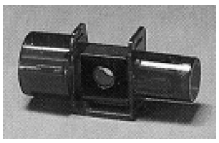
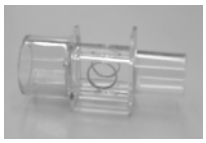
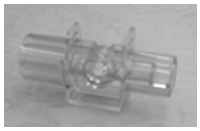
2 Prepare an airway adapter suitable for the patient.

⚠ CAUTION

- The disposable airway adapter should be opened just before use.
- Do not reuse the disposable airway adapter.Do not disassemble, clean, disinfect, or sterilize it.

NOTE

- There are 4 types of airway adapters. Select the appropriate adapter according to the used endo-tracheal tube size and operating environment.

	Airway Adapter (Adult) 7007 For patients using an endo-tracheal tube more than, or equal to 4.0 mm in diameter. Reusable Type
	Airway Adapter (Neonate) 7053 For patients using an endo-tracheal tube less than, or equal to 4.0 mm in diameter. Reusable Type
	Airway Adapter (Disposable, Adult) 6063 For patients using an endo-tracheal tube more than, or equal to 4.0 mm in diameter. Single-Use Type
	Airway Adapter (Disposable, Neonate) 6312 For patients using an endo-tracheal tube less than, or equal to 4.0 mm in diameter. Single-Use Type

REFERENCE

- For cleaning procedure of the airway adapter, refer to ☞Maintenance Manual "Airway Adapter for Capnostat 5" P8-5.

3 Verify that the warm up is complete, and attach the CO_2 sensor to the airway adapter until a click sound is heard.

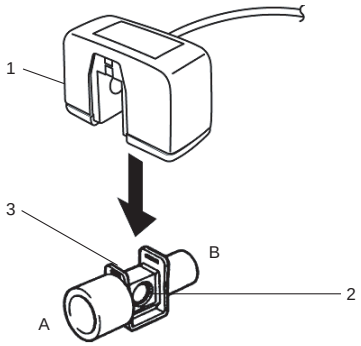
1 Capnostat 5 CO_2 Sensor

2 Window

3 Airway Adapter

A: Thick Side

B: Thin Side



⚠ CAUTION

- Align the triangle mark on the airway adapter when attaching the Capnostat 5. If attached oppositely, it may damage the CO_2 sensor or airway adapter.

4 Perform the setting for the O_2 compensation, N_2O compensation, anesthetic gas compensation, atmospheric pressure

(☞"CO_2 Parameter Setup" P7-70)

NOTE

- Set these items each time the condition changes.

5 Press the [Menu], [Parameter], [CO_2], [Calibrate Airway Adapter] keys to calibrate the airway adapter.

- Calibration will start.
- During calibration, <Zeroing> will be displayed.
- Upon completion of calibration, a tone will be generated and <Cal. complete> will be displayed.
- If the calibration fails, an error tone will be generated and <Cal. error> will be displayed.

NOTE

- The airway adapter calibration must be performed before connecting to the respiration circuit.
  The airway adapter calibration should be also performed for the following case.
  - When the airway adapter is replaced.
  - When <Zero the CO_2 Adapter> or <Check CO_2 Airway Adapter.> is displayed.
- A clean airway adapter must be used.
  If reusing an airway adapter, clean and air-dry it. Then, wipe the window with a swab, and sterilize (EOG, etc.) before use.
- During the calibration, the measurement data will be displayed as "---". The measurement data during calibration may be included in the trend data causing discontinuity.
- Calibration cannot be performed if respiration is detected within 20 seconds before calibration. In such case, wait for 20 seconds and perform the calibration again.
- When <Cal. error> is displayed, perform the airway adapter calibration again.
- The $EtCO_2$ accuracy is checked according to the test method of ISO 80601-2-55:2011 (Medical electrical equipment -- Part 2-55: Particular requirements for the basic safety and essential performance of respiratory gas monitors) .
- The waveform sampling rate is 100 Hz.
- Quantitative effects of humidity and condensation: Full accuracy specifications will be maintained for all non-condensing humidity levels.
- The CO_2 measurement accuracy is tested at 35°C/95°F.
- The respiration rate accuracy was verified by using a solenoid test setup to deliver a square wave of known CO_2 concentration to the device. 5% and 10% CO_2 concentrations were used and respiration rate was varied over the range of the device. Pass/Fail criteria was comparison of the respiratory rate output from the sensor to the frequency of the square wave. $EtCO_2$ measurements at those rates were compared to the CO_2 readings under static flow conditions.

6 Verify that the airway adapter calibration is properly completed, disconnect the CO_2 sensor from the airway adapter temporarily, and attach the airway adapter to the patient’s respiration circuit.

7 Connect the CO_2 sensor to the airway adapter.

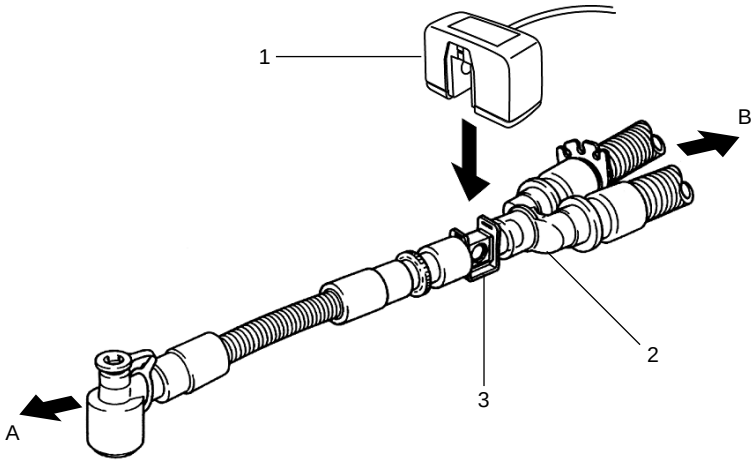
1 Capnostat 5 CO_2 Sensor

2 Y-Piece

3 Airway Adapter for Adult

A: Patient Side

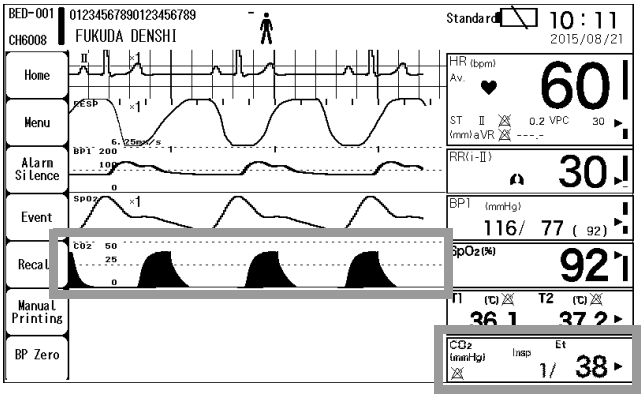
B: Equipment Side



NOTE

- Attach the airway adapter between the patient's circuit Y-piece and intubation tube.
- The CO_2 sensor should be facing upward.

8 Verify that the CO_2 waveform, $EtCO_2$ value, $InspCO_2$ value are displayed.

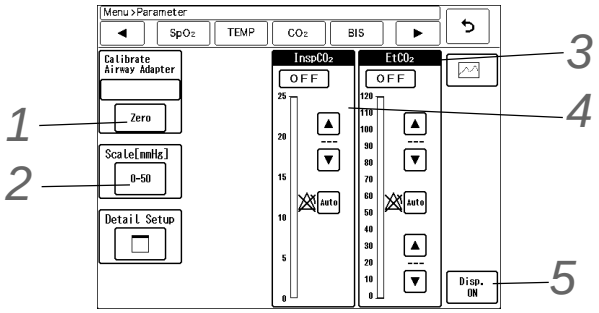


NOTE

- Set the scale, measurement unit, alarm, etc. as necessary.

CO_2 Parameter Setup

Press the [Menu], [Parameter], [CO_2] keys to display the "CO_2" setup screen.



1 Calibrate Airway Adapter

The airway adapter will be calibrated.

(☞"Patient Application and Display" P7-67)

2 Scale

Select from [0-50]/[0-100] if the measurement unit is mmHg, and from [0-4]/[0-8]/[0-10] if the unit is kPa or %.

3 $EtCO_2$ (End-tidal CO_2)

(☞"Alarm Limit Setup for Each Parameter" P6-9)

NOTE

- $EtCO_2$ alarm will not generate unless 2 or more respiration is detected within 30 seconds after power ON or after discharge.
- Set the upper limit in the range of 3 mmHg to 100 mmHg/0.3 kPa to 13.3 kPa/0.3% to 13.3%.
  Setting a value above 100 mmHg/3.3 kPa/13.3% will turn OFF the alarm.
- Set the lower limit in the range of 1 mmHg to 98 mmHg/0.1 kPa to 13.1 kPa/0.1% to 13.1%.
  Setting a value below 1 mmHg/0.1 kPa/0.1% will turn OFF the alarm.

REFERENCE

- The alarm limit should be set for each unit (mmHg/kPa/%).
- The upper/lower limit can be set in 1 mmHg, 0.1 kPa, 0.1% increment.
- When [Auto] is set, the upper and lower limit will be automatically set to +10 mmHg / +1.3 kPa / +1.3%, and -10 mmHg / -1.3 kPa / -1.3% respectively to the current value.
- To use the auto setting, [Enable] should be selected for "Alarm Auto Setup" under "Initial Settings". (☞Maintenance Manual "Alarm Related Setup" P5-5)
- When [Enable] is set for "Alarm Threshold Limit" under "Initial Settings", and auto setting is used, the upper and lower alarm limit will be clipped to the set limit.

4 $InspCO_2$ (Inspired CO_2)

(☞"Alarm Limit Setup for Each Parameter" P6-9)

NOTE

- $InspCO_2$ alarm will not generate unless 2 or more respiration is detected within 30 seconds after power ON or after discharge.
- Set the upper limit in the range of 1 mmHg to 4 mmHg/0.1 kPa to 0.4 kPa/0.1% to 0.4%.
  Setting a value equal to or above 4 mmHg/0.4 kPa/0.4% will turn OFF the alarm.

REFERENCE

- The alarm limit should be set for each unit (mmHg/kPa/%).
- The upper limit can be set in 1 mmHg/0.1 kPa/0.1% increments. There is no lower limit.
- When [Auto] is set, the upper limit will be set to 3 mmHg / 0.4 kPa / 0.4%.
- To use the auto setting, [Enable] should be selected for "Alarm Auto Setup" under "Initial Settings". (☞Maintenance Manual "Alarm Related Setup" P5-5)
- When [Enable] is set for "Alarm Threshold Limit" under "Initial Settings", and auto

setting is used, the upper and lower alarm limit will be clipped to the set limit.

5 Display ON/OFF

When the filter line is applied to the patient during the "Display OFF" condition, the waveform and numeric data will be automatically displayed when 2 or more respirations are detected in 30 seconds.

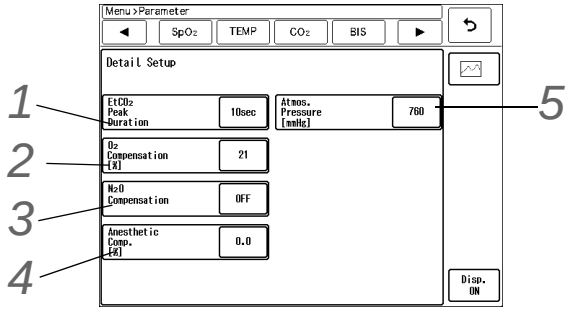
(☞"ECG Parameter Setup" P7-6)

⚠ CAUTION

- When the waveform and numeric data display is set to OFF, the alarm generation and tabular trend input will also cease.
- When the waveform and numeric data display is set to OFF, the respiration rate measured by CO_2 will not be displayed either.

❑Detail Setup

Press the [Detail Setup] key, and set the monitoring details for the CO_2 measurement.



1 $EtCO_2$ Peak Duration

[10sec]/[20sec]: Maximum $EtCO_2$ value for the selected duration will be displayed.

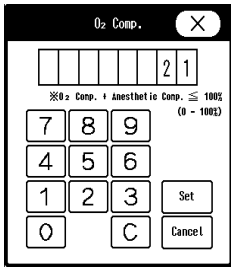
[OFF]: $EtCO_2$ value for each respiration will be displayed.

NOTE

- As the $EtCO_2$ value display is updated each second, $EtCO_2$ value for each respiration cannot be displayed if respiration rate is 60 Bpm and above.
- For the $InspCO_2$ value, minimum value of 20 seconds will be displayed regardless of the setting.

2 O_2 Compensation

By entering the used O_2 concentration value, compensation can be made to display more accurate value. Enter the O_2 compensation value on the "O_2" screen, and press the [Set] key.



NOTE

- The value cannot be changed if the total value of O_2 compensation and anesthetic

agent compensation exceeds 100%. In such case, change the O_2 compensation value after changing the anesthetic agent compensation value.

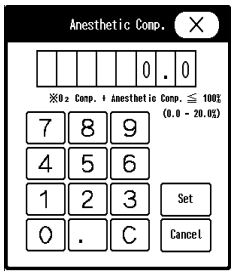
3 N_2O Compensation

NOTE

- If N_2O is present in the respiration circuit, the CO_2 value tends to be displayed higher than the actual value. By setting the N_2O compensation to [ON], this can be adjusted.

4 Anesthetic Agent Compensation

By entering the used anesthetic agent concentration value, compensation can be made to display more accurate value.
Enter the anesthetic compensation value on the "Agent" screen, and press the [Set] key.

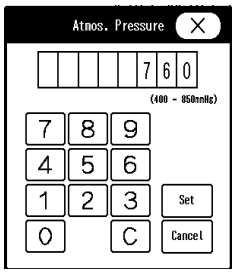


NOTE

- The value cannot be changed if the total value of O_2 compensation and anesthetic agent compensation exceeds 100%. In such case, change the anesthetic agent compensation value after changing the O_2 compensation value.

5 Atmospheric Pressure

By entering the atmospheric pressure, the pressure difference will be compensated and allows more accurate measurement.
Enter the atmospheric pressure value on the "Atmos. Pressure" screen, and press the [Set] key.



CO_2 Concentration (Sidestream Method)

The HCP-810/HCP-820 is a CO_2 Gas Unit which measures CO_2 concentration by connecting to the AUX connector or rear side on the DS-8007.The HCP-810/HCP-820 CO_2 Gas Unit incorporates Microstream technology of Covidien for $EtCO_2$ (End-tidal CO_2 concentration) and $InspCO_2$ (Inspiratory CO_2 concentration) measurement. This section explains about the procedure and setup of the CO_2 concentration measurement of the HCP-810/HCP-820.

⚠ WARNING

- Only one of either HCP-810 or HCP-820 can be connected.
- When using a sampling line for intubated patients with a closed suction system, do not place the airway adapter between the suction catheter and endotracheal tube. This is to ensure

that the airway adapter does not interfere with the functioning of the suction catheter.

- Loose or damaged connections may compromise ventilation or cause an inaccurate measurement of respiratory gases. Securely connect all components and check connections for leaks according to standard clinical procedures.
- Do not cut or remove any part of the sampling line. It could lead to erroneous readings.
- If too much moisture enters the sampling line (i.e., from ambient humidity or breathing of unusually humid air), <Check Sample Line> will appear in the message area. Replace the sampling line when this message appears.
- Carefully route the filter line to reduce the possibility of patient entanglement or strangulation.
- Do not lift the HCP-810/HCP-820 by the filter line, as the filter line could disconnect from the equipment, causing the equipment to fall on the patient.
- CO_2 readings and respiration rate can be affected by sensor application, ambient environment, and patient conditions.

⚠ CAUTION

- The Microstream $EtCO_2$ sampling lines are designed for single patient use, and are not to be reused. Do not attempt to clean, disinfect, sterilize or flush any part of the sampling line as this can cause damage to the monitor.
- Dispose of sampling lines according to standard operating procedures or local regulations for the disposal of contaminated medical waste.
- Before use, carefully read the Directions for Use for the Microstream $EtCO_2$ sampling line.
- Use only the Microstream $EtCO_2$ sampling line to ensure proper function of the monitor.
- During nebulization or suction for intubated patient, remove the sampling line from the HCP-810/HCP-820 to avoid moisture buildup and sampling line occlusion.
- Replace the sampling line according to hospital protocol or when a blockage is indicated on the equipment. Excessive patient secretions or a buildup of liquids in the airway tube may occlude the sampling line, requiring more frequent replacement.

NOTE

- When connecting a sampling line to the HCP-810/HCP-820, screw the sampling line clockwise into the connector firmly to avoid inaccurate measurement which may be caused by gas leak from the connection point.
- When <Check Sample Line> appears on the screen indicating that the filter line connected to the HCP-810/HCP-820 is blocked, the CO_2 pump will stop pumping the patient's breath to the monitor. In such case, follow the instructions in the "Troubleshooting" section of this manual. First, disconnect and reconnect the filter line. If the message still appears, disconnect and replace the filter line. Once a working filter line is attached, the pump will automatically resume operation.
- After connecting the CO_2 sampling line to the HCP-810/HCP-820 and patient, check that CO_2 values appear on the monitor display.
- The $EtCO_2$ accuracy is checked according to the test method of ISO 80601-2-55:2011 (Medical electrical equipment - Part 2-55: Particular requirements for the basic safety and essential performance of respiratory gas monitors) .
- The waveform sampling rate is 20 samples per second.
- When using the HCP module with a ventilator, under high over pressures close to 10 kPa (100 cmH_2O), the module may enter into a blockage mode in order to protect the module from damage.
- The respiration rate test simulates breaths for use in respiration rate measurement with a system which uses a tank of N2 (representing no CO_2 for inhalation) and a tank of CO_2 (of

the %CO_2 required for the particular test). A control board, which is triggered by a computer, uses solenoids to switch the module input between the 2 tanks of gas, creating a gas CO_2 square wave. This system can create simulated breaths over the full required range of specified respiration rates.

Patient Application and Display

CO_2 concentration measurement can be performed by connecting the HCP-810/HCP-820 CO_2 Gas Unit to the AUX connector on the DS-8007.

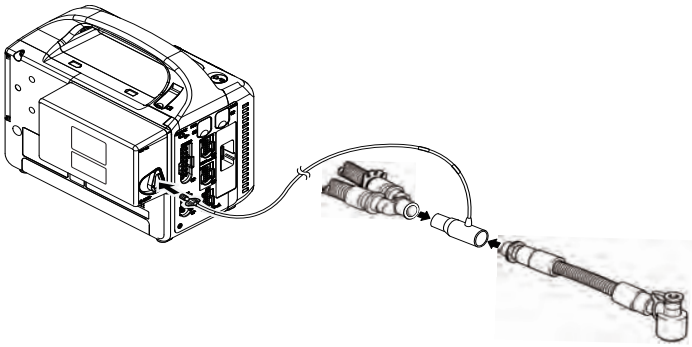
NOTE

- Accurate CO_2 concentration measurement can be acquired after 40 seconds from turning the power ON.

1 Connect the HCP-810/HCP-820 CO_2 Gas Unit to the AUX connector on the DS-8007.

2 Attach the airway adapter, oral/nasal sampling line or nasal sampling line to the patient.

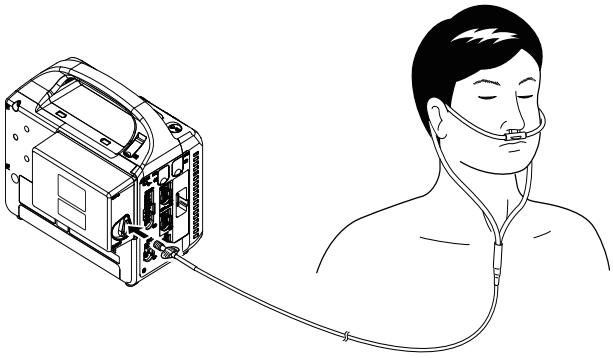
<For intubated patient>



1 Attach the airway adapter to respiration circuit.

2 Connect one end of the sampling tube to the connector on the HCP-810/HCP-820. Verify that all the tubes are properly connected.

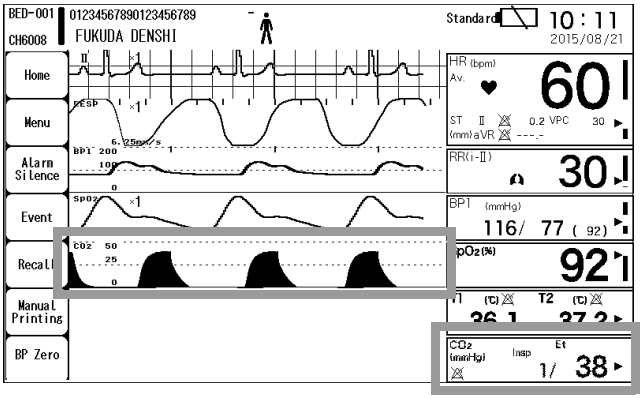
<For patient using the nasal prong>



1 Attach the nasal prong to the patient.

2 Connect the sampling tube to the connector on the HCP-810/HCP-820.
Verify that all the tubes are properly connected.

3 Start the CO_2 concentration measurement.



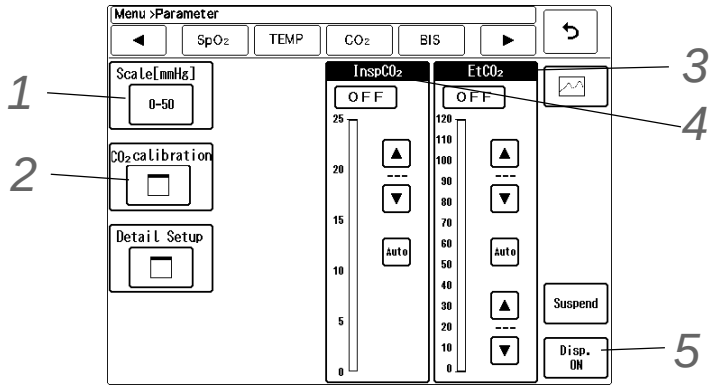
▸ Verify that the CO_2 waveform, $EtCO_2$ value, $InspCO_2$ value are displayed.

NOTE

- Connecting a sampling tube or nasal prong to the HCP-810/HCP-820 will automatically start the sampling pump. To prevent the pump from deteriorating, disconnect the sampling tube and nasal prong from the HCP-810/HCP-820 when not measuring the CO_2 concentration.
- Set the scale, measurement unit, alarm, etc. as necessary.
- When ambient temperature or atmospheric pressure changes significantly, auto zeroing will function. During auto zeroing, "---" will be displayed inside the CO_2 numeric data box and CO_2 measurement cannot be performed. The auto zero function compensates for drifts between components, changes in ambient temperature, and barometric conditions. This automatic process eliminates variances that might cause measurement drift. Therefore the module does not exhibit drift.
- If the power supply is interrupted due to power failure, etc., HCP-810/HCP-820 will be initialized even if the power interruption was within 30 seconds.

CO_2 Parameter Setup

Press the [Menu], [Parameter], [CO_2] keys to display the "CO_2" setup screen.



1 Scale

Select from [0-50]/[0-100] if the measurement unit is mmHg, and from [0-4]/[0-8]/[0-10] if the unit is kPa or %.

2 CO_2 Calibration

CO_2 calibration can be performed.

(☞Maintenance Manual "CO_2 Calibration (HCP-810/HCP-820)" P9-9)

3 $EtCO_2$ (End-tidal Carbon Dioxide)

(☞"Alarm Limit Setup for Each Parameter" P6-9)

NOTE

- $EtCO_2$ alarm will not generate unless 2 or more respiration is detected within 30 seconds after power ON or after discharge.
- Set the upper limit in the range of 3 mmHg to 100 mmHg/0.3 kPa to 13.3 kPa/0.3% to 13.3%.
  Setting a value above 100 mmHg/3.3 kPa/13.3% will turn OFF the alarm.
- Set the lower limit in the range of 1 mmHg to 98 mmHg/0.1 kPa to 13.1 kPa/0.1% to 13.1%.
  Setting a value below 1 mmHg/0.1 kPa/0.1% will turn OFF the alarm.

REFERENCE

- The alarm limit should be set for each unit (mmHg/kPa/%).
- The upper/lower limit can be set in 1 mmHg/0.1 kPa/0.1% increment.
- When [Auto] is set, the upper and lower limit will be automatically set to +10 mmHg / +1.3 kPa / +1.3%, and -10 mmHg / -1.3 kPa / -1.3% respectively to the current value.
- To use the auto setting, [Enable] should be selected for "Alarm Auto Setup" under "Initial Settings". (☞Maintenance Manual "Alarm Related Setup" P5-5)
- When [Enable] is set for "Alarm Threshold Limit" under "Initial Settings", and auto setting is used, the upper and lower alarm limit will be clipped to the set limit.

4 $InspCO_2$ (Inspired Carbon Dioxide)

(☞"Alarm Limit Setup for Each Parameter" P6-9)

NOTE

- $InspCO_2$ alarm will not generate unless 2 or more respiration is detected within 30 seconds after power ON or after discharge.
- Set the upper limit in the range of 1 mmHg to 4 mmHg/0.1 kPa to 0.4 kPa/0.1% to 0.4%.
  Setting a value above 4 mmHg / 0.4 kPa / 0.4% will turn OFF the alarm.

REFERENCE

- The alarm limit should be set for each unit (mmHg/kPa/%).
- The upper limit can be set in 1 mmHg/0.1 kPa/0.1% increments. There is no lower limit.
- When [Auto] is set, the upper limit will be set to 3 mmHg / 0.4 kPa / 0.4%.
- To use the auto setting, [Enable] should be selected for "Alarm Auto Setup" under "Initial Settings". (☞Maintenance Manual "Alarm Related Setup" P5-5)
- When [Enable] is set for "Alarm Threshold Limit" under "Initial Settings", and auto setting is used, the upper and lower alarm limit will be clipped to the set limit.

5 Display ON/OFF

(☞"ECG Parameter Setup" P7-6)

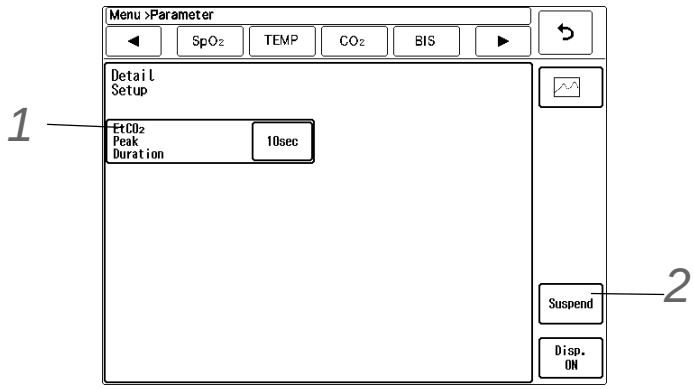
⚠ CAUTION

- When the waveform and numeric data display is set to OFF, the alarm generation and tabular trend input will also cease.
- When the waveform and numeric data display is set to OFF, the respiration rate measured by CO_2 will not be displayed either.

REFERENCE

- During "Display OFF" condition, the display will automatically return if the filter line is applied to the patient and more than 2 respirations are detected in 30 seconds.

❑Detail Setup



1 $EtCO_2$ Peak Duration

[10sec]/[20sec]: Maximum $EtCO_2$ value, minimum $InspCO_2$ value for the selected duration will be displayed.

[OFF]: $EtCO_2$ value, $InspCO_2$ value for each respiration will be displayed.

NOTE

- As the $EtCO_2$ value display is updated each second, $EtCO_2$ value for each respiration cannot be displayed if respiration rate is 60 Bpm and above.

2 Suspend

[Suspend]: The pump operation will stop, CO_2 waveform and numeric data display will disappear, and "Suspended" will be displayed inside the CO_2 numeric data box.

[Resume]: Resumes CO_2 monitoring. This key will be displayed when the measurement is suspended.

⚠ CAUTION

- When the measurement is suspended, the alarm generation and trend input will be also suspended.

BIS Data (HBX-800 with BISx)

This section explains about the BIS measurement and setup procedure when using the BISx with the BIS I/F Unit, HBX-800.

⚠ WARNING

- Clinical judgment should always be used when interpreting BIS in conjunction with other available clinical signs. Reliance on BIS alone for intra-operative anesthetic management is not recommended.
- BIS values should also be interpreted cautiously with certain anesthetic combinations, such as those relying primarily on either ketamine or nitrous oxide/narcotics to produce unconsciousness.
- As with any monitored parameter, artifacts and poor signal quality may lead to inappropriate BIS values. Potential artifacts may be caused by poor skin contact (high impedance), muscle activity or rigidity, head and body motion, sustained eye movements, improper sensor placement and unusual or excessive electrical interference.

⚠ CAUTION

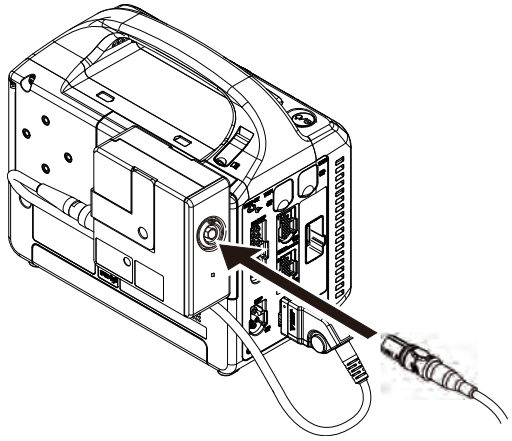
- Generally, the BIS value decreases with the decrease of brain activity. When a patient is in hypothermia state during cardiac bypass surgery, the suppression of brain wave will cause the BIS value to decrease.
- Pay attention when artifact interferes or signal quality decreases, as it may cause incorrect BIS measurement.
- Pay attention when AC disturbing signal interferes during Filter OFF condition, as it may cause incorrect BIS measurement.
- Pay attention when a pacemaker pulse is displayed in the brain wave, as it may cause incorrect BIS measurement.
- The BIS value tends to increase with the EMG interference. The patient's shivering during recovery from anesthesia increases the EMG and may case the BIS value to increase.
- When attaching the BIS sensor, lightly apply pressure to the electrode part for about 5 seconds to decrease the electrode impedance.

Preparation for Monitoring

By connecting the BISx module using the HBX-800 BIS I/F Unit, BIS data can be monitored.

1 Select the appropriate sensor for the patient.

2 Connect the HBX-800 to the AUX connector on the DS-8007 and the BISx to the serial communication connector on the HBX-800.



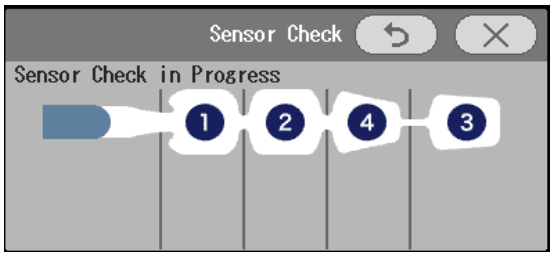
3 Attach the BIS sensor to the patient.

4 When the system detects the sensor, "Sensor Check" window will be displayed, and impedance for all the electrodes will be automatically measured.

REFERENCE

- Pressing the [Sensor Check] key will also start the sensor check process.

▸ The measured results will be displayed on the "Sensor Check" window.



▸ In this display, the impedance value for each electrode, in kilo ohms, appears on the screen along with its status.

- <PASS>: An electrode passes if the impedance for that electrode is less than 7.5 kilo ohms, and the ground electrode (electrode #2) is less than 30 kilo ohms.
- <HIGH>: The impedance value is above 7.5 kilo ohms.
  As long as the combined impedance of electrodes #1 and #3 and the combined impedance of electrodes #1 and #4 are less than 15 kilo ohms, and the ground electrode is less than 30 kilo ohms, the sensor check will be considered successful.
- <LEAD OFF>: The electrode is detached from the patient.
- <NOISE>: The signal from the electrode is outside the measurable range.

NOTE

- During the sensor check process, EEG waveform will become unstable.

5 If the impedance for all the electrodes are within variable range, <Sensor Check Passed> will be displayed on the "Sensor Check" window.

6 Press the (X) key on the "Sensor Check" window to end the sensor check process.

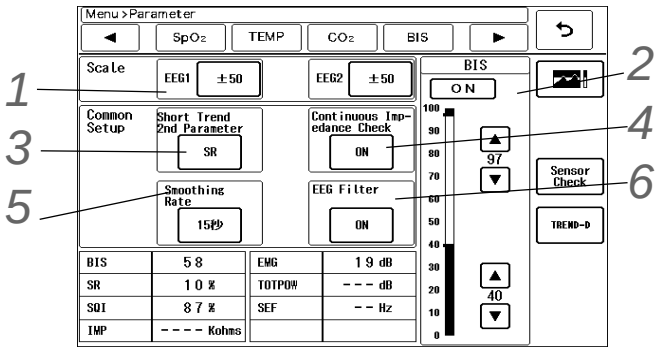
▸ BIS measurement will automatically start when the "Sensor Check" window is closed.

NOTE

- If the "Sensor Check" window is closed before <Sensor Check Passed> is displayed, <BIS Perform "Sensor Check"> will be displayed. Press the [Sensor Check] key and start the sensor check again.

BIS Setup

Press the [Menu], [Parameter], [BIS] keys to display the "BIS" setup screen.



1 Scale

▸ Select the EEG waveform scale from [±25]/[±50]/[±100]/[±250].

2 BIS Alarm

▸ Select ON/OFF of BIS alarm and set the alarm limits.

3 Short Trend 2nd Parameter

▸ Select the second parameter for short trend from [SR]/[EMG]/[SQI].

▸ [OFF] will not display the second parameter.

4 Continuous Impedance Check

▸ Select whether or not to perform continuous impedance check.
If [ON] is selected, the check process will continue until it passes.
Select [OFF] if it affects other measurements.

⚠ CAUTION

- The conductive parts of sensors and connectors should not contact other conductive parts, including earth.

- To reduce the hazard of burns in the high-frequency surgical neutral electrode connection, the BIS sensor should not be located between the surgical site and the electrosurgical unit return electrode.
- The BIS sensor must not be located between defibrillator pads when a defibrillator is used on a patient connected to the patient monitor.
- Continuous impedance checking may need to be disabled if the 1 nA, 128 Hz impedance check signal interferes with other equipment (e.g., evoked potential monitors).
- Considerations when using Electro-Convulsive Therapy (ECT) equipment during BIS monitoring: Place ECT electrodes as far as possible from the BIS sensor to minimize the effect of interference. Certain ECT equipment may interfere with the proper function of the BIS monitoring system.

NOTE

- During the continuous impedance check, the following impedance will be measured.
- A) Combined Impedance of Signal Electrode and Reference Electrode
  This check process will not affect the EEG waveform. If the impedance value is within the allowable range, the check result will not be notified.
- B) Impedance of Ground Electrode
  This check process will be performed every 10 minutes. During this process, <Ground Check in Progress> will be displayed, as artifact interferes to the EEG waveform.

5 Smoothing Rate

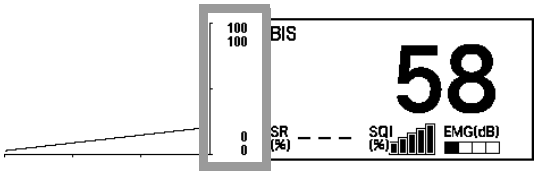
- Select from [10 sec.] / [15 sec.]/ [30 sec.].

6 EEG Filter

- Select from [ON]/[OFF].

BIS Data (A-2000/A-3000)

This section explains about the BIS setup procedure when using the A-2000 BIS Monitor or A-3000 BIS Vista (Covidien).
On the BIS setup screen, the second parameter to be displayed on the short trend can be selected.
The first parameter is fixed to BIS value.



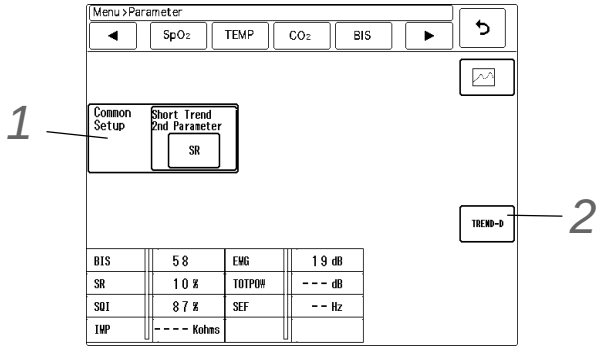
Press the [Menu], [Parameter], [BIS] keys to display the BIS setup screen.

1 Short Trend 2nd Parameter

- Select the second parameter for short trend from [SR]/[EMG]/[SQI].
- Selecting [OFF] will not display the second parameter for short trend.

2 Trend D

- Trend D screen will be displayed.



Stopwatch

The stopwatch function can be used by setting the [Stopwatch] key on the numeric data box or on the user key.

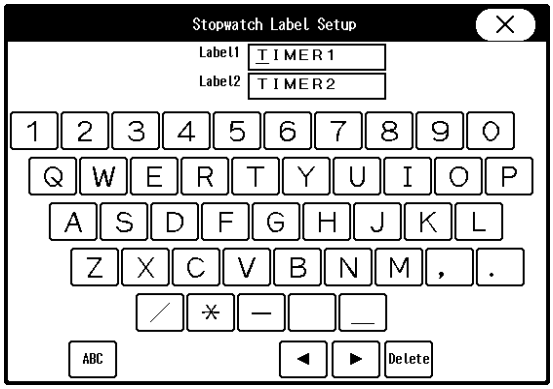
1 Press the [Stopwatch] key on the numeric data box or on the user key.

- The "Stopwatch" window will be displayed.

Label Setup

1 Press the [Label] key on the "Stopwatch" window.

- The stopwatch label setup window will be displayed.



2 Enter 8 characters using alphanumeric keypad.

Start/Stop

1 Press the [Start]/[Stop]/[Reset] key on the "Stopwatch" window.

- [Start]: The stopwatch will start.
- [Stop]: The stopwatch will suspend/resume.
- [Reset]: The stopwatch will reset to "00:00:00". If pressed during stopwatch operation, counting will resume from "00:00:00".

NOTE

- If the discharge procedure is performed during stopwatch operation, the counting will stop and will be reset to "00:00:00" .
- The stopwatch counting will continue even when the monitoring is suspended.

Multiparameter Connector Setup for BP, TEMP, CO Measurement

On the DS-8007, a multiparameter connector is provided.

Multiparameter Connectors	DS-8007 Main Unit
2 ports TEMPx6 (maximum, including fixed channel) BPx4 (maximum) CO x1 (maximum)	DS-8007N,DS-8007M

By using the multiparameter connector, any combination of BP, TEMP and CO measurement can be performed according to the monitoring purpose.
By using the 2ch TEMP relay cable, 2ch BP relay cable, or 2ch BP conversion cable, 2 channels of temperature and BP can be monitored through one multiparameter connector.

Multiparameter Connector Setup

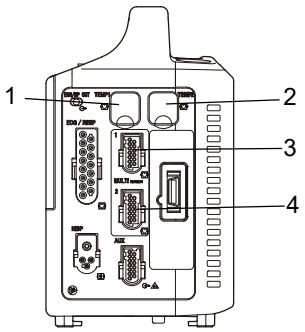
Connecting the relay cable to the multiparameter connector on the DS-8007 will automatically set the measuring parameter.

1 TEMP1 Connector

2 TEMP2 Connector

3 In Case of BP: BP1, BP2
In Case of TEMP: TEMP5, TEMP6
In Case of CO: CO

4 In Case of BP: BP3, BP4
In Case of TEMP: TEMP3, TEMP4
In Case of CO: CO



NOTE

- Only one channel of cardiac output can be measured. Do not connect more than one catheter relay cables to the multiparameter connector 1 and 2.

Chapter 8 Review Function

Chapter 8 Review Function

Quantity of Review Data that can be Saved

The quantity of review data that can be saved differs depending on whether the SD card is used or not.
If the power is turned OFF when the SD card is not used, the saved data may be deleted.

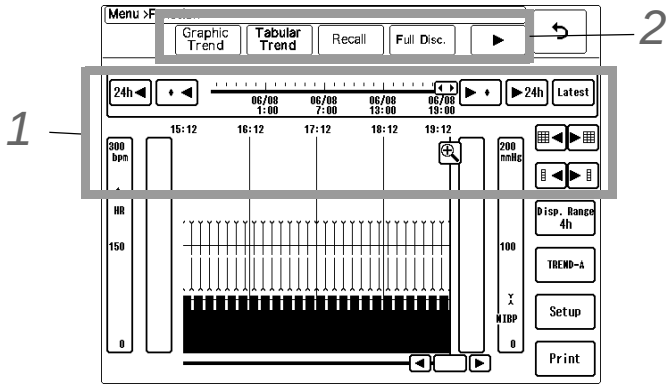
	SD Card Not Used	SD Card (8 GB) Used	SD Card (16 GB) Used	Retainable Data when the power is turned OFF without SD Card
Graphic/Tabular Trend	240 hours	240 hours	240 hours	24 hours
Recall	300 data	300 data	300 data	10 data
Full Disclosure Waveform	None	120 hours	240 hours	None
ST	2 hours	120 hours	240 hours	None
12-Lead Analysis	10 data	10 data	10 data	3 data
OCRG	16 min.	16 min.	16 min.	None
CO	10 data	10 data	10 data	5 data
Hemodynamics	10 data	10 data	10 data	5 data
Lung Function	256 data	256 data	256 data	5 data
Short Trend (Home Display)	360 min.	360 min.	360 min.	360 min.

NOTE

- When the SD card (8 GB or 16 GB) is used, <Reading Data> may be displayed. During this message is displayed, graphic/tabular trend data is being read from the SD card, and the data will be displayed after the data is read.

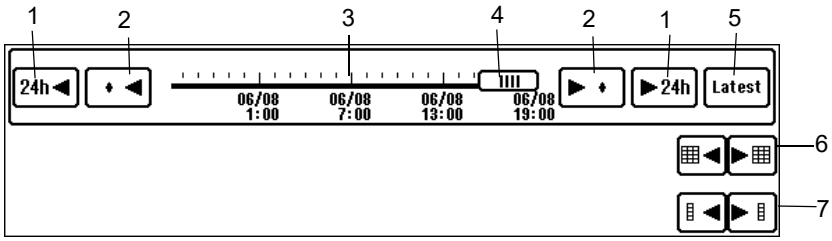
Common Operation

The common operations for all the review screens are explained below.



1 Time Bar

▸ Changing the time span, scrolling the time, displaying the latest data can be performed.



1 The display can be switched in 4 hours to 48 hours interval.

2 Pressing the [◆◀] / [▶◆] key will move the cursor to the alarm generated time.

3 The time zone for the whole data is shown. ◆ indicates the alarm occurrence point.
The lower row shows the time zone for the displayed data.
Pressing the time bar will display the data at pressed time.

4 Indicates the displayed time range with the bar length.
Dragging the slider to the right will display newer data, and dragging it to the left will display older data.

5 Pressing the [Latest] will display the latest data.

6 Pressing the [▦◀] / [▶▦] will switch the display by page.

7 Pressing the [▮◀] / [▶▮] will switch the display by 1 data each.

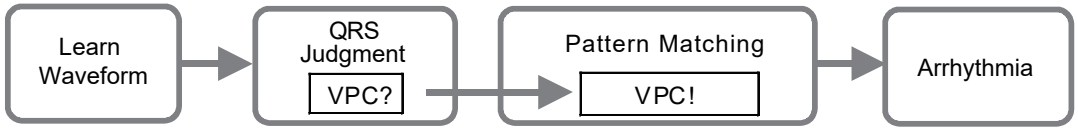
2 Displays other review data at the same time.

▸ With the displayed date/time, the review data display can be switched.

Arrhythmia Analysis

This section explains about the arrhythmia analysis.

Arrhythmia Definition



The arrhythmia detection is performed by learning the normal waveform of the patient, and determines the VPC by comparing the waveform (QRS pattern) and R-R interval for each heartbeat.
The parameters such as QRS amplitude, QRS width, QRS polarity, RR interval are compared with the normal waveform to extract the abnormal QRS.
Then, the QRS with suspected VPC is pattern matched.The noise and VPC are distinguished to determine the VPC, and generates the arrhythmia alarm.

⚠ WARNING

- 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 by closely checking the data obtained by manual printing, alarm printing and recall waveform.

⚠ CAUTION

- For stable arrhythmia detection and ECG monitoring, verify proper electrode placement, lead selection, and ECG waveform size. If necessary, turn ON the AC filter.If not properly selected, it may cause erroneous detection.

❑Arrhythmia Type

With the QRS judgment, the following types of arrhythmia alarm will be generated.

Arrhythmia	Description	Detection Criteria
Asystole	ON 3 sec. to 10 sec., 1 sec. increments	Cardiac arrest is detected for more than preprogrammed time.
VF	ON	A random, rapid electrical activity of the heart is detected.
VT (Ventricular Tachycardia)	ON	9 or more continuous VPC beats are detected.*1
Slow VT	ON, OFF	9 or more continuous VPC beats are detected.*2
Run (Consecutive VPC)	ON, OFF 2 beats to 8 beats, 1 beat increments	Continuous VPC exceeding the preprogrammed value (2 beats to 8 beats) is detected.*3
Couplet (Couplet VPC)	ON, OFF	2 continuous VPC beats are detected.
Pause	ON, OFF 1.5 sec. to 5.0 sec., 0.5 sec. increments	Cardiac arrest exceeding the preprogrammed duration is detected.
Bigeminy (Ventricular Bigeminy)	ON, OFF	QRS pattern of V-x-V-x-V-x is detected.*4
Trigeminy	ON, OFF	QRS pattern of x-x-V-x-x-V is detected.*4
Frequent (Frequent VPC)	ON, OFF 1 bpm to 50 bpm, 1 beat increments	VPC exceeding the preprogrammed value is detected within 1 minute.
Tachy(Tachycardia)	ON, OFF	The upper HR alarm limit is exceeded.
Brady (Bradycardia)	ON, OFF	The lower HR alarm limit is exceeded.
Ext Tachy (Extreme Tachycardia)	ON, OFF 22 bpm to 300 bpm, 22 bpm to 60 bpm, 1 beat increments 60 bpm to 300 bpm, 5 beat increments	The upper alarm limit of extreme tachycardia is exceeded.
Ext Brady (Extreme Bradycardia)	ON, OFF 20 bpm to 295bpm 20 bpm to 60 bpm, 1 beat increments 60 bpm to 295 bpm, 5 beat increments	The lower alarm limit of extreme bradycardia is exceeded.
R on T (R on T VPC)	ON, OFF 200 ms to 600 ms, 8 ms increments	VPC is detected within the preprogrammed RR interval (200 ms to 600 ms).
Multiform (Multiform VPC)	ON, OFF	2 different forms of VPC beats are detected within 4 minutes.
Vent Rhythm (Ventricular Rhythm)	ON, OFF	Continuous VPC beats with HR below the set value for "HR Lower Limit for Run" (0 bpm to 100 bpm), and same or above value of the set beats for Run (2 beats to 8 beats) are detected.
SVT (Supraventricular Tachycardia)	ON, OFF 2 beats to 10 beats, 1 beat increments	Continuous SVPC exceeding the preprogrammed value (2 beats to 10 beats) is detected.
Irregular RR (Irregular RR Interval)	ON, OFF 10% to 20%, 5% increments	RR interval variability exceeding the preprogrammed value (10% to 20%) is detected.

Prolonged RR (Prolonged RR Interval)	ON, OFF	RR interval of 1.75 times longer than the normal RR interval is detected.
Pacer Not Capture (Non-Capture)	ON, OFF 80 ms to 480 ms, 8 ms increments	HR is not detected from the pacing pulse within the set duration.
Pacer Not Pacing (Oversensing)	ON, OFF 20 bpm to 200 bpm, 20 bpm to 150 bpm, 5 beat increments 150 bpm to 200 bpm, 10 beat increments	Pacing pulse and HR are not detected during the set instant HR.
Triplet (Triplet VPC)	ON, OFF	3 continuous VPC beats are detected.
S Frequent (Frequent SVPC)	ON, OFF 1 bpm to 50 bpm, 1 beat increments	SVPC exceeding the preprogrammed value is detected within 1 minute.
S Couplet (Couplet SVPC)	ON, OFF	2 continuous SVPC beats are detected.
VPC (Ventricular Extrasystole)	ON, OFF	VPC is detected.
SVPC (Supraventricular Extrasystole)	ON, OFF	SVPC is detected.

*1: HR of 140 bpm/120 bpm and above

*2: HR of 100 bpm to 140 bpm or 100 bpm to 120 bpm

*3: HR of same or above the set value of "HR Lower Limit for RUN" (0 bpm to 100 bpm)

*4: x indicates N, P, F, ?.

Arrhythmia Alarm Setup

Arrhythmia alarm setup procedure is explained below.
ON/OFF of arrhythmia alarm and arrhythmia detection level can be set.
When the measured value exceeds the set arrhythmia detection level, arrhythmia alarm will generate.

Arrhythmia Detection Level Setting

Item	Description
Asystole	3 sec. to 10 sec.
Run	2 beats to 8 beats
Pause	1.5 sec. to 5 sec.
Frequent	1 bpm to 50 bpm
Ext Tachy	22 bpm to 300 bpm
Ext Brady	20 bpm to 295 bpm

Item	Description
R on T	200 ms to 600 ms
SVT	2 beats to 10 beats
Irregular RR	10, 15, 20%
S Frequent	1 bpm to 50 bpm
Pacer Not Capture	80 ms to 480 ms
Pacer Not Pacing	20 bpm to 200 bpm

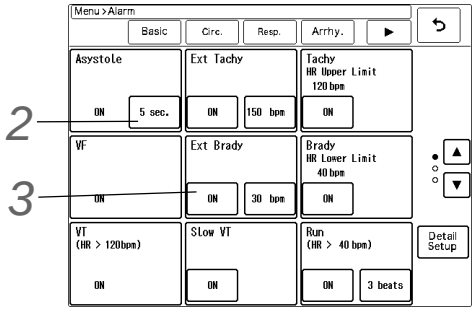
1 Press the [Menu], [Alarm], [Arrhy.] keys.

- The arrhythmia alarm setup screen will be displayed.

2 Set the detection level.
Set using the dropdown list, numeric keys, or displayed key selection.

3 Select ON/OFF for the alarm.

- [ON]: Alarm will generate.
- [OFF]: Alarm will not generate.

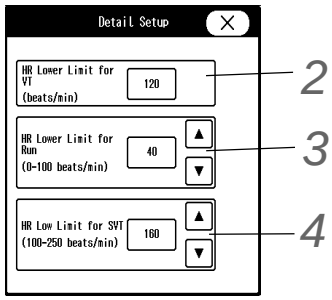


❑Arrhythmia Alarm Detail Setup

On the "Detail Setup" of arrhythmia alarm, HR Lower Limit for VT, RUN, and SVT can be set .

1 Press the [Menu], [Alarm], [Arrhy.], [Detail Setup] keys.

- The "Detail Setup" window for arrhythmia alarm will be displayed.



2 Set [120] or [140] (beats/min) for "HR Lower Limit for VT".

- Set the VT analyzing condition for the arrhythmia analysis. VT alarm will generate if the HR is same or above the set value (120 bpm/140 bpm).Slow_VT alarm will generate when the HR is below the set value.

3 Set the "HR Lower Limit for Run".

- Set the Run analyzing condition for the arrhythmia analysis.Run alarm will generate if the HR is same or above the set value.
- Use the [▲]/[▼] keys to set the HR in the range from 0 bpm to 100 bpm.

4 Set the "HR Lower Limit for SVT".

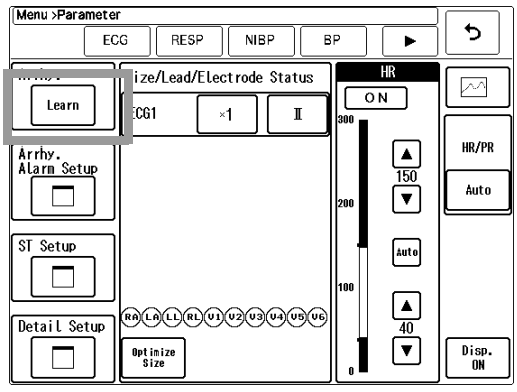
- Set the SVT analyzing condition for the arrhythmia analysis.SVT alarm will generate if the HR is same or above the set value.
- Use the [▲]/[▼] keys to set the HR in the range from 100 bpm to 250 bpm.

Arrhythmia Learn

Learning the 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, VF, Tachy, Brady, Ext Tachy, Ext Brady will not generate.

1 Press the [Menu], [Parameter], [ECG] keys. Or, press the HR numeric data box.

- The ECG setup screen will be displayed.

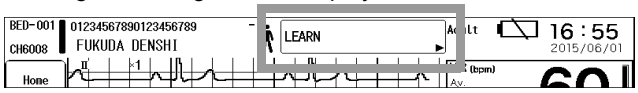


2 Press the [Learn] key while displayed in white.

- The key will change to blue.

▸ Arrhythmia learning will start.

▸ During arrhythmia learning, a message will be displayed.



NOTE

- If [Used] is selected for "Pacemaker", the [Learn] key will not change to blue and <LEARN> will not be displayed, but the learning process will be performed.
- Pressing the key while arrhythmia learning is in process will not stop the process.

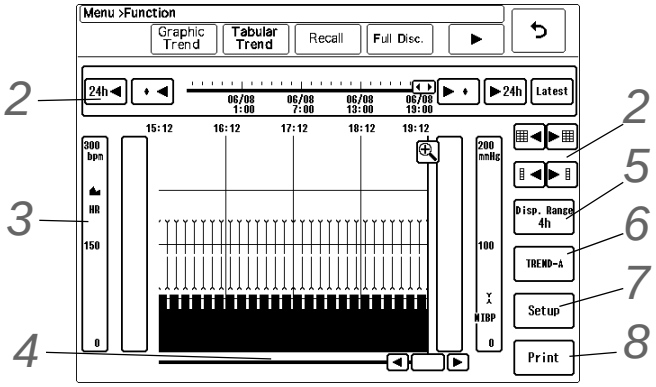
Graphic Trend

This section explains the graphic trend function and printing procedure.
If the numeric data is displayed on the home display, 240 hours (24 hours, if optional SD card is not used) of data will be automatically stored and displayed as trend data.

Graphic Trend Setup

1 Press the [Menu], [Function], [Graphic Trend] keys.
Or, press the [Graphic Trend] key on the user key area.

▸ The graphic trend will be displayed.



2 Changing the displayed time, scrolling the time, updating the data
(☞"Common Operation" P8-1)

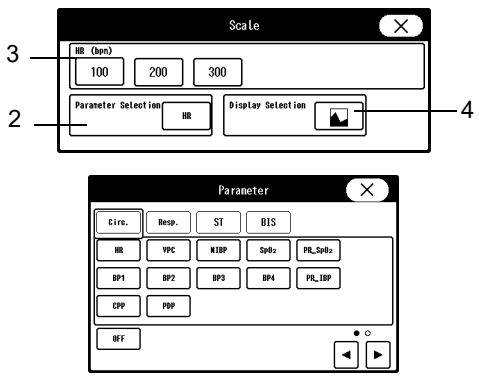
3 Set the parameter, display type, scale.

1 Pressing the scale display section of each parameter will display the "Scale" window.

2 Pressing the key for "Parameter Selection" will display the "Parameter" window.
Select a parameter.

3 Select the scale.

4 Select the display format.



NOTE

- The selected parameter will be also registered for the trend group.
- The apnea duration will be stored when it exceeds the upper alarm threshold level. If lower than the alarm threshold level, it will be stored as "0 (zero)".

4 Move the cursor.

1 Pressing the center part of ◀ ▶ will display the trend data at the cursor position.

2 The cursor will move to left and right by dragging ◀ ▶.

REFERENCE

- The data display at cursor position will be automatically erased after fixed duration.

3 Press 🔍+ to display the 5-minute trend data before and after the cursor position.

4 Press 🔍− to return the display to the previous time range.

5 Select the display range.

REFERENCE

- The displayed data is compressed as follows depending on the display interval.
  VPC: Maximum value within the display interval
  APNEA: Maximum value within the display interval
  Other than above: Latest value within the display interval
  For example, if the 24-hour trend for the parameter with minimum resolution of 1 minute is displayed, one mark will be displayed for the 12-minute (720-second) data.
- If the display resolution is higher than the minimum resolution of the data, the same data is repeated to match the display resolution.
  Refer to the following table for resolution.The data resolution differs according to the parameter.

Display Resolution

Time Span	Minimum Resolution			
	Line Display		Mark Display	
	10 sec. Sample	30 sec. Sample	10 sec. Sample	30 sec. Sample
5 min.	10 sec.	30 sec.	10 sec.	30 sec.
1 hour	10 sec.	30 sec.	30 sec.	30 sec.
2 hours	10 sec.	30 sec.	60 sec.	60 sec.
4 hours	20 sec.	60 sec.	120 sec.	120 sec.
8 hours	40 sec.	120 sec.	240 sec.	240 sec.
12 hours	60 sec.	120 sec.	360 sec.	360 sec.
16 hours	80 sec.	240 sec.	480 sec.	480 sec.
24 hours	120 sec.	240 sec.	720 sec.	720 sec.

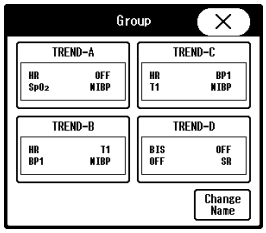
Data Resolution

Minimum Resolution	Parameter
10 sec.	HR, ST, SpO2, PR_SpO2, BP1, BP2
30 sec.	Other than above (Excluding NIBP*)

* Actual measured data will be displayed for NIBP.

6 Select the trend group.

Maximum of 4 groups with 4 parameters each can be registered, and can be selected according to the monitoring purpose.

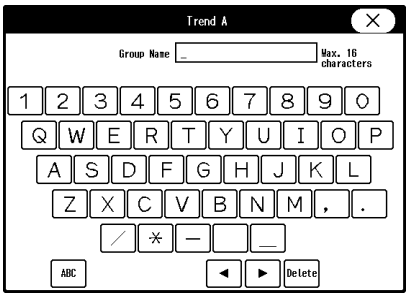


1 Press the trend group key to display the trend group selection window. (shown on right)

2 Select the group.

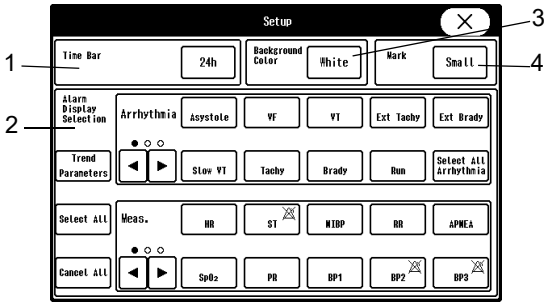
3 To change the name of trend group, press the [Change Name] key. (☞"To Enter Characters" P3-18)

- The window to enter the name of trend group will be displayed.
- Enter the name of trend group in alphanumeric characters.



4 After entering the name, press (X) to close the window.

7 Perform the setup for trend display.



1 Time Bar

- Select the time bar display interval from [4h]/ [8h]/ [12h]/ [16h]/ [20h]/ [24h]/ [36h]/ [48h].

2 Alarm Display Selection
Select the alarm display status.
If the alarm for the selected arrhythmia, parameter is generated during the displayed time range, it will be indicated in red at the alarm status display area.

- [Trend Parameters]: The displayed trend parameters will be selected.
- [Select All]: All parameters including arrhythmia will be selected.
- [Cancel All]: All selections will be canceled.
- [Select All Arrhythmia]: All arrhythmia will be selected.
- Each parameter key: Each time the key is pressed, selected/unselected status will change.

3 Background Color

- Select the background color of the graphic trend from [White]/[Black]/[Gray].

4 Mark

- Select the mark size on the graphic trend from [Small]/[Big].

8 Press the [Print] key.

- To print the trend data, press the [Print] key, select the parameter, and press the [Enter] key.

Description for Each Parameter

Numeric Data	Description	Scale	Unit
HR	HR	100, 200, 300	bpm
VPC	VPC Counts	20, 50, 100	-
ST (I, II, III,aVR, aVL, aVF, V, V1 to V6)	ST Level	±0.2, ±0.5, ±1.0, ±2.0	mV
		±2, ±5, ±10, ±20	mm
SpO_2	SpO_2 Value	0 to 100, 50 to 100, 80 to 100	%SpO_2
PR_SpO_2	SpO_2 Pulse Rate	100, 200, 300	bpm
RR_SpO_2	SpO_2 Respiration Rate	50, 100, 150	Bpm
NIBP	NIBP Value (SYS / DIA)	100, 150, 200, 300	mmHg
		16, 20, 24, 40	kPa
BP1 to BP4	Blood Pressure (Systolic / Mean / Diastolic)	20, 50, 100, 150, 200, 300	mmHg
		4, 8, 16, 20, 24, 40	kPa
		20, 40	cmH_2O
PDP	Peak Diastolic Pressure of IABP	20, 50, 100, 150, 200, 300	mmHg
		4, 8, 16, 20, 24, 40	kPa
CPP	Cerebral Perfusion Pressure	20, 50, 100, 150, 200, 300	mmHg
		4, 8, 16, 20, 24, 40	kPa
PR_IBP	BP Pulse Rate (BP1/ART)	100, 200, 300	bpm
T1~6	Temperature	68.0 to 113.0, 86.0 to 104.0	°F
Tb	Blood Temperature (Cardiac Output Measurement)	68.0 to 113.0, 86.0 to 104.0	°F
ΔTEMP-A to C	Temperature Difference	±18.0, ±45.0	°F
RR_IMP	Impedance Respiration Rate	50, 100, 150	Bpm
APNEA	Apnea Duration (Impedance, CO_2, Ventilator)	15, 30	s (second)
$EtCO_2$, $InspCO_2$	Gas Unit CO_2 Concentration	50, 100	mmHg
		4, 8, 10	kPa, %
RR_GAS	Gas Unit Respiration Rate	50, 100, 150	Bpm
BIS	Bispectral Index	25, 50, 75, 100	-
SR	Suppression Ratio	25, 50, 75, 100	%
EMG	Electromyography Index	30 to 80	dB
SQI	Signal Quality Index	100	%
SpCO	Carboxyhemoglobin Concentration	20, 40, 100	%SpCO
SpMet	Methemoglobin Concentration	10, 15, 100	%SpMet
SpHb	Total Hemoglobin Concentration	10 to 20, 0 to 25	g/dL
PI	Perfusion Index	10, 20	%
PVI	Pleth Variability Index	30, 60, 100	%

NOTE

- The apnea duration will be stored when it exceeds the upper alarm threshold level. If lower than the alarm threshold level, it will be stored as "0 (zero)".

Short Trend

The trend data can be displayed on the home display.

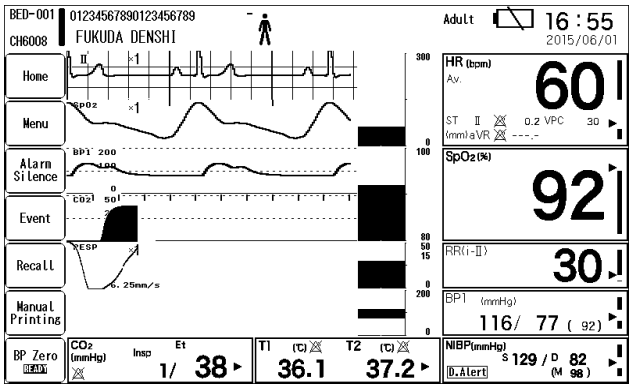
As the alarm occurrence point on the graph is displayed in red, the alarm data of up to 6 hours can be verified on the home display.

Pressing the short trend of an alarm generated parameter will display the recall screen.

The short trend can be displayed when the display layout is "Numeric Data/Side (1 column)", "Numeric Data/Bottom".

The short trend display can be turned ON or OFF using the [Short Trend ON/OFF] user key.

(☞"User Key Selection" P10-12)



NOTE

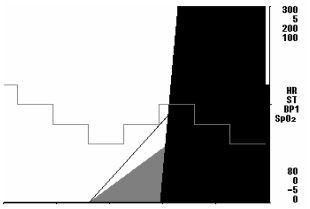
- For the short trend overlap display, only the parameter on top will be displayed in red at alarm occurrence.

❑Selecting the Parameters to be Displayed

The parameters to be displayed can be changed on the "Display Config." menu.

(☞"Display Configuration" P10-1)

Maximum of 4 parameters can be displayed overlapped in the same short trend display area. (shown on right)



❑Changing the Trend Scale and Display Duration

The short trend scale will be displayed on the right or left side of the short trend.

The displayed scale will be in accordance with the scale set on the "Trend" screen.

For BP, the short trend scale can be synchronized with the waveform scale by selecting [Waveform] for "Short Trend Scale" under [Menu>Setup>Display Config.>Detail Setup].

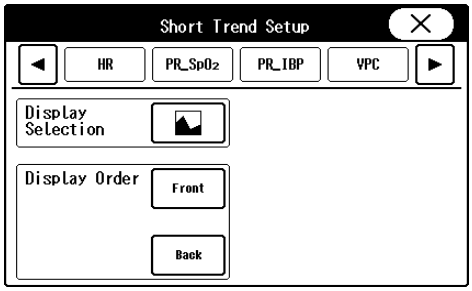
The short trend width can be enlarged/reduced to the pressed position on the waveform area.

Also, by setting the "Data Resolution" (10 sec./30 sec./60 sec.) under [Display Config.] > [Detail Setup], maximum display duration (1 hr./3 hr./6 hr.) can be changed. The display width can be selected from 7 levels.

❑Changing the Display for Each Parameter

The graph type and display order can be changed for each parameter.

By pressing the short trend scale area, "Short Trend Setup" window (shown on right) will be displayed.



◆"Display Selection"

Select the graph type.

- For example, there are following graph types.
  - Line
  - Filled in with black color from the baseline
  - Filled in with black color between S-D (For BP)
  - Filled in with black color from the top
- [OFF]: Graph will not be displayed.

The displayable graph types will differ depending on the parameter.

◆"Display Order"
When the parameters are displayed overlapped (ex. short trend overlap, BP overlap), the display order can be selected.

- [Front]: The display will be on the front side.
- [Back]: The display will be on the back side.

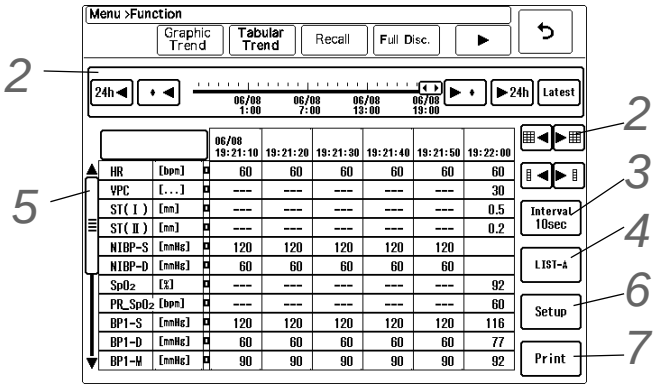
Tabular Trend

This section explains the tabular trend function and printing procedure.
If the numeric data is displayed on the home display, 240 hours (24 hours, if optional SD card is not used) of data will be automatically stored and displayed in 10 seconds/30 seconds interval.

To Display/Print the Tabular Trend

1 Press the [Menu], [Function], [TabularTrend] keys.
Or, press the [Tabular Trend] key on the user key area.

▸ The tabular trend will be displayed.



2 Changing the displayed time, scrolling the time, updating the data
(☞"Common Operation" P8-1)

3 Select the display interval.
[NIBP]: The tabular trend display interval will be according to the NIBP measurement time.

NOTE

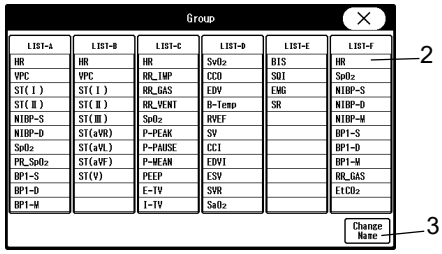
- If the display resolution is higher than the minimum resolution of the data, the same data is repeated to match the display resolution.
- The data resolution differs according to the parameter.
- When the display interval is set to [NIBP], 6 data or 48 hours of data up to specified time will be displayed.

Data Resolution

Minimum Resolution	Parameter
10 sec.	HR, ST, SpO2, PR_SpO2, BP1, BP2
20 sec.	NIBP
30 sec.	Other than above

4 Change the trend group.

Maximum of 6 different groups of parameters can be registered according to the monitoring purpose.



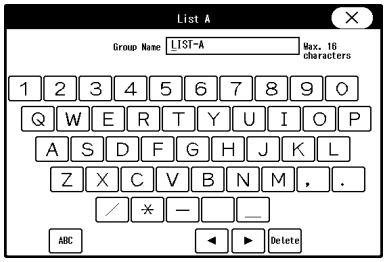
1 Press the [List] key.

▸ The "Group" window will be displayed.

2 Select a group from [A]/[B]/[C]/[D]/[E]/[F].

3 To change the name of trend group, press the [Change Name] key.
(☞"To Enter Characters" P3-18)

▸ Enter the name of trend group in alphanumeric characters.



4 After entering the name, press (X) to close the window.

5 Scroll to display other parameters.

6 Set the parameters for the tabular trend.

(☞"Parameter Setup for Tabular Trend" P8-13)

7 Press the [Print] key.

▸ [Print]: The currently displayed tabular trend will be printed.

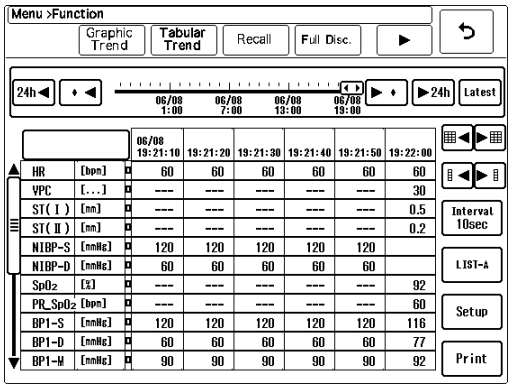
The Description of the Display

If the measured data is not displayed on the home display, or if BP zero balance is not performed, the data will be displayed as "---".

The alarm generated data will be displayed with red background.
The date column of alarm generated data will be also displayed with red background.

NOTE

- The red background will be displayed for the alarm generated parameter.
  The alarm display for the expiratory and inspiratory parameter such as $EtCO_2$ and $InspCO_2$ will be the same.
  For example, if the alarm is generated for BP-S, the background color of BP1-S, BP1-M, BP1-D will be displayed in red.



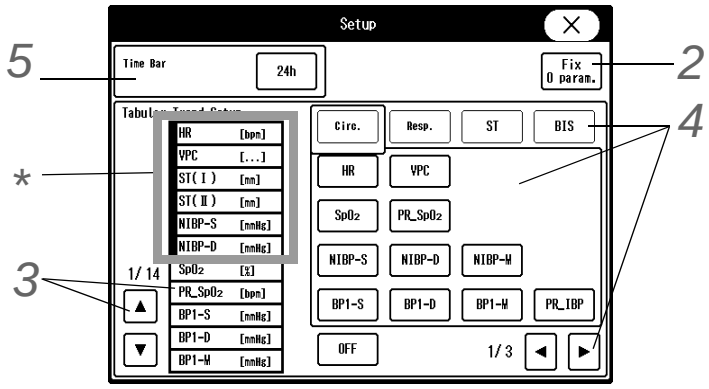
		06/08 19:21:10	19:21:20	19:21:30	19:21:40	19:21:50	19:22:00
HR	[bpm]	60	60	60	60	60	60
VPC	[...]	---	---	---	---	---	30
ST(Ⅰ)	[mm]	---	---	---	---	---	0.5
ST(Ⅱ)	[mm]	---	---	---	---	---	0.2
NIBP-S	[mmHg]	120	120	120	120	120	
NIBP-D	[mmHg]	60	60	60	60	60	
SpO2	[%]	---	---	---	---	---	92
PR_SpO2	[bpm]	---	---	---	---	---	60
BP1-S	[mmHg]	120	120	120	120	120	116
BP1-D	[mmHg]	60	60	60	60	60	77
BP1-M	[mmHg]	90	90	90	90	90	92

On the right side of the parameter, the color assigned for the corresponding parameter will be displayed.

Parameter Setup for Tabular Trend

1 Press the [Menu], [Function], [TabularTrend], [Setup] keys.

- The tabular trend setup screen will be displayed.



2 Select the quantity of fixed parameters from [0 param.] to [6 param.].

- The selected quantity of parameters will be always displayed on the tabular trend, and these data will be remained displayed even when scrolled.(* part on the display example shown above.)

3 Select the display location for the parameter.

- The selected location will be indicated with blue frame.
- To change the displayed page, press the [▲]/[▼] keys on the left.

4 Select the parameters to be displayed on the tabular trend.

- [Circulatory]/[Respiratory]/[ST]/[BIS]: The parameters for the corresponding category will be displayed.
- [◀]/[▶]: The displaying page for the parameters can be selected.

Parameters for each Category

Circulatory	HR, VPC, SpO_2, PR_SpO_2, NIBP, BP1 to 4, PR-IBP, PDP, PCWP, CPP, T1 to 6, Tb, CO
Respiratory	$EtCO_2$, $InspCO_2$, RR-GAS, RR-IMP, APNEA, RR_SpO_2
ST	ST(I) to ST(V6)
BIS	BIS, SQI, EMG, SR, SEF, TOTPOW, IMP

NOTE

- The apnea duration will be stored when it exceeds the upper alarm threshold level. If lower than the alarm threshold level, it will be stored as "0 (zero)".

5 Time Bar

- Select the time bar display interval from [4h]/[8h]/[12h]/[16h]/[20h]/[24h]/[36h]/[48h].

Recall

This section explains about the recall function and the setup procedure.

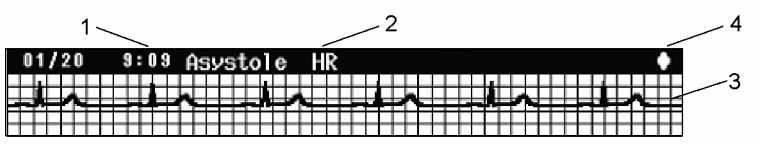
To Display the Recall Waveform

1 Date/Time at Alarm Occurrence

2 Recall Factor

3 Recall Waveform (Compressed: 12 sec.)

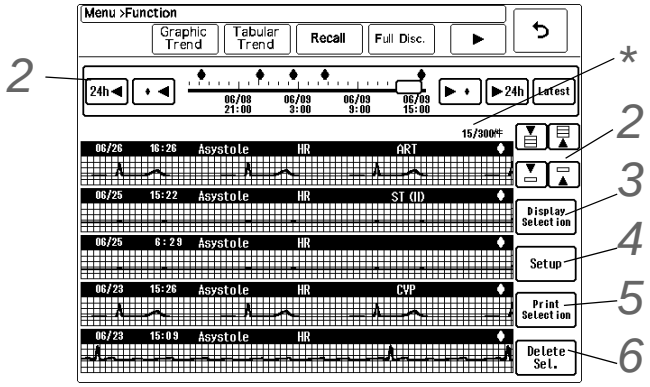
4 ◆Mark



When the alarm for the specified recall factor occurs, waveforms (max. 2 waveforms/12 seconds) and numeric data for each recall factor will be stored up to 300 data.
On the display selection menu, the data to be displayed can be selected from the stored recall data.
5 compressed recall waveforms will be displayed.
Pressing the waveform area will display the enlarged waveform. When using the full disclosure waveform function, an enlarged full disclosure waveform will be displayed.
If the recall data exceeds 300, the data will be erased from the oldest one.
The recall waveform will be acquired from the point prior to alarm occurrence so that alarm-generated point will be displayed at 7 to 8 seconds point on the 12-seconds recall waveform.◆ mark indicates the alarm generated point.

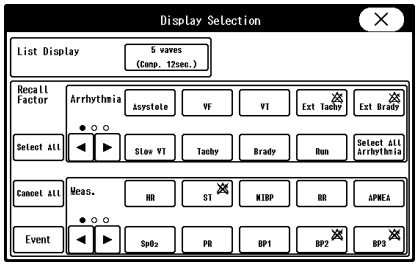
1 Press the [Menu], [Function], [Recall] keys.
Or, press the [Recall] key on the user key area.

- Recall screen will be displayed.
- 5 compressed waveforms (12 sec. per each waveform) will be displayed.
- The alarm occurrence time, the recall factor occurred at the same time, and the compressed waveform of recall waveform 1 will be displayed.
- The displayed quantity (* shown below) indicates "Displayed Data/Total Recall Data".



2 Changing the displayed time, scrolling the time, updating the data
(☞"Common Operation" P8-1)

3 Select the recall factor to display on the recall screen.



- The key will turn blue when pressed to indicate that it is selected as the recall factor.
- [Select All]: All parameters including arrhythmia will be selected.
- [Select All Arrhythmia]: All arrhythmia will be selected.
- [Cancel All]: All selections will be canceled.

4 Set the storing condition for recall data.
(☞"Recall Setup" P8-18)

5 Print Selection
Select the recall factor to print out.

REFERENCE

- The [Print Selection] key will be displayed only when the network printer setting is performed in advance.
- To select the laser printer, select [DS-LAN] for "Network Printer" under [Menu > Setup > Initial Settings > External Device > Network] in advance. (☞Maintenance Manual "Laser Printer Setup" P4-13)

6 Deleting All Recall Waveform

1. Press the [Delete Sel.] key.
2. Select the parameters to delete. For the selected parameter, "x" will be displayed.
   To select all displayed waveforms, press the [Select All] key.
   To cancel the selection, select again the parameter with "x" mark. "x" mark will be cleared indicating that it has been removed from the deleting parameter selection.
3. Press [Delete]>[Delete OK] keys to delete the parameters with "x" mark.

NOTE

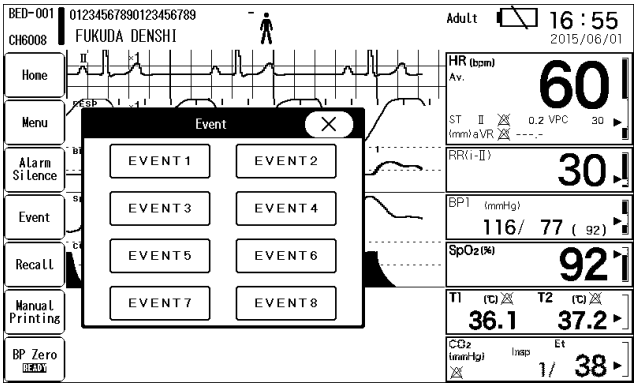
- Deleting the recall factor will not delete the full disclosure waveform.

Saving the Recall Waveform Using the Event Key

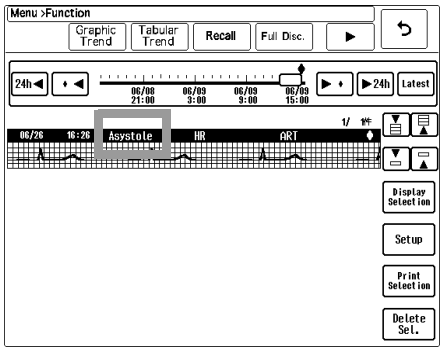
The waveform at the point when the PRINT START/STOP key (fixed key) or [Event] key (preprogrammed as user key) is pressed can be saved as recall waveform.

1 Press the [Menu], [System Config.], [Display Config.] keys.
Press the [Change] key for "User Key" to set the "Event" key on the user key.

2 Press the [Event] key (user key) or PRINT START/STOP key (fixed key).



- The waveform at the point when the key is pressed will be saved as recall waveform.
- There are 8 event keys from [Event 1] to [Event 8] to specify the recall waveform.
  For example, if the [Event 1] key is pressed, the display will be as follows:



- When the PRINT START/STOP key (fixed key) is pressed, the recall waveform label will be fixed as "Event 1".

NOTE

- When the patient classification is adult/child, the waveform from 12 seconds before the [Event] key or fixed key is pressed will be saved.
  When the patient classification is neonate, the waveform from 8 seconds before to 4 seconds after the [Event] key or fixed key is pressed will be saved.

REFERENCE

- Refer to ☞Maintenance Manual "Display/Print Setup" P5-12 for event label setup procedure.

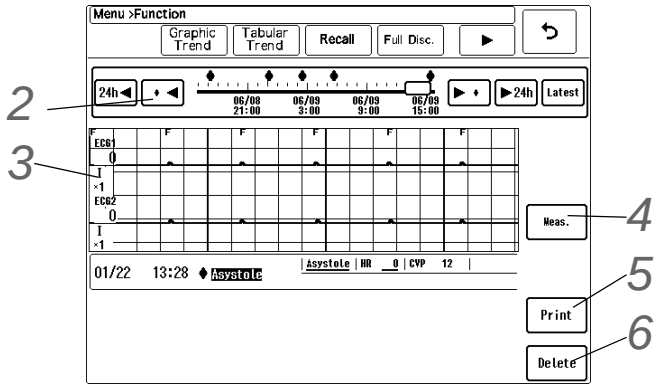
To Display/Print the Enlarged Recall Waveform

On the enlarged recall waveform display, the recall waveform will be displayed in 25 mm/s, and the data before and after the alarm occurrence can be checked using a cursor.
A case when not using the full disclosure waveform function is explained below.

NOTE

- When using the full disclosure waveform function, an enlarged full disclosure waveform will be displayed.
  (☞"Full Disclosure Waveform" P8-35)

1 Pressing the recall waveform area will display the enlarged recall waveform.



2 Shifts the recall waveform display.

3 Recall Waveform

The waveform can be dragged to left and right.

4 Numeric Data

The numeric data at alarm occurrence will be displayed.

5 Prints the recall waveform.

The displayed enlarged waveform and numeric data will be printed. The output printer can be selected on the "Manual Printing" setup.
(☞"Printing Setup" P9-1)

6 Deletes the recall waveform.

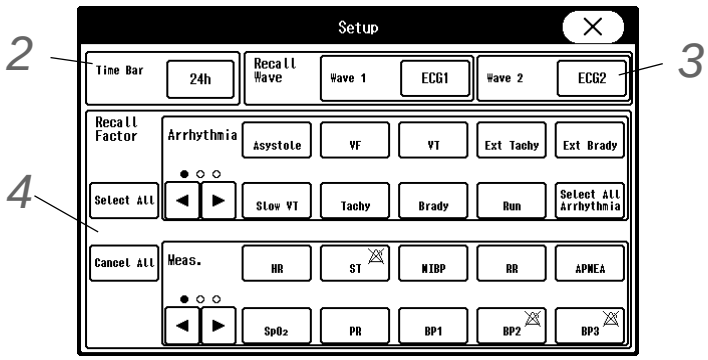
The displayed recall waveform will be deleted.

Recall Setup

The storing condition at alarm occurrence can be set for the recall function.
The recall waveform and recall factor (numeric data, arrhythmia) can be selected.

1 Press the [Setup] key on the recall screen.
(☞"To Display the Recall Waveform" P8-14)

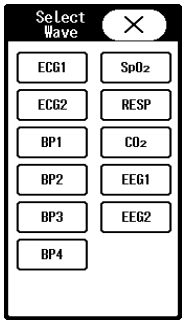
- The "Setup" window will be displayed.



2 Time Bar

- Select the time bar display interval from [4h]/[8h]/[12h]/[16h]/[20h]/[24h]/[36h]/[48h].

3 Select the recall waveform. Up to 2 waveforms can be selected for recall waveform. (shown on right)



4 Select the recall factor.
(☞"To Display the Recall Waveform" P8-14)

NOTE

- The recall waveform will start with the following delay time tracing back from the alarm occurrence.

	Adult	Child	Neonate	
			Numeric Data Alarm	Arrhythmia Alarm
Delay Time	12 sec.	12 sec.	8 sec.	12 sec.

OCRG

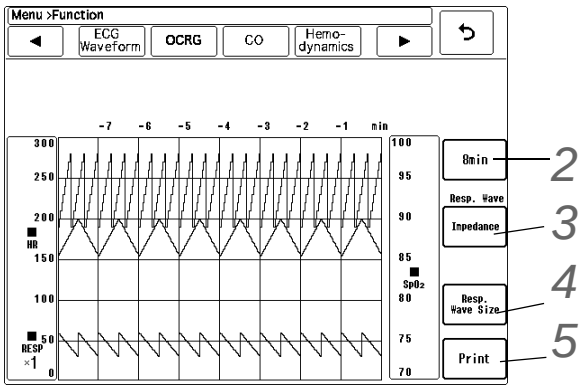
This section explains about the OCRG display.

On the OCRG display, compressed respiration waveform, HR trend and SpO_2 trend are displayed simultaneously. The trend scale is fixed as follows.

- HR: 0 bpm to 300 bpm
- SpO_2: 70%SpO_2 to 100%SpO_2

1 Press the [Menu], [Function], [OCRG] keys.

▸ OCRG screen will be displayed.



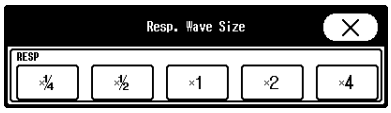
2 Display Duration

Select from [8min]/[16min].

3 Respiration Waveform

Select from [Impedance]/[CO_2].

4 Respiration Waveform Size (shown on right)



Select the waveform size for compressed respiration waveform.

Respiration Waveform	Size, Scale
Impedance RESP	[x1/4]/[x1/2]/[x1]/[x2]/[x4]
CO_2	[50]/[100] (unit: mmHg)
	[4]/[8]/[10] (unit: % or kPa)

5 Printing

The currently displayed trend and compressed waveform on the OCRG screen will be printed.

Alarm History

This section explains the alarm history function and printing procedure.
The alarm generation of numeric data, arrhythmia, equipment status and change in alarm settings can be stored as alarm history. Maximum of 1599 data can be stored.

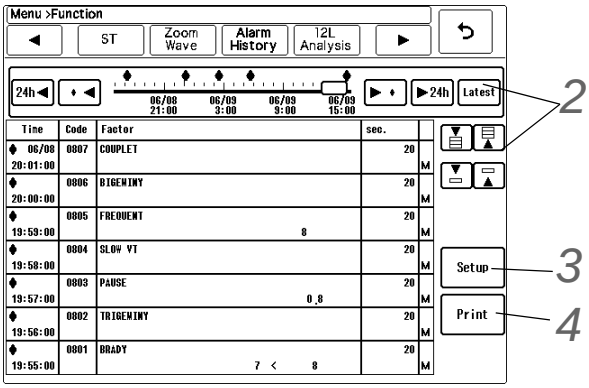
NOTE

- When the alarm history exceeds 1600 data, the data will be deleted from the oldest one.

Alarm History Setup

1 Press the [Menu], [Function], [Alarm History] keys.

▸ The alarm history screen will be displayed.



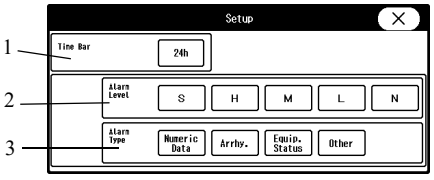
2 Changing the displayed time, scrolling the time, updating the data (☞"Common Operation" P8-1)

3 Set the "Alarm History".

1 Select the time bar display interval from [4h]/[8h]/[12h]/[16h]/[20h]/[24h]/[36h]/[48h].

2 Select the alarm level to be displayed.
The selected item will be displayed in blue.

3 Select the alarm type to be displayed.
The selected item will be displayed in blue.



4 Press the [Print] key.

▸ The currently displayed alarm history will be printed.

Description for Each Item

The descriptions of each item are as follows.

Item	Description
Time	The alarm generated time or alarm setting changed time will be displayed.
Code	The hexadecimal code related to alarm generation or alarm setting change will be displayed.
Factor	The factor for alarm generation and alarm setting change will be displayed.
	In case of numeric data/arrhythmia alarm, the numeric data and alarm setting at alarm generation will be also displayed.
	In case of equipment status alarm, a detailed code may be also displayed.
	In case of alarm setting change, the changed value will be also displayed.
sec.	The duration of numeric data/arrhythmia/equipment status alarm generation, alarm suspend, monitor suspend, night mode will be displayed in seconds. The maximum displayable value is 99999 sec. It will not be displayed for the alarm setting change.

Zoom Wave

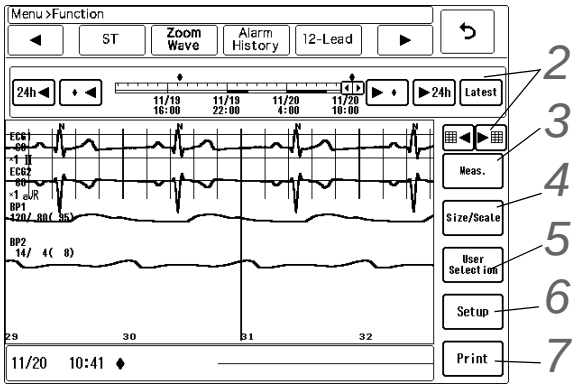
This section explains about the "Zoom Wave" window. (When the SD card is inserted.)
Maximum of 6 waveforms (3.6 seconds each) can be displayed.

REFERENCE

- When the SD card is not inserted, the latest enlarged recall waveform will be displayed.
- The "Zoom Wave" window can be also displayed by pressing the waveform area on the "Full Disc. Wave" window.The enlarged waveform of the pressed time will be displayed.
- Pressing the [Recall] key will also display the enlarged waveform.

1 Press the [Menu], [Function], [Zoom Wave] keys.

- The "Zoom Wave" window will be displayed.
- When the enlarged waveform is displayed by pressing the recall waveform, the last part of recall waveform (after 12 seconds) will be displayed at the center.
  By swiping the enlarged waveform from left to right, the waveform will shift rightwards, and the alarm occurrence point can be checked by shifting the waveform.



2 Changing the displayed time, scrolling the time, updating the data
(☞"Common Operation" P8-1)

3 The numeric data of the displayed time will be displayed.

4 The size/scale of the displayed waveform will change.

5 Switch the waveform to display.
[Limb]: Limb lead ECG waveform will be displayed.
[Chest]: Chest lead ECG waveform will be displayed.
[User Selection]: The waveform selected at procedure 6 will be displayed.

6 When [User Selection] is set at procedure 5, select the waveforms to be displayed.

7 The currently displayed waveform will be printed.
On the HR-800, 12 seconds of waveform will be printed. The printing range starts from 6 seconds before the left end of the enlarged waveform.
On the laser printer, 10 seconds of waveform will be printed. The center part (blue line) of the enlarged waveform display will be located at the center of the printing paper.

ST Measurement

This section explains about the ST measurement and ST alarm function.

To Display/Print the ST Measurement

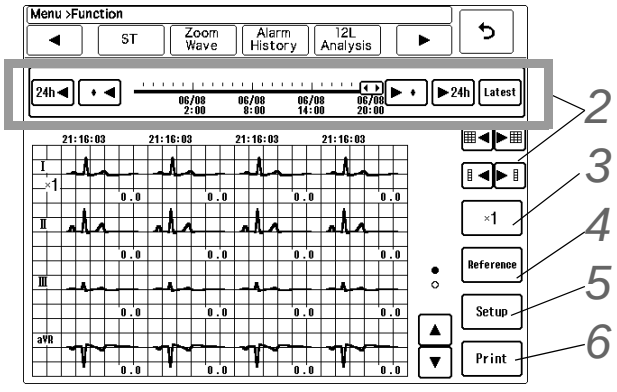
On the ST display, ECG for the selected time duration (10 sec./1 min./5 min./10 min.) will be displayed overlapped in 1 block.
If 3-lead cable is used, maximum of 2 hours of ST waveform will be displayed.

NOTE

- If 3-lead cable is used, the measurement will be performed for only the displayed leads.
- For the following case, ST level will not be displayed.
  - When learning arrhythmia.
  - When the lead is off.
  - When the reference waveform is not set.
  - When "N" or "S" is not detected for QRS within 30 seconds.

1 Press the [Menu], [Function], [ST] keys.
Or, press the [ST] key on the user key area.

▸ ST screen will be displayed.



2 Changing the displayed time, scrolling the time, updating the data
(☞"Common Operation" P8-1)

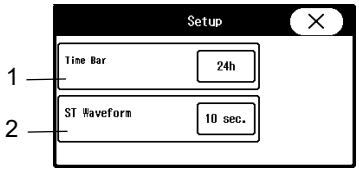
3 Changing the waveform size of the overlapped waveform

Select from [x1/4]/[x1/2]/[x1]/[x2]/[x4].The same waveform size will be applied to all the leads. The selected size will not be applied to the ECG waveform on the home display.

4 Reference Waveform Setup

(☞"Reference Waveform Setup" P8-23)

5 Changing the time bar and displayed block duration



1 Select the time bar display interval from [4h]/[8h]/[12h]/[16h]/[20h]/[24h]/[36h]/[48h].

2 Select the displayed block duration.
The duration of each block can be selected from [10 sec.]/[1 min.]/[5 min.]/[10 min.]. For the selections other than [10 sec.], the overlapped waveform for the selected duration will be displayed.

REFERENCE

- When 3-lead cable is used, 12 blocks of ST waveform will be displayed. When 4, 5, 10-electrode cable is used, 4 blocks of ST waveform for each lead will be displayed.

6 Printing

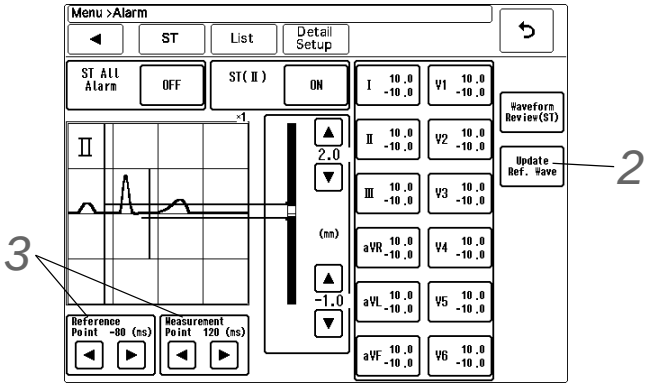
The currently displayed ST waveform will be printed.

Reference Waveform Setup

The ST reference waveform will be automatically set after learning the arrhythmia.
The reference waveform can be updated manually.

1 Press the [Menu], [Alarm], [ST] keys.

▸ The ST alarm setup screen will be displayed.



2 Update the ST reference waveform.

⚠ CAUTION

- For the lead which the electrode is detached, the reference waveform cannot be set.Check if the electrode is correctly attached, and perform the setup again.

- 16 beats average of the ECG judged as normal QRS by arrhythmia analysis will be set as the reference waveform.
  The averaged waveform at the point when the [Update Ref. Wave] key is pressed will be set as the reference waveform.
- During the following process, the [Update Ref. Wave] key will be displayed in blue.
  *During arrhythmia learning
  *After 16 beats from completion of arrhythmia learning until averaged waveform is calculated
- The updated time of the reference waveform will be displayed.

NOTE

- While learning arrhythmia, or if VPC is present, it will take more than 16 beats to set the reference waveform.
- When the electrode quantity is changed, the reference waveform will be automatically updated.
- In case such as when the patient is discharged, the reference waveform will be automatically set.

3 Set the reference point and measurement point.

1 Slide the reference point to right and left using the ◀/▶ keys.

2 Slide the measurement point to right and left using the ◀/▶ keys.

NOTE

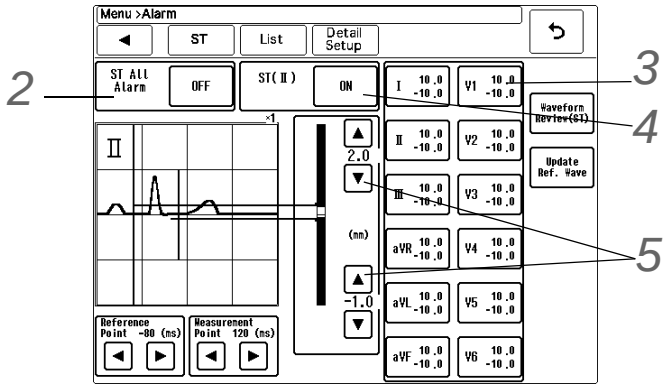
- Set the reference point in the range of –240 ms to 0 ms in increments of 10 ms from the peak of QRS to the P wave direction.
- Set the measurement point in the range of 0 ms to 560 ms in increments of 10 ms from the peak of QRS to the T wave direction.

ST Alarm Setup

Set the ST upper limit and lower limit for the reference waveform.

1 Press the [Menu], [Alarm], [ST] keys.

▸ The ST alarm setup screen will be displayed.



2 Select [ON]/[OFF] for "ST All Alarm" .

▸ [OFF]: Alarms will not generate even if the alarm for each lead is set to ON.

3 Select the lead to set the alarm limit.

▸ The selected lead will be displayed large at the left.

4 Select [ON]/[OFF] of ST alarm for each lead.

5 Set the upper and lower alarm limit.

(☞"Alarm Limit Setup for Each Parameter" P6-9)

NOTE

- Set the upper limit in the range from -18 mm to +20 mm/-1.8 mV to +2.0 mV. If a value above +20 mm/+2.0 mV is set, the upper alarm will turn OFF.
- Set the lower limit in the range from - 20 mm to +18 mm/ - 2.0 mV to +1.8 mV. If a value below -20mm/-2.0mV is set, the lower alarm will turn OFF.

REFERENCE

- The upper and lower limit can be set in 1 mm/0.1 mV increments.

12-Lead Analysis

This section explains about the 12-lead analysis function. By using the 10-electrode cable, 12-lead ECG can be displayed, analyzed, stored, and printed. Maximum of 10 analyzed results can be saved.

WARNING

- The 12-Lead ECG analysis function is designed to acquire and interpret ECG data from a resting, supine patient. If ECG signals from moving or shaking patients are acquired, erroneous 12-lead interpretation result may occur. Always ensure that the patient is kept motionless during 12-lead ECG signal acquisition and analysis.
- The 12-lead ECG analysis function is intended for use with adult and pediatric patients.
- All computerized ECG analysis results should be reviewed by a physician before making decision of the patient treatment.

CAUTION

- Interpretation and Minnesota codes given by this equipment do not instruct the physician as to the kind and degree of cardiac disease. Accordingly, four value judgments are given for ECG waveform and although "abnormal" indicates a large possibility of organic cardiac disease, there are cases where no cardiac disease exists despite an abnormal ECG (that is, an abnormal ECG may be caused by something other than heart).
  On the other hand, care should be taken in the event any preclinical coronary arteriosclerosis could be present despite a normal ECG interpretation.
  Therefore, for a proper diagnosis, the ECG should be integrated with other interpretations.
- ECG Recording by the Mason-Likar System
  The 12-lead ECG recorded with the torso placement of the limb leads (Mason-Likar 12-lead system) may differ from the standard 12-lead ECG. Moreover, waveforms may differ somewhat also in a supine position and a standing position (sitting position).
  We recommend to carry out the recording of the ECG by taking into consideration the waveform differences according to electrode positions or postures.
- About the ECG Analysis Program
  The ECG analysis program is intended to analyze the standard 12-lead ECG waveforms. Therefore, the analyzed result for waveforms recorded with the torso placement of the limb leads (Mason-Likar 12-lead system) may differ from that of the standard 12-lead ECG waveforms.
- When a pacemaker is used, select [Used] for "Pacemaker" under "Admit/Discharge" menu.
- The threshold values for classification of 12-lead ECG interpretation and Minnesota code are set by age and sex as follows.
  1. Male and Female of ages 19 years old and above
  2. Male of age 12 through 18 years old
  3. Female of age 12 through 18 years old
  4. Male and Female of ages 3 through 11 years old
  5. Male and Female of ages below 2 years old
- If no patient information (i.e. Default: "Class.": [Adult], "Sex": undetermined) has been entered, the system algorithm will handle the patient as a "35 years old male".
- Before the analysis, make sure the patient classification ([Adult] / [Child]) is properly selected. If [Neonate] is selected, the 12-lead ECG analysis will not function.
- Enter the age of patient if known. If no age information (i.e. Default: [0]) has been entered, the system algorithm will handle the patient as "35 years old".
- Enter the sex of patient if known. If no sex information (i.e. Default: undetermined) has been entered, the system algorithm will handle the patient as "Male".

- If the patient classification is set as [Child] and no age (i.e. Default: [0]) has been entered, the system algorithm will handle the patient as "less than 2 years old."

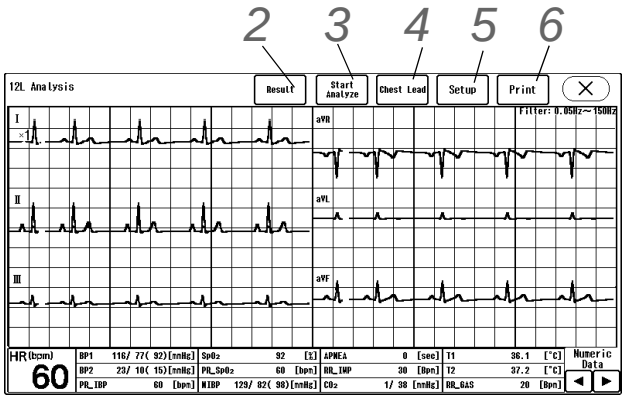
NOTE

- Electrode Placement for 12-Lead ECG Analysis
  When acquiring 12-lead ECG signals, it is recommended to place the limb electrodes anywhere along the arms and legs. (☞"Electrode Placement" P7-2)
  If it is difficult, use the Mason-Likar 12-lead system. To reduce the waveform differences from the standard 12-lead, it is recommended that the torso placement of the RA and LA electrodes be near as possible to each arm, in the infraclavicular fossae, within the area unaffected by myoelectricity.

12-Lead ECG Display

1 Press the [Menu], [Function], [12-Lead] keys.

- The 12-lead analysis screen will be displayed.
- The real-time waveforms are displayed. The 12-lead analysis will be performed based on the displayed waveforms.



REFERENCE

- Pacemaker pulse will not be displayed on the 12-lead analysis screen.
- A pacemaker pulse will not be displayed on the 12-lead analysis screen even if [ON] is set for "Pacemaker Pulse".

2 Analyzed Result Display

- The analyzed result can be displayed.
  (☞"12-Lead Analyzed Result Display of Past Data" P8-31)

3 Start Analyze

- The 12-lead analysis will start.
  (☞"12-Lead ECG Analysis" P8-29)

REFERENCE

- If a lead cable other than 10-electrode is used, [Start Analyze] will not be displayed regardless of the patient classification. When the patient classification is [Neonate], [Start Analyze] will not be displayed. (12-lead analysis function is not available.)

4 All Leads/Chest Lead/Limb Lead

- The display will switch between all leads, chest lead, and limb lead.

5 Setup

- The setup window will be displayed.
- On the setup window, 12-lead waveform size, filter, background color of the waveform can be set.
  (☞"12-Lead Analysis Setup" P8-28)

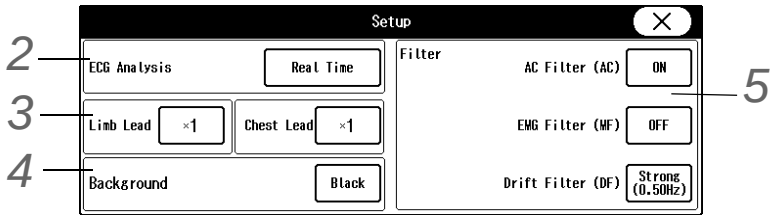
6 Printing

- The currently displayed waveform can be printed.
- The output printer will be according to the setting made for "12-Lead Waveform" ([Bedside]/[Laser]).
  (Menu>Setup>Manual Printing>Graphic Printing (Other Setup)>Printer Selection)
  (☞"Manual Printing (Other Setup)" P9-6)

12-Lead Analysis Setup

1 Press the [Menu], [Function], [12-Lead], [Setup] keys.

- The 12-lead analysis setup window will be displayed.



2 ECG Analysis

- The timing to read the waveform for ECG analysis can be set.
- [Real Time]: The waveform of 10 seconds after the [Start Analyze] key is pressed will be analyzed.
- [Review]:The waveform of 10 seconds before the [Start Analyze] key is pressed will be analyzed.

3 Waveform Size

- The waveform size for the real-time waveform displayed on the 12-lead analysis screen can be set.
- Limb Lead: The waveform size for the limb lead can be changed.
- Chest Lead: The waveform size for the chest lead can be changed.

4 Background Color

- The background color for the 12-lead analysis display can be set.
- [White]: Similar display with the electrocardiograph.
  Background Color: White
  Grid Color: Orange
  Waveform Color: Black (Fixed)
- [Black]: Standard color
  Background Color: Black
  Grid Color: Gray
  Waveform Color: Green (Fixed)

5 Filter

- The setup for the AC Filter, EMG Filter, Drift Filter can be performed.
- AC Filter: If AC noise is present, select [ON]/ [OFF] for "AC Filter".
  If [ON] is selected, cut-off frequency will be 75 Hz.
- EMG Filter: If EMG noise is present, select [Strong (25Hz)]/ [Weak (35Hz)]/ [OFF].
- Drift Filter: If base line drift is present, select [Strong (0.50Hz)]/ [Weak (0.25Hz)]/ [OFF].

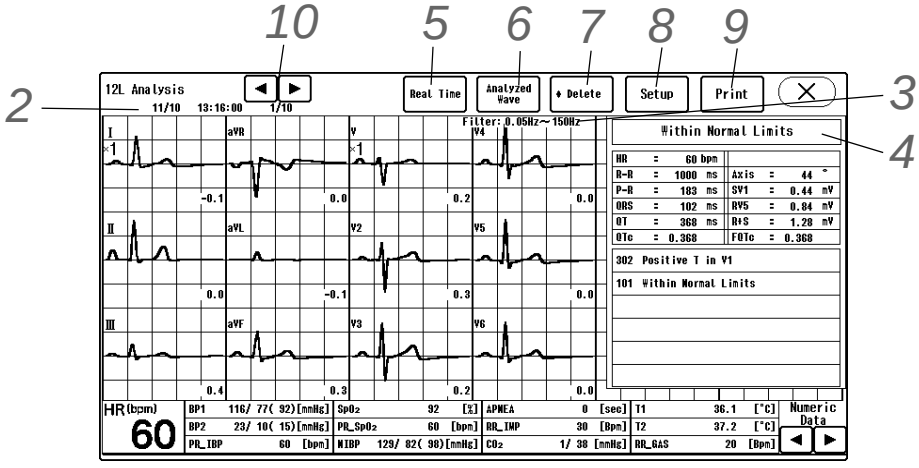
CAUTION

- The filter settings of the 12-lead analysis display and the home display are not linked with each other.
- A baseline or notch will be generated on the ECG waveform (display, print, recall) during the filter setting (up to about 2.4 seconds).
- This equipment complies to IEC 60601-2-25 when all the filters are set to OFF. The frequency characteristic is 0.05 Hz to 150 Hz when all the filters are set to OFF.
- When a pacemaker is used, the baseline fluctuation becomes large and it may be difficult to read the electrocardiogram. Set the drift filter by checking the electrocardiogram.

12-Lead ECG Analysis

1 Press the [Menu], [Function], [12-Lead], [Start Analyze] keys.

- When the analysis completes, the analyzed result will be displayed.
  For the analyzed result, dominant waveform and analyzed result will be displayed.
- Abnormal region will be indicated by highlight display.



2 Analyzed Time

- The analyzed time will be displayed.

REFERENCE

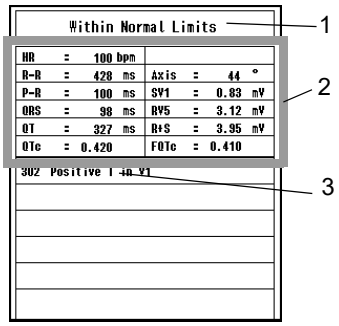
- During the analysis, [Start Analyze] key will change to [In Progress].
  The analysis can be suspended by pressing the [In Progress] key.

3 Filter Information

- The filter used for analysis will be displayed.

4 Analyzed Result

- For the analyzed result, overall judgment, numeric data, finding will be displayed.
- When the dominant waveform is displayed, pressing the [Analyzed Result] key will display the analyzed result.



1 Overall Judgment: The highest grade judgment will be displayed.

2 Numeric Data: Main numeric data used for ECG analysis will be displayed.
The abnormal numeric data with the highest grade finding will be highlighted in red.

3 Finding: The findings by the ECG analysis will be displayed. These will be classified by colors according to the grade specified for each finding.
Grade 6: Red
Grade 4: Blue
Grade 2, 0: Black
The highest grade finding will be highlighted in color specified for each abnormality level.

5 Analyze Real Time Waveform

- The display will return to the 12-lead analysis display.
- Pressing the [Start Analyze] key on the 12-lead analysis display starts the analysis and displays the analyzed result.

6 Analyzed Waveform

- The 12-lead analysis waveform screen will be displayed.
(☞"To Display the Analyzed Waveform" P8-31)

7 Deleting the Analyzed Result

- Press the [Delete]>[Delete OK] keys to delete the displayed analyzed result.
- Press [Cancel] to cancel the delete process.

8 12-Lead Analysis Setup

(☞"12-Lead Analysis Setup" P8-28)

9 Printing the Analyzed Result

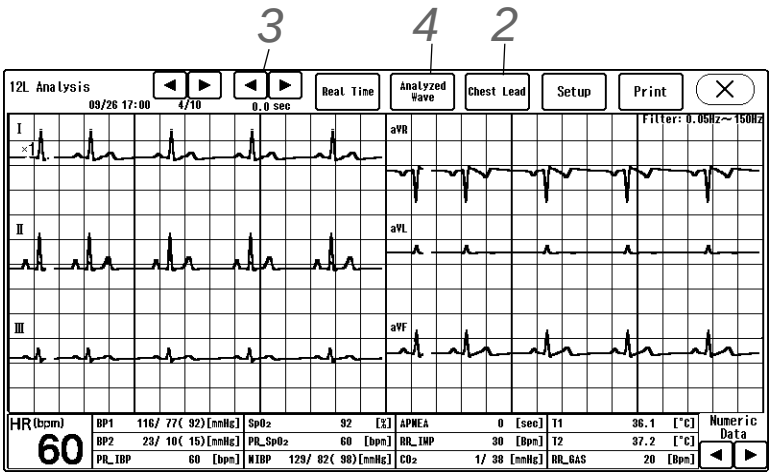
(☞"12-Lead Analyzed Result Output Example" P8-32)

10 Displaying the Past Data of Analyzed Result

- The past data of 10 analyzed results can be displayed.
(☞"12-Lead Analyzed Result Display of Past Data" P8-31)

❑To Display the Analyzed Waveform

1 To display the analyzed waveform, press the [Analyzed Wave] key on the 12-lead analysis result display.



2 [Chest Lead]: Chest lead (V1 to V6) waveform will be displayed.
[Limb Lead]: Limb lead (I to aVF) waveform will be displayed.

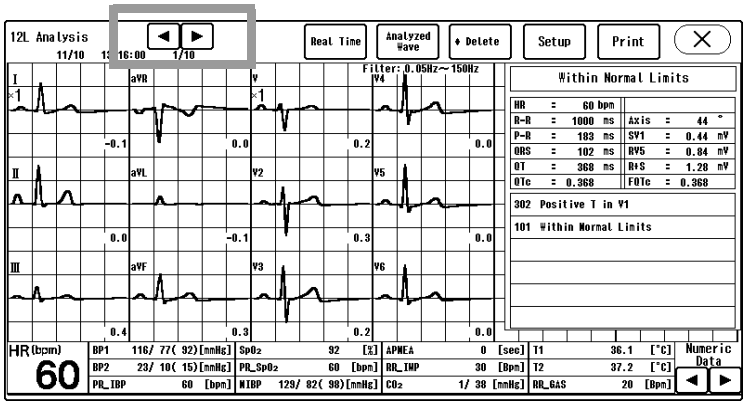
3 The analyzed waveform can be scrolled by 2 seconds using the ◀/▶ keys.

4 Press the [Result] key to return to the 12-lead analysis result display.

12-Lead Analyzed Result Display of Past Data

1 Press the ◀/▶ keys on the 12-lead analysis result display.

▸ Maximum of 10 analyzed results can be displayed.



12-Lead Analyzed Result Output Example

Press the [Print] key on the analyzed result screen or analyzed waveform screen.
There are following 2 types of analyzed result printing.

Displayed key when [Print] key is pressed	Printer Selection for Graphic Printing		Key Display	Remarks
Waveform Report	12-Lead Waveform	Bedside	Yes	Standard 12-lead waveform printing Prints the analyzed waveform.
		Laser	Yes	
Analyzed Report	12-Lead Analysis Result	Bedside	Yes	Standard analyzed result printing Prints the waveform and analyzed result.
		Laser	Yes	

NOTE

- If no patient information has been entered, "Adult", "35 years old", and "Male" will be printed.
- If the patient classification is set as "Child", and no age and sex information have been entered, "Child", "2 years old", and "Male" will be printed.
- The output printer will be according to the setting made for “12L Analysis Result” ([Bedside]/ [Laser]). [Manual Printing>Printer Sel. (Graphic Printing)]
(☞"Manual Printing (Other Setup)" P9-6)

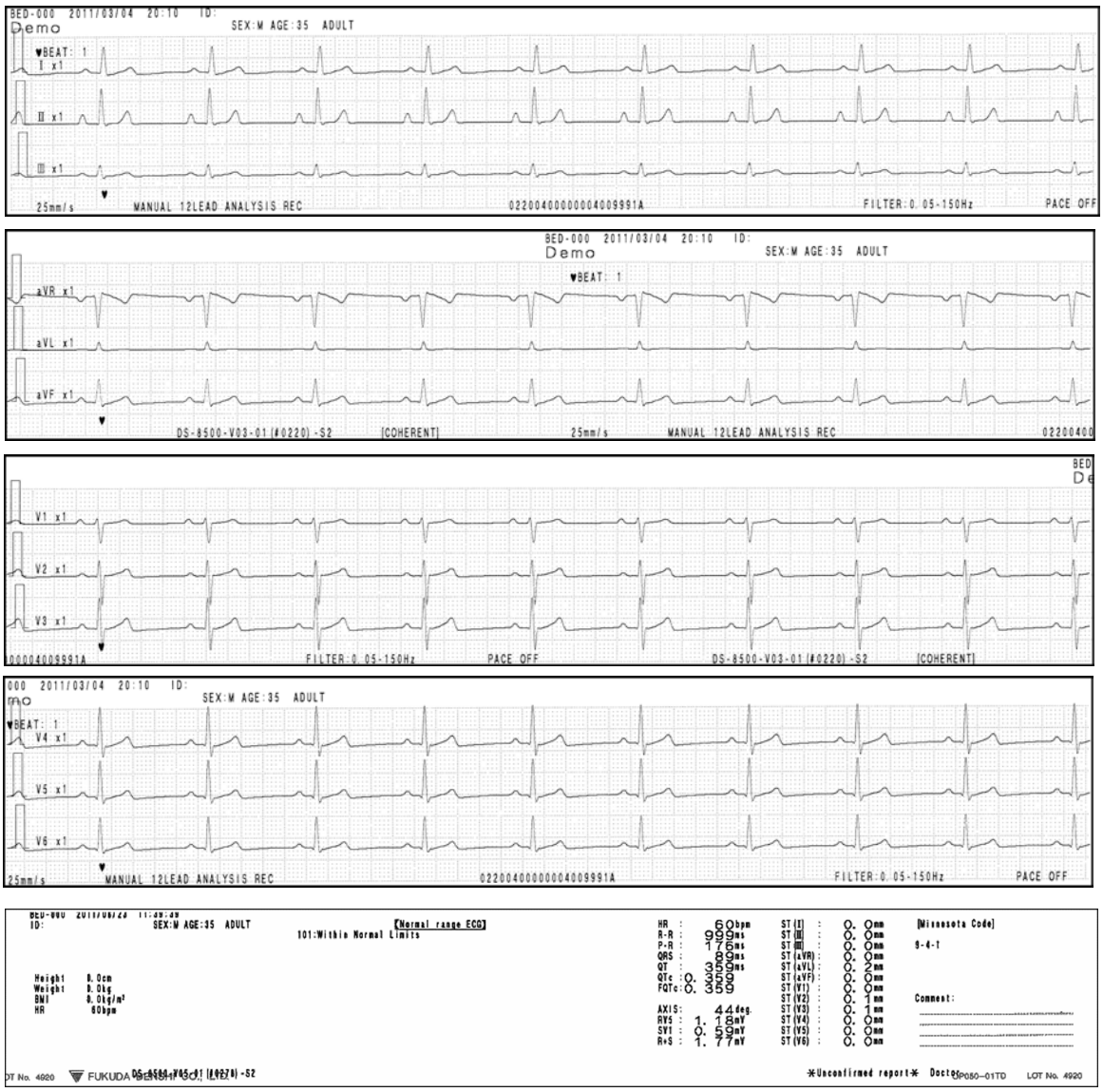
❑Printed Data

The following basic data will be printed.

HR	Heart rate obtained by basic arrhythmia measurement
QRS Interval	QRS interval of basic waveform measurement. Average value of measurements of leads I to V6. The equipotential part (I wave) at the beginning of QRS and the equipotential part (K wave) at the end of QRS are not included in QRS interval.
R-R Interval	R-R interval of basic waveform measurement. Average value calculated from all the heartbeats first, and then recalculated from the R-R interval within ±25% of that value.
P-R Interval	P-R interval of basic waveform measurement. Average value of measurements of leads I to V6.
QT Interval	QT interval of basic arrhythmia measurement. Average value of measurements of leads I to V6.
QTc Interval	QTc interval of basic arrhythmia measurement.This value is calculated from the following equation: $QTc = \frac{\text{Average waveform QT time}}{\sqrt{\text{Average R-R time of arrhythmia (sec.)}}}$
QRS Axis	QRS axis of basic arrhythmia measurement. This value is calculated from the following equation, where, I, II, and III are the sums of the maximum amplitude values (signed) of Q, R, S, R', and S' waves from each lead. $\text{Axis}(°) = \text{Tan}^{-1}\left[\frac{\sqrt{3}(\text{II}+\text{III})}{2\,\text{I}+\text{II}-\text{III}}\right]$
R V5/V6	Maximum amplitude of R wave or R' wave of lead V5 or lead V6. Lead V5 > Lead V6: RV5 Lead V5 = Lead V6: RV6
SV1	Maximum (absolute) value of Q, S, or S' wave of lead V1.
R+S	Sum of the amplitudes of RV5/RV6 and SV1.
ST	Amplitude from the baseline. Measurement position: End of QRS complex + (QT/10) sec.

❑Printing on the Bedside Monitor Printer

- When [Bedside] is set for the "12-Lead Waveform" (Menu>Manual Printing>Graphic Printing), pressing [Print] will display [Waveform Report]/[Analyzed Report] keys.
- The following is the output example when [Analyzed Report] key is pressed.



- Pressing the [Waveform Report] key will print the analyzed waveform in a standard format.

❑Laser Printer Output

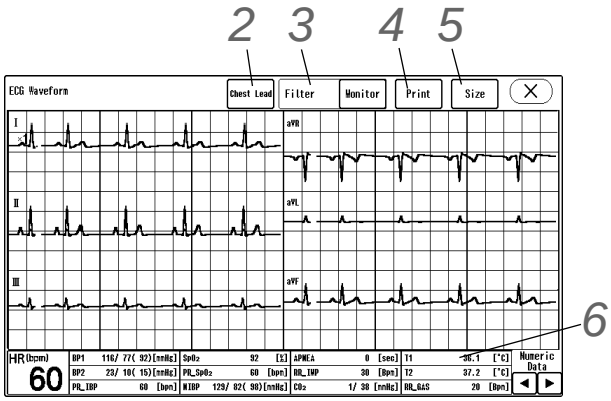
- When [Laser] is set for the "12-Lead Analysis Result", pressing the [Print] key will display [Waveform Report]/[Analyzed Report] keys.
- Pressing the [Analyzed Report] will print the analyzed result in a format set for "12-Lead Analysis Format" under [Menu>Setup>Manual Printing]. (☞"Manual Printing (ECG Waveform)" P9-4)
- Pressing the [Waveform Report] will print the waveform in a format set for "12-Lead Waveform Format" under [Menu>Setup>Manual Printing]. (☞"Manual Printing (ECG Waveform)" P9-4)

ECG Waveform Display

This section explains about the ECG waveform display function. Six ECG waveforms of limb leads and six ECG waveforms of chest leads of the same filter setting with the home display can be monitored at the same time.

1 Press the [Menu], [Function], [ECG Waveform] keys.

- ECG waveform will be displayed.



2 Chest Lead/Limb Lead/All Leads

- The display will switch between chest lead, limb lead, and all leads.

3 Filter Mode

- The filter mode of ECG waveform will be switched.

NOTE

- Changing the filter mode will also change the ECG filter mode of the home display.

4 Printing

- The currently displayed 12-lead waveforms can be printed.
- The output printer will be according to the setting of "12-Lead Waveform" under [Menu>Setup>Manual Printing>Graphic Printing (Other Setup)>Printer Selection].
  (☞"Manual Printing (Other Setup)" P9-6)

5 Waveform Size

- The waveform size of currently displayed ECG waveform will be switched.

NOTE

- Changing the waveform size will also change the ECG waveform size of the home display.

6 Real Time Numeric Data Display

- The current numeric data will be displayed.
- The ◀/▶ keys will switch the numeric data.

NOTE

- At alarm occurrence, the background of the numeric data will be displayed in red.

Full Disclosure Waveform

By using the optional SD card (FSD-8GA, SD-16G), the waveform data of 120 hours and 240 hours respectively can be saved.

Up to six waveforms can be displayed.The alarm event and time will be also saved which allows to search the waveform by each factor.

⚠ CAUTION

- Use only the specified SD card.
- Turn OFF the power before removing the SD card.
- To turn OFF the power of the main unit, use the standby function.
- The full disclosure waveform card can be used only on the equipment where it was formatted.
- It will take about 3 minutes to format the full disclosure waveform card.Do not format the card during monitoring as all operation will not be possible during the format process.
- The SD card formatted for the central monitor full disclosure waveform data cannot be used on the DS-8007 System.

NOTE

- When the full disclosure waveform data exceeds the capacity of the SD card, the data will be deleted from the old one.
- To delete the full disclosure waveform data, perform the discharge procedure.
  (☞"Discharge" P5-6)

Formatting the SD Card

REFERENCE

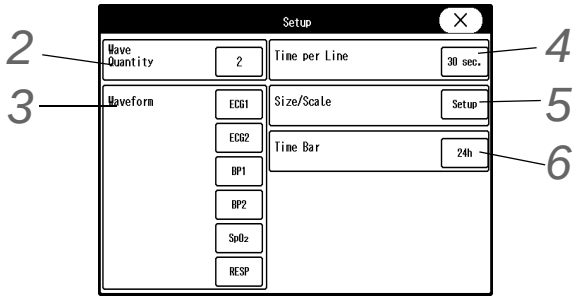
- To save the full disclosure waveform, the SD card needs to be formatted for the full disclosure waveform.
  (☞Maintenance Manual "Formatting the Full Disclosure Waveform Card" P3-5)

Waveform Setup

The quantity of displaying waveforms and display duration (sec.) per line for the full disclosure waveform can be set.

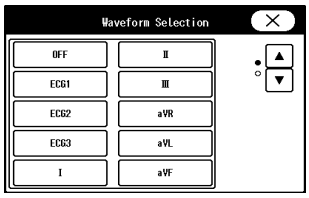
1 Press the [Menu], [Function], [Full Disc.], [Setup] keys.

▸ The "Setup" window for full disclosure waveform will be displayed.



2 Select the displaying waveform quantity from [1]/[2]/[3]/[4]/[5]/[6].

3 Select the parameter for the displaying waveform. (shown on right)



4 Select the waveform displaying duration per line from [10 sec.]/[30 sec.]/[1 min.].

5 Select the waveform size/scale.

6 Select the time bar display interval from [4h]/[8h]/[12h]/[16h]/[20h]/[24h]/[36h]/[48h].

Description of the Full Disclosure Waveform Display

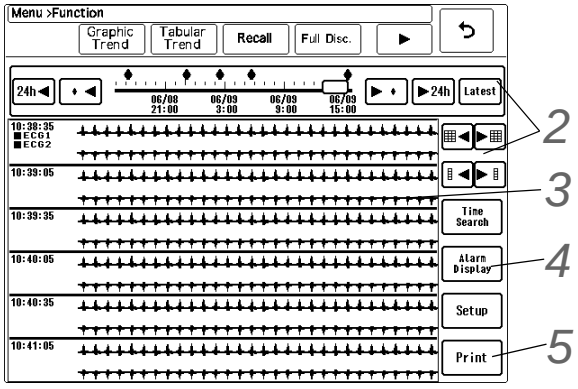
1 Press the [Menu], [Function], [Full Disc.] keys.

▸ The full disclosure waveform will be displayed.

2 Changing the displayed time, scrolling the time, updating the data
(☞"Common Operation" P8-1)

3 Press the full disclosure waveform.

▸ The enlarged full disclosure waveform will be displayed.
(☞"Zoom Wave" P8-21)



4 Press the [Alarm Display] key.

▸ The background color of the waveform at alarm occurrence can be changed.

NOTE

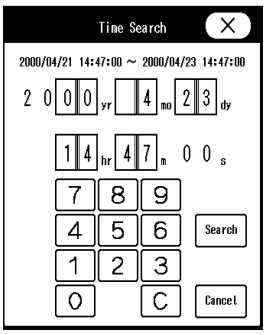
- On the full disclosure waveform display, the arrhythmia occurrence point will be displayed 7 seconds before the actual arrhythmia occurrence time.

5 Press the [Print] key.

▸ The currently displayed waveform will be output on the printer.

To Search by Time

The full disclosure waveform of the specified time can be displayed.



1 Press the [Time Search] key on the full disclosure waveform display.

▸ The "Time Search" window will be displayed.

2 Enter the searching date/time using the numeric keys and press the [Search] key.

▸ Searching will start.

▸ The searched waveform will be displayed on the full disclosure waveform display.

Hemodynamics

This section explains the procedure for hemodynamics calculation and printing.

NOTE

- If the equipment is connected to DS-LAN, and [ON] is selected for "Synchronize Hemodynamic Data with the Central Monitor", 5 latest hemodynamic data will be synchronized between this monitor and the central monitor. Other hemodynamic data will be deleted. For the 5 latest data, the hemodynamic data edited on this monitor will be also reflected on the central monitor, and vice versa.
- If the equipment is connected to DS-LAN, and [OFF] is selected for "Synchronize Hemodynamic Data with the Central Monitor", 5 latest data will be transmitted to the central monitor, but the data will not be synchronized between this monitor and the central monitor. The hemodynamic data edited on the central monitor will be deleted. The hemodynamic data edited on this monitor will be transmitted to the central monitor.

Calculation Data

Data	Item	Formula
BSA	Body Surface Area (m^2)	$h^{0.725}xw^{0.425}x71.84x10^{-4}$ (Dubois Formula)
CI	Cardiac Index (L/min/m^2)	$\frac{CO}{BSA}$
SV	Stroke Volume (mL/beat)	$\frac{CO \times 1000}{HR}$
SVI	Stroke Volume Index (mL/beat/m^2)	$\frac{SV}{BSA}$
SVR	Systemic Vascular Resistance (dynes·sec·cm^{-5})	$\frac{(MAP - CVP) \times 79.90}{CO}$
SVRI	Systemic Vascular Resistance Index (dynes·sec·cm^{-5}•m^2)	SVRxBSA
PVR	Pulmonary Vascular Resistance (dyn·sec·cm^{-5})	$\frac{(MPAP - PCWP) \times 79.90}{CO}$
PVRI	Pulmonary Vascular Resistance Index (dyn·sec·cm^{-5}•m^2)	PVRxBSA
LVW	Left Ventricular Work (kg·m)	COx(MAP-PCWP)x0.0136
LVWI	Left Ventricular Work Index (kg·m^2)	$\frac{LVW}{BSA}$
LVSW	Left Ventricular Stroke Work (g·m)	SVx(MAP-PCWP)x0.0136
LVSWI	Left Ventricular Stroke Work Index (g·m/m^2)	$\frac{LVSW}{BSA}$
RVW	Right Ventricular Work (kg·m)	COx(MPAP-CVP)x0.0136
RVWI	Right Ventricular Work Index (kg•m/m^2)	$\frac{RVW}{BSA}$
RVSW	Right Ventricular Stroke Work (g·m)	SVx(MPAP-CVP)x0.0136
RVSWI	Right Ventricular Stroke Work Index (g·m/m^2)	$\frac{RVSW}{BSA}$

NOTE

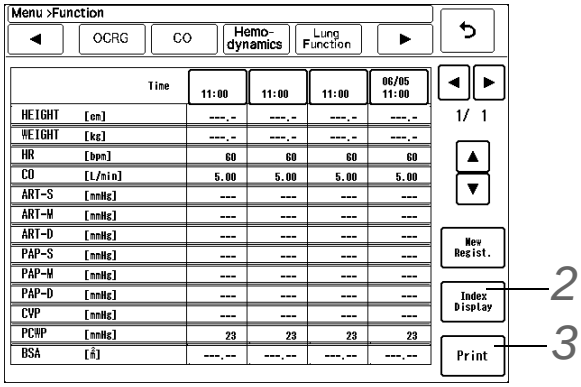
- The blood pressure unit for hemodynamics is "mmHg". If the unit is "kPa" or "cmH_2O", it will be converted to "mmHg" when calculating.

To Display/Print the Hemodynamics Data

10 hemodynamic data can be viewed in list format.

1 Press the [Menu], [Function], [Hemodynamics] keys.

▸ The hemodynamics screen will be displayed.



2 [Index Display] Key

The display will alternately switch between "BSA, SV, SVR, PVR, LVW, LVSW, RVW, RVSW" and "CI, SVI, SVRI, PVRI, LVWI, LVSWI, RVWI, RVSWI".

3 [Print] key

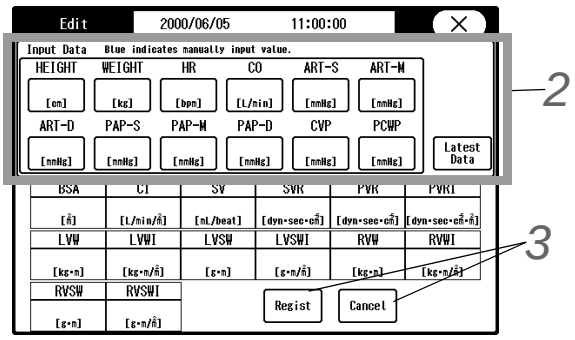
The currently displayed hemodynamic data will be printed.

New Input of Hemodynamics Calculation

The hemodynamics calculation can be performed using the newly entered data.
The data can be entered manually using the numeric keys or automatically using the current data.

1 Press the [Menu], [Function], [Hemodynamics], [New Regist.] keys.

▸ The "Edit" window will be displayed.



▸ The current time will be displayed at the upper area.

▸ Unmeasured data will be left blank.

2 Enter the calculation data.

1 Press the [Latest Data] key to display the measured data.

2 Press the key for the editing data to display the numeric keys.

3 Enter the value using the numeric keys.

4 Press the [Set] key, and the edited data will be displayed in blue.

NOTE

- If the height, weight, BSA is changed on the "Admit/Discharge" screen, average CI will be recalculated. However, the hemodynamic result will not be recalculated with the new average CI.

Input Data

Data	Item (Unit)	Editing Range
HEIGHT	Height (inch)	0 inch to 118.1 inch
WEIGHT	Weight (lbs)	0 lbs to 771.6 lbs
BSA	Body Surface Area (m^2)	0 m^2 to 9.99 m^2
CO	Cardiac Output (L/min)	0.00 L/min to 20.00 L/min
HR:	Heart Rate (bpm)	0 bpm to 350 bpm
ART S	Systolic Arterial Pressure (mmHg / kPa)	0 mmHg to 350 mmHg / 0 kPa to 46.6 kPa
ART M	Mean Arterial Pressure (mmHg / kPa)	0 mmHg to 350 mmHg / 0 kPa to 46.6 kPa
ART D	Diastolic Arterial Pressure (mmHg / kPa)	0 mmHg to 350 mmHg / 0 kPa to 46.6 kPa
PAP S	Systolic Pulmonary Artery Pressure (mmHg / kPa)	0 mmHg to 100 mmHg / 0 kPa to 13.3 kPa
PAP M	Mean Pulmonary Artery Pressure (mmHg / kPa)	0 mmHg to 100 mmHg / 0 kPa to 13.3 kPa
PAP D	Diastolic Pulmonary Artery Pressure (mmHg / kPa)	0 mmHg to 100 mmHg / 0 kPa to 13.3 kPa
CVP	Central Venous Pressure (mmHg / kPa)	0 mmHg to 100 mmHg / 0 kPa to 13.3 kPa
PCWP	Pulmonary Capillary Wedge Pressure (mmHg / kPa)	0 mmHg to 100 mmHg / 0 kPa to 13.3 kPa

3 Press the [Regist.]/[Cancel] key.

- [Regist.]: The calculation will be performed using the newly entered data, and the entered data and calculation result will be registered on the list.
- [Cancel]: The entered data will be deleted.

REFERENCE

- The calculation result will not be displayed if sufficient data is not entered.
- Maximum of 10 data can be registered. If exceeded, the oldest data will be deleted.
- The edited data will be also displayed in blue on the list.

To Edit the Hemodynamics Input Data

The input data which has been already calculated can be edited or deleted.

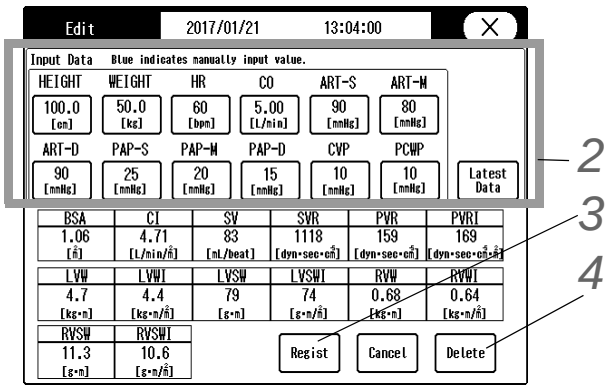
1 Press the [Menu], [Function], [Hemodynamics], and then the date/time display area for the data to edit.

- The "Edit" window will be displayed.

2 Edit the data.
(☞"New Input of Hemodynamics Calculation" P8-39)

3 Register the edited data.
(☞"New Input of Hemodynamics Calculation" P8-39)

4 Delete the data.



- Pressing the [Delete] key will display the "Delete" window.

Lung Function

This section explains the procedure for lung function calculation and printing.

Calculation Data

Data	Item	Formula
BSA	Body Surface Area (m^2)	$h^{0.725}xw^{0.425}x71.84x10^{-4}$
CaO_2	Arterial Oxygen Content (mL/dL)	$CaO_2=1.34xHbxSaO_2+0.003xPaO_2$
$C\bar{v}O_2$	Mixed Venous Oxygen Content (mL/dL)	$C\bar{v}O_2=1.34xHbxS\bar{v}O_2+0.003xP\bar{v}O_2$
a-vDO_2	Arteriovenous Oxygen Content Difference (vol %)	$a\text{-}vDO_2=CaO_2-C\bar{v}O_2$
DO_2	Oxygen Transport(mL/min)	$DO_2=CaO_2xCOx10$
DO_2I	Oxygen Transport Index(mL/min/m^2)	$DO_2I=CaO_2xCIx10$
$\dot{V}O_2$	Oxygen Consumption(mL/min)	$\dot{V}O_2=a\text{-}vDO_2xCOx10$
$\dot{V}O_2I$	Oxygen Consumption Index(mL/min/m^2)	$\dot{V}O_2I=a\text{-}vDO_2xCIx10$
O_2ER	Oxygen Extraction Rate (%)	$O_2ER=(CaO_2-C\bar{v}O_2)/CaO_2x100$
$AaDO_2$	Alveolar-Arterial Oxygen Difference (Torr)	$AaDO_2=P_AO_2-PaO_2$ $P_AO_2=P_IO_2-(P_ACO_2/R)x(1-F_IO_2x(1-R))$ R:Respiration Quotient (0.8 for this equipment) $P_IO_2=(P_B-47)xF_IO_2$
$\dot{Q}_s/\dot{Q}_t$	Shunt Rate (%)	$\dot{Q}_s/\dot{Q}_t=(C\acute{c}O_2-CaO_2)/(C\acute{c}O_2-C\bar{v}O_2)$ $C\acute{c}O_2=1.34xHb+0.003xP_AO_2$

REFERENCE

- The blood pressure unit for lung function calculation is "mmHg". If the unit is other than "mmHg", it will be converted to "mmHg" when calculating.

To Display/Print the Lung Function Data

256 lung function data can be viewed in list format.

1 Press the [Menu], [Function], [Lung Function] keys.

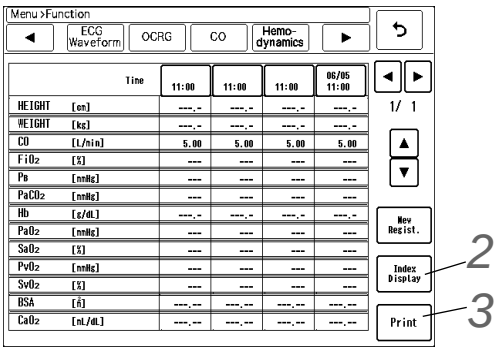
▸ The lung function list will be displayed.

2 [Index Display] Key

The display of BSA, CaO_2, CvO_2, a-vDO_2, DO_2, VO_2, O_2ER, $AaDO_2$, Qs/Qt will alternately switch with that of CI, DO_2I, VO_2I.

3 [Print] key

The currently displayed lung function data will be printed.

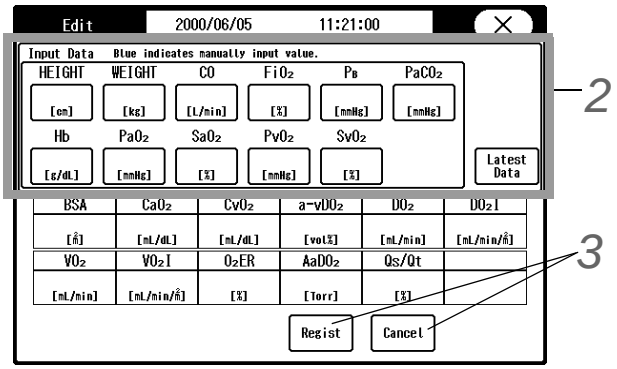


New Input of Lung Function Calculation

The lung function calculation can be performed using the newly input data.
The data can be entered manually using the numeric keys or automatically using the current data.

1 Press the [Menu], [Function], [Lung Function], [New Regist.] keys.

▸ The "Edit" window will be displayed.



2 Enter the calculation data.

1 Press the [Latest Data] key to display the entered data of HEIGHT, WEIGHT, CO.

2 Press the key for the editing data to display the numeric keys.

3 Enter the value using the numeric keys.

4 Press the [Set] key, and the edited data will be displayed in blue.

NOTE

- If the height, weight, BSA is changed on the "Admit/Discharge" screen, average CI will be recalculated. However, the lung function calculation result will not be recalculated with the new average CI.

Input Data

Data	Item (Unit)
HEIGHT	Height (cm)
WEIGHT	Weight (kg)
BSA	Body Surface Area (m^2)
CO	Cardiac Output (L/min)
FiO_2	Fraction of Inspiratory Oxygen (%)
P_B	Atmospheric Pressure (mmHg)
$PaCO_2$	Partial Pressure of Arterial Carbon Dioxide (mmHg)
Hb	Hemoglobin Concentration (g/dL)
PaO_2	Partial Pressure of Arterial Oxygen(mmHg)
SaO_2	Arterial Oxygen Saturation (%)
$P\bar{v}O_2$	Partial Pressure of Mixed Venous Oxygen (mmHg)
$S\bar{v}O_2$	Mixed Venous Oxygen Saturation (%)

3 Press the [Regist.]/[Cancel] key.

- [Regist.]: The calculation will be performed using the newly entered data, and the entered data and calculation result will be registered on the list.
- [Cancel]: The entered data will be deleted.

REFERENCE

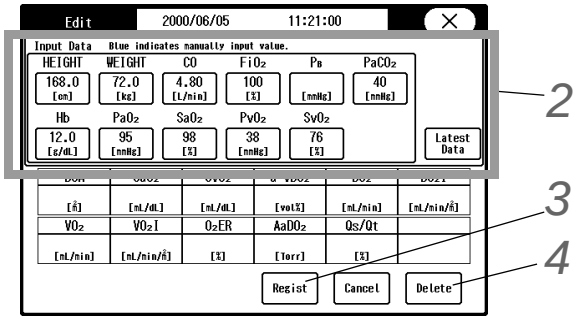
- The calculation result will not be displayed if sufficient data is not entered.
- Maximum of 256 data can be registered. If exceeded, the oldest data will be deleted.
- The edited data will be also displayed in blue on the list.

To Edit the Lung Function Input Data

The entered data which has been already calculated can be edited or deleted.

1 Press the [Menu], [Function], [Lung Function], and then the date/time display area for the data to edit.

- The "Edit" window will be displayed.



2 Edit the data.
(☞"New Input of Lung Function Calculation" P8-42)

3 Register the lung function list.
(☞"New Input of Lung Function Calculation" P8-42)

4 Delete the data.
(☞"New Input of Lung Function Calculation" P8-42)

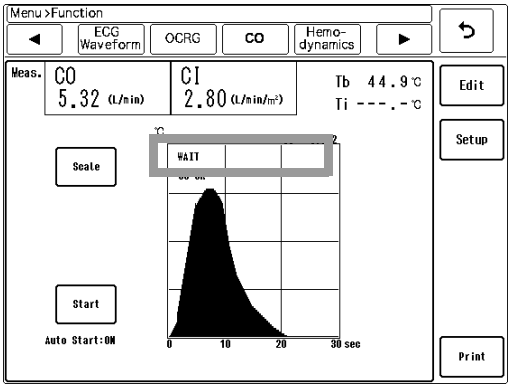
Cardiac Output (CO)

This section explains about the cardiac output measurement using the thermodilution method, setup procedure for catheter type, etc., and procedure for editing the measurement result.

To Display the CO Measurement Screen

1 Press the [Menu], [Function], [CO] keys.
Or, press the [Cardiac Output] key on the user key area.

- The CO measurement screen will be displayed.
- The message according to the status will be displayed, and if "READY" is displayed, the measurement can be started.
(☞"Cardiac Output Message" P11-16)



❑The Description of the CO Measurement Screen

1 Cardiac Output (CO)

2 Cardiac Index (CI)

3 Status Message

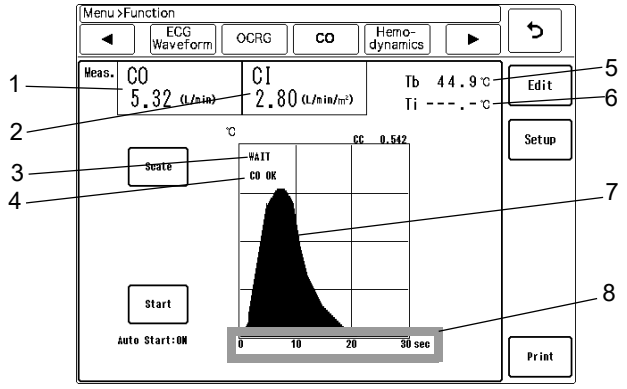
4 Result Status

5 Blood Temperature

6 Injectate Temperature

7 Thermodilution Curve

8 Time Scale



Cardiac Output Setup

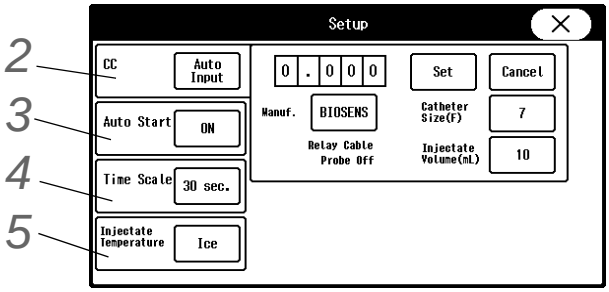
Before measuring the cardiac output, set the measurement condition such as ON/OFF of auto start, time scale for thermodilution curve, injection condition, etc.

1 Press the [Menu], [Function], [CO], [Setup] keys.

- The "Setup" window will be displayed.

2 Set the CC (Computation Constant) value.

- [Auto Input]: The computation constant will be automatically set according to the catheter size and the injection volume.



- [Manual Input]: The computation constant for the used catheter can be manually input with the numeric keys.

3 Set ON/OFF of "Auto Start".

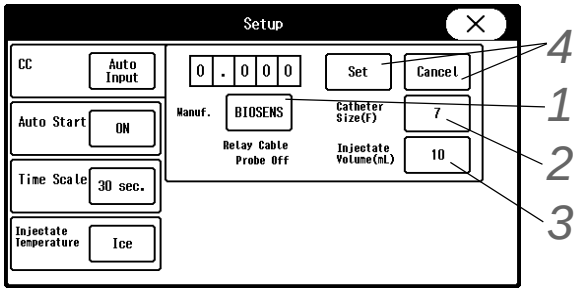
- [ON]: The measurement will automatically start when the injectate is injected.
  Even when [ON] is selected, the measurement can be manually started by pressing the [Start] key.
- [OFF]: The measurement will start by pressing the [Start] key.

4 Select [30 sec.]/[60 sec.] for "Time Scale".

5 When the CJ0-P01C-C2.4 Catheter Relay Cable is used, set the injectate temperature.

- [Ice]: The measurement will be performed at 0°C/32.0°F.
- [Room]: The measurement will be performed at room temperature of 24°C/75.2°F.

❑Auto Input of CC Value



1 Select the catheter manufacturer from [BIOSENS]/[ARGON]/[EDWARDS].

REFERENCE

- ARGON: Argon Medical Devices Japan, K.K. (formerly Becton, Dickinson and Company)
- The manufacturer name can be changed on "Catheter Manufacturer for CC Input" setting (Menu>Initial Settings>Meas.>Other).

2 Select the "Catheter Size (F) from [5]/[6]/[7]/[7.5].

3 Select the "Injectate Volume (mL)" from [3]/[5]/[10].

▸ When the above items are selected, the computation constant will be automatically set.

4 Press the [Input]/[Cancel] key.

▸ [Input]: The computation constant will be finalized.

NOTE

- If the CC value does not correspond to the used catheter, or to return to the previous CC value, press the [Cancel] key, and input the value manually.
- To automatically input the computation constant, the catheter relay cable needs to the connected.

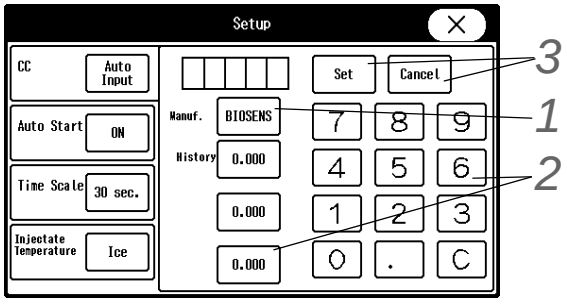
❑Manual Input of Computation Constant

1 Select the catheter manufacturer from [BIOSENS]/[ARGON]/[EDWARDS].

2 Up to 3 types of CC value can be programmed for each manufacturer.

▸ If previously entered value is present, press the key for "History".

▸ If the previously entered value is not present, enter the CC value using the numeric keys.



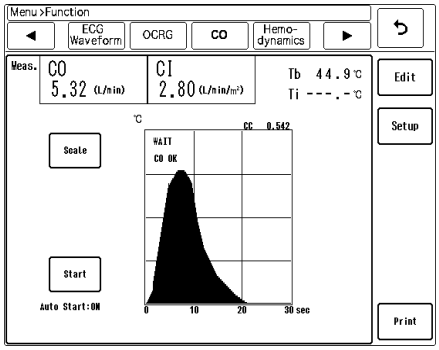
3 Press the [Input]/[Cancel] key.

▸ [Input]: The computation constant will be finalized.

CO Measurement

1 Press the [Menu], [Function], [CO] keys.

▸ The CO measurement screen will be displayed.



▸ The displayed message will change from "WAIT" to "READY".

NOTE

- While "WAIT" is displayed, the measurement cannot be started. Wait until "READY" is displayed.

2 Verify that "READY" is displayed, and press the [Start] key.

▸ Pressing the key will generate a sound.

3 Inject as soon as the sound generates.

▸ When the measurement is complete, CO and CI (Cardiac Index) value will be displayed.

REFERENCE

- If "Auto Start" is ON, the measurement will automatically start at injection by detecting the blood temperature.

4 Press the [Print] key.

▸ The displayed thermodilution curve, CO, CI value will be printed.

NOTE

- When "WAIT" message is continuously displayed, verify that catheter relay cable is properly connected to the cardiac output module, and thermodilution catheter is securely connected.
- Before injecting, check that the Ti (injectate temperature) setting is correct.
- When repeating the measurement, inject at intervals of 30 seconds to 60 seconds.
- The CI value will not be displayed unless height/weight or BSA value is entered on the "Admit/Discharge" screen.
  (☞"Entering the Patient Information" P5-1)
- For the following cases, measurements may be inaccurate.
  - Shunt disease, tricuspid regurgitation or pulmonic regurgitation.
  - During exercise stress
    As body temperature varies non-continuously and unevenly by exercise, constant CO value cannot be measured.

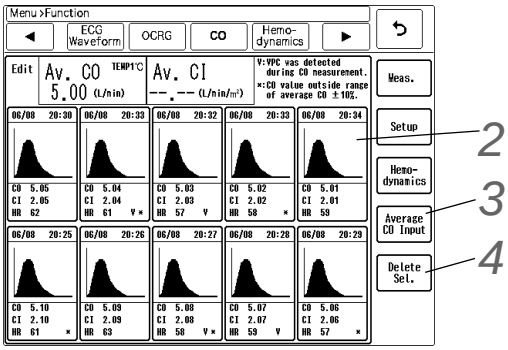
- Excessive Arrhythmia
  As blood volume varies non-continuously due to arrhythmia, accurate CO value cannot be measured.

To Edit the CO Measurement Result

The average CO and average CI can be calculated by performing the CO measurement continuously and editing the measurement result.

1 Press the [Menu], [Function], [CO], [Edit] keys.

- The CO measurement screen will be displayed.
- The average CO and average CI value obtained from the measurement result will be displayed.



2 To Change the Selected Status

The selected data for the average value will be displayed in blue.
Press the graph area to change the selected status.
V Mark: VPC detected during CO measurement.
*: CO value exceeding the average CO value ±10%.

3 [Average CO Input] Key

The displayed average CO value will be entered to the list.

NOTE

- If the height, weight, BSA is changed on the "Admit/Discharge" screen, average CI will be recalculated.
  As the CI will not be recalculated after the hemodynamic calculation, save the average CI by hemodynamic calculation before changing the height, weight, and BSA.

4 [Delete Sel.] key ([Delete] key)

The [Delete Sel.] key will change to [Delete] key, and the data can be deleted.
x mark will be displayed for the data to be deleted, and pressing the [Delete OK] key will delete the data.

Other Bed Display

This section explains about the function to display the waveform/numeric data and to set alarms for other bedside monitors.
The other bed alarm function generates the alarm sound for the other bed on this monitor. To use this function, wired network (DS-LAN II or DS-LAN III) connection is required.

⚠ CAUTION

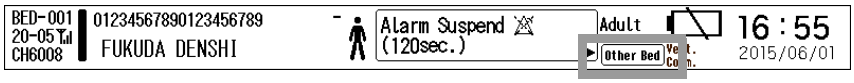
- On the DS-LANII network system, maximum of 3 monitors (including the central monitor) can display the data of this monitor using the other bed display function.
  However, there is no restriction of numbers for the DS-7000 series central monitors and DS-5700. These monitors will be counted as 1 monitor regardless of the numbers.
  Ex. 1) In case of 1 central monitor and 5 bedside monitors (A to E):
  The total number of monitors that can display the data of Bedside Monitor A is 3 monitors which consist of 1 central monitor and 2 out of 4 bedside monitors (B to E).
  Ex. 2) In case of 3 central monitors (DS-7000 series or DS-5700) and 5 bedside monitors (A to E):
  The total number of monitors that can display the data of Bedside Monitor A is 5 monitors which consist of 3 central monitors and 2 out of 4 bedside monitors (B to E).
- If the number of bedside monitors displaying the same bed exceeds the limit, the bedside monitor with smaller ID will be prioritized.

NOTE

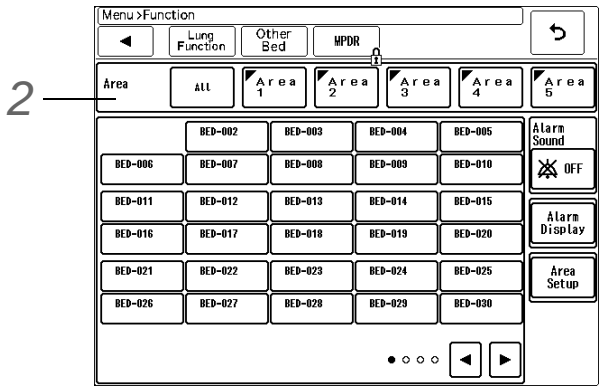
- This equipment cannot connect to a wired network of AU-5500N 8ch Recorder set as the administrator.
  Even if connected, other bed display, printing and other function cannot be used.

Other Bed Display/Alarm

The other bed display can be accessed from the menu or from the preprogrammed user key.
Also, by setting the other bed alarm to [ON], [Other Bed] will be displayed when other bedside monitor generates an alarm.



1 Press the [Menu], [Function], [Other Bed] keys.

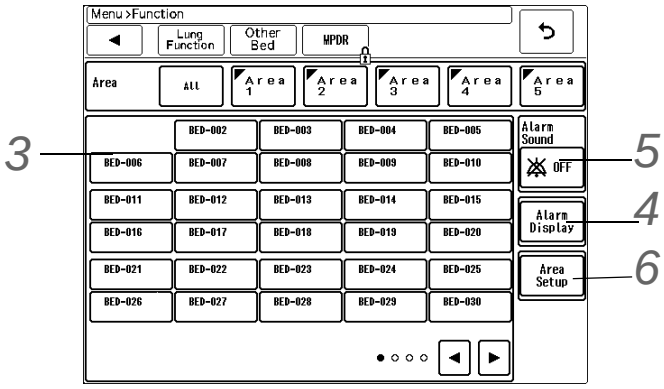


- On the other bed selection menu, select the bed to display from maximum of 100 beds (in case of DS-LAN III) connected to the wired network. The Room / Bed ID for the alarm generating bed will be displayed in red.The other bed alarm generating bed will be

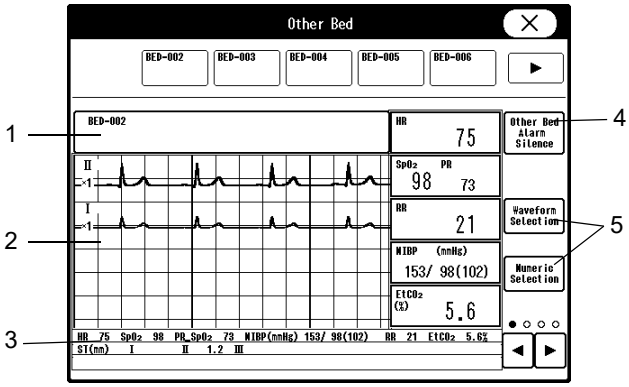
indicated by an icon ⚠ inside the Room/Bed ID key.

2 Select the area to be displayed.

- [All]: The beds for all the area connected to the network will be displayed.
- [Area 1 to 5]: The beds for the selected area will be displayed.



3 Press the Room / Bed ID key and access the display for the other bed.
Waveforms 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.



1 Message Area
The message for the other bed will be displayed.

2 Waveform Display Area
Maximum of 4 waveforms for the DS-LAN III network, and maximum of 2 waveforms for the DS-LAN II network can be displayed.

3 Numeric Data Area
The numeric data will be displayed at the right and bottom (if not enough space at the right) of the screen.

4 By pressing the [Other Bed Alarm Silence] key on the other bed display, the alarm sound for the displayed bed can be silenced.

5 Press the [Waveform Selection]/[Numeric Selection] key to select the waveform/numeric data.

- Select the displaying waveforms and numeric data.
- Waveform 1 is fixed as ECG, but other waveforms can be selected.
  Maximum of 4 waveforms for the DS-LAN III network, and maximum of 2 waveforms for the DS-LAN II network can be displayed.
  Select the waveform from the waveform selection window.

4 Set the other bed alarm.

Press the [Alarm Display] key to change the screen to other alarm setup mode. When the mode is changed, the [Alarm Display] key will be displayed in blue. To return to the original mode, press the [Alarm Display] key again.

Select the bed to generate the other bed alarm.

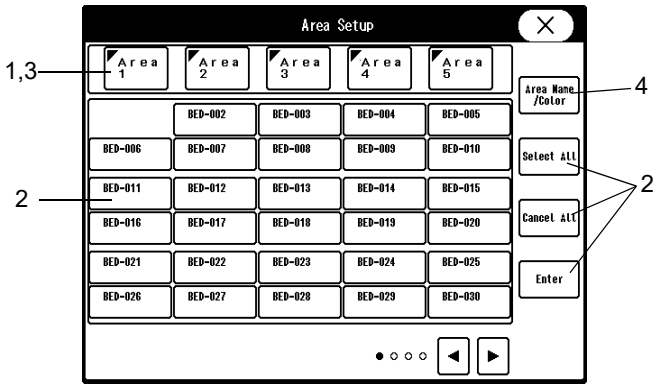
- Select the room/bed ID for the bed to generate the alarm. The selected bed will be indicated by blue frame. To cancel the selection, press the key for the bed again.
- [Select All], [Cancel All]: Selection/cancellation for all the beds can be performed at once.
- [Enter]: The selection will be finalized.

5 Turn ON the other bed alarm.

- [ON]: Other bed alarm will be generated.
- [OFF]: Other bed alarm will not be generated.

6 Set the area for other bed.

All the beds connected to the network can be displayed, but it is also possible to divide the beds by areas, which allows to display the beds by each area.



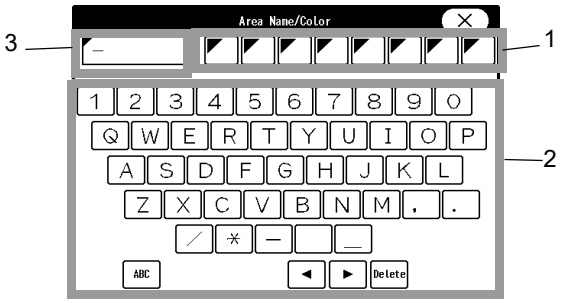
1 Press the key for "Area Setup" to change the screen to area setup mode. When the mode is changed, the key for selected area will be displayed in blue. To return to the original mode, press the key again.

2 Select the room/bed ID for the bed to assign to the area. The selected bed will be indicated by blue frame. To cancel the selection, press the key for the bed again.

- [Select All], [Cancel All]: Selection/cancellation for all the beds can be performed at once.
- [Enter]: The selection will be finalized.

3 Press the key for "Area Setup" to change the screen to area setup mode.

4 Press the [Area Name/Color] key.



1 Select the color to distinguish the area.
A triangle mark with the selected color will be displayed at the corner of the room/bed ID key.

2 Enter the area name using the numeric keys.

3 Maximum of 8 characters can be set for the area name.

MPDR

This section explains the operation and printing procedure of MPDR display.

The MPDR (Multiple Patient Data Review) is a function to monitor the data of current/discharged/transferring patients saved on the SD card.

By using the optional SD card (FSD-8GA/SD-16G), 240 hours of review data for the current/discharged patients can be saved. By using the FSD-8GA, 120 hours of full disclosure waveform data can be saved.

Refer to ☞"Using the External Media" P3-1 for procedure to use the SD card.

⚠ CAUTION

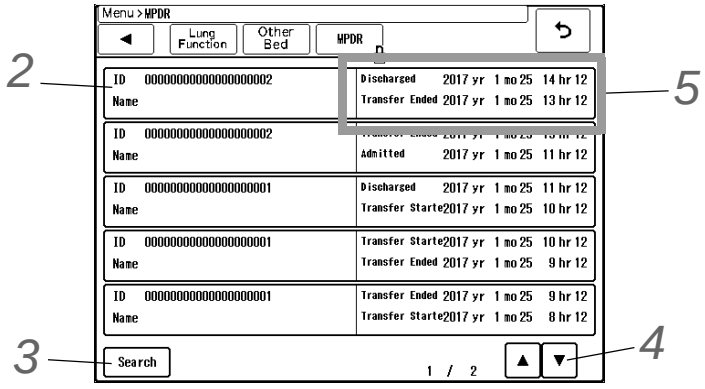
- This function may display the data of the patient other than the currently monitored patient.
- When using this function, make sure to discharge the previous patient before monitoring. Otherwise, the data cannot be distinguished between the previous patient and the current patient.
  Do not use the MPDR function if monitoring the current patient data. The latest data cannot be monitored.
- When <Reading Data> is displayed, MPDR data may not be displayed. To review the MPDR data, check that <Reading Data> is not displayed.
- If the discharge process is performed after the SD card is removed, and if the same SD card is inserted again, the previous and current patient data may become combined. If the SD card for full disclosure waveform data is used for monitoring, make sure to perform the discharge process before removing the SD card.

MPDR Data List (Patient Selection)

Select the patient data to display for the MPDR function.

1 Press the [Menu], [Function], [MPDR] keys.

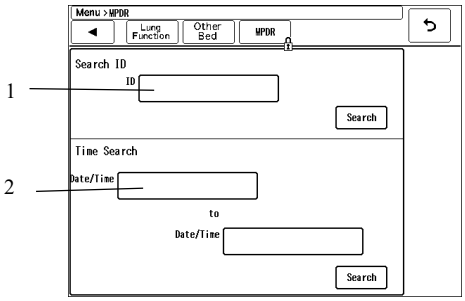
- The MPDR data list will be displayed.
- On the MPDR data list, the patient data saved on the SD card are listed by the date/time of admittance, discharge, transfer start/end. Multiple data lists may be present for the same patient if transferred.



2 On the data list, maximum of 256 data (5 data/1page) can be displayed.

- The data of discharged patient and the transferring data of currently monitored patient will be displayed.
- The transferring data is the data during the DS-8007 being disconnected from the DSA-81, DSA-82, or the DS-8400.
- Pressing the patient data area will display the review data selection screen. (☞"Review Data Display" P8-52)

3 The patient data can be searched within the saved time on the SD card. (shown on right)



- The patient data can be searched using the patient ID or time range.
- The searched result will be displayed on the MPDR data list.

1 Search Patient ID
Only exact match can be searched. Wildcard cannot be used.
If searched without entering the ID, the patient data with no patient ID will be searched.

2 Time Search
If the data is present for the specified time range, the searched result will be displayed. The data cannot be searched for the time range outside the saved time range on the SD card.

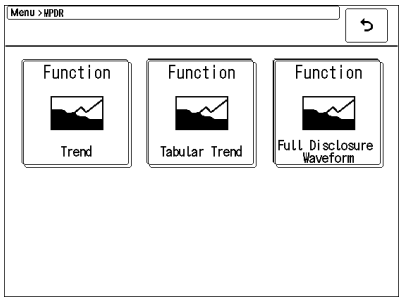
4 The page will be switched. 5 data per page will be displayed.

5 The time range for the patient data will be displayed.

- Discharged Date/Time: The discharged date/time of the patient will be displayed.
- Admit Date/Time: The date/time of the previous discharge process will be displayed. It is not the actual admitted date/time.
- Transfer End: The date/time of the patient being connected to the host monitor or AC unit will be displayed.
- Transfer Start: The date/time of the patient being disconnected from the host monitor or AC unit will be displayed.

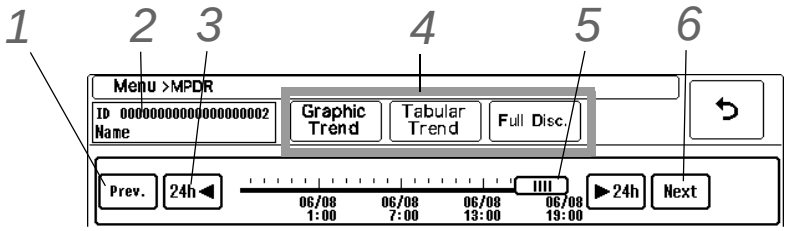
Review Data Display

Pressing the patient data area on the MPDR data list will display the review data selection screen.
The displaying review data can be selected from graphic trend, tabular trend, and full disclosure waveform.



❑Common Operation on the MPDR Display

The common operations on the MPDR display are explained below.



1 [Prev.]: The previous patient data on the MPDR data list will be displayed.

2 Patient Name Edit Key

The discharged patient information (ID and name) can be edited.

The edited data will be saved on the SD card.

⚠ WARNING

- When the name of the discharged patient is edited, be cautious not to mix up the patients.

3 The display can be switched in 4 hours to 48 hours interval.

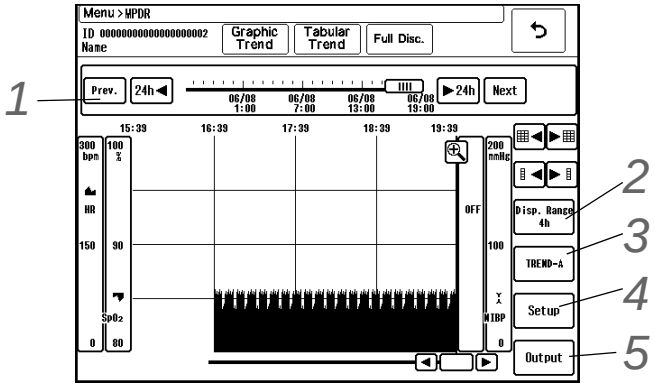
4 The display will switch to graphic trend/tabular trend/full disclosure waveform for the currently selected patient.

5 Indicates the displayed time range with the bar length.

6 [Next]: The next patient data on the MPDR data list will be displayed.

❑Graphic Trend (MPDR)

The MPDR graphic trend display is explained below.



1 Changing the displayed time, scrolling the time, updating the data

(☞"Common Operation on the MPDR Display" P8-53)

2 Set the display range.

3 Change the trend group.

4 Perform the setup for the graphic trend display.

REFERENCE

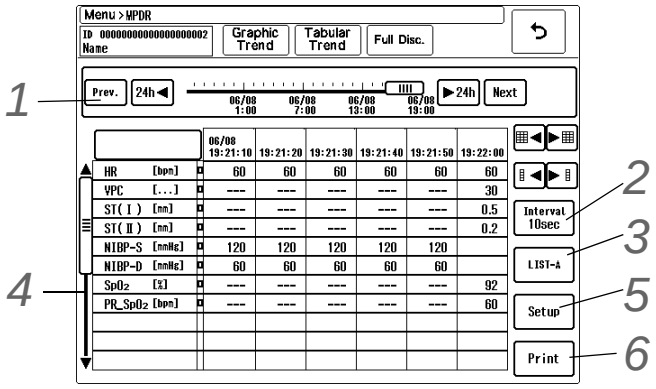
- The operation procedures for the display range, trend group, trend display setup are the same with that of the standard graphic trend display. (☞"Graphic Trend Setup" P8-6)

5 The data will be output to the selected destination.

- [Print]: The data will be printed according to the manual printing setting.
- [Upload]: The currently selected patient data will be uploaded to the central monitor.

❑Tabular Trend (MPDR)

The MPDR tabular trend display is explained below.



1 Changing the displayed time, scrolling the time, updating the data
(☞"Common Operation on the MPDR Display" P8-53)

2 Select the display interval.
[NIBP]: The tabular trend display interval will be according to the NIBP measurement time.

3 Change the trend group.

4 Scroll to display other parameters.

5 Set the parameters for the tabular trend.

REFERENCE

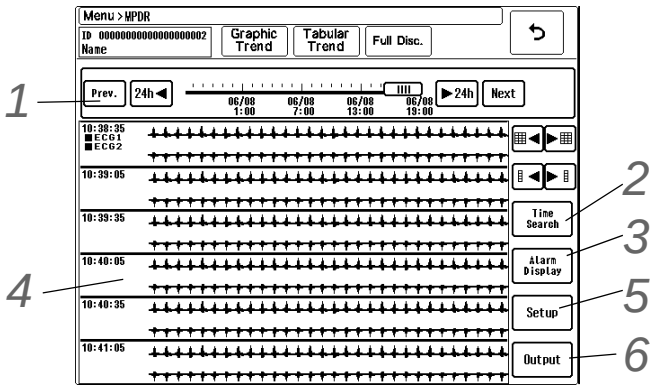
- The operation procedures for the display interval, trend group, parameter selection are the same with that of the standard tabular trend display. (☞"To Display/Print the Tabular Trend" P8-11)

6 The data will be output to the selected destination.

- [Print]: The data will be printed according to the manual printing setting.
- [Upload]: The currently selected patient data will be uploaded to the central monitor.

❑Full Disclosure Waveform (MPDR)

The MPDR full disclosure waveform display is explained below.



1 Changing the displayed time, scrolling the time, updating the data
(☞"Common Operation on the MPDR Display" P8-53)

2 The full disclosure waveform of the specified time can be displayed by using the time search function.

⚠ CAUTION

- The data will be searched within the admittance period of the patient selected on the MPDR data list.
  To search from the whole data range, use the search function on the MPDR data list display.
- When using the FDS-8GA, the data from 120 hours prior to the current time will be displayed. The data older than 120 hours will not be displayed.

3 The background color of the waveform at alarm occurrence can be changed.

4 The enlarged waveform (MPDR) will be displayed.

REFERENCE

- The operation procedure for the enlarged waveform is the same with that of the standard enlarged waveform. (☞"Zoom Wave" P8-21)

5 The quantity of displaying waveforms and display duration (sec.) per line for the full disclosure waveform can be set.

REFERENCE

- The operation procedures for the time search, alarm display, display setup are the same with that of the standard full disclosure waveform display. (☞"Full Disclosure Waveform" P8-35)

6 The data will be output to the selected destination.

- [Print]: The data will be printed according to the manual printing setting.
- [Upload]: The currently selected patient data will be uploaded to the central monitor.

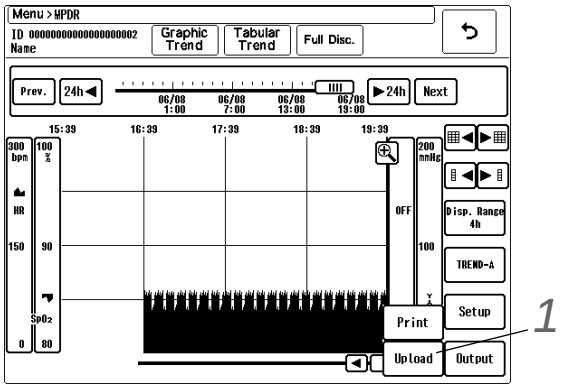
❑Uploading the MPDR Data

The data selected on the MPDR data list can be uploaded to the central monitor.
On the MPDR review display (graphic/tabular trend, full disclosure waveform), press the [Output] > [Upload] keys.

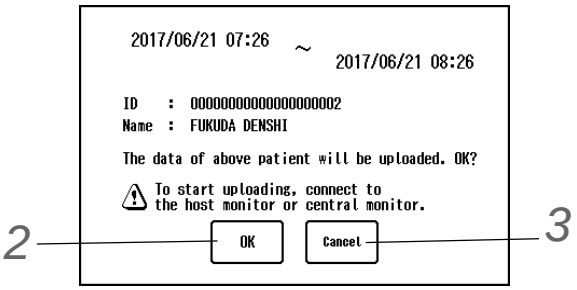
⚠ CAUTION

- To upload the data, the host monitor or central monitor needs to be compatible to this function. For the compatible central monitor, refer to your nearest service representative.
- The upload function is effective only when connected to the DS-LANIII network. Uploading is not possible when telemeter or TCON network is used.

1 On the MPDR review display (graphic/tabular trend, full disclosure waveform), press the [Output] > [Upload] keys.

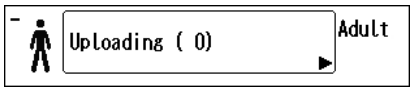


▸ A confirmation message will be displayed.



2 Press the [OK] key to start uploading the selected data.

▸ During uploading the MPDR data, the message shown on right will be displayed.
The remaining quantity of data to be uploaded will be displayed.



▸ If the host /central monitor is not connected on a wired network, pressing the [OK] key will suspend the uploading process, and once connected again, the uploading process will start automatically.

▸ Maximum of 2 data can be suspended.

3 Press [Cancel] to cancel the upload process.

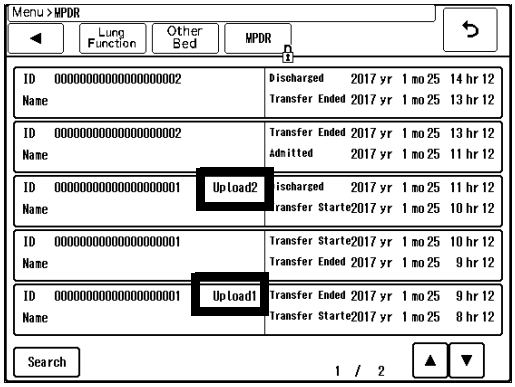
❑Canceling the Suspended Status of Upload Data

⚠ CAUTION

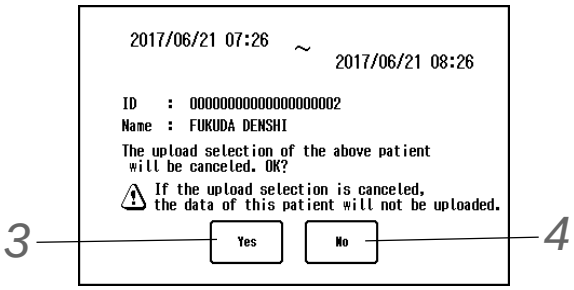
- Do not disconnect the DS-8007 from the DSA-81 or host monitor while <Uploading> is displayed. Otherwise, upload process cannot be completed.

The suspended status of MPDR upload data can be canceled if it is before starting the process.

1 On the MPDR data list, "Upload1" or "Upload2" will be displayed for the suspended data to be uploaded.



2 By selecting the data to cancel the upload suspended status, and pressing again the [Upload] key, a confirmation window will be displayed.



3 Make sure the data to cancel the upload process is correct, and press [Yes].
The suspended status will be canceled.

4 Selecting [No] will not cancel the suspended status.

Chapter 9 Printing

Chapter 9 Printing

Printing Setup

This section describes the procedure for printing and recording.
For the DS-8007 System, the following type of printing/recording can be performed.

- Manual Printing
- Automatic Printing (Periodic Printing)
- Automatic Printing (Alarm Printing)
- Freeze Printing
- Graphic Printing (Graphic Trend, Tabular Trend, Recall, etc.) (☞"Review Function" P8-1)
- USB Memory Recording
- ECG Waveform Printing

REFERENCE

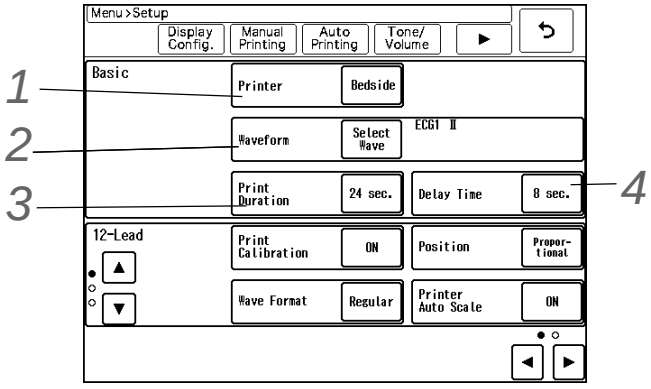
- The printed HR/PR data depends on the ECG/SpO2/BP selection for "Synchronized Mark/Tone" under [Menu>Parameter>ECG(SpO2/BP)]. (☞"Synchronized Mark/Tone Setup"7-9)
- Under the following condition, the amplitude value will be printed for the ECG calibration waveform.
  *[Bar (10mm)] is set for "Waveform Size Display" under [Initial Settings>User I/F>Display/Print].
  *[ON] is set for "Print Calibration" under [Setup>Manual Printing>Common Setup] or [Setup>Manual Printing>12-Lead].

1 Press the MENU (fixed key), [Setup], [Manual Printing] or [Auto Printing] keys.

▸ The manual printing or automatic printing setup screen will be displayed.

Manual Printing (Basic)

The manual printing can be set to start from the time the key is pressed, or 8 sec./16 sec. prior to the time the key is pressed.
Also, the printing can be set to automatically stop after 24 seconds, or continue to print until the "Print Start/Stop" key is pressed again.
The printer can be selected from bedside monitor printer or central monitor printer.



1 Printer

[Bedside]: Data will be printed on the bedside monitor printer.

[Central]: Data will be printed on the central monitor printer.

2 Waveform

On the "Select Wave" window, 3 waveforms can be selected for printing.
The key for the selected waveform will be displayed in blue.

3 Print Duration

[24sec.]: Printing will automatically stop after 24 seconds.
[Cont.]: Printing will continue until the [Print Start/Stop] key is pressed again or until paper runs out.

4 Delay Time

[None]: Printing will start from the point the [Print Start/Stop] key is pressed.
[8 sec.] / [16 sec.]: Printing will start 8 sec. or 16 sec. prior from the point the [Print Start/Stop] key is pressed.

NOTE

- If [None] is selected for the manual printing delay time, QRS classification symbol will not be printed. To print the QRS symbol, set the delay time to [8 sec.] or [16 sec.].

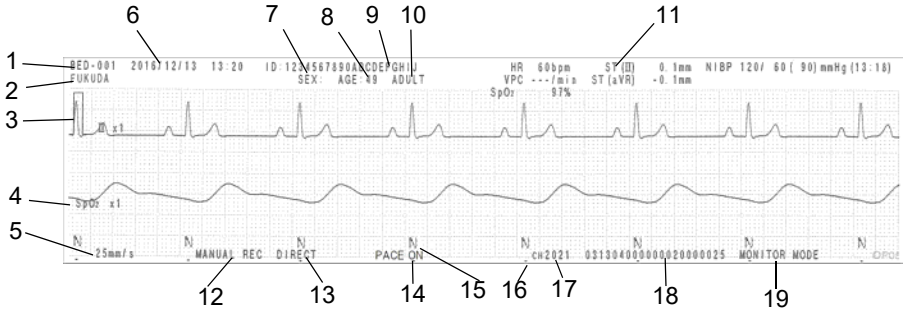
❑To Start/Stop the Printing

1 Press the [Print Start/Stop] (user key) or PRINT START/STOP (fixed key).

- Pressing this key during periodic printing, alarm printing, graphic printing, or recall printing will cease the printing in process.
- Inside the [Print Start/Stop] key, the output printer status for manual printing will be displayed.

Message	Description
None	Normal Operation
PAPER OUT	There is no thermal paper.
CASSETTE	Check the cassette.
CHECK?	Other abnormality is found.

❑Example of Manual Printing



1	Bed ID
2	Patient Name
3	Waveform Type, Lead, Size
4	Waveform Type, Scale
5	Paper Speed
6	Print Duration
7	Sex
8	Age
9	Patient ID
10	Patient Classification

11	Numeric Data (Value at the beginning of the waveform)
12	Printing Mode
13	Delay Time
14	Pacemaker
15	QRS Classification
16	R Wave Trigger Mark
17	Telemetry Channel
18	Equipment Setting ID (Refer to the next table.)
19	Filter Mode

The 21-digit number printed at the bottom of the paper indicates the settings of the equipment. At the 14th digit from the left, filter setting (AC filter, drift filter) is printed in hexadecimal number.

0 0 0 0 0 0 0 0 0 0 0 0 0 **0** 0 0 0 0 0 0 0

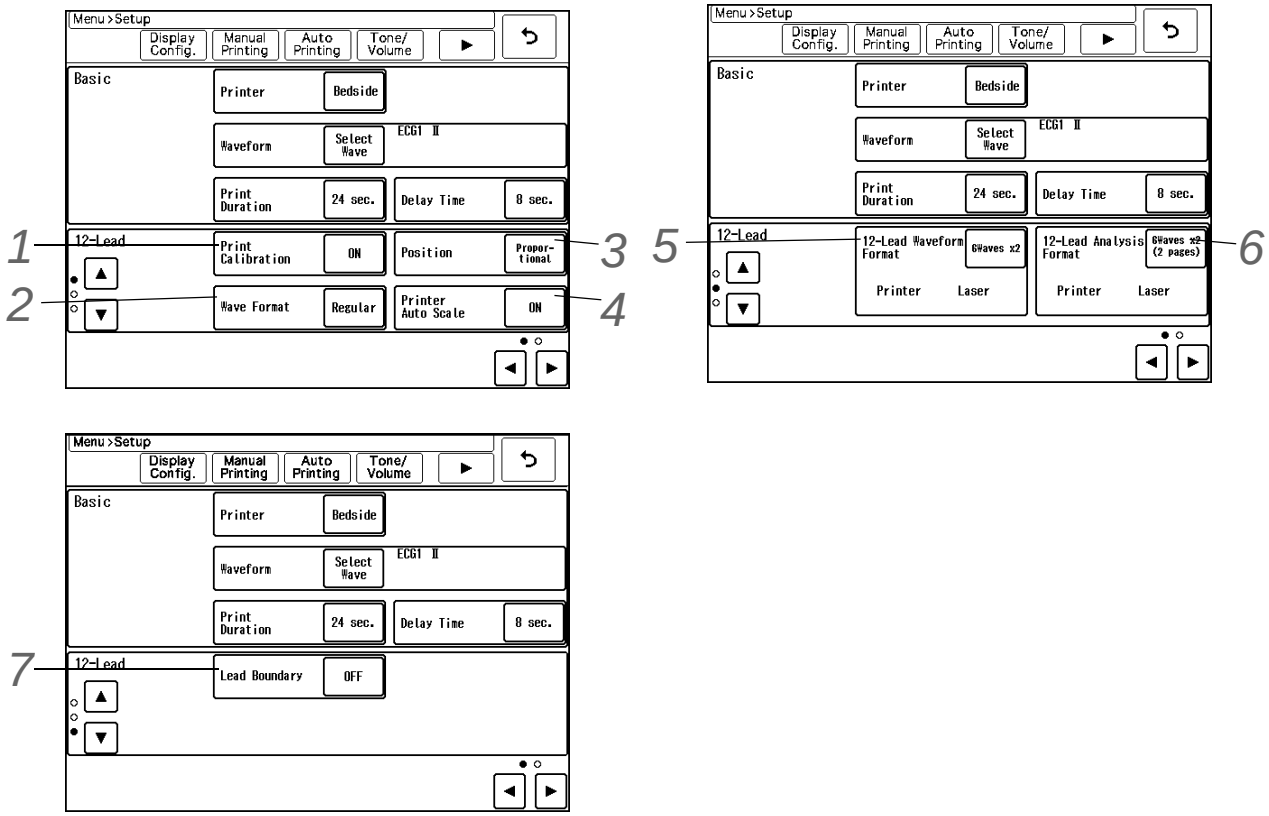
0	
1	
2	AC Filter ON
3	AC Filter ON
4	
5	
6	AC Filter ON
7	AC Filter ON

8		Drift Filter ON
9		Drift Filter ON
A	AC Filter ON	Drift Filter ON
B	AC Filter ON	Drift Filter ON
C		Drift Filter ON
D		
E	AC Filter ON	Drift Filter ON
F	AC Filter ON	Drift Filter ON

Filter setting is OFF for the numbers in blank.

Manual Printing (ECG Waveform)

The monitoring ECG waveform can be printed on the bedside printer.The delay time is 6 seconds. The ECG waveform cannot be printed on the central monitor printer.



1 Print Calibration

[ON]: Calibration waveform will be printed.
If [Bar (10mm)] is set for "Waveform Size Display" under [Initial Settings>User I/F>Display/Print], the amplitude value corresponding to the displayed waveform size will be printed.

[OFF]: Calibration waveform will not be printed.

2 Waveform Format

[Regular]: Printing will start from the limb leads. (In the order of I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5, V6)

[Reverse]: Printing will start from the chest leads. (In the order of V1, V2, V3, V4, V5, V6, I, II, III, aVR, aVL, aVF)

3 Position

[Center]: Equalizes the printing width of each lead so that the waveform baseline will be at the center. The printing scale of the waveform will be also automatically adjusted.

[Proportional]: Equalizes the blank space between each lead to avoid overlapping of the waveforms. The printing scale of the waveform will be also automatically adjusted.

[OFF]: Waveform position will not be adjusted when printing.

4 Printer Auto Scale

When position adjustment is [OFF], select whether or not to automatically adjust the scale.

NOTE

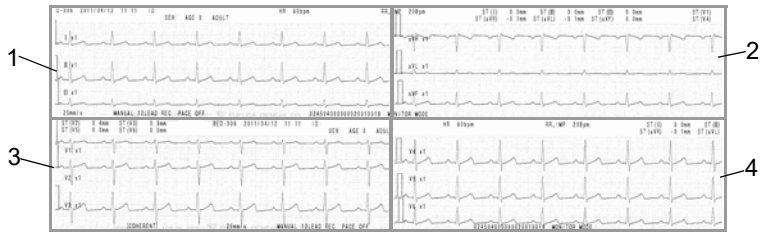
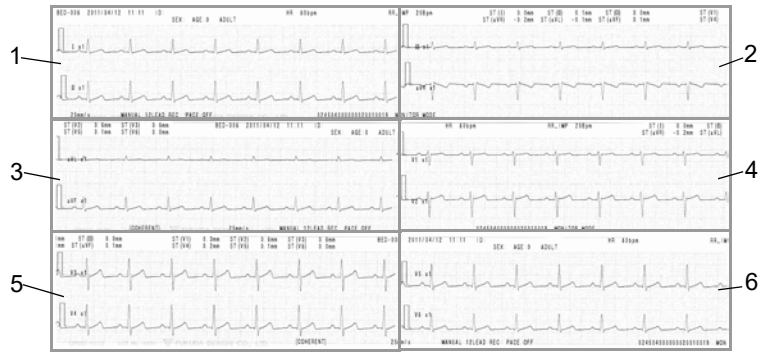
- The printer scale will be adjusted in the range of x1, x1/2, x1/4. It will not be adjusted to x2 or x4 even if the amplitude is small.

[ON]: Printing scale will be automatically adjusted.

[OFF]: Printing will be performed with the displayed scale.

5 12-Lead Waveform Format

For Bedside Monitor Printer: Select from [3Wavesx4]/[2Wavesx6].

Output Example	Waveform Layout	Length of Each Waveform
3 waves x 4 	First column: I,II,III Second column: aVR, aVL, aVF Third column: V1, V2, V3 Fourth column: V4, V5, V6	10 sec.
2 waves x 6 	First column: I,II Second column: III, aVR Third column: aVL, aVF Fourth column: V1, V2 Fifth column: V3, V4 Sixth column: V5, V6	10 sec.

For Laser Printer: Select from [3Wavesx4]/[6Wavesx2]/[3Wavesx4+Rhy.]/[12Waves].

6 12-Lead Analysis Format

For Bedside Monitor Printer: The format is fixed as [3Wavesx4].

For Laser Printer: Select from [6Wavesx2 (2 pages)]/[6Wavesx2 (1 page)]/[3Wavesx4+Rhy. (1 page)].

REFERENCE

- The output printer for the 12-lead waveform and 12-lead analysis result can be selected under [Manual Printing>Other Setup>Graphic Printing].

7 Print Lead Boundary

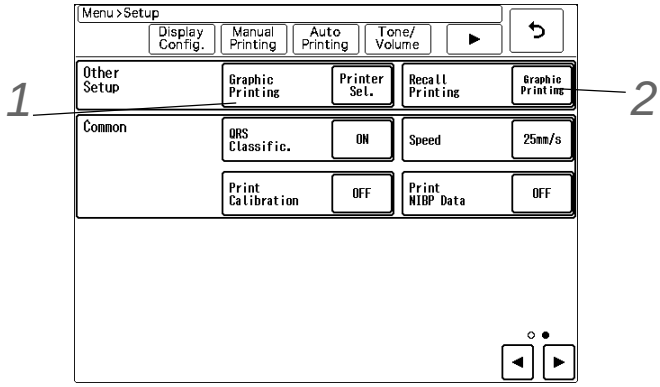
This setting is available only when [Laser] is set for "12-Lead Waveform" or "12L Analysis Result" under [Manual Printing>Printer Sel. "Graphic Printing"].

[ON]: Lead boundary between the leads will be printed.

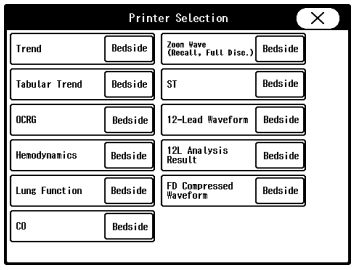
[OFF]: Lead boundary will not be printed.

Manual Printing (Other Setup)

Select the printer for graphic printing and recall printing.
Graphic printing is a printing performed from the data review screen such as graphic trend and tabular trend.



1 Press the [Printer Sel.] key for "Graphic Printing" to select the printer.



- [Bedside]: Data will be printed on the bedside monitor printer.
- [Central]: Data will be printed on the central monitor printer.
- [Laser]: Data will be printed on the laser printer connected to the central monitor.

REFERENCE

- To select the laser printer, it is necessary to select [DS-LAN] for "Network Printer" under [Menu > Setup > Initial Settings > External Device > Network] in advance.
  (☞Maintenance Manual "Laser Printer Setup" P4-13)

2 Recall Printing

- [Graphic Printing]: Recall enlarged waveform will be output on the printer selected for "Graphic Printing".
- [Manual Printing]: Recall enlarged waveform will be output on the printer selected for "Printer" under "Basic".

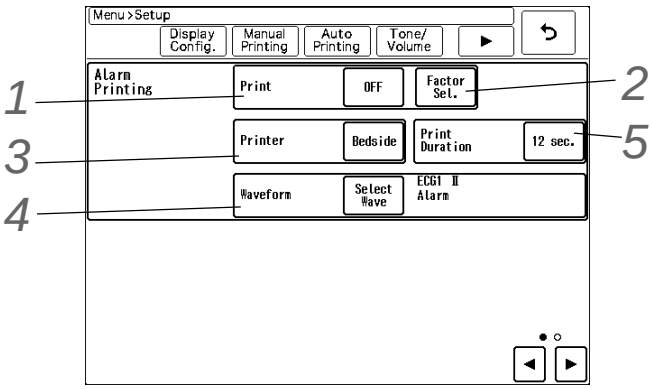
Automatic Printing (Alarm Printing)

The data will be automatically printed at occurrence of numeric alarm or arrhythmia alarm.

NOTE

- The alarm detection is performed each second, and if more than one alarm occurs at the same time, one data will be stored according to the alarm priority.
- Maximum of 3 alarm data can be stored. If more than 3 alarms generate, the higher priority alarm will replace the previously stored lower priority alarm. The stored data will be deleted once it is printed.
- Priority of alarm printing factor ;
  ASYSTOLE > VF > VT > Ext Tachy > Ext Brady > SLOW VT > TACHY > BRADY > RUN > HR (HR / PR_SpO_2 / PR_IBP) > APNEA > BP1 (or ART) > SpO_2 > NIBP > RR (RR_IMP / RR_GAS) > $EtCO_2$ > $InspCO_2$ > PAUSE > TRIPLET > COUPLET > R ON T > MULTIFORM > VENT RHYTHM > BIGEMINY > TRIGEMINY > FREQUENT > SVT > IRREGULAR RR > PROLONGED RR > S FREQUENT > S COUPLET > VPC > SVPC > NOT CAPTURE > NOT PACING > BP2 > ST > TEMP > Tb > SpCO > SpMet > SpHb > RR_SpO_2 > BIS

Press the MENU (fixed key), [Setup], [Auto Printing] keys to set the alarm printing condition.

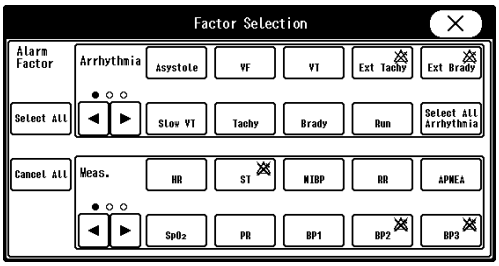


1 Alarm Printing

[ON]: Printing will automatically start at alarm occurrence.

[OFF]: Printing will not start at alarm occurrence.

2 Alarm Factor Selection



The "Factor Selection" window will be displayed. The selected alarm factor key will be displayed in blue.
The alarm OFF mark will be displayed inside the key for the parameter in alarm OFF condition.
[Select All Arrhythmia]: All arrhythmia factors will be selected.
[All ON]: All alarm factors will be selected.
[All OFF]: All selections for the alarm factor will be canceled.

3 Printer

[Bedside]: Data will be printed on the bedside monitor printer.

[Central]: Data will be printed on the central monitor printer.

4 Waveform

(☞"Manual Printing (Basic)" P9-1)

[Alarm]: Prints the waveform of the alarm factor.

5 Print Duration

(☞"Manual Printing (Basic)" P9-1)

NOTE

- The delay time differs depending on the print duration.

Print Duration	Delay Time			
	Adult	Child	Neonate	
			Numeric Data Alarm	Arrhythmia Alarm
12 sec.	12 sec.	12 sec.	8 sec.	12 sec.
24 sec.	16 sec.	16 sec.	16 sec.	16 sec.

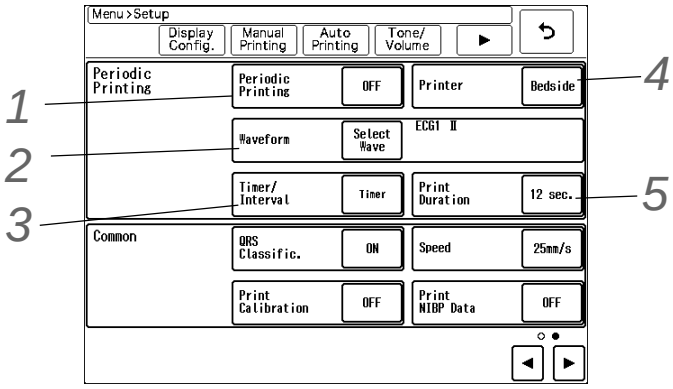
Automatic Printing (Periodic Printing)

The printing will be automatically performed with the selected interval.

NOTE

- If the periodic printing is interrupted due to paper out, etc., the latest periodic printing will be performed when the printing is resumed.
- QRS classification symbol will not be printed for periodic printing.

Press the MENU (fixed key), [Setup], [Auto Printing], ▶ keys to set the periodic printing condition.



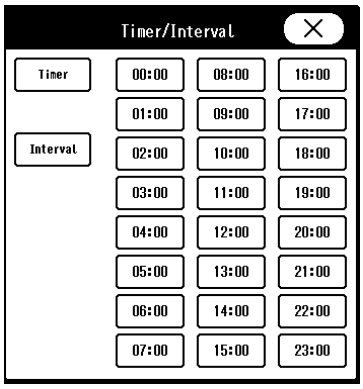
1 Periodic Printing

[ON]: Printing will automatically start at fixed interval.

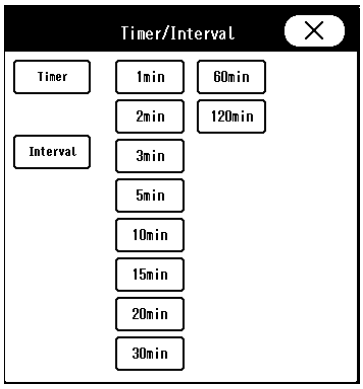
[OFF]: Turns OFF the periodic printing function.

2 Waveform (☞"Manual Printing (Basic)" P9-1)

3 Timer/Interval for Periodic Printing



Display Example for "Timer"



Display Example for "Interval"

[Timer]: Printing will automatically start at selected time.

[Interval]: Printing will automatically start at selected interval.

REFERENCE

- If [5 min.] is selected for [Interval], the time will be displayed in real time such as 10:00, 10:05, ...10:25.If [60 min.] is selected, it will be displayed as 10:00, 11:00, 12:00.

4 Printer

[Bedside]: Data will be printed on the bedside monitor printer.

[Central]: Data will be printed on the central monitor printer.

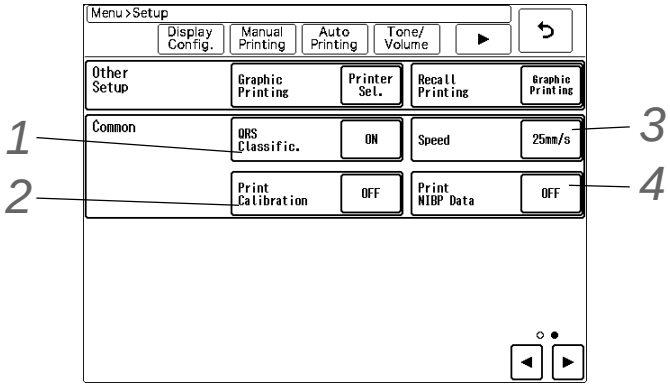
5 Print Duration

The printing will automatically stop after the selected duration.

Common Setup for Printing

The printing condition common for manual printing and automatic printing can be set.

Press the MENU (fixed key), [Setup], [Manual Printing] or [Auto Printing], ▶ keys to set the printing condition.



Display Example for Manual Printing

1 QRS Classification

[ON]: QRS classification symbol will be printed with 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 unmatched beat

[OFF]: QRS classification symbol will not be printed.

NOTE

- The QRS symbol cannot be printed for manual printing if the "Delay Time" is set to [None], and for periodic printing. To print the QRS symbol, set the "Delay Time" to [8 sec.] or [16 sec.] for manual printing.

2 Print Calibration

[Top]: Calibration waveform will be printed at the beginning of the waveform.

[Each Page]: Calibration waveform will be printed in 18.75 cm interval.

[OFF]: Calibration waveform will not be printed.

3 Printing Speed

[25mm/s]: The printing speed will be set to 25 mm/s.

[50mm/s]: The printing speed will be set to 50 mm/s.

4 Print NIBP Data

[ON]: Oscillation graph and NIBP data will be printed after the waveform.

[OFF]: Oscillation graph and NIBP data will not be printed.

Freeze Printing

The waveform trace can be suspended and printed from 12 seconds prior to the point the waveform trace was stopped.
The waveform selected for manual printing will be printed. The print duration is 12 seconds.
To freeze the waveform display, the [Freeze] key needs to be assigned as user key.
(☞"To Configure the Display" P10-4)

1 Press the [Freeze] key on the user key.

▸ The waveform trace will stop.

2 Press the [Print Start/Stop] key.

▸ Freeze printing will be output on the HR-800 connected to this equipment.

USB Memory Recording

When a USB memory is connected, the screen shot of the home display can be saved on the USB memory by pressing the [Print Start/Stop] (user key) or PRINT START/STOP (fixed key).

1 Press the [Print Start/Stop] (user key) or PRINT START/STOP (fixed key).

- The screen shot of the point when the key is pressed will be saved.

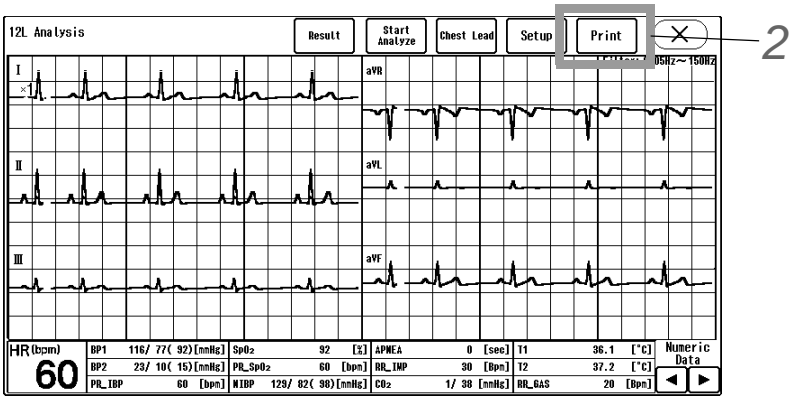
NOTE

- The data saved on the USB memory can be viewed/printed on the PC. The data saved on the USB memory cannot be viewed on this equipment.

ECG Waveform Printing

The ECG waveform can be printed by pressing the [Print] key on the 12-lead analysis screen or ECG waveform screen.

1 Press the [Menu], [Function], [ECG Waveform] keys to display the ECG waveform screen.



2 Press the [Print] key.

- Printing will start.
- The printing duration of the waveforms for each format are as follows.

	Printing Format	Printing Duration	Delay Time
When printed on the HR-800 (“Printer” selection: [Bedside])	3 waves x 4	10 sec.	6 sec.
	2 waves x 6		
When printed on the laser printer (“Printer” selection: [Laser])	3 wavesx4*1	2.5 sec.	10 sec.
	6 wavesx2*1	5 sec.	
	3 wavesx4+Rhythm*1	12.5 sec.	
	12 waves*2	10 sec.	

*1: [CONTINUOUS]: The waveform output will be in the time sequence of waveform block order.

*2: [COHERENT]: The waveform output will be in the same time phase for all waveforms.

NOTE

- The output printer for the ECG waveform can be selected under [Manual Printing>Other Setup>Graphic Printing>12-Lead Waveform]. (☞"Manual Printing (Other Setup)" P9-6)
- The printing format can be selected under [Manual Printing>12-Lead>Wave Format]. (☞"Manual Printing (ECG Waveform)" P9-4)

Chapter 10 System Configuration

Chapter 10 System Configuration

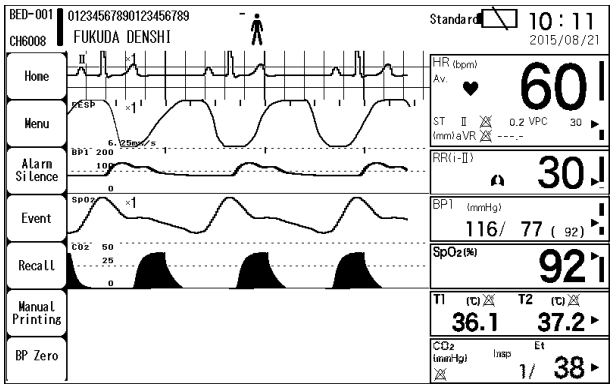
Display Configuration

This section describes about the display configuration type and the procedure to configure the display.
The waveform/numeric data display can be configured according to the monitoring purpose.
The layout of configuring the numeric data to side and bottom, side only, or bottom only can be selected.
When configuring the numeric data to side, right side or left side can be also selected.
When ECG cascade or block cascade is selected, a full disclosure waveform can be displayed.

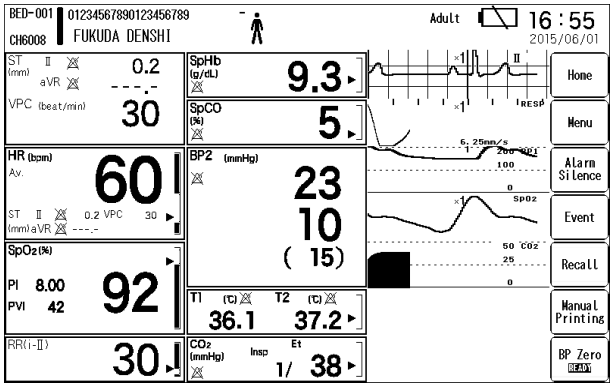
⚠ CAUTION

- The display configuration set on this menu will not be registered on the display mode.When the display mode is changed, the display will change to the configuration registered on the display mode.To apply the set display configuration using the [Display] key on the user key area, it needs to be registered on the display mode.
  (☞Maintenance Manual "User Mode Registration" P5-23)

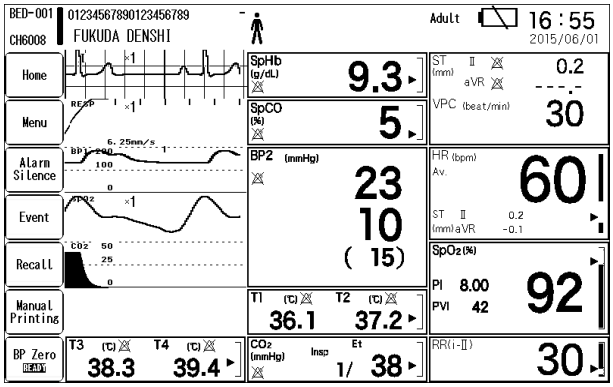
❑Example on DS-8007



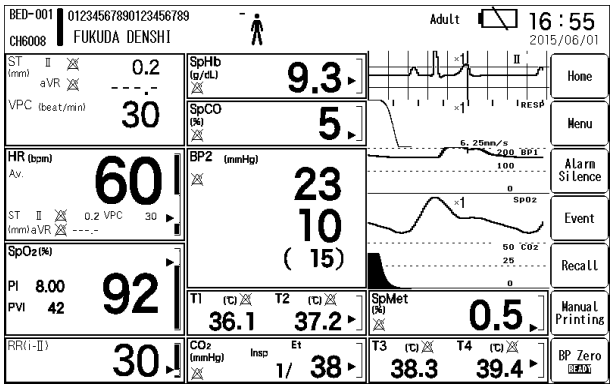
Numeric Data: Right (1 column)



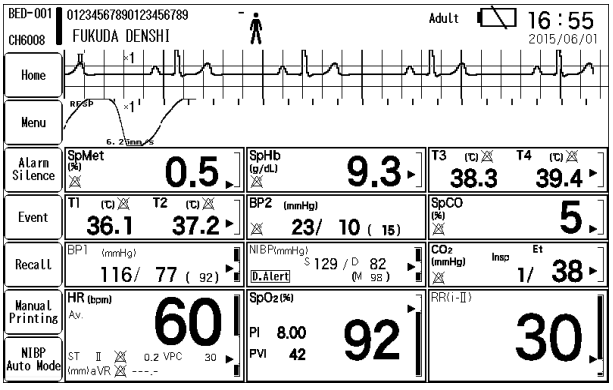
Numeric Data: Left (2 columns)



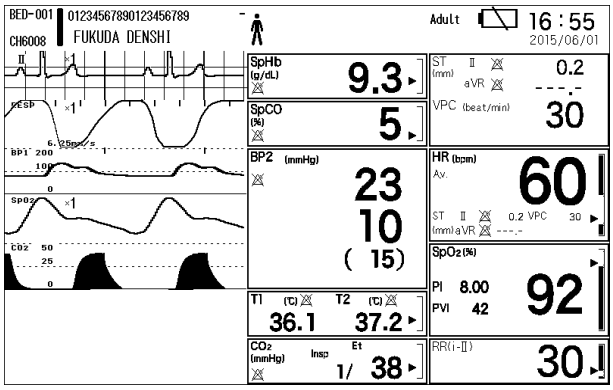
Numeric Data: Right (2 columns) + Bottom (1 row)



Numeric Data: Left (2 columns) + Bottom (2 rows)



Numeric Data: Bottom (5 rows)



User Key Hidden

6 monitor modes can be preprogrammed according to the monitoring purpose.
By registering the configuration to each mode, the display configuration setups at admittance of patient can be simplified by just selecting one of the modes.
(☞"User Mode" P5-8)
(☞Maintenance Manual "User Mode Registration" P5-23)
It is recommended to program the mode in rough classification such as patient's condition, monitoring purpose (ICU or surgery), and if necessary, perform unique setup for each patient.

Numeric Data Selection

The numeric data to be displayed can be selected on the "Numeric Data Selection" window.
The parameters of the "Numeric Data Selection" window can be assigned to the numeric data box on the home display.
(☞"Displayed Items" P3-5)

The Numeric Data Box Size for Each Parameter

Numeric Data	Size									
	Width*1	W1			W2					W3*3
	Height*2	H1	H2	H3	H1	H2	H3	H4	H5	H5
HR/PR		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
HR		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
PR_SpO_2		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
PR_IBP		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
VPC, PACE		Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
ST, VPC		Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
ST-A, ST-B, ST-C		Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
BP1 to BP4		Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
NIBP		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NIBP List		Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
SpO_2		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SpO_2, PR_SpO_2		Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
SpCO		Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
SpMet		Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
SpHb		Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
RR_IMP, RR_GAS, RR_SpO_2		Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
T1 to T6, Tb		Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
T1/T2, T3/T4, T5/T6		Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
ΔTEMP-A, ΔTEMP-B, ΔTEMP-C		Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
CO_2		Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
STOPWATCH		Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
Sp*		Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
BIS		Yes	Yes	Yes	Yes	Yes	Yes	No	No	No

*1: W1 is about 46 mm, W2 is about 91 mm, W3 is about 137 mm

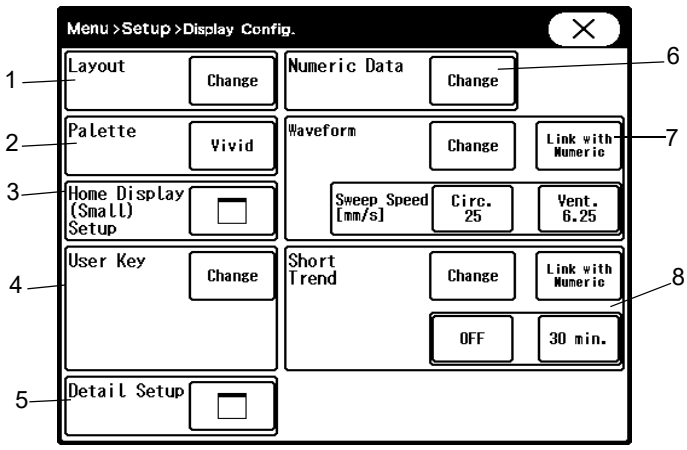
*2: H1 is about 11 mm, H2 is about 23 mm, H3 is about 34 mm, H4 is about 46 mm, H5 is about 57 mm (H1 is the same length as waveform areax2.)

*3: W3 size can be set only for "Numeric Data/Bottom" layout.

To Configure the Display

1 Press the [Menu], [System Config.], [Display Config.] keys.

▸ The display configuration menu will be displayed.



1 Layout
(☞"Changing the Layout" P10-4)

2 Palette
(☞"Detail Setup" P10-10)

3 Home Display (Small) Setup
(☞"Home Display (Small) Setup" P10-8)

4 User Key
(☞"User Key Setup" P10-9)

5 Detail Setup
(☞"Detail Setup" P10-10)

6 Numeric Data
(☞"Changing the Displayed Numeric Data" P10-5)

7 Waveform, Sweep Speed
(☞"Changing the Displayed Waveform" P10-6)

8 Short Trend
(☞"Short Trend Display" P10-7)

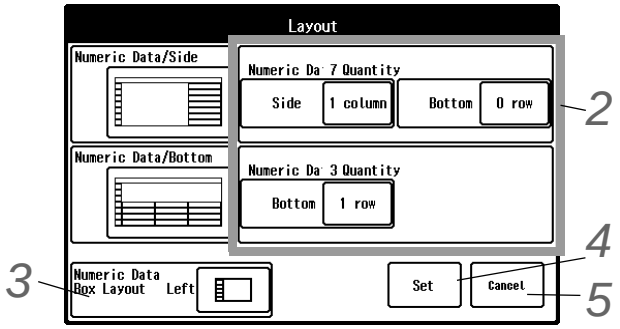
❑Changing the Layout

Change the layout.

1 Press the [Change] key for "Layout" to display the "Layout" menu.

2 Select the quantity of columns/rows for the numeric data boxes to be displayed at side/bottom.

3 When configuring the numeric data box to side, select the side from right or left.



4 Press the [Set] key, and check the home display if it is properly displayed with the selected layout.

NOTE

- The displayed parameters will be automatically located with the selected layout.

5 If not changing the layout, press the [Cancel] key.

❑Adjusting the Layout Automatically

The display layout will be always automatically adjusted.

The measured parameters will be automatically located based on the set display configuration. If the measured parameter is not set to be displayed, it will be located according to the parameter priority.
If the measured parameters are less than the parameters set to be displayed, numeric data box will be displayed enlarged.

If there is not enough space to display all parameters, the display layout will change.

NOTE

- The waveform layout can be selected from [Link with Numeric] and [User Setup].
  [Link with Numeric] will set the same layout when [Same as Numeric] is selected on the "Waveform Selection" window.
  [User Setup] will allow the user to set the layout.

❑Changing the Displayed Numeric Data

The displayed numeric data can be changed with the following procedure.

⚠ CAUTION

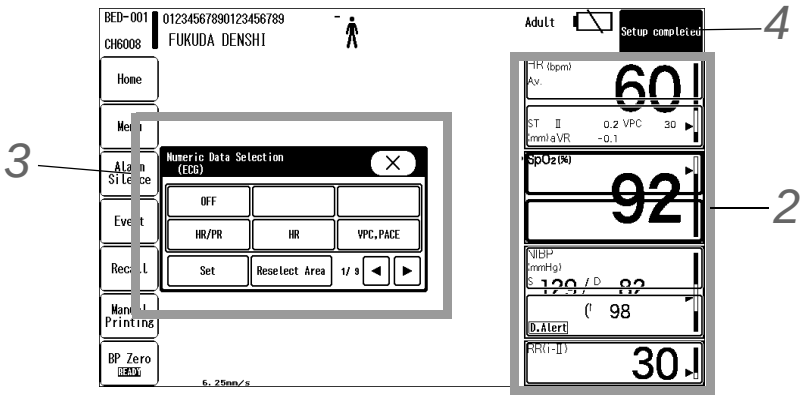
- When performing the telemetry or wired network transmission, configure the display so that the numeric data corresponding to the waveform is displayed. If not, the displayed waveform or numeric data may not be transmitted.

NOTE

- For HR/PR data, an alarm will be generated only for the current parameter displayed in the HR/PR numeric data box.
  The parameter for the HR/PR numeric data box can be selected by pressing the key for "HR/PR" on the ECG, BP, SpO_2 parameter setup window or by pressing the [HR/PR] key on the user key area.

1 Press the [Change] key for "Numeric Data".

- The display will change to numeric data selection mode.
- The "Numeric Data Selection" window will be displayed.



2 Press the numeric data display area to change the parameter.

- By pressing the selected area again, the selection will be canceled.
- By swiping, continuous area can be selected.

NOTE

- To start again from the beginning, press the [Reselect Area] key.
- Relocate the selected area which is indicated by blue box.

3 Select the parameter on the "Numeric Data Selection" window, and press the [Set] key.

NOTE

- Press the ◀/ ▶ keys to switch the displayed parameters. (☞"Numeric Data Selection" P10-3)

4 Press the [Setup completed] key.

▸ The setup will be finalized.

NOTE

- The selected parameter may not be displayed depending on the combination of the parameters and size.
  In such case, the same parameter will be separately located. Adjust the size or change the parameter.

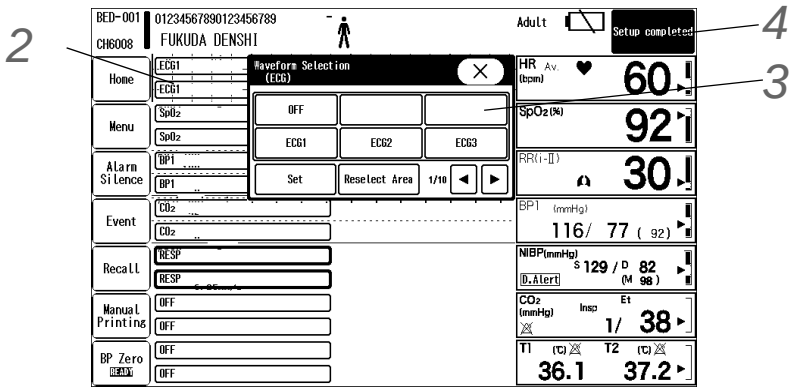
❑Changing the Displayed Waveform

Change the displayed waveforms.

1 Press [Change] for "Waveform".

▸ The display will change to waveform selection mode.

▸ The "Waveform Selection" window will be displayed.



2 Press the waveform display area to change the parameter.

▸ By pressing the selected area again, the selection will be canceled.

▸ By swiping, continuous area can be selected.

NOTE

- To start again from the beginning, press the [Reselect Area] key.
- Adjust the size of the selected area which is indicated by blue box.

3 Select the parameter on the "Waveform Selection" window, and press the [Set] key.

NOTE

- Press the ◀/ ▶ keys to switch the displayed parameters. (☞"Waveform Selection" P10-12)

4 Press the [Setup completed] key.

▸ The setup will be finalized.

❑Short Trend Display

The short trend can be displayed on the home display with the waveforms and numeric data.
As the alarm generated data are displayed in red (with white box), the alarm data of up to 60 minutes, 180 minutes, 360 minutes can be verified on the home display.
Set the short trend display.

NOTE

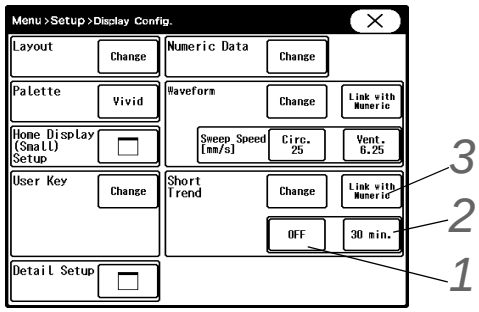
- When the numeric data layout is "Numeric Data/Side (1 column)", "Numeric Data/Bottom", short trend can be displayed.

1 Select from [ON] / [OFF] / [Overlap].

▸ [ON]: Short trend will be displayed on the home display.

▸ [OFF]: Short trend will not be displayed on the home display.

▸ [Overlap]: Short trend will be displayed overlapped with the waveform.



2 When [ON] or [Overlap] is selected, set the display duration.

The dropdown list selection will differ depending on the "Data Resolution" setting (10 sec./30 sec./60 sec.) for "Short Trend" (Detail Setup).

▸ [0 min.] to [60 min.]: Displayed when the "Data Resolution" is set to [10 sec.].
The short trend will be displayed in 60 minutes increments from 0 minute to 60 minutes.

▸ [0 min.] to [180 min.]: Displayed when the "Data Resolution" is set to [30 sec.].
The short trend will be displayed in 30 minutes increments from 0 minute to 180 minutes.

▸ [0 min.] to [360 min.]: Displayed when the "Data Resolution" is set to [60 sec.].
The short trend will be displayed in 60 minutes increments from 0 minute to 360 minutes.

3 Select the area to display the short trend.

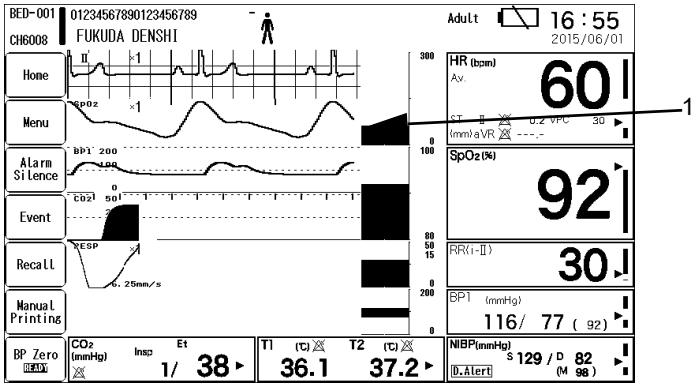
▸ [Link with Numeric]: The short trend will be displayed beside the currently displayed numeric data.

▸ [Link with Waveform]: The short trend will be displayed beside the currently displayed waveform area.

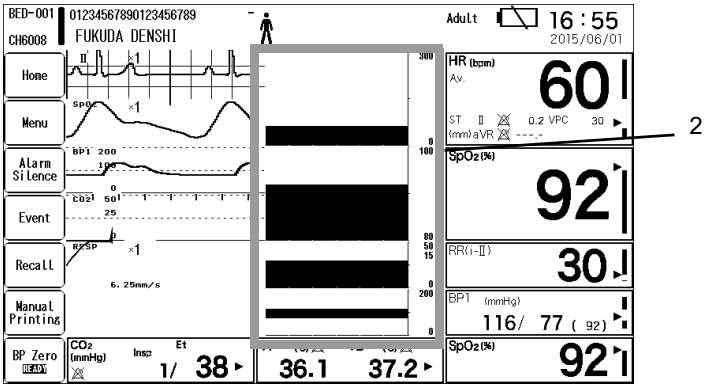
▸ [User Setup]: The short trend will be displayed on the user setting area. Press the [Change] key and assign the parameter to the desired area.

4 Select the display duration for the short trend.

1 Press the waveform display area on the home display.



2 The trend display time will change to the time of the pressed position.



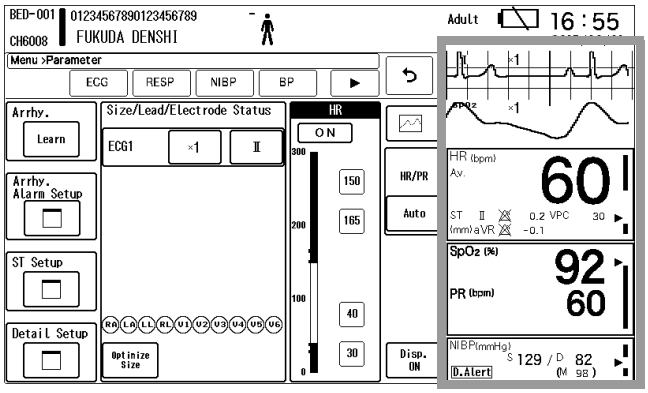
NOTE

- When an alarm is generated for the recall alarm factor, pressing the short trend display area will display the recall screen.

❑Home Display (Small) Setup

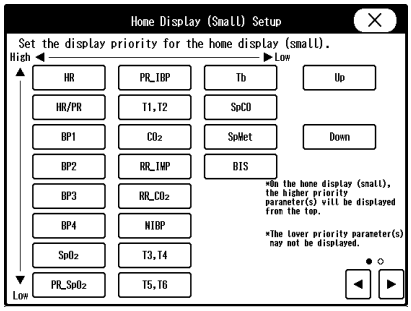
The "Home Display (Small)" is a small size home display which is displayed when a setup window is displayed.

On the "Home Display (Small) Setup", the numeric data and waveforms to be displayed can be set. Maximum of 7 numeric data, 4 waveforms can be displayed.



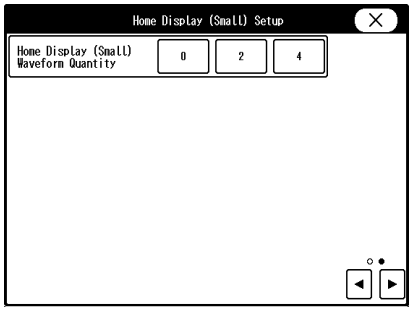
1 Home Display (Small) Setup: Page 1

- The numeric data of the measured parameters will be displayed according to the display priority.



2 Home Display (Small) Setup: Page 2

- Select the quantity of waveforms to be displayed. The waveforms will be displayed according to the display priority of the parameter.
  [0]: 0 waveform, 7 numeric data
  [2]: 2 waveforms, 6 numeric data
  [4]: 4 waveforms, 5 numeric data



❑Sweep Speed

The sweep speed can be set with the following procedure. The sweep speed can be set differently for the circulatory system waveforms (ECG, BP) and respiratory system waveforms.

1 Press [Circ.] for "Sweep Speed (mm/s)", and select from [6.25]/ [12.5] / [25] / [50].

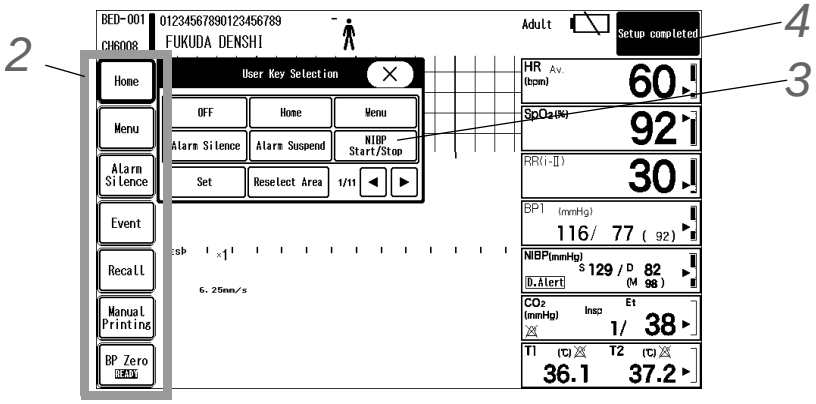
2 Press [Vent.], and select from [6.25] / [12.5] / [25].

❑User Key Setup

The user key can be set with the following procedure.

1 Press the [Change] key for "User Key".

- The display will change to user key selection mode.
- The "User Key Selection" window will be displayed.



2 Select the area to change the user key.

▸ By pressing the selected area again, the selection will be canceled.

NOTE

- To start again from the beginning, press the [Reselect Area] key.
- Relocate the selected area which is indicated by blue box.

3 Select the function to assign to the user key on the "User Key Selection" window.

NOTE

- Press the ◀/ ▶ keys to switch the user key selection. (☞"User Key Selection" P10-12)

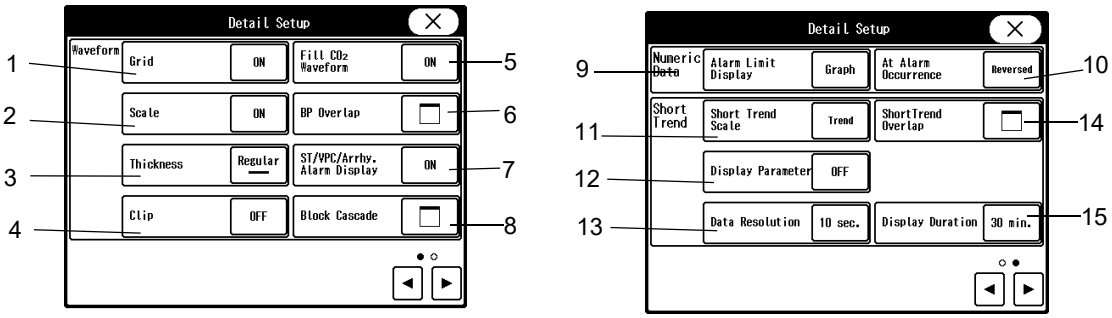
4 Press the [Setup completed] key.

▸ The setup will be finalized.

❑Detail Setup

1 Press the key for "Detail Setup".

▸ The "Detail Setup" window will be displayed.



1 Grid

The ECG waveform can be displayed on the grid.

[OFF]: Grid will not be displayed.
[ON]: Grid will be displayed.
[Bold]: Grid will be displayed in bold format.

REFERENCE

- Short trend and grid cannot be displayed overlapped.

2 Scale

The scale can be selected from [ON]/[Bold1]/[Bold2].

3 Waveform Thickness

The thickness of the displayed waveforms can be selected from [Thin] / [Regular] / [Thick].

4 Waveform Clip

Whether or not to clip the overlapped waveforms of the neighboring display area can be selected.

5 Fill CO_2 Waveform

Whether or not to fill in the CO_2 waveform from the baseline can be selected.

6 BP Overlap Waveform

The waveform combination for BP overlap waveform can be selected.

7 ST/VPC/Arrhy. Alarm Display

Whether or not to display the ST value, VPC (integrated value of 1 minute), arrhythmia alarm message inside the HR numeric data box can be selected.

8 Block Cascade

The waveform combination for block cascade display can be set.
By setting multiple block cascades to the waveform display area, a full disclosure waveform can be displayed.

9 Alarm Limit Display

The alarm limit can be displayed inside the numeric data box.

[Graph]: Alarm limit will be displayed in bar graph.
[Numeric]: Alarm limit will be displayed in numeric format.
[OFF]: Alarm limit will not be displayed.

10 At Alarm Occurrence

The numeric data display format at alarm occurrence can be selected.

[Reversed]: The numeric data and background will be displayed in reversed color at alarm occurrence.
[3D]: The numeric data will be displayed in 3D at alarm occurrence.

11 Short Trend Scale

The short trend scale for BP and CO_2 can be synchronized with the scale of either trend or waveform.

12 Display Parameter

Whether or not to display the parameter name of the displayed short trend can be set.

[ON]: Displays the parameter name with the corresponding color of the parameter.
[Gray]: Displays the parameter name in gray.
[OFF]: Parameter name will not be displayed.

13 Data Resolution

The short trend data resolution can be selected from [10 sec.]/[30 sec.]/[60 sec.].

14 Short Trend Overlap

Maximum of 4 parameters can be displayed overlapped in the same short trend area.However 2 blocks of waveform area are required for each parameter. For example, to display 3 parameters in the same short trend area, 6 blocks of waveform area are required.

15 Short Trend Display Duration

The display duration will differ depending on the "Data Resolution" setting. When the "Data Resolution" is set to [10 sec.], maximum display duration is 30 minutes. When the "Data Resolution" is set to [30 sec.], [60 sec.], the maximum display duration is 90 minutes, 180 minutes respectively.

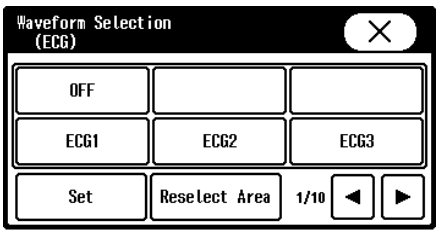
2 Press the HOME key (fixed key) or [Home] key on the user key area, and check the configured display.

NOTE

- After configuring the display, make sure to verify the configured display by pressing the [Home] key.
- To maintain the configured display even after the power is turned OFF or after the discharge procedure, store the configuration to one of the user modes, or select [Backup] for "Display Configuration" under Initial Settings>User I/F>At Power ON/At Discharge. (☞"To Select the User Mode" P5-9)

Waveform Selection

The waveform to be displayed can be selected on the "Waveform Selection" window.
This section explains the details of the displayed waveforms.



1 ECG1 to ECG12

The ECG waveform of the specified channel will be displayed.

2 ECG1 to ECG12 Cascade

The ECG waveforms of the specified channel will be displayed in cascade. Minimum of 2 blocks are required to display in cascade.

3 BP Overlap

The BP waveform (BP1 to BP4) set on "BP Overlap Setup" will be displayed.
If the waveform display area is too small to display the assigned BP waveforms, it will be displayed in the priority from smaller channel numbers.

4 Block Cascade

The waveforms (2 to 6) set on the "Block Cascade Setup" will be displayed in one block.

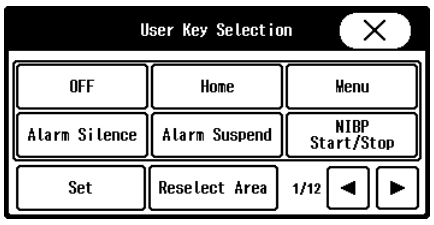
5 EEG1, EEG2

The EEG waveform of the specified channel will be displayed. Minimum of 2 blocks are required to display the EEG waveform.

Other than the waveforms explained above, the selected waveform on the "Waveform Selection Window" will be displayed.

User Key Selection

The user keys can be set on the "User Key Selection" window.
This section explains the function for each user key.



Example of User Key Selection Window

Page 1

OFF	Blank key will be displayed.
Home	The display will return to the home display. The [Home] key is also available as fixed key.
Menu	The menu screen will be displayed. The [Menu] key is also available as fixed key.
Alarm Silence	Alarm sound will be suspended for fixed amount of time. The [Alarm Silence] key is also available as fixed key. By pressing the key for more than 3 seconds while the alarm is not generated, it will bring the system to "Alarm Sound Suspend" condition.
Alarm Suspend	Alarm (sound and display) will be suspended for fixed amount of time.
NIBP Start/Stop	NIBP measurement will start/stop.

Page 2

NIBP Cont.	NIBP continuous measurement will start/stop.
Print Start/Stop	Manual printing will start/stop.
Monitor Suspend	Confirmation window to suspend monitoring will be displayed.
Night Mode	Night mode will turn ON/OFF.
Freeze	The waveform trace will freeze for fixed amount of time. Pressing the [Print Start/Stop] key while in freeze condition will print the frozen waveform. The freeze condition will be canceled after 30 seconds or by pressing the [Freeze] key again.
Key Lock	The touch key operation will turn ON/OFF. It is useful when cleaning the display panel.

Page 3

Mode Selection	User mode selection screen will be displayed.
Admit/Discharge	Admit/Discharge screen will be displayed.
Rapid Discharge	Confirmation window to erase the data will be displayed.
HR/PR	The HR/PR numeric data box will be switched between HR and PR.
HR/PR Source	The parameter for HR/PR source will be switched.
BP Zero	Zero balance of BP1 to BP4 will be performed.

Page 4

Leads	List of lead groups will be displayed, and selecting a lead group will display the lead selection window.
ECG Size (All Leads)	The waveform size for all ECG leads can be changed.
Scale	The home display will change to scale selection mode.
SpO_2 Display ON/OFF	SpO_2 display will turn ON/OFF.
CO_2 Display ON/OFF	CO_2 display will turn ON/OFF.
Suspend CO_2	CO_2 measurement suspend status will switch.

Page 5

Short Trend ON/OFF	Short Trend display will turn ON/OFF.
Transparent Window ON/OFF	Transparent window will turn ON/OFF.
Change Palette	Palette selection window will be displayed.
Graphic Trend	The graphic trend will be displayed.
Trend (Group)	List of trend groups will be displayed, and selecting a trend group will display the graphic trend.
Tabular Trend	The tabular trend will be displayed.

Page 6

Tabular Trend (Group)	List of tabular trend groups will be displayed, and selecting a trend group will display the tabular trend.
NIBP List	NIBP list will be displayed.
Recall	Recall screen will be displayed.
Alarm History	Alarm history will be displayed.
OCRG	OCRG screen will be displayed.
ST	ST screen will be displayed.

Page 7

Cardiac Output	CO measurement screen will be displayed.
PCWP	PCWP measurement screen will be displayed. If BP labeled as PAP is not measured, this screen will not be displayed.
Hemodynamics	Hemodynamics screen will be displayed.
Lung Function	Lung Function screen will be displayed.
Full Disclosure Waveform	The full disclosure waveform will be displayed.
12-Lead Analysis	12-lead analysis screen will be displayed.

Page 8

ECG Waveform Display	ECG waveform will be displayed.
Tone/Volume	The "Tone/Volume" menu will be displayed.
NIBP Auto Mode	NIBP Auto Mode window will be displayed.
Alarm Setup (All)	Alarm settings for all parameters will be displayed.
Alarm Setup (Basic)	Alarm settings for basic parameters will be displayed.
Manual Printing	Manual printing setup screen will be displayed.

Page 9

Display Configuration	The display configuration window will be displayed.
Clock Setting	The Time/Date setup window will be displayed.
Other Bed	Other bed screen will be displayed.
MPDR	MPDR (multiple patient data review) list will be displayed.
STOPWATCH	Stopwatch screen will be displayed.
Print (LBP) Cancel	Printing on the laser printer will be canceled.

Page 10

Monitor Mode 1 (Adult Mode)	"Adult" will be set for "Mode Select" on "Admit/Discharge".
Monitor Mode 2 (Child Mode)	"Child" will be set for "Mode Select" on "Admit/Discharge".
Monitor Mode 3 (Neonate Mode)	"Neonate" will be set for "Mode Select" on "Admit/Discharge".
Monitor Mode 4 (Initial:_Adult)	"Initial_Adult" will be set for "Mode Select" on "Admit/Discharge".
Monitor Mode 5 (Initial: Child)	"Initial_Child" will be set for "Mode Select" on "Admit/Discharge".
Monitor Mode 6 (Initial: Neonate)	"Initial_Neonate" will be set for "Mode Select" on "Admit/Discharge".

* The default mode names are displayed inside the brackets. The mode names can be changed.

(☞Maintenance Manual "To Program the User Mode" P5-24)

Page 11

Switching the Display	Display mode selection will switch.
Group 1 to 5*	Selection list of key group 1 to 5 will be displayed.

* If the key group name is not set, it will be displayed as "Group n". If the key group name is set, the set name will be displayed instead of "Group".

Page 12

Event	Event selection list will be displayed. The selected event will be saved as recall waveform.

WARNING

- After changing the mode, make sure that the monitoring setting is appropriate.
  When the mode is changed, patient classification, alarm settings, etc. will change to the settings of the selected mode.

Tone/Volume

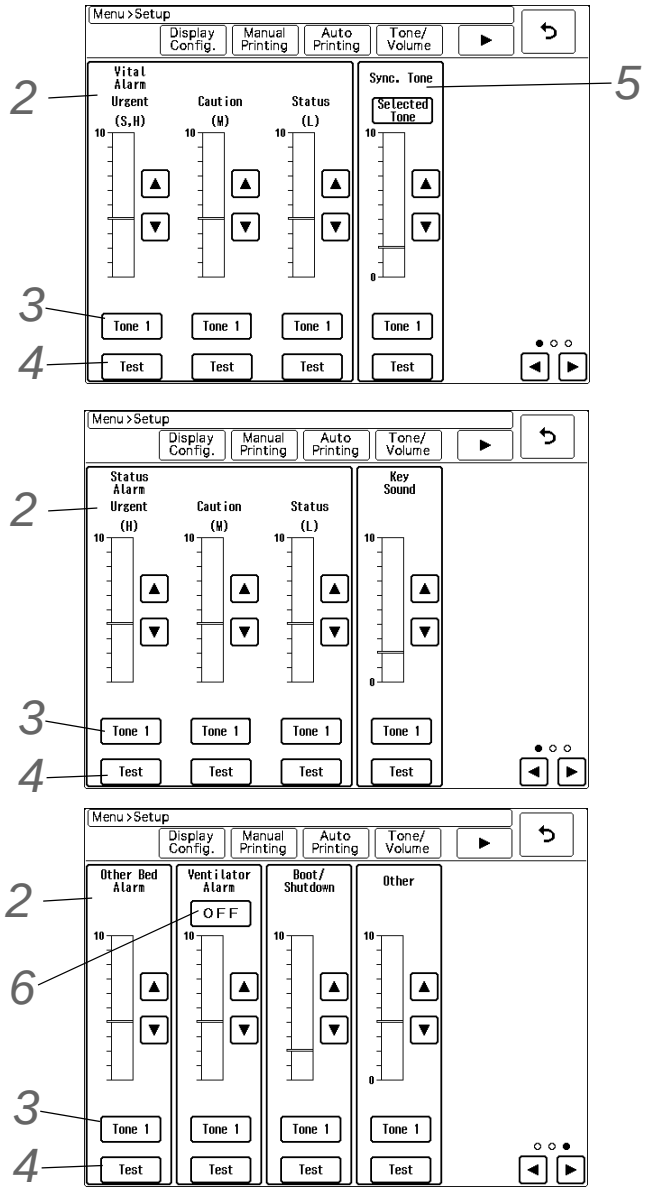
This section explains the tone/volume setup procedure for alarm sound, HR synchronized tone, key sound, and boot/shutdown sound. This setup also allows to turn OFF the ventilator alarm sound.
The volume of the sound which notifies the completion of BP zero balance and NIBP measurement can be adjusted on "Other" setting.

NOTE

- The synchronized tone setup is effective only for HR and BP. The SpO_2 synchronized tone will change according to the SpO_2 value. The tone will increase as the SpO_2 value increases, and vice versa.

1 Press the [Menu], [Setup], [Tone/Volume] keys.

▸ The "Tone/Volume" menu will be displayed.



2 Set the volume.

⚠ WARNING

- Changing the setting for "Alarm System" (Initial Settings > Alarm) will also change the alarm volume and tone setting. Make sure to check the volume and tone when the setting is changed.
- When using this equipment, the operator should stay in a distance close enough to recognize an alarm sound. Do not move too far away from the equipment where an alarm sound cannot be recognized.

⚠ CAUTION

- Pay attention not to set the alarm volume too low to avoid missing any important alarms.When [Melodic Tone] is set for the "Alarm System", the alarm sound for ECG, SpO_2, CO_2 will be different from the test sound. The set volume will be applied but the set tone will not be applied to these parameters.

- When [Standard Tone] is set for the "Alarm System", the alarm volume and tone for the ventilator alarm and equipment status alarm will be the same with that of the vital alarm.

▸ Press [▲]/[▼] to set the volume.

REFERENCE

- The order of alarm priority is Urgent (H) > Caution (M) > Status (L).
  The volume is also set according to the alarm priority.
  The volume for high priority alarm cannot be set lower than the lower priority alarm, and vice versa.
- The volume above the set minimum volume can be set.
  (☞Maintenance Manual "Alarm Related Setup" P5-5)

3 Set the tone for the alarm sound, key sound.

4 Press the [Test] key to check the set volume/tone.

5 Set the "Sync. Tone".

▸ [Selected Tone]: The HR synchronized tone will be generated with the selected tone.

▸ [Sync. with SpO_2 Value]: The HR synchronized tone will be generated with the same tone with the SpO_2 synchronized tone. If the SpO_2 value is invalid, [Tone 2] will be applied.

6 For "Ventilator Alarm", select [ON]/[OFF] of ventilator alarm sound.

❑Alarm System

Alarm System	Fukuda Tone (1) Tone 1 to 4 (2) Tone 5 to 8	Melodic Tone	Standard Tone
Vital Alarm Sound			
Level H	(1) Continuous melodic tone (2) Continuous rapid tone	ECG: Continuous melodic tone with rising pitch SpO_2, O_2: Continuous melodic tone with falling pitch CO_2: Continuous melodic tone with mixed low and high pitch Other than above: Continuous melodic tone	Continuous tone
Level M	(1) Alternate high and low pitch in 5 seconds interval (2) Rapid tone in 5 seconds interval	ECG: Rising pitch in 4 seconds interval melodic tone SpO_2, O_2: Falling pitch in 4 seconds interval melodic tone CO_2: Mixed low and high pitch sound in 4 seconds interval melodic tone Other than above: 4 seconds interval melodic tone	4 seconds interval tone
Level L	(1) 15 seconds interval melodic tone (2) 15 seconds interval tone	17 seconds interval melodic tone	17 seconds interval tone
Equipment Status Alarm Sound			

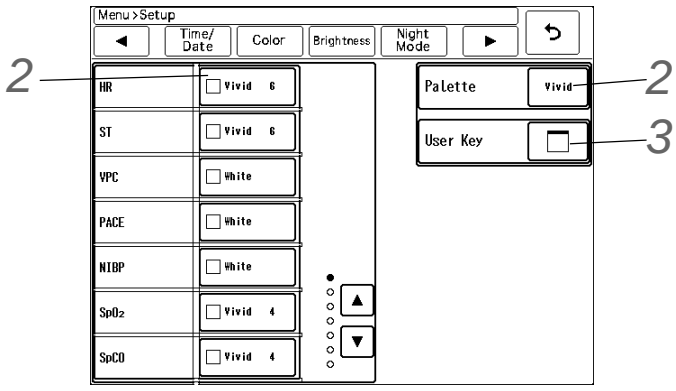
Level H	(1) Continuous melodic tone (2) Continuous rapid tone	Continuous melodic tone	Continuous tone
Level M	(1) Alternate high and low pitch in 5 seconds interval (2) Rapid tone in 5 seconds interval	4 seconds interval melodic tone	4 seconds interval tone
Level L	(1) 15 seconds interval melodic tone (2) 15 seconds interval tone	17 seconds interval tone	17 seconds interval tone
Volume Setup			
Level H, M, L	The volume for low level alarm cannot be set higher than the higher level alarm.		
Tone Setup			
Level H Level M Level L	Vital Alarm: Setup can be performed. Equipment Status Alarm: Setup can be performed.	Vital Alarm: Setup can be performed. Equipment Status Alarm: Setup cannot be changed.	
Setup other than above			
Other Bed Alarm	Sound: Continuous tone Tone: Cannot be changed. Volume: Can be adjusted.	Sound: Continuous tone Tone: Cannot be changed. Volume: Can be adjusted.	
Ventilator Alarm Sound	Sound: Continuous tone Tone: Cannot be changed. Volume: Can be adjusted.	Sound: Continuous melodic tone Tone: Cannot be changed. Volume: Can be adjusted.	Continuous tone

Color

This section explains the procedure to set the color of background, numeric data, and waveform.
The colors of the background, numeric data, waveform, user key can be customized.
The colors can be customized according to the various monitoring scene such as recognizable colors from a far distance or colors which will not strain your eyes by the long time monitoring.

1 Press the [Menu], [Setup], [Color] keys.

▸ The "Color" selection window will be displayed.

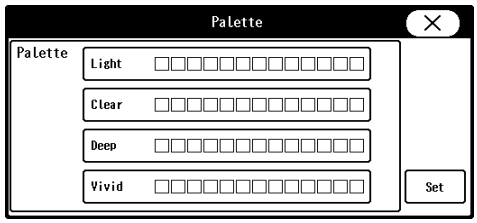


2 Set the color of the numeric data and waveform.

The color can be set for each parameter. 12 colors (+white) from each palette are selectable.

1 Press the key for "Palette".

▸ The "Palette" selection window will be displayed.

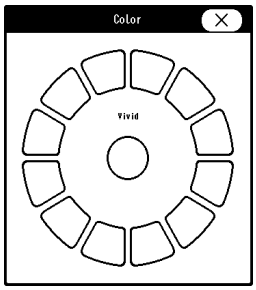


2 Select the palette from [Light] / [Clear] / [Deep] / [Vivid], and press the [Set] key.

▸ The color of the numeric data and waveform will change to the selected palette color.

3 Press the key for the parameter to change the color.

▸ The "Color" selection window will be displayed.

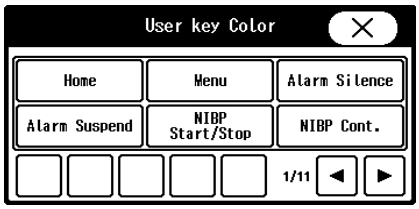


4 Select a color.

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

3 The color of the user key can be set.

1 Pressing the key for "User Key" will display the "User Key Color" window.



2 Press ◀/▶ to switch the page.

3 Select the user key to change the color.

▸ Pressing the key again will cancel the selection.

4 Select from the 5 colors displayed below.

▸ The color of the user key will change.

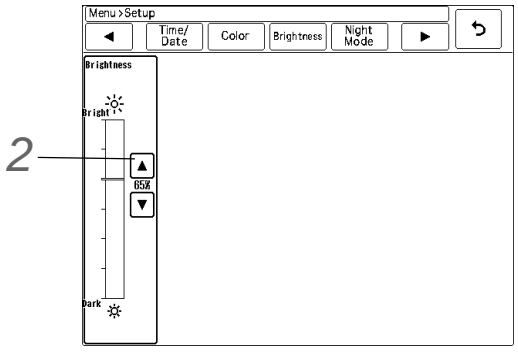
Brightness

This section explains the brightness adjustment of the monitor display.

⚠ CAUTION

- This equipment utilizes LED for the backlight. Since this LED 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.

1 Press the [Menu], [Setup], [Brightness] keys to display the "Brightness" menu.



2 Press the ▲/▼ keys.

▸ The brightness will be adjusted.

NOTE

- When [Low Power] is set for "Battery Operation" under "Initial Settings" menu, power saving brightness will be applied during battery operation regardless of the brightness setting.
- The power saving mode brightness will be darker than the 5% setting of the brightness.
- The display will return to the set brightness when any key is touched. After the set duration on "Time to Dim the Display at Power Saving Mode", the power saving mode brightness will be applied again.

Night Mode

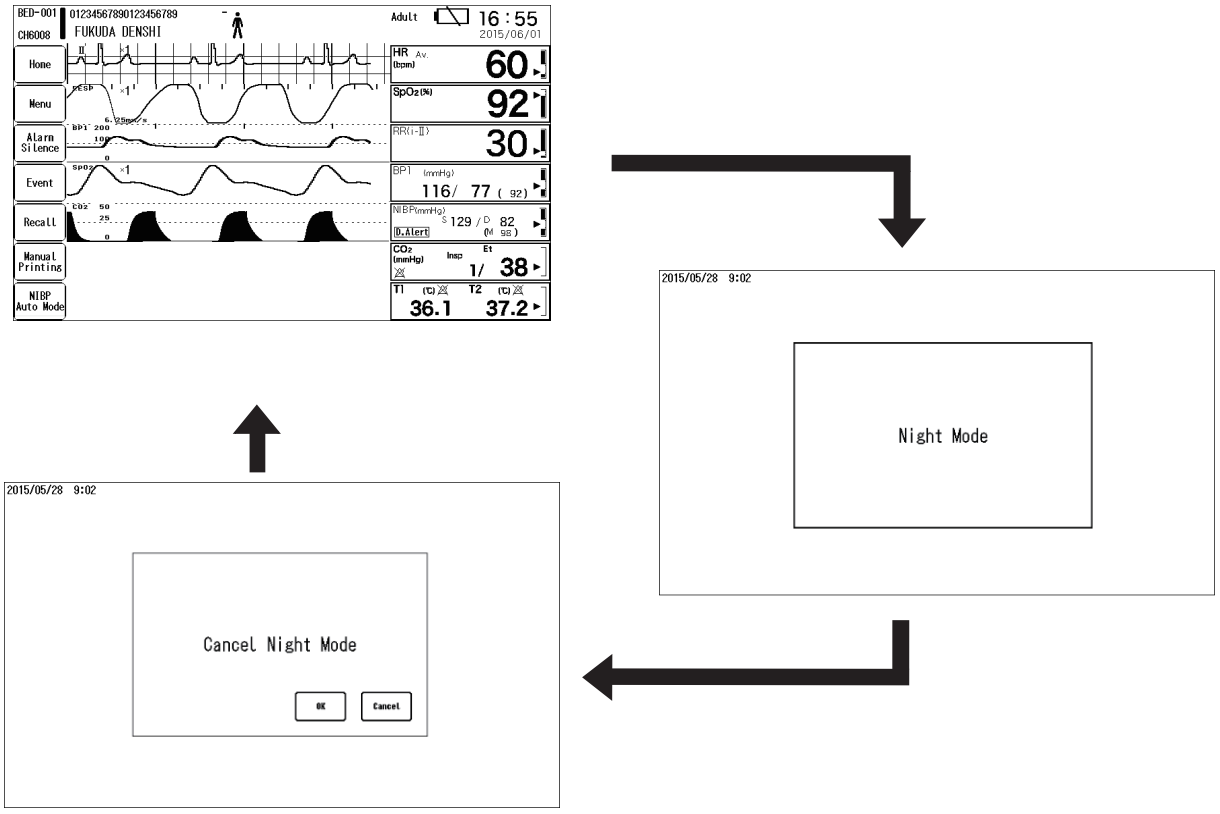
This section explains the procedure to set the night mode.

The night mode is a function to preset the screen brightness and alarm volume when turning OFF the light of the ward or when the patient is asleep, etc.

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.

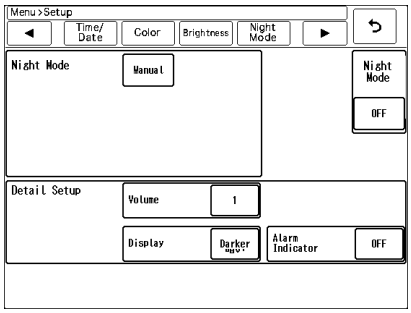
❑Operation flow when the night mode is set to "Timer"

During the night mode, touching the screen will display the "Cancel Night Mode" window.



❑Operation flow when the night mode is set to [Darker] or [Dark]

1 To manually set the night mode, select [ON] for "Night Mode" or press the [Night Mode] key on the user key area.



- During the night mode, "Night Mode Active" message will be displayed.

NOTE

- When the timer is set, the night mode will automatically start at the set "Start Time".

2 Cancel the night mode.

- There are two ways to cancel the Night Mode, which can be selected on the "Initial Settings" menu. (☞Maintenance Manual "Display/Print Setup" P5-12)
- [Any Key]: The night mode can be canceled by pressing any key on the screen.
- [Night Mode Key]: The night mode can be canceled by pressing the [Night Mode] key on the user key area or on the menu.

NOTE

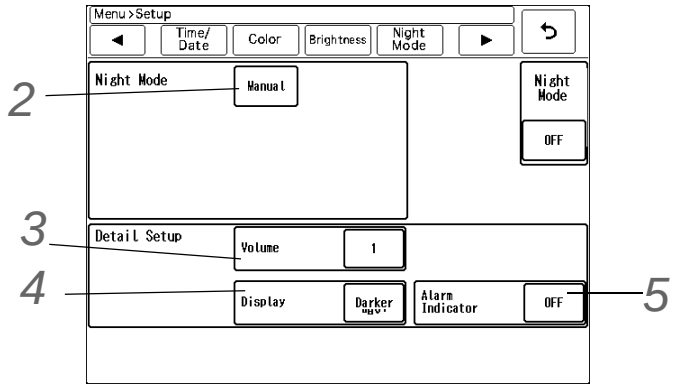
- The night mode can be manually turned ON from the menu or user key even when the night mode is set to automatically turn ON. The night mode will automatically turn OFF at the set "End Time".
- The night mode cannot be set when the ventilator alarm is generated.
- The night mode cannot be set during the battery operation. If switched to battery operation during the night mode, the night mode will be canceled.

Night Mode

On the "Night Mode" menu, the time to start/end the night mode, and the night mode display brightness, volume, alarm indicator operation can be set.

1 Press the [Menu], [Setup], [Night Mode] keys.

- The "Night Mode" menu will be displayed.



2 Set the "Start Time" and "End Time" for the night mode.

- [Manual]: The night mode can be turned ON or OFF manually using the user key.
- [Timer]: The night mode will automatically turned ON or OFF at the preprogrammed time. The night mode can be manually turned ON from the user key even when the [Timer] is set.

When [Timer] is selected:

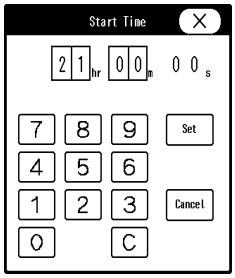
1 Press the key for "Start Time".

- The "Start Time" window will be displayed.

2 Use the numeric keys to enter the time.

3 Press the [Set] key.

4 Set the "End Time" with the same procedure from step 2 to 3.



3 Set the volume.

WARNING

- When selecting [Silence], pay attention not to miss any important alarm by simultaneously monitoring the bed on other monitors such as central monitor.

- [No Change]: Standard volume will be set.
- [3]: Third level from the minimum volume will be set.
- [1]: Minimum volume will be set.
- [Silence]: Sound will be silenced.

4 Set the brightness of the display.

WARNING

- When selecting [Time Only], pay attention not to miss any important alarm by simultaneously monitoring the patient on other monitors such as central monitor.

- [No Change]: Brightness will not change
- [Dark]: The display will become dark during the night mode.
- [Darker]: The display will become darker (than [Dark]) during the night mode.
- [Time Only]: Only the time will be displayed. The message will disappear after 1 minute from starting the night mode.

5 Set the alarm indicator operation.

- [ON]: The alarm indicator will light even during the night mode.
- [OFF]: The alarm indicator will not light during the night mode.

Chapter 11 Troubleshooting

Chapter 11 Troubleshooting

Message List

This section lists the alarm messages for each parameter.

For the vital alarm message, there are numeric data alarm and arrhythmia alarm, and the delay time are as follows.

- Numeric Data Alarm: Adult/Child: 5 sec., Neonate: none
  However, for HR alarm, there is no delay time for adult/child if "HR Delay" is set to ON.
- Arrhythmia Alarm: Adult/Child/Neonate: none

Vital Alarm Message

⚠ CAUTION

- The arrhythmia alarm message other than Tachy, Brady, Ext Tachy, Ext Brady will continue to be displayed for 30 seconds after the alarm is resolved.
- The alarm level shown below is the standard level set by Fukuda Denshi.
- The alarm level can be changed on the "Initial Settings".

❑Top Priority Alarm (Alarm Level S)

This level can be selected for some parameters only when [Fukuda Tone] is selected for the "Alarm System" under [Menu>Setup>Initial Settings>Alarm). It cannot be selected when the "Alarm System" is [Melodic Tone] or [Standard Tone].

❑Life Threatening Alarm (Alarm Level H)

Parameter	Message
Respiration (Impedance, CO_2)	<Apnea>
Arrhythmia	<Asystole>
	<VF>
	<VT>
	<Tachy>
	<Brady>
	<Ext Tachy>
	<Ext Brady>
	<Slow VT>
SpO_2	<Lower Ext SpO_2 Alarm>

❑Cautionary Alarm (Alarm Level M)

Parameter	Message
HR	<Lower HR Alarm>
	<Upper HR Alarm>
Blood Pressure	<Lower BP* Alarm> or <Lower (label) Alarm>*
	<Upper BP* Alarm> or <Upper (label) Alarm>*
Pulse Rate (BP)	<Lower PR Alarm>
	<Upper PR Alarm>
SpO_2	<Lower SpO_2 Alarm>
	<Upper SpO_2 Alarm>
Pulse Rate (SpO_2)	<Lower PR Alarm>
	<Upper PR Alarm>
Non-Invasive Blood Pressure	<Lower NIBP Alarm>
	<Upper NIBP Alarm>
Respiration (Impedance, CO_2, SpO_2)	<Lower RR Alarm>
	<Upper RR Alarm>
CO_2	<Lower CO_2-E Alarm>
	<Upper CO_2-E Alarm>
	<Upper CO_2-I Alarm>
Arrhythmia	<Run>
	<Pause>
ST1 to 12	<Lower ST(Lead Type) Alarm>
	<Upper ST(Lead Type) Alarm>

*: * indicates the label of BP, TEMP.

❑Treatment Needed Alarm (Alarm Level L)

Parameter	Message
SpCO	<Upper SpCO Alarm>
SpMet	<Upper SpMet Alarm>
SpHb	<Lower SpHb Alarm>
	<Upper SpHb Alarm>
Temperature (TEMP1 to 6)	<Lower TEMP* Alarm> or <Lower (label) Alarm>*
	<Upper TEMP* Alarm> or <Upper (label) Alarm>*
Blood Temperature	<Upper Tb Alarm>
	<Lower Tb Alarm>
Arrhythmia	<Couplet>
	<Bigeminy>
	<Trigeminy>
	<Frequent>
	<Triplet>
	<R on T>
	<Multiform>
	<Vent Rhtm>
	<SVT>
	<Ireg. RR>
	<Prolong RR>
	<S Freq>
	<S Couplet>
	<VPC>
	<SVPC>
	<Not Capt>
	<Not Pace>

* indicates the channel number of BP, TEMP.

❑Notification Alarm

Parameter	Message
All Alarm	<Alarm Suspend (xxx sec.)>
Alarm Sound Suspend	<Alarm Silence (xxx min.)>
Alarm Silence	<Alarm is silenced.>
Arrhythmia	<LEARN>
	<ARRHY. OFF>

NOTE

- (xxx sec) of the <Alarm Suspend (xxx sec)> message indicates the remaining time of alarm suspended duration.
- (xxx min.) of the <Alarm Silence (xxx min.)> message indicates the remaining time of alarm sound suspended duration.
- The <ARRHY OFF> message will be displayed when the Slow_VT, Tachy, Brady, Ext Tachy, Ext Brady and HR alarm is OFF.

Vital Alarm Message (DS-LAN Standard Setup)

⚠ WARNING

- The SpO_2 respiration measurement function is not intended for use as an APNEA monitor.

⚠ CAUTION

- The arrhythmia alarm message other than Tachy, Brady, Ext Tachy, Ext Brady will continue to be displayed for 30 seconds after the alarm is resolved.
- The alarm level shown below is the standard level set by Fukuda Denshi.
- The alarm level can be changed on the "Initial Settings".

❑Top Priority Alarm (Alarm Level S)

This level can be selected for some parameters only when [Fukuda Tone] is selected for the "Alarm System" under [Menu>Setup>Initial Settings>Alarm]. It cannot be selected when the "Alarm System" is [Melodic Tone] or [Standard Tone].

❑Life Threatening Alarm (Alarm Level H)

Parameter	Message
HR	<Lower HR Alarm>
	<Upper HR Alarm>
Pulse Rate (SpO_2)	<Lower PR Alarm>
	<Upper PR Alarm>
Pulse Rate (BP)	<Lower PR Alarm>
	<Upper PR Alarm>
SpO_2	<Lower SpO_2 Alarm>
	<Upper SpO_2 Alarm>
	<Lower Ext SpO_2 Alarm>
Blood Pressure	<Lower BP1 Alarm>
	<Upper BP1 Alarm>
	<Lower ART Alarm>
	<Upper ART Alarm>
Non-Invasive Blood Pressure	<Lower NIBP Alarm>
	<Upper NIBP Alarm>
Respiration (Impedance*, CO_2, SpO_2)	<Lower RR Alarm>
	<Upper RR Alarm>
	<Apnea Alarm>
CO_2	<Lower CO_2-E Alarm>
	<Upper CO_2-E Alarm>
Arrhythmia	<Asystole>
	<VF>
	<VT>
	<Tachy>

Parameter	Message
	<Brady>
	<Run>
	<Ext Tachy>
	<Ext Brady>
	<Slow VT>

*: The SpO_2 respiration measurement function is not intended for use as an APNEA monitor.

❑Cautionary Alarm (Alarm Level M)

Parameter	Message
Blood Pressure	<Lower BP2 (to BP4) Alarm> or <Lower (label other than ART) Alarm>*
	<Upper BP2 (to BP4) Alarm> or <Upper (label other than ART) Alarm>*
ST1 to 12	<Lower ST(Lead Type) Alarm>
	<Upper ST(Lead Type) Alarm>
SpCO	<Upper SpCO Alarm>
SpMet	<Upper SpMet Alarm>
SpHb	<Lower SpHb Alarm>
	<Upper SpHb Alarm>
TEMP (TEMP1 to 6)	<Upper TEMP* Alarm> or <Upper (label) Alarm>*
	<Lower TEMP* Alarm> or <Lower (label) Alarm>*
Blood Temperature	<Upper Tb Alarm>
	<Lower Tb Alarm>
BIS	<Upper BIS Alarm>
	<Lower BIS Alarm>
CO_2	<Upper CO_2-I Alarm>
Arrhythmia	<Pause>
	<Couplet>
	<Bigeminy>
	<Trigeminy>
	<Frequent>
	<Triplet>
	<R on T>
	<Multiform>
	<Vent Rhtm>
	<SVT>
	<Ireg. RR>
	<Prolng RR>
	<S Freq>
	<S Couplet>
	<VPC>
	<SVPC>
	<Not Capt>
	<Not Pace>

Parameter	Message

* indicates the channel number of BP, TEMP.

❑Notification Alarm

Parameter	Message
All Alarm	<Alarm Suspend (xxx sec.)>
Alarm Sound Suspend	<Alarm Silence (xxx min.)>
Alarm Mute	<Alarm is silenced.>
Arrhythmia	<LEARN>
	<ARRHY. OFF>

NOTE

- (xxx sec) of the <Alarm Suspend (xxx sec)> message indicates the remaining time of alarm suspended duration.
- (xxx min.) of the <Alarm Silence (xxx min.)> message indicates the remaining time of alarm sound suspended duration.
- The <ARRHY OFF> message will be displayed when the Slow_VT, Tachy, Brady, Ext Tachy, Ext Brady and HR alarm is OFF.

Equipment Status Alarm Message

❑Top Priority Alarm (Alarm Level S)

Item	Message	Delay Time (sec.)
Ventilator	<Vent. Alarm>	1
	<VENT COMM>	1

❑Life Threatening Alarm (Alarm Level H)

Item	Message	Delay Time (sec.)
Main Unit	<DS-8007 Failure>	10
	<ECG Unit Error>	5
	<DS-8007 Multiamp. Failure>	3
	<NIBP Meas. Error (xxx-xxx)>*1	10 or 3
	<GAS Unit I/F Failure>	3
	<DS-8007 SpO_2 Failure>	5 or 1
	<Charge the battery> (0% to 14%)	10
	<Telemeter Failure>	3
Blood Pressure	<Transducer Voltage Failure>	3
	<Check the ART catheter.>	1

*1: # indicates an error code.

❑Cautionary Alarm (Alarm Level M)

Item	Message	Delay Time (sec.)
NIBP	<NIBP meas. failed. (###-##)>*1	1
CO_2 (HCP-810/HCP-820)	<CO_2 Check Sample Line>	1
	<CO_2 Check Exhaust Port>	1
	<CO_2 Unit Failure>	1
	<CO_2 Cal. Required>	1
Capnostat 5 CO_2 (HPD-810/HPD-820)	<CO_2 Sensor Failure>	1
Main Unit	<DS-8007 Check Long-Term Battery>	10
	<DS-8007 Out of Operating Temp. Range>	3
	<DS-8007 Analog Unadjusted>	3
	<Charge the battery> (15% to 19%)	10
	<Replace the battery>	10
Monitor Suspend	<Monitor Suspend Time-Out>	1
BIS	<Check BIS Sensor, Perform Sensor Check>	3

*1: On "Initial Settings" menu, the alarm level can be selected from Level M, L, N (Notification). (Default: Level M)
If [Alarm Silence] key is pressed during Level M, L alarm generation, the alarm level will change to Level N (notification).
# indicates an error code.

❑Treatment Needed Alarm (Alarm Level L)

Item	Message	Delay Time (sec.)
ECG	<Check Electrodes (#, #, #)>*1	3
	<ECG Check Electrodes Attachment.>	3
	<Cannot Analyze>	1
	<ECG Pacing Detection Error>	1
Impedance	<RR meas. range is exceeded.>	3
	<CVA detected>	Adult, Child: 20, Neonate: 10
SpO_2 (Masimo Unit)	<SpO_2 Check Sensor Attach.>	3
	<SpO_2 Replace Sensor>	1
	<SpO_2 Low Perfusion>*2	1
	<SpO_2 Pulse Search>	1
	<SpO_2 Noise Interference>	1
	<SpO_2 Check Sensor>	1
	<SpO_2 Replace Cable>	3
	<SpO_2 Check Cable>	3
	<SpO_2 Disconnected>	3
	<SpO_2 only mode>	1
	<SpO_2 Check Cable, Sensor>	1
SpO_2 (Nellcor Unit)	<SpO_2 Check Sensor Attach.>	3
	<SpO_2 Replace Sensor>	1
	<SpO_2 No Pulse Detected>	1

Item	Message	Delay Time (sec.)
Blood Pressure	<BP # Transducer OFF>*3*6	5
Temperature	<T # Unknown Sensor>*4	3
Non-Invasive Blood Pressure	<Check NIBP cuff, hose>*5	3
	<NIBP Check patient type, air hose>	3
Capnostat 5 CO_2 (HPD-810/HPD-820)	<Check CO_2 Airway Adapter>	1
BIS	<Replace BIS Sensor>	3
	<BIS Sensor Usage > 24hrs.>	3
	<BIS Sensor Disconnected>	1
	<BIS High Impedance, Check Sensor>	3
	<BIS Lead Off, Check Sensor>	3
	<BIS SQI < 15%>	3
	<BISx Disconnected>	3
Connector Off	<ECG Disconnected>	3
	<BP # Disconnected>*3	3
	<SpO_2 Disconnected>	3
	<T ## Disconnected>*4	3
	<CO Disconnected>	3
	<CO_2 Disconnected>	3
	<BIS Disconnected>	3
Main Unit	<DS-8007 Check Unit>	10
	<DS-8007 Out of Operating Temp. Range>	10
	<DS-8007 Check SD Card>	3
	<DS-8007 TEMP Unit Failure>	3
	<AC Unit Failure>	3
	<Check charging board.>	10
	<Charge the battery.>	10
	<Reinstall the battery.>	5
	<Fan Failure>	3
	<Analog Output Failure>	3
Check Connection, Check Reception, Interference	<Check BIS Conn.>	1
	<Check Printer Conn.>	3
	<Chk DS-LAN Comm>	3
	<Check TCON Comm.>	1
	<Chk TCON Reception>	1
	<TCON Interference>	1
	<Check Printer Comm>	1
	<Check DS-LAN Mode>	1
Central Printer	<Chk DS-LAN Comm>	1
Full Disclosure Waveform	<Wrong CF card for full disclosure.>	1
	<Failed to read full disclosure from the CF card.>	1
	<Failed to write full disclosure to the CF card.>	1
	<Check CF card for full disclosure.>	1

Item	Message	Delay Time (sec.)

*1: # indicates an electrode type.

*2: On "Initial Settings" menu, the alarm level can be selected from Level L/N. (Default: Level L)

*3: # indicates the label of BP.

*4: # indicates the label of TEMP.

*5: On "Initial Settings" menu, the alarm level can be selected from Level M/L/N. (Default: Level L)
If [Alarm Silence] key is pressed during Level M/L alarm generation, the alarm level will change to Level N (notification).

*6: On "Initial Settings" menu, the alarm level can be selected from Level M/L. (Default: Level L)

NOTE

- <NIBP meas. failed>, <Check NIBP cuff, hose>, <Connector Off>, <Check xx Conn.>, <Check xx Comm.> alarms will be canceled when [Alarm Silence] key is pressed. Pay attention not to cancel the important alarm.

❑Notification Alarm

Item	Message	Delay Time (sec.)
Operation	<Waveform Frozen (xxsec.)>*1	1
	<Key Locked (xx sec.)> (Key Unlock/Hold 2 sec.)*1	1
	<Night Mode Active>	1
ECG	<ECG Low Amplitude>	3
	<ECG Artifact>	3
	<Check Electrodes (##, ##, ##)>*4	3
	<ECG Artifact>	3
Blood Pressure	<BP # Zeroing Required>*2	1
SpO_2 (Masimo Unit)	<SpO_2 Demo Mode>	1
	<SpO_2 Zeroing>	1
	<SpO_2 Check Sensor Attach.>*4	3
	<SpO_2 Cable Near Expiration>	3
	<SpO_2 Sensor Near Expiration>	3
SpO_2 (Nellcor Unit)	<SpO_2 Motion Artifact>	1
	<SpO_2 Check Sensor Attach.>*4	1
Capnostat 5 CO_2 (HPD-810/HPD-820)	<CO_2 Warming Up>	1
	<Zero the CO_2 Adapter>	1
	<Unknown CO_2 Sensor>	1
CO_2 (HCP-810/HCP-820)	<CO_2 Suspended>	1
	<CO_2 Zeroing>	1
Non-Invasive Blood Pressure	<Initializing NIBP>	3
	<Check NIBP cuff, hose>	3
BIS	<BIS Sensor Expired>	3
	<BIS Sensor Check in Progress>	3
	<BIS Ground Check in Progress>	3
	<BIS Noise>	3
	<BIS Perform "Sensor Check">	3

Item	Message	Delay Time (sec.)
	<BIS SQI < 50%>	3
	<BIS Demo Sensor>	3
Recorder Unit	<Check Printer>*3	3
	<Check Paper>*3	3
	<Printer Busy>*3	1
	<Check Cassette>*3	3
Central Printer	<Check Paper (Central)>*3	3
	<Check Cassette>*3	3
	<Printer Busy (Central)>*3	1
	<Check Central Printer>*3	3
Central Printer	<Central Printer Check Connection>	1
	<Central Printer Check Setting>	1
	<Check Central ID>	1
	<Chk DS-LAN Comm>	1
Main Unit	<DS-8007 Check Rotary SW>	1
	<DS-8007 Check DIP SW>	1
	<Reading data.>	1
	<Battery Charge Suspended>	10
System Configuration	<Check System Conn.>	3
Upload	<Uploading (#)*5>	1
	<Failed to upload.>	1
	<Uploading>	1
	<Upload Standby>	1

*1: ## indicates the remaining time.

*2: # indicates the channel number of BP.

*3: The alarm generation can be inhibited depending on the setting.

*4: Displayed when lead-off or sensor-off condition remains after the power is turned ON, monitoring is resumed, or a patient is discharged.

*5: # indicates the remaining quantity of MPDR data to be uploaded.

Numeric Data Box Message

❑HR

Message
<Unit Failure>
<Upper HR Alarm>
<Lower HR Alarm>
<Lower ST Alarm>
<Upper ST Alarm>
<Cannot Analyze>
<Check Electrodes>
<Check Electrodes Attachment.>
<Pacing Detection Error>
<Only 5 electrodes are used.>
<Out of Range>
<Low Amplitude>
<Noise Interference>
<Artifact>

❑ST

Message
<Lower ST Alarm>
<Upper ST Alarm>

❑BP1 to 4

Level H for BP1 and ART, Level M for other label

Message
<Lower BP Alarm>
<Upper BP Alarm>
<Zero Required>
<Check the catheter.>
<Out of Range>

❑Pulse Rate (BP Source)

Message
<Upper PR Alarm> (BP)
<Lower PR Alarm> (BP)
<Check the catheter.>
<Out of Range>

❑NIBP

If <NIBP Meas. Error> is displayed, the message can be canceled by pressing [Cancel Error] on the NIBP setup screen, or [NIBP Start/Stop] key (user key or fixed key).

If the same message is repeatedly displayed, a failure of the equipment can be considered. Cease the measurement, and contact your nearest service representative. If the equipment is continued to use, the temperature of its bottom could get hot and there is a possible risk of burn injury if touched. (☞"<NIBP Unit Error (E**-**)> is displayed on the main unit." P11-37)

Message
<NIBP Meas. Error>
<Upper NIBP Alarm>
<Lower NIBP Alarm>
<Measurement Failed.>
<Check NIBP cuff, hose>
<Check patient type, air hose>
<Initializing>
<Out of Range>

❑SpO_2 (Nellcor Model)

Message
<Unit Failure>
<Lower SpO_2 Alarm>
<Upper SpO_2 Alarm>
<Replace Sensor>
<Check Sensor Attach.>
<No Pulse Detected>
<Motion Artifact>
<Pulse Search>

❑SpO_2/SpCO/SpMet/SpHb (Masimo Model)

Message
<Lower SpO_2 Alarm>
<Upper SpO_2 Alarm>
<Upper SpCO Alarm>
<Upper SpMet Alarm>
<Lower SpHb Alarm>
<Upper SpHb Alarm>
<Replace Sensor>
<Check Sensor Attach.>
<Low Confidence>
<Pulse Search>
<Noise Interference>
<Check Sensor>
<Replace Cable>

Message
<Check Cable>
<Check Sensor Conn.>
<Zeroing Sensor>
<SpO_2 only mode>
<Low Signal IQ>
<Low Confidence>

❑RR (SpO_2: Nellcor Model)

Message
<Unit Failure>
<RR Interference>
<Unable to calculate>
<Calculating>
<Outside Range>
<Out of Range>
<Upper RR SpO_2 Alarm>
<Lower RR SpO_2 Alarm>

❑PR-SpO_2

Message
<Upper PR Alarm> (SpO_2)
<Lower PR Alarm> (SpO_2)
<Out of Range>

❑TEMP1 to 6

Message
<Upper TEMP Alarm>
<Lower TEMP Alarm>
<TEMP Unit Failure>
<Unknown Sensor>
<Out of Range>

❑Tb

Message
<Lower Tb Alarm>
<Upper Tb Alarm>
<Out of Range>

❑RR (Impedance)

Message
<Apnea Alarm>
<Upper RR Alarm>
<Lower RR Alarm>
<CVA detected>
<RR meas. range is exceeded.>
<Out of Range>
<Suspended>

❑RR (Gas)

Message
<Apnea Alarm>
<Upper RR Alarm>
<Lower RR Alarm>
<Out of Range>

❑CO_2 (When HPD-810/HPD-820 is used)

Message
<Upper CO_2-E Alarm>
<Lower CO_2-E Alarm>
<Upper CO_2-I Alarm>
<Check airway adapter.>
<Zeroing>
<GAS Warm Up>
<Zero CO_2 Adapter>
<Unknown Sensor>
<Out of Range>

❑CO_2 (HCP-810/HCP-820)

Message
<Initializing>
<Check Sample Line>
<Zeroing>
<Check the Exhaust Port>
<Perform calibration.>
<GAS Unit I/F Failure>
<Out of Range>
<Upper CO_2-E>
<Lower CO_2-E>
<Upper CO_2-I>

Ventilator Alarm Message

❑Top Priority Alarm (Alarm Level S)

Item	Message
Ventilator	<Vent. Alarm>
Ventilator	<VENT COMM>

⚠ WARNING

- When the VELIA, ASTRAL, VS ULTRA ventilator is connected, and the ventilator power is turned OFF, alarm will not generate on the DS-8007. If the connection cable is disconnected from the ventilator, <Vent. Alarm> will generate, but <VENT_COMM> alarm will not generate on the DS-8007.
- The ventilator alarm sound is set to OFF (factory default).
- The alarm sound can be turned ON on the "Tone/Volume" menu. (☞"Tone/Volume" P10-15)
- When the AC Unit (DSA-81) is disconnected from the DS-8007, <VENT_COMM> alarm will not generate.

Ventilator Alarm Factor

⚠ CAUTION

- For the ventilators other than SV-300, SERVO-i, SERVO-s, SERVO-U/n/air, ventilator alarm factor will not be notified to the central monitor.
- Depending on the central monitor type and software version, ventilator alarm factor may not be displayed. For details of the central monitor type and software version, refer to your nearest service representative.
- The ventilator alarm factors are displayed only on the central monitor. These will not be displayed on the bedside monitor.

Displayed Alarm Message	Remarks
VENT AWP	Airway Pressure Alarm
VENT MV	Minute Ventilation Alarm
VENT APNEA	Apnea Alarm
VENT CONT. HP	Continuous High Pressure Alarm
Upper VENT_FiO_2	FiO_2 Upper Limit Alarm
Lower VENT_FiO_2	FiO_2 Lower Limit Alarm
Upper VENT_CO_2	$EtCO_2$ Upper Limit Alarm
Lower VENT_CO_2	$EtCO_2$ 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
Ventilator	Other ventilator alarm

Cardiac Output Message

❑Status Message

Message	Details
WAIT	Preparing for measurement. It will be also displayed when catheter relay cable is not connected to the CO module, or when thermodilution catheter is not connected.
READY	Ready to start the measurement.
BUSY	In process of measurement.
END	Measurement is completed.

❑Result Status

The result status will be displayed for 30 seconds after completion of measurement.

Message	Details
CO_OK	CO is correctly measured.
UPPER_FAULT	Measurement error • After the injection, the blood temperature is out of the measurement range. • The thermistor connector and relay cable are not securely connected. • The sensor or relay cable is defective.
PEAK_FAULT	Measurement error • The peak of the thermodilution curve can not be detected. • The thermistor connector and relay cable are not securely connected. • The sensor or relay cable is defective.
LOWER_FAULT	Measurement error • The blood temperature has not returned to stable condition after the measurement. • The thermistor connector and relay cable are not securely connected. • The sensor or relay cable is defective.
SENSOR_ERROR	Measurement error • The thermistor connector and relay cable are not securely connected. • The sensor or relay cable is defective.
OVER RANGE	Measurement error • The CO value is out of the calculation range.

Troubleshooting

ECG

❑<Check Electrodes> or <LEAD OFF> is displayed.

Cause 1

The electrode is detached, or is not making good electrical contact with the skin.

Solution

Check if the electrodes are properly attached.
Replace the electrodes.
Make sure that the lead cable or relay cable is not defective (wire break, etc.).
(☞"Before Attaching the Electrodes" P7-1)
(☞"Electrode Placement" P7-2)

Cause 2

Even though the "3-lead Override" (ECG Parameter Setup) is set to [ON], electrodes other than LA, RA, LL are connected.

Solution

Set the "3-lead Override" to [OFF].
Or, detach the electrodes other than LA, RA, LL.

❑<ECG Low Amplitude> is displayed.

Cause 1

The ECG amplitude is 0.25 mV or below for the waveform size of x1, x1/2, x1/4, and 0.15 mV or below for the waveform size of x2, x4.

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.

Cause 2

The electrode contact is poor.
Electrical blanket or other noise source is near the patient.

Solution

Attach the electrodes firmly. Or, replace the electrodes.

- If the lead cable or relay cable is defective (wire break, etc.), replace it.
- If any noise source is near the patient, move it away from the patient as far as possible.

Cause 3

Even though the "3-lead Override" (ECG Parameter Setup) is set to [ON], electrodes other than LA, RA, LL are connected.

Solution

Set the "3-lead Override" to [OFF].Or, detach the electrodes other than LA, RA, LL.

❑<ECG Artifact> is displayed.

Cause 1

The electrode contact is poor.
Electrical blanket or other noise source is near the patient.

Solution

Attach the electrodes firmly.

- If the lead cable or relay cable is defective (wire break, etc.), replace it.
- If any noise source is near the patient, move it away from the patient as far as possible.

Cause 2

EMG is interfering.

Solution

- Change the electrode site to a location where the myoelectricity will be less likely to interfere.
- Select ESIS for the filter mode.

⚠ CAUTION

- Selecting ESIS for the filter mode will decrease the QRS amplitude and may result in not counting the heart rate.

Cause 3

Even though the "3-lead Override" (ECG Parameter Setup) is set to [ON], electrodes other than LA, RA, LL are connected.

Solution

Set the "3-lead Override" to [OFF].Or, detach the electrodes other than LA, RA, LL.

❑The ECG waveform is in the baseline position.

The lead-off condition may have occurred by the following causes.

Cause 1

Electrode is detached.

Solution

Place the electrodes again.If the electrode contact is poor, replace the electrode.
(☞"Before Attaching the Electrodes" P7-1)
(☞"Electrode Placement" P7-2)

Cause 2

The lead cable is disconnected from the electrode terminal.

Solution

Securely connect the lead cable.

REFERENCE

- If the error persists, wire break of the lead cable or relay cable can be considered. Contact your nearest service representative.

❑<Check Electrodes Attachment> is displayed.

Cause 1

The electrode contact with the skin is poor. There is substantial contact resistance between the electrodes.

Solution

Replace all the electrodes.Make sure to use the same type of electrodes .
(☞"Before Attaching the Electrodes" P7-1)
(☞"Electrode Placement" P7-2)

Cause 2

Even though the "3-lead Override" (ECG Parameter Setup) is set to [ON], electrodes other than LA, RA, LL are connected.

Solution

Set the "3-lead Override" to [OFF].Or, detach the electrodes other than LA, RA, LL.

❑<ECG Unit Error> is displayed.

Cause

A communication error has occurred between the ECG measuring unit.

Solution

A failure of the ECG unit can be considered. Contact your nearest service representative.

❑The measurement data is displayed as "xxx".

Cause

The heart rate is outside the measurement range.

Solution

- Check if the electrodes are properly attached.
  (☞"Before Attaching the Electrodes" P7-1)
  (☞"Electrode Placement" P7-2)
- Replace the electrode, or check the lead cable and relay cable.

❑Heart rate is not counted. Heart rate is low.

Cause

The ECG waveform amplitude is below the QRS detection level (0.3 mV).

Solution 1

Change the electrode site, or select a lead with higher QRS amplitude.

⚠ CAUTION

- 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.Change the electrode site and increase the ECG amplitude.

Solution 2

Increase the displayed waveform size. By increasing the waveform size, small QRS wave will become detectable. However, noise may be also detected.

❑Heart rate is not counted, and <LEAD OFF> is displayed.

Cause 1

The electrode of the displayed lead type is detached, or is not making good electrical contact with the skin.

Solution

- Check if the electrodes are properly attached.
  (☞"Before Attaching the Electrodes" P7-1)
  (☞"Electrode Placement" P7-2)
- Replace the electrode, or check the lead cable and relay cable.

Cause 2

Even though the "3-lead Override" (ECG Parameter Setup) is set to [ON], electrodes other than LA, RA, LL are connected.

Solution

Set the "3-lead Override" to [OFF].Or, detach the electrodes other than LA, RA, LL.

❑Artificial pacemaker pulse is not displayed.

Cause 1

[Not Used] is selected for "Pacemaker" on the "Admit/Discharge" menu.

Solution

Select [Used] for "Pacemaker".

Cause 2

"Pacemaker Pulse" is set to [OFF] (ECG Parameter Setup).

Solution

Select [ON] for "Pacemaker Pulse" .

Cause 3

The electrode attachment site is not appropriate.

Solution

Check the electrode attachment site.
(☞"Before Attaching the Electrodes" P7-1)
(☞"Electrode Placement" P7-2)

❑<ECG Pacing detection error> is displayed.

Cause

The pacemaker pulse is detected 16 pulses or more per second.

Solution 1

- Check if the electrodes are properly attached.
  (☞"Before Attaching the Electrodes" P7-1)
  (☞"Electrode Placement" P7-2)
- Replace the electrode, or check the lead cable and relay cable.
- If any noise source is near the patient, move it away from the patient as far as possible.

Solution 2

If the patient is not using a pacemaker, select [Not Used] for "Pacemaker"("Admit/Discharge").

❑<ECG Disconnected> is displayed.

Cause

While monitoring the ECG, the relay cable was unplugged.

Solution 1

To cease monitoring, press the [Alarm Silence] key. The message will disappear, and the alarm will be silenced.

Solution 2

To continue monitoring, plug in the ECG relay cable. The message will disappear, and the alarm will be silenced.

❑<Cannot analyze> is displayed.

Cause

"Suspend Arrhy, Analysis during Noise Interference" ("Initial Settings") is set to ON, and arrhythmia analysis is suspended for more than 30 seconds due to continuous noise or EMG interference.

Solution

Check the electrode attachment, and remove the noise source.

- Check the electrode attachment, lead cable and relay cable.

- If the electrode, lead cable, or relay cable is defective, replace them.
- If any noise source is near the patient, move it away from the patient as far as possible.
  If EMG is interfering, change the electrode site to a location where EMG will less likely to interfere.

❑Arrhythmia cannot be detected, or is judged as "?".

Cause 1

The amplitude of ECG1 or ECG2 is below the QRS detection level (250 μV and below).

Solution

Change the electrode site, or select a lead with higher QRS amplitude for both ECG1 and ECG2.When the electrode site is changed, perform the arrhythmia learn process.

Cause 2

The shapes of normal heartbeat and arrhythmia are similar.

Solution

Change the electrode site or select a lead which shows a clear difference between a normal heartbeat and arrhythmia. When the electrode site is changed, perform the arrhythmia learn process.

Cause 3

Noise is interfering with the ECG.

Solution

Check the electrode attachment, and remove the noise source.

- Check the electrode attachment, lead cable and relay cable.
- If the electrode, lead cable, or relay cable is defective, replace them.
- If any noise source is near the patient, move it away from the patient as far as possible.
  If EMG is interfering, change the electrode site to a location where EMG will less likely to interfere.

Respiration

❑<CVA detected> is displayed.

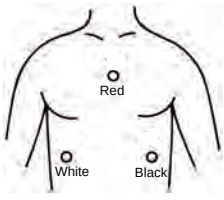
Cause

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.

Or, select a lead where the heartbeat will be less likely to interfere.



❑<RR meas. range is exceeded.> is displayed.

Cause 1

Electrode is detached.

Solution

Place the electrodes again.If the electrode contact is poor, replace the electrode.
(☞"Before Attaching the Electrodes" P7-1)

(☞"Electrode Placement" P7-2)

Cause 2

The electrode contact impedance is high.

Solution 1

Place the electrodes again.If the electrode contact is poor, replace the electrode.
(☞"Before Attaching the Electrodes" P7-1)
(☞"Electrode Placement" P7-2)

Solution 2

Change the lead for respiration measurement.

❑"0" is displayed for respiration rate, or apnea alarm is generated.

Cause

The amplitude of the respiration waveform is too low.

Solution 1

Change the electrode site, or select a lead with higher QRS amplitude.

Solution 2

Increase the displayed waveform size.

❑The respiration waveform and respiration rate is not displayed.

Cause 1

The baseline position of the respiration waveform is outside the waveform display area.

Solution

Increase the waveform display area.
Adjust the 0Ω baseline position. (☞"RESP Parameter Setup" P7-15)

Cause 2

The electrosurgery-proof type ECG relay cable is used.

Solution

The impedance respiration can not be measured if the electrosurgery-proof type cable is used.Use the standard ECG relay cable if not using the electrosurgical knife.

Cause 3

The impedance respiration measurement is ceased.

Solution

Select [ON] for "Impedance Measurement" on "Admit/Discharge" or "RESP" setup menu.

⚠ CAUTION

- If a pacemaker with minute ventilation measurement function is used, select [OFF] for "Impedance Measurement".Otherwise, both the pacemaker and the monitor will not be able to perform accurate measurement.

❑The measurement data is displayed as "xxx".

Cause

The respiration rate is outside the measurement range.

Solution

- Check if the electrodes are properly attached.
  (☞"Before Attaching the Electrodes" P7-1)
  (☞"Electrode Placement" P7-2)
- Replace the electrode, or check the lead cable.
- Change the lead for respiration measurement.

❑The lead for respiration measurement cannot be changed.

Cause

TCON network is used.

Solution

- If TCON is set, the lead will be fixed to [II].
- If the respiration amplitude for lead II is small, check if the electrodes are properly attached.
  (☞"Before Attaching the Electrodes" P7-1)
  (☞"Electrode Placement" P7-2)

Invasive Blood Pressure

❑<BP* Transducer OFF> is displayed.

Cause

The BP (1 to 4) transducer is not connected.

Solution 1

To cease monitoring, press the [Alarm Silence] key. The message will disappear, and the alarm will be silenced.

Solution 2

Connect the transducer.

Solution 3

The BP relay cable or transducer may be defective. Replace the BP relay cable or transducer.

❑<BP* Zero Required> is displayed.

Cause

The BP zero balance has not been performed since the power is turned ON.

Solution

Open the three-way valve of the transducer to air and perform zero balance.

❑The measurement data is displayed as "---".

Cause

The BP zero balance has not been performed since the power is turned ON.

Solution

Open the three-way valve of the transducer to air and perform zero balance.

❑BP value and waveform are not displayed properly.

Cause

The BP zero-balance is unstable.

Solution 1

Open the three-way valve of the transducer to air and perform zero balance.

Solution 2

Disconnect the BP transducer from the BP relay cable, and check if there is any abnormality on the connector terminal. Make sure that there is no distortion nor substance, such as blood, medicament, attached which may cause contact failure.
If any abnormality is found, replace the BP transducer or BP relay cable.

❑The measurement data is displayed as "xxx".

Cause

The BP value is outside the measurement range.

Solution

- Perform BP zero balance again.
- Check if the measurement data is within the measurement range.
- Check the BP relay cable and BP transducer.

❑<BP# Disconnected> is displayed.

Cause

While monitoring the blood pressure, BP relay cable was disconnected from the 2ch BP conversion cable.

Solution 1

To cease monitoring, press the [Alarm Silence] key. The message will disappear, and the alarm will be silenced.

Solution 2

To continue monitoring, plug in the BP interface cable or 2ch BP conversion cable. The message will disappear, and the alarm will be silenced.

❑The zero balance process fails.

Cause

The three-way valve may not be opened to air, or artifact is present due to movements, etc.

Solution

Check if the three-way valve is opened to air. Verify that <Zero ready> is displayed on the parameter setup screen, or <READY> is displayed on the user key before starting the zero balance.

❑<Transducer Voltage Failure> is displayed.

Cause 1

The BP relay cable or transducer is defective.

Solution

Replace the BP relay cable or transducer.

Cause 2

A hardware failure has occurred.

Solution

Immediately turn OFF the power and cease the operation. Contact your nearest service representative.

❑<Check the ART catheter.> is displayed.

Cause 1

During the measurement, ART catheter was disconnected.

Solution

Connect the ART catheter securely. Make sure that the ART catheter is not loose.

Cause 2

The BP relay cable or transducer is defective.

Solution

Replace the BP relay cable or transducer.

SpO_2 Measurement (DS-8007N)

❑<SpO_2 Check Sensor Attach.> 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 that the light emitting and receiving parts of the sensor LED are aligned.

❑<SpO_2 Pulse Search> is displayed.

Cause 1

The amplitude of the pulse waveform is too low, or the sensor is not positioned correctly.

Solution

Check that the light emitting and receiving parts of the sensor LED are aligned.

Cause 2

The sensor has not been attached long enough to obtain stable measurement.

Solution

After the sensor attachment, wait and see for about one minute until the waveform stabilizes.

❑<SpO_2 No Pulse Detected> is displayed.

Cause

The amplitude of the pulse waveform is too low, or the sensor is not positioned correctly.

Solution

Check that the light emitting and receiving parts of the sensor LED are aligned.
Avoid the sensor from exposure to ambient light.

❑<SpO_2 Motion Artifact> is displayed.

Cause

There is excessive body motion from the patient.

Solution

Relocate the sensor to which body motion will have less influence.

❑The pulse waveform is not displayed, or interrupted.

Situation: <SpO_2 Check Sensor Attach.> is displayed.

Cause 1

The amplitude of the pulse waveform is too low, or the sensor is not positioned correctly.

Solution

Check that the light emitting and receiving parts of the sensor LED are aligned.

Cause 2

The sensor is defective.

Solution

Replace the sensor.

Cause 3

SpO_2 sensor is not firmly connected to the connector.

Solution

Make sure the SpO_2 sensor is firmly connected.

Cause 4

Sensor is exposed to light.

Solution

Place a black or dark cloth over the sensor to avoid direct sunlight. When not using the sensor for measurement, avoid placing the sensor in light or unplug the sensor from the connector.

❑SpO_2 value is unstable.

Cause 1

There is excessive body motion from the patient which disables correct measurement.

Solution 1

Have the patient lie still.

Solution 2

Relocate the sensor, or change the sensor to which the body motion will have less influence.

Cause 2

The probe size is not appropriate.

Solution

Select a probe size which is appropriate for the patient.

Cause 3

Sensor is exposed to light.

Solution

Place a black or dark cloth over the sensor to avoid direct sunlight.

❑<SpO_2 Failure> is displayed.

Cause 1

The sensor is defective.

Solution

Replace the sensor.

Cause 2

Communication error has occurred with the SpO_2 unit.

Solution

A defective cable or SpO_2 unit failure can be considered.
Contact your nearest service representative.

Cause 3

The system was started with the sensor and cable connected.

Solution

Disconnect the SpO_2 cable and sensor from this equipment, and press the standby switch to enter into standby mode.Then, press the standby switch again to cancel the standby mode, and when the monitoring screen is displayed, connect the cable and sensor.

❑<SpO_2 Replace Sensor> 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 the usable sensors, refer to your nearest service representative.
If the message is still displayed even after replacing the sensor, contact your nearest service representative.

❑<SpO_2 Disconnected> is displayed.

Cause

The SpO_2 relay cable is disconnected during SpO_2 monitoring.

Solution 1

To cease monitoring, press the [Alarm Silence] key. The message will disappear, and the alarm will be silenced.

Solution 2

To continue monitoring, plug in the SpO_2 relay cable. The message will disappear, and the alarm will be silenced.

❑<Disconnect SpO_2 sensor/cable and set the system in standby mode.> is displayed.

Cause

Initialization of SpO_2 unit is not completed.

Solution

Disconnect the SpO_2 cable and sensor from this equipment, and press the standby switch to enter into standby mode.Then, press the standby switch again to cancel the standby mode, and when the monitoring screen is displayed, connect the cable and sensor.

❑<RR Interference> is displayed.

Cause

RR cannot be measured due to signal interference.

Solution 1

Keep the patient still as much as possible, and measure while the patient is not moving.

Solution 2

Check if the patient has the history of atrial fibrillation or implanted pacemaker.

Solution 3

Use other procedure to measure the respiration rate.

❑<Unable to Calculate> is displayed.

Cause

SpO_2 or pulse rate value is invalid, and respiration rate cannot be measured.

Solution 1

Refer to the operation manual, and make sure that the sensor is correctly attached.

Solution 2

Refer to the operation manual, and make sure that the environment or patient's condition is not adversely affecting the sensor performance.

❑<Calculating> is displayed.

Cause

This message will be displayed only during the RR calculation. When the calculation completes, this message will disappear.
When calculation error occurs, <UNABLE TO CALCULATE> will be displayed.

❑<No RR Sensor Connected> is displayed.

Cause

The connected sensor is not applicable.

Solution

Connect the specified sensor.

❑<Outside Range> is displayed.

Cause

One of the following situation is occurring.
*PR is outside the range of 40 bpm to 170 bpm.
*RR > PRx0.5

Solution

To determine the cause of interference, assess the patient's condition using both SpO_2 and PR values.

SpO_2 Measurement (DS-8007M)

❑<SpO_2 Replace Sensor> 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.
(☞"Pulse Oximetry Measurement (Manufactured by Masimo)" P13-4)

Cause 4

The sensor is used beyond its expected life.

Solution

Replace the sensor.

NOTE

- The X-Cal function automatically monitors the Active Monitoring Time (actual time of SpO_2 monitoring) for each sensor and cable.
- Even if the sensor is used beyond its expected life, the measurement will not cease unless the power is turned OFF, sensor is disconnected from the cable, cable is disconnected from the monitor, or the sensor is reattached.
- When a measurement with a sensor that has reached its end of life is suspended for certain amount of time, and resumed with the same sensor, a message to replace the sensor will be displayed.
- Depending on the equipment, some sensors may not be recognized.

❑<SpO_2 Check Sensor Attach.> is displayed.

Cause 1

The sensor is detached from the patient.

Solution 1

Check if the sensor is properly attached to the patient.

Solution 2

Check that the light emitting and receiving parts of the sensor LED are aligned.

Cause 2

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 the sensor from exposure to ambient light.

Solution 3

Relocate the sensor position.

❑<SpO_2 Low Perfusion> is displayed.

Cause

The amplitude of the pulse waveform is too low, or the sensor is not positioned correctly.

Solution

Check that the light emitting and receiving parts of the sensor LED are aligned.

❑<Low Confidence> is displayed.

Cause

The amplitude of the pulse waveform is too low, or the sensor is not positioned correctly.

Solution

Check that the light emitting and receiving parts of the sensor LED are aligned.

❑<SpO_2 Pulse Search> is displayed.

Cause 1

The amplitude of the pulse waveform is too low, or the sensor is not positioned correctly.

Solution

Check that the light emitting and receiving parts of the sensor LED are aligned.

Cause 2

The sensor has not been attached long enough to obtain stable measurement.

Solution

After the sensor attachment, wait and see for about one minute until the waveform stabilizes.

❑<SpO_2 Noise Interference> is displayed.

Cause

External signal or energy is interfering with the measurement.

Solution

Remove the external interference or apply ambient shielding.

❑<SpO_2 Check Sensor>, <SpO_2 Replace Cable>, or <SpO_2 Check Cable> is displayed.

Cause 1

Unrecognizable sensor is connected.

A wrong patient cable is used.

When attached to the patient, the sensor was exposed to high-intensity light which lead to false recognition.

Solution

Reattach the SpO_2 sensor and patient cable.

Replace with a Fukuda Denshi specified patient cable and sensor.

(☞"Pulse Oximetry Measurement (Manufactured by Masimo)" P13-4)

Cause 2

The cable is used beyond its expected life.

Solution

Replace the patient cable.

NOTE

- The X-Cal function automatically monitors the Active Monitoring Time (actual time of SpO_2 monitoring) for each sensor and cable.
- Even if the cable is used beyond its expected life, the measurement will not cease unless the power is turned OFF or the cable is reconnected.
- When a measurement with a cable that has reached its end of life is suspended for certain amount of time, and resumed with the same cable, a message to replace the cable will be displayed.
- Depending on the equipment, some cable may not be recognized.

❑<SpO2 Failure> is displayed.

Cause

Communication error has occurred with the SpO_2 unit.

Solution

A defective cable or SpO_2 unit failure can be considered. Contact your nearest service representative.

❑<SpO_2 Disconnected> is displayed.

Cause

The SpO_2 relay cable is disconnected during SpO_2 monitoring.

Solution 1

To cease monitoring, press the [Alarm Silence] key. The message will disappear, and the alarm will be silenced.

Solution 2

To continue monitoring, plug in the SpO_2 relay cable. The message will disappear, and the alarm will be silenced.

❑<SpO_2 only mode> is displayed.

Cause

When the Rainbow sensor is used, SpCO, SpMet or SpHb parameter cannot be measured.

Solution 1

Remove the sensor from the patient's finger, and then reattach it.

Solution 2

Remove the sensor or patient cable from the DS-8007, and then reconnect it to the SpO_2 connector.

❑<Low Signal IQ> is displayed.

Cause

There is excessive body motion, or sensor attached position is not appropriate.

Solution 1

Check that the light emitting and receiving parts of the sensor LED are aligned.

Solution 2

Relocate the sensor to which body motion will have less influence.

❑PVI, SpCO, SpMet, SpHb, SpOC cannot be measured.

Cause 1

PVI, SpCO, SpMet, SpHb, SpOC measurements are optional functions.

Solution

It is necessary to add these as the measuring parameters.
For details, contact your nearest service representative.

Cause 2

The used sensor cannot measure the PVI, SpCO, SpMet, SpHb, SpOC.

Solution

Use the sensor which can measure the PVI, SpCO, SpMet, SpHb, SpOC.
For details, contact your nearest service representative.

Non-Invasive Blood Pressure

❑The cuff is not inflated although the pump is operating.

Cause 1

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 does not match the selected patient type.

Solution

Use the cuff with correct size for the selected patient type.

❑The pump is not operating.

Cause

The air hose is disconnected from the NIBP connector.

Solution

Check if the air hose is properly connected.

❑The measurement data is displayed as "---" .

Cause 1

The measurement accuracy is not reliable due to body motion artifact.

Solution

During the measurement, have the patient stay still.

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 corresponds with the selected patient type.

Cause 3

The air hose is disconnected.

Solution

Check if the air hose is tightly connected, and then measure again. If the same message is displayed again, air leakage inside the DS-8007 can be considered.
Contact your nearest service representative.

❑<Check NIBP cuff, hose> is displayed.

Cause 1

The connection between the cuff and air hose or the air hose and NIBP connector is loose or disconnected.

Solution

If the connection is loose or disconnected, securely connect it and perform the measurement again.

If the same message is displayed again, internal air leakage can be considered. Cease the measurement, and contact your nearest service representative.

Cause 2

The cuff is compressed.

Solution

Make sure that the cuff is not subjected to compression, and measure with the patient arms extended as much as possible.

If the same message is repeatedly displayed, air system may be clogged. Cease the measurement, and contact your nearest service representative.

Cause 3

The cuff size is not suitable for the patient.

Solution

Check that the cuff size is appropriate for the patient, and that the cuff is properly attached, and measure again.

Cause 4

The cuff size and the patient classification setting do not match.

Solution

Make sure that the appropriate cuff size is used according to the patient classification setting.

❑<NIBP measurement failed (Cxx-xx)> is displayed.

Error code condition (phenomenon, or situation) and its cause are indicated below.

C02-00 When "Quick Measurement" is [OFF], the data could not be measured.

Cause 1

The blood pressure may not be correctly measured due to the patient's condition.

Solution

Check the patient's condition, and measure again.

Cause 2

The cuff application has become loose.

Solution

Check that the cuff size is appropriate for the patient, and then measure again after attaching the cuff properly.

C02-01 When "Quick Measurement" is [ON], the data could not be measured.

Cause 1

The blood pressure may not be correctly measured due to the patient's condition.

Solution

Check the patient's condition, set "Quick Measurement" to OFF, and measure again.

Cause 2

The cuff application has become loose.

Solution

Check that the cuff size is appropriate for the patient, and then measure again after attaching the cuff properly.

C02-02 The air hose was disconnected from the NIBP connector during the measurement.

Cause

The air hose was disconnected from the NIBP connector during the measurement.

Solution

Connect the air hose to the NIBP connector, and then measure again.

C03-xx The exhaust ventilation has ceased, or the target deflation speed was not achieved.

Cause 1

During measurement, an artifact such as body motion may have interfered.

Solution

Keep the patient still as much as possible, and measure while the patient is not moving. When performing the measurement during surgery, avoid artifact caused by the surgery.

Cause 2

During the measurement, air hose was bent or occluded by the compression.

Solution

Make sure that the air hose is not bent or compressed before the measurement.

If the error persists and C03-xx error is frequently displayed, contact your nearest service representative and notify the error code.

C04-xx The cuff inflation was insufficient for the patient's blood pressure.

Cause

The blood pressure has significantly increased from the previous measurement.

Solution

Check the cuff application and size and perform the manual measurement.

C06-xx The pulse signal detected during the measurement was unstable.

Cause 1

During the measurement, the patient has trembled or moved.

Solution

Keep the patient still as much as possible, and measure while the patient is not trembling or moving.

Cause 2

Arrhythmia has frequently occurred during the measurement.

Solution

If arrhythmia occurs many times, correct measurement cannot be performed.Measure when arrhythmia is not frequently occurring.

C07-00 The measurement time has exceeded the allowable time.

Cause

Measurement is automatically repeated due to body motion or insufficient inflation.

Solution

Check the cuff application and size, and measure while keeping the patient still as much as possible.

C08-00 The detected PR value was abnormal.

Cause

The patient has trembled or moved.

Solution

Keep the patient still as much as possible, and measure while the patient is not moving.

C09-00 The inflation value has exceeded the allowable maximum value.

Cause

The cuff was subjected to compression.

Solution

Make sure that the cuff is not subjected to compression, and measure with the patient arms extended as much as

possible.

C10-xx The detected pulse amplitude was abnormal.

Cause

The cuff size is not suitable for the patient.

Solution

Check that the cuff size is appropriate for the patient, and that the cuff is properly attached, and measure again.

❑The time of measurement disappears and the numeric data is displayed as " - - - ".

Cause

The preprogrammed time to clear the NIBP data has elapsed.

Solution

The "NIBP Erase Time" can be selected from [60 min.], [120 min.], and after the set duration, the NIBP data will be displayed as "---".
Select the appropriate time which best fits the monitoring purpose.

❑The NIBP periodic measurement is ceased.

Cause

<NIBP Meas. Error (Exx-xx)> is displayed during the measurement.

Solution

When <NIBP Meas. Error (Exx-xx)> is displayed, the NIBP periodic measurement will be canceled. To resume the measurement, press the [NIBP Start/Stop] key and check that the measurement is properly performed.

❑Although the [NIBP Start/Stop] key is not pressed, standby mode is canceled and NIBP periodic measurement starts.

Cause

The NIBP measurement is started from the central monitor through the TCON communication.

Solution

As the discharge information is not transmitted through the TCON network, the discharged patient on the bedside monitor will not be discharged on the central monitor. When the patient is discharged on the bedside monitor, make sure to discharge the patient on the central monitor connected to the TCON network.

NOTE

- When the NIBP Start/Stop key is pressed or when the NIBP measurement interval is changed, the standby mode will be canceled and the NIBP periodic measurement will start.

❑<NIBP Unit Error (E**-**)> is displayed on the main unit.

Cause

An error has occurred on the NIBP unit.

E08-01: Communication Error (Sub CPU)
E08-02: WatchDog Timeout
E08-03: Pressure Offset Error
E08-04: Pressure Comparison Error
E08-05: Sub CPU Power Supply Failure
E08-06: Pressure Sensor 2 Power Supply Failure
E08-07: Pressure Sensor 1 A/D Reference Power Voltage Failure
E08-08: Rapid Exhaust Error

E08-09: Air Hose Identification Error
E09-A: Exceeded Maximum Cuff Pressure
E09-B: Inflation Timeout
E09-C: Quick Mode Timeout
E09-D: Measurement started during the long pause
E09-E: Measurement Timeout
E09-F: Main CPU Pressure Data Transmission Timeout
E09-G: Pressure Sensor 1 +5V Power Supply Failure
E09-H: Zero Calibration Timeout
E09-I: ROM Test Error
E09-J: RAM Test Error
E09-L: Clock Transmission Ceased
E09-M: Communication Failure at Power ON
E09-N: Pressure Comparison Error
E09-O: Maximum Inflation Timeout
E09-Q: Measurement was started before zero calibration
E09-R: Zeroing Error
E09-S: WatchDog Timeout
E09-T: +5V Digital Power Supply Failure
E09-U: Main CPU Power Supply Failure
E09-V: Pump Control Signal Failure
E09-W: Quick Exhaust Valve Control Signal Failure
E09-X: Sub CPU Constant Exhaust Valve Control Signal Failure
E09-Y: Main CPU Constant Exhaust Valve Control Signal Failure

Solution 1

These errors can be cleared by pressing the [Cancel Error] on the NIBP setup menu or [NIBP Start/Stop] key (fixed key or user key).If the same message is repeatedly displayed, a failure of the equipment can be considered. Cease the measurement, and contact your nearest service representative.

Solution 2

When <NIBP Unit Error (Exx-xx)> is displayed, make sure that the congestion is not generated, and remove the cuff if necessary.

Temperature

❑<T* Unknown Sensor> is displayed.

Cause 1

700 series temperature probe is used.

Solution

Use the 400 series temperature probe for measurement.

Cause 2

There is a contact failure of the temperature probe.

Solution

Check if the temperature probe is properly inserted.

❑The measurement data is displayed as "xxx".

Cause

The temperature measurement is outside the measurement range.

Solution

Check if the temperature probe is properly inserted.
Replace the temperature probe, or check the temperature probe.

❑<T* Disconnected> is displayed.

Cause

While monitoring the temperature, the temperature probe was unplugged.

Solution 1

To cease monitoring, press the [Alarm Silence] key.The message will disappear, and the alarm will be silenced.

Solution 2

To continue monitoring, plug in the temperature probe. The message will disappear, and the alarm will be silenced.

❑<TEMP Unit Failure> is displayed.

Cause

An error was detected on the temperature unit.

Solution

A unit failure can be considered.Cease the measurement, and contact your nearest service representative.

Cardiac Output (CO)

❑When measured consecutively, the measurement value varies. (±10% or more)

Cause 1

The injection method is not appropriate.

Solution

Inject within 1 to 3 seconds.

Cause 2

Injection temperature is not appropriate.

Solution

If iced injectate is used, pay attention not to warm the injector with hands.

Cause 3

The thermistor location is not appropriate.

Solution

Reposition the thermistor.

Cause 4

Arrhythmia event has occurred during the measurement.

Solution

Wait until the patient has stable heart rhythm.

Cause 5

There was patient's body movement during the measurement.

Solution

Have the patient stay still during the measurement.

Cause 6

The patient's hemodynamics changed during the measurement.

Solution

Wait until the patient has stable hemodynamics.

❑Abnormal measurement value is displayed.

Cause

The catheter size, injectate volume, catheter constant (CC) is not correct.

Solution

Set the proper condition, CC value for the used catheter.

❑The blood temperature (Tb), injectate temperature (Ti) is not displayed.

Cause

The catheter is not properly connected.

Solution

Securely connect the catheter.

❑The thermodilution curve is deformed.

Cause

The injection is not smooth, steady motion.

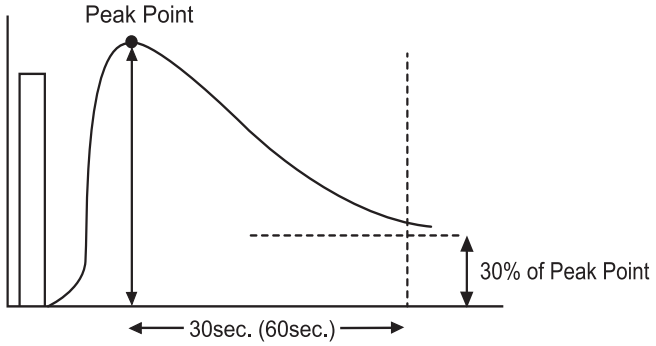
Solution

Inject promptly within 1 to 3 seconds.

❑The baseline of the thermodilution curve is displaced to the minus side. <LOWER FAULT> is displayed.

Cause

The blood temperature has not returned to stable condition after the measurement.



The thermodilution curve did not return to the cut off point soon enough. The temperature must return to a point that is 30% of the peak value within 30 seconds (or 60 seconds depending on the setup).

Solution

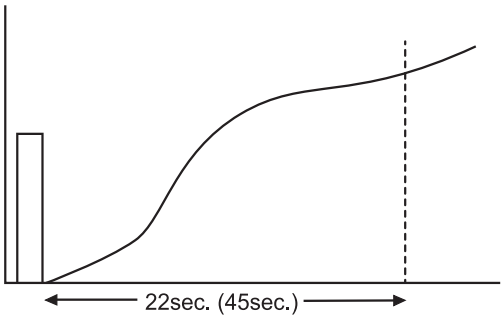
If performing continuous measurement, wait for 30 to 60 seconds and check that "Ready" is displayed before

performing the next measurement.

❑The thermodilution curve is low. <PEAK FAULT> is displayed.

Cause

The peak of the thermodilution curve can not be detected.



After the measurement is started, the peak of the thermodilution curve was not determined within 22 seconds (when the time scale is "30 sec") or 45 seconds (when the time scale is "60 sec").

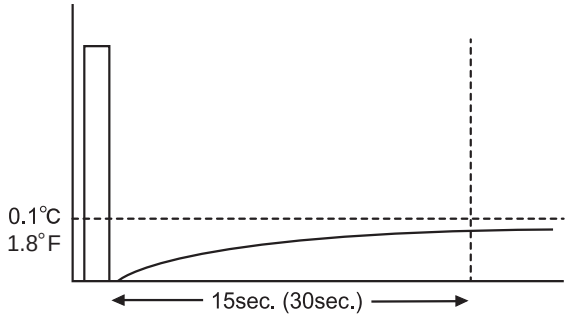
Solution

The thermistor may be contacting the pulmonary artery wall. Reposition the thermistor and measure again.

❑<UPPER FAULT> message is displayed.

Cause

After the injection, the blood temperature is out of the measurement range.



After the measurement is started, the change in blood temperature is less than 0.1°C /1.8°F for more than 15 seconds (when the time scale is "30 sec") or 30 seconds (when the time scale is "60 sec").

Solution

Use the iced injectate, and measure again.

❑<OVER RANGE> is displayed.

Cause

The CO value is out of the calculation range.

Solution

The area of the thermodilution curve is too large to calculate. Start the measurement again.

❑The measurement is interrupted, and the error message, <UPPER_FAULT>, <PEAK_FAULT>, <LOWER_FAULT> , <SENSOR_ERROR> is displayed.

Cause 1

The thermistor connector and relay cable is not securely connected.

Solution

Correct measurement cannot be performed unless the thermistor connector and relay cable is securely connected. Check the connection and perform the measurement again.

Cause 2

The sensor or relay cable is defective.

Solution

If the sensor or cable is defective, measurement can not be performed. Replace the sensor or cable and perform the measurement again.

❑<CO Disconnected> message is displayed.

Cause

The catheter relay cable was disconnected while monitoring the cardiac output.

Solution 1

To cease monitoring, press the [Alarm Silence] key. The message will disappear, and the alarm will be silenced.

Solution 2

To continue monitoring, plug in the catheter relay cable. This will clear the message and silence the alarm.

CO_2 Measurement (HCP-810/HCP-820)

❑<CO_2 Check Sample Line> is displayed.

Cause

The sampling tube is clogged.

Solution

Replace the sampling tube.

❑<Initializing> displayed inside the numeric data box does not disappear.

Cause

An error has occurred during the initialization at power ON.

Solution

The CO_2 unit failure can be considered.

❑<CO_2 Unit Error> is displayed.

Cause

Communication error has occurred with the CO_2 unit.

Solution

A cable disconnection or CO_2 unit failure can be considered. Contact your nearest 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 CO_2 calibration value is not appropriate.

Solution

Perform the CO_2 calibration again.

❑<CO_2 Disconnected> is displayed.

Cause

When the filter line is disconnected during CO_2 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.

❑<Check CO_2 Exhaust Port> is displayed.

Cause

The exhaust port of the HCP-810/HCP-820 is clogged.

Solution

After removing the occlusion by checking the exhaust port and gas exhaust system connection, press the [Resume CO_2 Meas.] key on the CO_2 setup menu for 2 seconds. If the message is still displayed, CO_2 unit failure can be considered. Contact your nearest service representative.

❑When the HCP-810/HCP-820 is connected, measurement data and waveform are not displayed.

Cause

Current version of the DS-8007 may need to be updated.

Solution 1

Update the DS-8007 to the latest version.

CO_2 Measurement (HPD-810/HPD-820)

❑<CO_2 Sensor Failure> is displayed.

Cause 1

The CO_2 sensor temperature has increased to 40°C/104°F and above.

Solution

Remove any heat generating source around the sensor.

Cause 2

The CO_2 sensor is malfunctioning.

Solution 1

Replace the CO_2 sensor.

Solution 2

If error persists, failure of the HPD-810/HPD-820 can be considered.Cease the measurement, and contact your nearest service representative.

❑<Zero the CO_2 Adapter> is displayed.

Cause

The CO_2 sensor is not zero balanced.

Solution

Perform the zero calibration of the sensor. (Refer to xxx)

❑<Check CO_2 Airway Adapter> is displayed.

Cause 1

The airway adapter is unclean.

Solution

A clean airway adapter must be used. If reusing an airway adapter, clean and air-dry it. Then, wipe the window with a swab, and sterilize (EOG, etc.) before use.

Cause 2

The airway adapter is disconnected from the sensor.

Solution 1

Securely connect the airway adapter to the sensor.

Solution 2

If error persists, perform the airway adapter calibration again.

❑<Unknown CO_2 Sensor> is displayed.

Cause

Unsupported CO_2 sensor is connected.

Solution

Connect the specified CO_2 sensor.

❑<CO_2 Disconnected> is displayed.

Cause

When the cable is disconnected during CO_2 monitoring, this message will be displayed.

Solution 1

To cease monitoring, press the [Alarm Suspend] key to clear the message and silence the alarm.

Solution 2

To continue monitoring, plug in the cable. This will clear the message and silence the alarm.

Recorder Unit (HR-800)

❑<Check Paper> is displayed and printing cannot be performed.
The power supply indicator on the HR-800 is lit in orange.
<PAPER OUT> is displayed inside the [Print Start/Stop] user key.

Cause

There is no paper in the printer.

Solution

Set the paper in the paper holder.

❑<Check Cassette> is displayed and printing cannot be performed.
The power supply indicator on the HR-800 is lit in orange.
<CASSETTE> is displayed inside the [Print Start/Stop] user key.

Cause

The paper holder is open.

Solution

Firmly close the paper holder.

❑Although the paper is fed, printing is not performed.

Cause

The paper is not correctly installed. The front and backside of the paper is set oppositely.

Solution

Set the paper in the paper holder so that the logo, FUKUDA DENSHI CO.,LTD appears on the upper surface.

❑The second and third waveforms are not printed for manual printing or alarm printing.

Cause

The second and third waveforms are not set on the printing setup screen.

Solution

Set the second and third waveform on the corresponding printing setup screen.

❑<Check Printer> is displayed and printing cannot be performed.
The power supply indicator on the HR-800 is lit in orange.
<CHECK?> is displayed inside the [Print Start/Stop] user key.

Cause 1

The paper is jammed.

Solution

Open the paper holder and properly set the paper.

Cause 2

The thermal head temperature has increased or other failure exists.

Solution

A damage to the thermal head or other failure can be considered. Contact our service representative.

Wired Network (DS-LANII/ DS-LANIII)

❑The data is not displayed on the central monitor.

Cause 1

The DS-LAN setup is not correct.

Solution

Make sure that the DS-LAN Setup (DS-LAN II/DS-LAN III) 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 is used.

Solution

The following central monitors can not be used on the DS-LAN III network.

- DS-5700
- DS-5800N/NX/NX^{MB}
- DS-7600/7600W with software version V05 and prior

When using these central monitors, all monitors in the same network should be set to DS-LAN II.

Cause 3

Inappropriate HUB is used.

Solution

For the DS-LAN II network, use the specified repeater HUB.
For the DS-LAN III network, use the specified switching HUB.

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

An equipment not specified by Fukuda Denshi is connected to the network.

Solution

Do not connect PC, printer, or other unspecified equipment to the DS-LAN network.

Cause 6

The DS-LAN cable is not properly connected.

Solution

The DS-LAN connection will be performed by our service representative.Contact your nearest service representative.

Cause 7

The AC Unit (DSA-81) is not connected.

Solution

Connect the DS-8007 to the AC Unit (DSA-81).

❑The CO_2 waveform is not displayed on the central monitor although the CO_2 numeric data is displayed.

Cause 1

[Impedance] is selected for "RR/APNEA Alarm Source" on the RESP setup menu.

Cause 2

[SpO_2] is selected for "RR/APNEA Alarm Source".

Solution

Select [CO_2] for "RR/APNEA Alarm Source" on the RESP setup menu.
In this case, RR and apnea alarm will be generated based on CO_2 measurement.

❑The impedance respiration waveform is not displayed on the central monitor although the RR numeric data is displayed.

Cause 1

[CO_2] is selected for "RR/APNEA Alarm Source" on the RESP setup menu.

Cause 2

[SpO_2] is selected for "RR/APNEA Alarm Source".

Solution

Select [Impedance] for "RR/APNEA Alarm Source" on the RESP setup menu.

NOTE

- The impedance waveform will not be displayed if [CO_2] is set for "RR/APNEA Alarm Source".
- The CO_2 waveform will not be displayed if [Impedance] is set for "RR/APNEA Alarm Source".
- The CO_2 waveform or impedance waveform will not be displayed if [SpO_2] is set for "RR/APNEA Alarm Source".

❑<Check DS-LAN Comm.> is displayed.

Cause

The LAN cable is loose, or contact failure has occurred.The power of the central monitor has been turned OFF.

Solution

Check the LAN connection on both the main unit and wall side. Disconnect and connect it again to make sure that it is firmly connected.
Check the LAN connection on the central monitor. Disconnect and connect it again to make sure that it is firmly connected.
Turn ON the power of the central monitor.

Telemeter (HLX-801)

❑The data cannot be received 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 impedance respiration waveform cannot be received at the telemetry center.

Cause 1

[CO_2] is selected for "RR/APNEA Alarm Source" on the RESP setup menu.

Cause 2

[SpO_2] is selected for "RR/APNEA Alarm Source".

Solution

Select [Impedance] for "RR/APNEA Alarm Source" on the RESP setup menu.

❑The BP waveform of 100 mmHg and above cannot be properly received.

Cause

The BP waveform and scale are not the same.

Solution

When the BP waveform is above 100 mmHg, set the BP scale above 100 mmHg.

❑<Check HLX Conn.> is displayed.

Cause

The connection with the HLX is interrupted.

Solution

Check the connection between the HLX and DS-8007.
Check if [HLX] is set for the corresponding port under [Initial Settings] > [External Device] > [AC Unit].

❑<HLX Ver.> is displayed.

Cause

Installation to the telemeter has failed.

Solution

Check the software version of the telemeter.
If "Telemeter V99-99" is displayed, perform the installation again.

❑<Telemeter Failure> is displayed.

Cause

Communication failure has occurred with the telemeter.

Solution

The telemeter unit failure can be considered. Contact your nearest service representative.

Bidirectional Wireless Communications (TCON)

❑There is a communication error with the central monitor.

Cause

The AC Unit (DSA-81) is not connected.

Solution

Connect the DS-8007 to the AC Unit (DSA-81).

❑There is a communication error with the central monitor. <Chk TCON Reception> is displayed.

Cause 1

The unit is too far away from the central monitor.

Solution

Readjust the location so that it is close enough to the central monitor.

Cause 2

The setup is incorrect.

Solution

Make sure that TCON is set to [ON] on the "Initial Settings", TCON ID is not duplicated with other bedside monitors, and TCON group number is the same with that of central monitor.

Cause 3

The connection cable of the TCON unit is disconnected.

Solution

The connection cable of the HTC-702 (FA) TCON unit is disconnected from the serial connector.Make sure to firmly connect the cable.

❑<Check TCON Comm.> is displayed.

Cause

TCON is not communicating with the monitor.

Solution

Check the connection between the TCON and monitor.
Check if [TCON] is set for the corresponding port under "Initial Settings" > "External Device".

❑<TCON Interference> is displayed.

Cause

There is other bedside monitor with the same TCON ID.

Solution

Check the TCON ID of other bedside monitor in the same TCON group, and if the same TCON ID exist, set a different TCON ID.

General

❑The data is initialized each time the power is turned ON.

Cause

The internal switch setting is incorrect.

Solution

The internal switch setting needs to be changed. Contact your nearest service representative.

❑The display is dark, or cannot be seen clearly.

Cause 1

The night mode is set.

Solution

Cancel the night mode.

Cause 2

The display brightness is not adjusted.

Solution

Due to the LCD characteristic, the visible range is limited.
Adjust the brightness on the "Brightness" menu.

Cause 3

The service life of the LCD backlight has expired.

Solution

The backlight needs to be replaced. Contact your nearest service representative.

⚠ CAUTION

- This equipment utilizes LED for the backlight.
  Since this LED 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.

❑The system does not start although the standby switch is pressed.

Cause 1

The power cable is not connected.

Solution

Plug in the power cable.

Cause 2

Incorrect SD card is inserted.

Solution

Remove the SD card, turn OFF the power, and turn ON the power again.

Cause 3

The control board is in the disabled state.

Solution

Press the standby switch for about 7 seconds to restart the system.

Cause 4

The battery was installed too soon after it was removed, and the system could not detect the standby switch condition.

Solution

After removing the battery, wait for 3 to 4 seconds before installing the battery. Then, press the standby switch to properly restart the system.

Cause 5

The battery is almost empty.

Solution

Connect to the AC power source, or replace with fully charged battery.

❑<Check Standby> is not displayed although the standby switch is pressed.

Cause

The control board is in the disabled state.

Solution

Press the standby switch for about 7 seconds to restart the system.

❑The clock is often delayed.

Cause

The battery for the backup memory is depleted.

Solution

Check if the time is delayed when the power is turned OFF.
The battery needs to be replaced. Contact your nearest service representative.

❑The touch panel does not function properly.

Cause

A scratch on the touch panel surface or foreign object entering the touch panel junction is causing misdetection of the key area.

Solution

The touch panel needs to be replaced. Contact your nearest service representative.

❑<AC Unit Failure> is displayed.

Cause

The data could not be read from the AC Unit.

Solution 1

Disconnect the DS-8007 from the AC Unit, and connect it again.
Also, check the backup settings on the AC Unit. (settings for AC Unit network, network printer, alarm status output, DS-LAN, TCON, search patient ID)

Solution 2

If the error persists, contact your nearest service representative.

❑<DS-8007 Check Unit>, <DS-8007 Out of Operating Temp. Range>, <Fan Failure>, or <Analog Output Failure> is displayed.

Cause 1

The equipment is used outside the specified operating temperature range.

Solution

Make sure the ambient temperature is within 10°C to 40°C/50°F to 104°F.

Cause 2

The equipment has been stored in an environment below the specified operating temperature before the usage.

Solution

Warm up the equipment until the alarm message disappears.

Cause 3

The vent hole is clogged.

Solution

Relocate the equipment. For installation location of the equipment, refer to ☞Maintenance Manual "Precautions for Installing the Equipment" P1-1.

Cause 4

The hardware failure has occurred.

Solution

If error persists, the equipment failure can be considered. Immediately turn OFF the power and cease the operation. Contact your nearest service representative.

❑<DS-8007 Check Rotary SW> is displayed.

Cause

The rotary switch setting is incorrect.

Solution

If the rotary switch is not set to "0", the equipment will not function properly.
Immediately turn OFF the power and cease the operation. Contact your nearest service representative.

❑<DS-8007 Check Long-Term Battery> is displayed.

Cause

The battery is depleted or malfunctioning.

Solution

The battery needs to be replaced. Contact your nearest service representative.

❑<Reinstall the battery.> is displayed.

Cause

The battery is not firmly installed and battery status cannot be detected. Or, charging of the battery is ceased.

Solution

Reinstall the battery. If the message is still displayed, replace the battery.

❑<Battery Charge Suspended.> is displayed.

Cause

Battery charge is temporarily suspended because the temperature of the battery is out of range for charging.

Solution

Wait until the battery is back to chargeable temperature. The battery may not be fully charged. When operating with battery, check the battery icon and operable time on the screen.

❑<Replace the battery.> is displayed.

Cause

The battery is deteriorated and cannot be charged and discharged.

Solution

Replace the battery.

Ventilator

❑<Vent. Alarm> is displayed.

Cause

The following alarm has generated on the ventilator.

- Parameter alarm such as AWP, MV, FiO_2
- Technical alarm such as battery replacement of the ventilator

Solution

Check the alarm cause of the ventilator, and take appropriate action.

❑<Vent. Offline> is displayed.
<VENT COMM> is displayed on the monitor and the ventilator.

Cause 1

The cable between the DS-8007 System and the ventilator is disconnected or not securely connected.

Solution

Make sure the cable is properly connected.

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 network setting of the monitor does not match with the ventilator.

Solution

Make sure that the network setting of the connecting equipments are as follows.

SV-300/SERVO-i/SERVO-s

- No network setting.

SERVO-U/n/air

- No network setting.

VELIA, ASTRAL, VS ULTRA

- No network setting.

PB-740/760/840

- Baud Rate: 9600 bps
- Parity Bit: None
- Stop Bit: 1
- Data Bit: 8

Evita4/2dura/XL

- Communication Protocol: Medibus
- Baud Rate: 19200 bps
- Parity Bit: Even
- Stop Bit: 1

BIS Monitor (A-2000/A-3000)

❑The numeric data is not displayed.

Cause 1

If the SQI value is lower than 15, BIS data and SR data will not be displayed.

Solution

Refer to the BIS monitor operation manual and set the SQI value above 15.

Cause 2

The communication setting of the BIS monitor is incorrect.

Solution

ASCII should be set to communicate with this system.

Make sure that ASCII is set on the BIS monitor communication setting.

Refer to the BIS monitor operation manual for procedures.

❑<Check BIS Conn.> is displayed.

Cause

The cable is disconnected or not properly connected.

Solution

Securely connect the connection cable to the serial connector of the AC Unit (DSA-81), or Status II connector and BIS monitor connector .

BIS (When HBX-800 is used)

❑<BISx Disconnected> is displayed.

Cause 1

The BISx is disconnected.

Solution

Verify all cable connections and connect the BISx correctly.

Cause 2

The BISx cable is defective.

Solution

Check the cable including the connector part, and replace the cable if necessary.

Cause 3

The BISx is defective.

Solution

Replace the BISx.

❑<BIS High Impedance, Check Sensor> is displayed.

Cause 1

The sensor is not fully in contact with patient's skin.

Solution

Attach the electrode firmly to patient's skin.

Cause 2

The sensor application is incorrect.

Solution

Read instructions on sensor package to ensure correct sensor placement.

Cause 3

The patient interface cable (PIC cable) is defective.

Solution

Replace the patient interface cable (PIC cable).

Cause 4

The BISx is defective.

Solution

Replace the BISx.

❑<BIS Sensor Disconnected> is displayed.

Cause 1

The sensor is disconnected.

Solution

Connect the sensor.

Cause 2

Poor or contaminated connection between the sensor and patient interface cable (PIC cable).

Solution

Clean the connection part, and connect them properly.

Cause 3

The patient interface cable (PIC cable) is disconnected.

Solution

Connect the patient interface cable (PIC cable) correctly.

Cause 4

The patient interface cable (PIC cable) is defective.

Solution

Replace the patient interface cable (PIC cable).

Cause 5

The BISx is defective.

Solution

Replace the BISx.

❑<BIS Perform "Sensor Check"> is displayed.

Cause 1

At least one element of sensor has too high impedance, and "Sensor Check" window is closed before sensor check completes.

Solution

Press the "Sensor Check" key to start the sensor check process and ensure that <PASS> is displayed.

Cause 2

The sensor application is incorrect.

Solution

Read instructions on sensor package to ensure correct sensor placement.

Cause 3

The sensor is not properly connected.

Solution

Verify that the sensor is properly connected.

Cause 4

The patient interface cable (PIC cable) is defective.

Solution

Replace the patient interface cable (PIC cable).

Cause 5

The BISx is defective.

Solution

Replace the BISx.

❑<Artifacts> is displayed.

Situation: The signal quality is less than half of the level desirable for optimal monitoring conditions.

NOTE

- This message may occur as the results of artifact (non-EEG signal) such as those generated from motion (patient movement or eye blinks) or the presence of electrocautery, warming blankets, or other devices.

Cause 1

Artifact, such as those generated by motion or eyeblinks, is causing loss of EEG recognition.

Solution

If <Artifacts> appears on the display, attempt to identify and eliminate artifact source.

Cause 2

EMG bar indicates electrical activity that may be interfering with EEG recognition.

Solution

If EMG bar is illuminated, attempt to determine and eliminate cause.

Cause 3

The patient interface cable (PIC cable) is defective.

Solution

Make sure that sensor check passes. If not, replace the patient interface cable (PIC cable).

Cause 4

The BISx is defective.

Solution

Replace the BISx.

❑<BIS SQI < 15%> is displayed.

Situation: The signal quality is too low to accurately calculate a BIS value.
The BIS value and other trend variables that are adversely affected by artifact are not displayed.

NOTE

- This message may occur as the results of artifact (non-EEG signal) such as those generated from motion (patient movement or eye blinks) or the presence of electrocautery, warming blankets, or other devices.

Cause 1

Artifact, such as those generated by motion or eyeblinks, is causing loss of EEG recognition.

Solution

If <BIS SQI < 15%> appears on the display, attempt to identify and eliminate artifact source.

Cause 2

EMG bar indicates electrical activity that may be interfering with EEG recognition.

Solution

If EMG bar is illuminated, attempt to determine and eliminate cause.

Cause 3

The patient interface cable (PIC cable) is defective.

Solution

Make sure that sensor check passes. If not, replace the patient interface cable (PIC cable).

Cause 4

The BISx is defective.

Solution

Replace the BISx.

❑<BISx Incompatible> is displayed.

Cause

The sensor is not compatible with the monitor configuration.

Solution

Replace the BISx.

❑<Check BIS Sensor, Perform Sensor Check> is displayed.

Cause

Problem is detected relating to sensor ground element, or sensor is using too much current.

Solution 1

Disconnect and examine sensor connection, clean any contamination, then perform "Sensor Check".

Solution 2

Replace the sensor if necessary, then perform "Sensor Check".

Solution 3

Replace the patient interface cable (PIC cable), then perform "Sensor Check".

Solution 4

Replace the BISx, then perform "Sensor Check".

❑<Replace BIS Sensor, Too Many Uses>, <Replace BIS Sensor, Invalid Sensor> is displayed.

Cause 1

Sensor has been connected and disconnected too many times.

Solution

Replace the sensor.

Cause 2

The sensor is invalid.

Solution

Replace the sensor.

❑<Sensor Usage > 24hrs.> is displayed.

Cause

The sensor was attached to the system for more than 24 hours.

Solution

Replace the sensor.

❑<BISx Failure> is displayed.

Cause

The BISx is defective.

Solution

Replace the BISx, then perform "Sensor Check".

❑The power indicator on the HBX-800 is lit in red.

Cause

The HBX-800 is defective.

Solution

Cease using the equipment and contact your nearest service representative to repair the equipment.

PC Communication

❑<Check System Conn.> is displayed.

Cause 1

The cable is disconnected or not properly connected. The power is not supplied to the communication port.

Solution

Connect the cable securely. Check if the power is supplied to the communication port by checking the communication indicator.

Cause 2

Communication with the PC is not performed. The communication is ceased.

Solution

Resume the communication with the PC. The communication time out period is about 1 minute.

Magnetic Card Reader/Barcode Reader

❑The magnetic card reader or barcode reader does not function.

Cause

The conversion cable (CJ-756) is not connected.

Solution

If the magnetic card reader or barcode reader is connected directly to the serial port on this equipment without the conversion cable, it will not function. Make sure to use the conversion cable.

SD Card

❑<There is no card in the slot.> is displayed.

Cause

SD card is not inserted or not correctly set in the SD card slot.

Solution

Set the SD card into the SD card slot.

❑<Data Read Error. Model type or software version is not compatible. Do you want to read only the common data?> is displayed.

Cause 1

There is no data on the SD card.

Solution

Check if the SD card is readable. Or, check if the data exists on the SD card. Pressing "Yes" will not start reading the compatible data. <Card access error.> will be displayed.

Cause 2

Error is detected during the read process.

Solution

The data may not be correctly written on the SD card. Format the card again on the used equipment and try the write/read process again. Pressing "Yes" will not start reading the compatible data.

❑<Card access error.> is displayed.

Cause 1

There is not enough capacity on the SD card to write the data.

Solution

Check the remaining card capacity. Format the card again on the used equipment and try the write/read process again.

Cause 2

Error is detected during the write process.

Solution

Make sure that the SD card is properly inserted and try the write process again. Format the card again on the used equipment and try the write/read process again.

Cause 3

Unspecified SD card is used.

Solution

Use the specified SD card.

Cause 4

The AC Unit was removed from the main unit while reading the data from the AC Unit (DSA-81).

Solution

Connect the AC Unit, and try reading the data again.

❑<Wrong card for full disclosure.>, <Failed to read full disclosure from the card.> is displayed.

Cause

Specified memory card is not used.
The card is not formatted.
The data stored in the card is damaged. The card has been already used on another equipment.

Solution 1

Use the recommended memory card.
Disconnect and connect the full disclosure waveform card again to make sure that it is properly inserted.
Format the card on the used equipment. (All previous data will be deleted.)

Solution 2

If the error persists, contact your nearest service representative.

❑The SD card is inserted to the card slot, but does not function.

Cause 1

The SD card is not properly inserted.

Solution

Insert the SD card properly.

Cause 2

The SD card is write-protected.

Solution

Move the lock slide to cancel the write protection.

❑<Reading Data> is displayed.

Cause

The SD card for full disclosure waveform is inserted.

Solution

It will take approximately 40 minutes to read the data. Wait until the reading completes.
Even while <Reading Data> is displayed, the system can enter into standby mode by pressing the standby switch.

❑The graphic/tabular trend data are not displayed.

Cause 1

<Reading Data> is displayed, and the data reading is in progress.

Solution

It will take approximately 40 minutes to read the data. Wait until the reading completes. The data will be sequentially displayed when the reading completes.

Cause 2

The SD card for full disclosure waveform is inserted or formatted.

Solution

If the SD card for full disclosure waveform is inserted or formatted, pay attention as some data will become unreadable.

❑<Failed to upload.> is displayed.

Cause 1

During uploading the MPDR data, the DS-8007 was disconnected from the host monitor or DSA-81.

Solution

When the DS-8007 is disconnected from the host monitor or DSA-81 during uploading, the uploading process will cease and the message will be displayed. To resume the upload process, connect the DS-8007 to the host monitor or DSA-81.

Cause 2

The DS-LAN cable of the DSA-81 is not securely connected.

Solution

When the DS-LAN cable is disconnected during uploading the MPDR data, the message will be displayed.Make sure the cable is securely connected.

Cause 3

The M-LAN cable of the DSA-82 is not securely connected.

Solution

When the M-LAN cable is disconnected during uploading the MPDR data, the message will be displayed.Make sure the cable is securely connected.

❑The MPDR suspended data is not uploaded.

Cause 1

The communication with the host monitor and central monitor is interrupted.

Solution

Suspend the data on the DS-8007 again, and start the upload process.

Cause 2

The SD card for full disclosure waveform is not inserted to the host monitor or central monitor.

Solution

Insert the SD card for full disclosure waveform to the host monitor or central monitor.

❑<Upload Standby> is displayed.

Cause

Uploading of other data is in progress on the central monitor.

Solution

Wait until the uploading of other data completes.

Chapter 12 Setup Item/Default Value

Chapter 12 Setup Item/Default Value

This section lists selection, default setting, and backup status for each setup item.
The following indicates the selection, default setting and backup status for each setup item.

Patient Admit / Discharge

Item	Description	Default	At Power ON	At Discharge
Mode Selection	Monitor Mode 1 to 6	Monitor Mode 1	Depends on the "Monitor Mode" setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].	
	Display Config. 1 to 6	Display Config. 1	Depends on the "Display Configuration" setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].	
ID	Numeric, Alphabet, Symbol (20 characters)	Blank	Backup	Initialize
Patient Name	Numeric, Alphabet, Symbol (16 characters)	Blank	Backup	Initialize
Patient Classification	Adult, Child, Neonate	Adult	Depends on the "Patient Classification" setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].	
Sex	Male, Female	No selection	Backup	Initialize
Team	Red, Orange, Yellow, Yellow-green, Green, Light Blue, Blue, Purple	Red	Backup	Initialize
Birth Date	Birth Date	Blank	Backup	Initialize
Age	0 year to 150 years or 0 day to 999 days	0 year	Backup	Initialize
Height	0 inch to 118.1 inch	0.0 inch	Backup	Initialize
Weight	0 lbs to 771.6 lbs	0.0 lbs	Backup	Initialize
BSA	0.00 m^2 to 9.99 m^2	0.00 m^2	Backup	Initialize
Blood Type	A+, B+, O+, AB+ A-, B-, O-, AB-	Blank	Backup	Initialize
Pacemaker	Used, Not used	Not Used	Depends on the setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].	
Impedance Measurement	ON, OFF	ON		
Admit Date/Time	Year, Month, Day, Time	Blank	Backup	Initialize

Alarm

Item	Description	Default	At Power ON	At Discharge
System Alarm	Suspend, ON	Suspend	-	-

Item	Description	Default	At Power ON	At Discharge
HR[*2] PR_SpO_2, PR_IBP	ON, OFF 20-300 bpm 5 bpm increments	ON 40-120 bpm	Depends on the "Monitor Mode" setting under [Setup>Initial Settings>User I/F>Power ON/Discharge]. If "Monitor Mode" setting is [Backup] ; Depends on the "Alarm" setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].	
Asystole	ON 3-10 sec. 1 sec. increments	ON 5 sec.		
VF	ON	ON		
VT	ON	ON		
Slow_VT	ON, OFF	ON		
Run	ON, OFF 2-8 beats 1 beat increments	ON 3 beats		
Couplet	ON, OFF	OFF		
Pause	ON, OFF 1.5-5 sec. 0.5 sec. increments	OFF 3.0 sec.		
BIGEMINY	ON, OFF	OFF		
TRIGEMINY	ON, OFF	OFF		
FREQUENT	ON, OFF 1-50 bpm 1 bpm increments	OFF, 10 bpm		
Tachy	ON, OFF	ON		
Brady	ON, OFF	ON		
Ext Tachy	ON, OFF 22-300 bpm 5 bpm increments	OFF, 150 bpm		
Ext Brady	ON, OFF 20-295 bpm 5 bpm increments	OFF, 30 bpm		
Triplet	ON, OFF	OFF		
R on T	ON, OFF 200-600 ms 8 ms increments	OFF 320 ms		
Multiform	ON, OFF	OFF		
Vent Rhythm	ON, OFF	OFF		
SVT	ON, OFF 2-10 beats 1 beat increments	OFF, 6 beats		
Irregular RR	ON, OFF 10-20% 5% increments	OFF 10%		
Prolonged RR	ON, OFF	OFF		
S FREQUENT	ON, OFF 1-50 bpm 1 bpm increments	OFF, 10 bpm		
S Couplet	ON, OFF	OFF		
VPC	ON, OFF	OFF		
SVPC	ON, OFF	OFF		
Pacer not Capture	ON, OFF 80-480 ms 8 ms increments	OFF 320 ms		
Pacer not Pacing	ON, OFF 20-200 bpm 5 bpm increments	OFF, 50 bpm		

Item	Description	Default	At Power ON	At Discharge
HR Lower Limit for VT	120 bpm, 140 bpm	120	Depends on the "Monitor Mode" setting under [Setup>Initial Settings>User I/F>Power ON/Discharge]. If "Monitor Mode" setting is [Backup] ; Depends on the "Alarm" setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].	
HR Lower Limit for Run*3	0-100 bpm 10 bpm increments	40		
HR Lower Limit for SVT	100-250 bpm 10 bpm increments	150		
ST1 to ST12(mm)*1	ST All Alarm ON, OFF Individual Alarm ON, OFF ±20 mm 1 mm increments	ST All Alarm OFF Individual Alarm OFF OFF-OFF		
ST1 to ST12(mV)*1	ST All Alarm ON, OFF Individual Alarm ON, OFF ±2.00mV0.1mV increments	ST All Alarm OFF Individual Alarm OFF OFF-OFF		
BP1 (mmHg)	ON, OFF 0-300 mmHg 5 mmHg increments	ON SYS: 80-180 DIA: OFF-OFF MEAN: OFF-OFF	Depends on the "Monitor Mode" setting under [Setup>Initial Settings>User I/F>Power ON/Discharge]. If "Monitor Mode" setting is [Backup] ; Depends on the "Alarm" setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].	
BP1 (kPa)	ON, OFF 0-40.0 kPa 0.5 kPa increments	ON SYS: 10.0-24.0 DIA: OFF-OFF MEAN: OFF-OFF		
BP2 to BP4 (mmHg)	ON, OFF 0-300 mmHg 5 mmHg increments	OFF SYS: OFF-OFF DIA: OFF-OFF MEAN: OFF-OFF		
BP2 to BP4 (kPa)	ON, OFF 0-40.0 kPa 0.5 kPa increments	OFF SYS: OFF-OFF DIA: OFF-OFF MEAN: OFF-OFF		

*1: The same setting applies for "mm" and "mV".

*2: For HR, Ext Tachy, Ext Brady, 60 bpm or lower can be set in 1 bpm increments. For PR_SpO_2, 25 bpm or lower can be set in 1 bpm increments.

*3: "HR Lower Limit for Run" can be set in 5 bpm increments for 50 bpm and above.

*4: For BP, 50 mmHg/7.0 kPa or lower can be set in 2 mmHg/0.2 kPa increments.

Item	Description	Default	At Power ON	At Discharge
CVP (mmHg) (kPa)	ON, OFF 0-300 mmHg 5 mmHg increments 0-40 kPa 0.5 kPa increments	OFF	Depends on the "Monitor Mode" setting under [Setup>Initial Settings>User I/F>Power ON/Discharge]. If "Monitor Mode" setting is [Backup] ; Depends on the "Alarm" setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].	
CVP (cmH_2O)	ON, OFF 0-40 cmH_2O 1 cmH_2O increments	OFF		
RR_IMP[*6] RR_GAS	ON, OFF 5 Bpm to 150 Bpm 5 Bpm increments 2-150 Bpm (Neonate) 2 Bpm increments	ON 5-30	Depends on the setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].	
RR_SpO_2	ON, OFF 5-35 Bpm 5 Bpm increments 6-34 Bpm (Child) 2 Bpm increments	ON 5-30		
Apnea	ON, OFF 10-60 sec. 1 sec. increments	ON 15 sec.		
SpO_2	ON, OFF 50-100%SpO_2 1%SpO_2 increments	ON 90%SpO_2 -OFF	Depends on the setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].	
Ext SpO_2	ON, OFF 50-98%SpO_2 1%SpO_2 increments	ON 80%SpO_2		
SpCO	ON, OFF 1-40%SpCO 1%SpCO increments	OFF		
SpMet	ON, OFF 1-15%SpMet 1%SpMet increments	OFF		
SpHb	ON, OFF 1.0-24.5 g/dL 0.1 g/dL increments	OFF		
NIBP (mmHg)	ON, OFF 10-300 mmHg 5 mmHg increments	ON SYS: 80-180 DIA: OFF-OFF MAP: OFF-OFF	Depends on the setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].	
NIBP (kPa)	ON, OFF 1.5 -40.0 kPa 0.5 kPa increments	ON SYS: 10.0-24.0 DIA: OFF-OFF MAP: OFF-OFF		
TEMP1 to TEMP6 (°C)	ON, OFF 30.0°C to 45.0°C/86.0°F to 113.0°F 0.5°C/1.0°F increments	OFF, OFF-OFF	Depends on the setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].	
Tb (°C)	ON, OFF 30.0°C to 45.0°C/86.0°F to 113.0°F 0.5°C/1.0°F increments	OFF, OFF-OFF		

Item		Description	Default	At Power ON	At Discharge
CO_2-Et (mmHg)		ON, OFF 1-100 mmHg 1 mmHg increments	OFF	Depends on the setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].	
(kPa)		ON, OFF 0.1-13.3 kPa 0.1 kPa increments	OFF		
(%)		ON, OFF 0.1-13.3% 0.1% increments	OFF		
CO_2-Insp (mmHg)		ON, OFF 1-4 mmHg 1 mmHg increments	OFF		
(kPa)		ON, OFF 0.1-0.4 kPa 0.1 kPa increments	OFF		
(%)		ON, OFF 0.1-0.4% 0.1% increments	OFF		
BIS (When HBX-800 is used)		ON, OFF 1-99 increments of 1	ON 40-OFF	Depends on the setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].	
Alarm Settings (Setup)	Alarm Suspend Time	1 min., 2 min.	2 min.	Backup	Backup
	Alarm Silence Time	1 min., 2 min.	2 min.		
	Alarm Sound Suspend	ON, OFF	ON		
	Alarm Sound Suspend Time	[1 min.] / [2 min.] / [5 min.] / [10 min.] / [30 min.] / [60 min.] / [90 min.] / [120 min.] / [240 min.] / [360 min.]	60 min.		
	Status Alarm Control Status Alarm Control	Link to alarm silence time, Link to each new occurrence	Link to each new occurrence		
	Alarm Limit Display	Graph, Numeric, OFF	Graph		

*6: For RR, 1 Bpm increments may be applied depending on the "RR Alarm Increment" settings. (☞Maintenance Manual "User I/F" P5-12)

NOTE

- By selecting [Backup] for "Power ON" and "Discharge" under [Setup>Initial Settings>User I/F >Power ON/Discharge], the settings will be retained at "Power ON" and "Discharge" respectively. If [Initialize] is selected, the settings will be initialized at "Power ON" and "Discharge".

Parameter

ECG

Item	Description	Default	At Power ON	At Discharge
Leads	I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5, V6	ECG1: II ECG2: aVR ECG3: I ECG4: III ECG5: aVL ECG6: aVF ECG7: V1 ECG8: V2 ECG9: V3 ECG10: V4 ECG11: V5 ECG12: V6	*1	
Waveform Size	Auto, x1/4, x1/2, x1, x2, x4	ECG1 to ECG12 x1	*1	
Filter Mode	Monitor, Diagnosis, ESIS	Monitor	Backup	Backup
Synchronized Mark/Tone	ECG, SpO_2, BP, Auto, OFF	Auto		
Pacemaker	*Same with "Patient Admit/Discharge" section.			
Pacemaker Pulse	ON, OFF	OFF	Backup	Backup
Pace Pulse Mask Time	Auto, 10ms, 20ms, 40ms, OFF	Auto	Backup	Initialize
HR Average	Average, Instant	Average	Backup	Backup
HR Delay	ON, OFF	OFF		
Drift Filter	ON, OFF	OFF		
AC Filter	ON, OFF	ON		
Auto Lead	ON, OFF	OFF		
3-lead Override	ON, OFF	OFF		
ST/VPC/Arrhy. Alarm Display	ON, OFF	ON		
Analog Output				

ECG

Item	Description	Default	At Power ON	At Discharge
Analog Output 1	Selected ECG Lead, Displayed ECG Lead, Multiparameter Connector 1-1, Multiparameter Connector 1-2, Multiparameter Connector 2-1, Multiparameter Connector 2-2	Displayed ECG Lead	Backup	Backup
Output Lead Sel.*2	I, II, III, aVF, aVL, aVR, V1, V2, V3, V4, V5, V6	I		
Analog Output 2	Selected ECG Lead, Displayed ECG Lead, Multiparameter Connector 1-1, Multiparameter Connector 1-2, Multiparameter Connector 2-1, Multiparameter Connector 2-2	Multiparameter Connector 1-1		
Output Lead Sel.*2	I, II, III, aVF, aVL, aVR, V1, V2, V3, V4, V5, V6	I		
Analog Output 3	Selected ECG Lead, Displayed ECG Lead, Multiparameter Connector 1-1, Multiparameter Connector 1-2, Multiparameter Connector 2-1, Multiparameter Connector 2-2, Sync Signal	Sync Signal		
Output Lead Sel.*2	I, II, III, aVF, aVL, aVR, V1, V2, V3, V4, V5, V6	I		
When [Sync Signal] is selected for “Analog Output 3”				
Signal Output	HR, RR	OFF		
Output Logic	Positive Logic, Negative Logic	Negative Logic		
Pulse Width (msec)	100, 60, 20	100	Backup	Backup
ECG Waveform Display during Lead-OFF	ON, OFF	OFF		
Chest Lead-OFF	Enable, Disable	Enable		

*1: Depends on the "Monitor Mode" setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].If "Monitor Mode" setting is [Backup] ; Depends on the "ECG1, ECG2 Size" setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].

*2: “Output Lead Sel.” will be displayed when [Selected ECG Lead] is set for “Analog Output”.

RESP

Item	Description	Default	At Power ON	At Discharge
Waveform Size	x1/4, x1/2, x1, x2, x4	x1	Backup	Initialize
RR Synchronized Mark	ON, OFF	ON	Backup	Backup
RR/APNEA Alarm Source	Auto, Impedance, SpO_2, CO_2	Auto		
CVA Detect	ON, OFF	OFF	*1	
Impedance Measurement	*Same with "Patient Admit/Discharge" section.			
Impedance Detection Lead	I, II	II	Depends on the setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].	
Impedance Detection Level	Fixed, Auto	Fixed		

* 1: Depends on the "Monitor Mode" setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].If "Monitor Mode" setting is [Backup] ; Depends on the "CVA Detect" setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].

SpO_2 (General)

Item	Description	Default	At Power ON	At Discharge
Waveform Size	x1/4, x1/2, x1, x2, x4	x1	Backup	Initialize

SpO_2 (General)

Item	Description	Default	At Power ON	At Discharge
Synchronized Mark/Tone	*Same with ECG setting.			
Alarm during NIBP	ON, OFF	ON	Backup	Backup

SpO_2 (Nellcor)

Item	Description	Default	At Power ON	At Discharge
Second Alarm	OFF, 10, 25, 50, 100	OFF	Backup	Backup

SpO_2 (Masimo Unit)

Item	Description	Default	At Power ON	At Discharge
SpO_2 Averaging	2–4 sec, 4–6 sec, 8 sec, 10 sec, 12 sec, 14 sec, 16 sec	8 sec.	*1	
Pulse Sensitivity	Normal, High, APOD	Normal	Backup	Backup
FAST SAT	ON, OFF	OFF		
Perfusion Index	ON, OFF	ON		
Signal IQ Wave	ON, OFF	OFF		
PI/PVI/SpOC Display Selection	PI+PVI, PI+SpOC, PVI+SpOC	PI+PVI		

*1: Depends on the "Monitor Mode" setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].If "Monitor Mode" setting is [Backup] ; Depends on the "SpO_2 Averaging" setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].

NIBP

Item	Description	Default	At Power ON	At Discharge
Patient Classification	*Same with "Patient Admit/Discharge" section.			
Quick Measurement	ON, OFF	ON	Depends on the setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].	
NIBP Auto Mode	Cont., 1min, 2min, 2.5min, 5min, 10min, 15 min, 20min, 30min, 60min, 120min, Lumbar Mode, OFF	OFF	*1	

NIBP

Item	Description	Default	At Power ON	At Discharge
Dyna Alert (Nellcor Only)	ON, OFF	ON	Backup	Backup
Sight Inflation	ON, OFF	OFF		
Oscillograph	ON, OFF, Real Time	OFF		
MAP	ON, OFF	ON		
PR Display	ON, OFF	OFF		
End Tone	ON, OFF	ON		
NIBP Erase Time	60 min., 120 min.	120 min.		
User Interval	Lumbar Mode	Lumbar Mode		
Measure at Alarm	ON, OFF	OFF		
	Asystole, VF, VT, Slow VT, Run, Bigeminy, Trigeminy, Pause, Couplet, Tachy, Brady, Frequent, ExtTachy, ExtBrady, RR IREG, Prolong RR ,R ON T, Triplet, Multiform, VENT Rhythm, Not Capt, Not Pacing, S Couplet, VPC, SVT, SVPC, S Frequent	No Selection		
	HR, ST, RR, APNEA, SpO_2, BP1, BP2, BP3, BP4, T1, T2, T3, T4, T5, T6, Tb, CO_2, SpCO, SpMet , SpHb, BIS	No Selection		
Auto Mode with Start/ Stop key	ON, OFF	ON		
Time Display	Elapsed, Meas.	Elapsed		
Periodic Measurement Starting Time	Time, Meas.	Time		

*1: Depends on the "Monitor Mode" setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].If "Monitor Mode" setting is [Backup] ; Depends on the "NIBP Auto Mode" setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].

BP1 to 4

Item	Description	Default	At Power ON	At Discharge
Scale*1	20, 50, 75, 100, 150, 200, 250, 300 mmHg	200 mmHg 50 mmHg (BP2)	*2	
	4, 8, 12, 16, 20, 24, 32, 40 kPa	24 kPa 8 kPa (BP2)		
Label	BP*, ART, PAP, CVP, ICP, IAP, LVP, US1 to US5	BP* (BP1 to BP4)	Backup	Backup
Synchronized Mark/Tone	*Same with ECG setting.			
Display Type	S/M/D, S/D, M	S/M/D	Backup	Backup
Wave Filter	6, 8, 12, 40 Hz	12 Hz		
Mean Wave	ON, OFF	OFF		
Respiration Filter	ON, OFF	OFF		
Analog Output				

BP1 to 4

Item	Description	Default	At Power ON	At Discharge
Analog Output 1	Selected ECG Lead, Displayed ECG Lead, Multiparameter Connector 1-1, Multiparameter Connector 1-2, Multiparameter Connector 2-1, Multiparameter Connector 2-2	Displayed ECG Lead	Backup	Backup
Output Lead Sel.*2	I, II, III, aVF, aVL, aVR, V1, V2, V3, V4, V5, V6	I		
Analog Output 2	Selected ECG Lead, Displayed ECG Lead, Multiparameter Connector 1-1, Multiparameter Connector 1-2, Multiparameter Connector 2-1, Multiparameter Connector 2-2	Multiparameter Connector 1-1		
Output Lead Sel.*2	I, II, III, aVF, aVL, aVR, V1, V2, V3, V4, V5, V6	I		
Analog Output 3	Selected ECG Lead, Displayed ECG Lead, Multiparameter Connector 1-1, Multiparameter Connector 1-2, Multiparameter Connector 2-1, Multiparameter Connector 2-2, Sync Signal	Sync Signal		
Output Lead Sel.*2	I, II, III, aVF, aVL, aVR, V1, V2, V3, V4, V5, V6	I		
When [Sync Signal] is selected for “Analog Output 3”				
Signal Output	HR, RR	OFF	Backup	Backup
Output Logic	Positive Logic, Negative Logic	Negative Logic		
Pulse Width (msec)	100, 60, 20	100		
Alarm during NIBP	ON, OFF	ON		
ART Catheter Check Message	ON, OFF	OFF		

*1: The scale selection will differ depending on the label.

* 2: Depends on the "Monitor Mode" setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].If "Monitor Mode" setting is [Backup] ; Depends on the "BP Scale" setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].

TEMP1 to 6

Item	Description	Default	At Power ON	At Discharge
Label	T#, Tsk, Tre, Tes, Tco, US1 to US7	T# (T1 to T6)	Backup	Backup

ΔTEMP-A to TEMP-C

Item	Description	Default	At Power ON	At Discharge
ΔTemp-A	(T1-T6) to (T1-T6)	T1 to T2	Backup	Backup
ΔTemp-B	(T1-T6) to (T1-T6)	T3 to T4		
ΔTemp-C	(T1-T6) to (T1-T6)	T5 to T6		

CO_2 (HPD-810/HPD-820)

Item	Description	Default	At Power ON	At Discharge
Scale	0-50, 0 -100 mmHg	0-50	*1	
	0-4, 0-8, 0-10 kPa	0-4		
	0-4, 0-8, 0-10%	0-4		
$EtCO_2$ Peak Duration	10 sec, 20 sec, OFF	10 sec.	*2	

CO_2 (HPD-810/HPD-820)

Item	Description	Default	At Power ON	At Discharge
O_2 Comp.	0-100%	21%	Backup	Backup
N_2O Compensation	ON, OFF	OFF		
Anesthetic Compensation	0.0-20.0%	0.0%		
Atmospheric Pressure	400 mmHg-850 mmHg 53.4 kPa-113.3 kPa	760 mmHg 101.3 kPa		

* 1: Depends on the "Monitor Mode" setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].If "Monitor Mode" setting is [Backup] ; Depends on the "CO_2 Scale" setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].

* 2: Depends on the "Monitor Mode" setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].If "Monitor Mode" setting is [Backup] ; Depends on the "$EtCO_2$ Peak Duration" setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].

CO_2 (HCP-810/HCP-820)

Item	Description	Default	At Power ON	At Discharge
Scale	0-50, 0-100 mmHg	0-50	*1	
	0-4, 0-8, 0-10 kPa	0-4		
	0-4, 0-8, 0-10%	0-4		
$EtCO_2$ Peak Duration	10 sec, 20 sec, OFF	10 sec.	*2	

* 1: Depends on the "Monitor Mode" setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].If "Monitor Mode" setting is [Backup] ; Depends on the "CO_2 Scale" setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].

*2: Depends on the "Monitor Mode" setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].If "Monitor Mode" setting is [Backup] ; Depends on the "$EtCO_2$ Peak Duration" setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].

Cardiac Output (CO)

Item	Description	Default	At Power ON	At Discharge
Auto Start	ON, OFF	ON	Backup	Backup
Time Scale	30 sec., 60 sec.	30 sec.		

Sp*

Item	Description	Default	At Power ON	At Discharge
SpCO	-	-	Backup	Backup
SpMet	-	-		
SpHb	Medium, Short, Long	Medium		
RR_SpO_2	RR Synchronized Mark	ON		
	RR/APNEA Alarm Source	Auto		

BIS (A-2000/A-3000)

Item	Description	Default	At Power ON	At Discharge
Short Trend 2nd Parameter	SR, EMG, SQI, OFF	SR	Backup	Backup

BIS (When HBX-800 is used)

Item	Description	Default	At Power ON	At Discharge
Short Trend 2nd Parameter	SR, EMG, SQI, OFF	SR	Backup	Backup
Scale (EEG1, EEG2)	±25, ±50, ±100, ±250 μV	±50 μV		
Smoothing Rate	15, 15, 30 sec.	15 sec.		
Continuous Impedance Check	ON, OFF	ON	Initialize	Initialize

BIS (When HBX-800 is used)

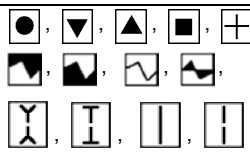
Item	Description	Default	At Power ON	At Discharge
EEG Filter	ON, OFF	ON	Backup	Backup

Stopwatch

Item	Description	Default	At Power ON	At Discharge
Label 1	8 alphanumeric characters	TIMER1	Backup	Backup
Label 2		TIMER2		

Data Review

Graphic Trend

Item	Description		Default	At Power ON	At Discharge
Trend A	HR, ST (I to V6), SpO_2, PR_SpO_2, VPC, NIBP, BP1 to BP4, PR_IBP, PDP, CPP, TEMP1 to TEMP6, Tb, ΔTEMP-A to ΔTEMP-C, RR_IMP, APNEA, $EtCO_2$, $InspCO_2$, RR_GAS, RR_SpO_2, BIS, PI, PVI, SpCO, SpMet, SpHb, SpOC, SQI, EMG, SR		HR, SpO_2, OFF, NIBP	Backup	Backup
Trend B			HR, BP1, T1, NIBP	Backup	Backup
Trend C			HR, T1, BP1, NIBP	Backup	Backup
Trend D			BIS, OFF, OFF, SR	Backup	Backup
Display Range	5min, 1h, 2h, 4h, 8h, 12h, 16h, 24h		4h	Backup	Backup
Display Selection					
Background Color	White, Black Gray		White	Backup	Backup
Mark	Small, Big		Small	Backup	Backup
Scale, Display Selection	HR, PR_SpO_2, PR_IBP	100, 200, 300 bpm	300 bpm	Backup	Backup
	ST (I to V6)	± 0.2, ± 0.5,± 1.0, ± 2.0 mV ±2.0, ± 5.0, ± 10.0, ± 20.0 mm	± 0.5 mV, ± 5.0 mm	Backup	Backup
	VPC	20, 50, 100 beats	20 beats	Backup	Backup
	BP1 to BP4	20, 50, 100, 150, 200, 300 mmHg 4, 8, 16, 20, 24, 40 kPa	200 mmHg 24 kPa	Backup	Backup
	PDP, CPP	20, 50, 100, 150, 200, 300 mmHg 4, 8, 16, 20, 24, 40 kPa	200 mmHg 24 kPa	Backup	Backup
	NIBP	100, 150, 200, 300 mmHg 16, 20, 24, 40 kPa	200 mmHg 24 kPa	Backup	Backup
	TEMP1 to TEMP6	20.0°C to 45.0°C, 30.0°C to 40.0°C/68.0°F to 113.0°F, 86.0°F to 104.0°F	30.0°C to 40.0°C/86.0°F to 104.0°F	Backup	Backup
	Tb	20.0°C to 45.0°C, 30.0°C to 40.0°C/68.0°F to 113.0°F, 86.0°F to 104.0°F	20.0°C to 45.0°C/68.0°F to 113.0°F	Backup	Backup

Graphic Trend

Item	Description		Default	At Power ON	At Discharge
	ΔTEMP-A to C	±10.0°C, ±25.0°C/±18.0°F, ±45.0°F	±10.0°C/±18.0°F	Backup	Backup
	SpO_2	0-100, 50-100, 80-100%SpO_2	80-100%SpO_2	Backup	Backup
	SpCO	20, 40, 100%SpCO	20%SpCO	Backup	Backup
	SpMet	10, 15, 100%SpMet	10%SpMet	Backup	Backup
	SpHb	10-20, 0-25 g/dL	10-20 g/dL	Backup	Backup
	SpOC	10-26, 0-36 mL/dL	10-26 mL/dL	Backup	Backup
	RR_IMP, RR_GAS, RR_SpO_2	50, 100, 150 Bpm	50 Bpm	Backup	Backup
	Apnea	15 sec., 30 sec.	15 sec.	Backup	Backup
	CO_2	50, 100 mmHg 4.0, 8.0, 10.0 kPa 4.0, 8.0, 10.0%	50 mmHg 4.0 kPa 4.0%	Backup	Backup
	PI	0-10, 0-20%	0-10%	Backup	Backup
	PVI	0-30, 0-60, 0-100%	0-30%	Backup	Backup
	BIS	25, 50, 75, 100	100	Backup	Backup
	SR	25, 50, 75, 100%	100%	Backup	Backup
	SQI	0-100%	100%	Backup	Backup
	EMG	30-80dB	30-80dB	Backup	Backup

Tabular Trend

Item	Description	Default	At Power ON	At Discharge
Interval	10 sec., 30 sec., 1 min., 2 min., 2.5 min., 5 min., 10 min., 15 min., 30 min., 60 min., NIBP	5 min.	Backup	Backup
Group	A to F	A	Backup	Backup
Fixed Parameters	0 to 6 param.	0 param.	Backup	Backup
Selection	OFF <Circulatory>HR, VPC, SpO_2, PR_ SpO_2, NIBP-S/D/M, BP1 to 4- S/D/M, PR_IBP, PDP, PCWP, CPP, TEMP1 to 4, Tb, CO, PI, PVI, SpCO, SpMet, SpHb, SpOC <Respiratory>$EtCO_2$, $InspCO_2$, RR_GAS, RR_IMP, RR_SpO_2, APNEA <ST>ST (I to V6) < BIS > BIS, SQI, EMG, SR, SEF, TOTPOW, IMP			
	Group A	HR, PR_SpO_2, NIBP-S, NIBP-D, NIBP-M	Backup	Backup
	Group B	HR, RR_IMP, RR_GAS, SpO_2, PR-SpO_2, NIBP-S, NIBP-D, NIBP-M, $EtCO_2$, APNEA	Backup	Backup
	Group C	HR, VPC, ST(I) to ST(V6)	Backup	Backup
	Group D	HR, VPC, ST (I) , ST (II) , NIBP-S, NIBP-D, SpO_2, PR_SpO_2, BP1-S, BP1-D, BP1-M, BP2-S, BP2-D, BP2-M, $EtCO_2$, RR_GAS, RR_IMP, APNEA, T1, T2, BIS, SQI, EMG, SR	Backup	Backup
	Group E	OFF	Backup	Backup
	Group F	OFF	Backup	Backup
Filtering (Sampling Interval)	10sec., All	All	Initialize	Initialize

OCRG

Item	Description	Default	At Power ON	At Discharge
Display Duration	8 min., 16 min.	8 min.	Backup	Backup
Waveform	Impedance, CO_2	Impedance	Backup	Backup
Respiration Waveform Size	x1/4, x1/2, x1, x2, x4	x1	Backup	Backup

Recall

Item	Description	Default	At Power ON	At Discharge
Waveform	ECG1, ECG2, BP1 to BP4, SpO_2, RESP, CO_2, EEG1, EEG2	ECG1, ECG2	Backup	Backup
Recall Factor	Asystole, VF, VT, Slow VT, Run, Bigeminy, Trigeminy, Pause, Couplet, Tachy, Brady, Frequent, ExtTachy, ExtBrady, RR Ireg, Prolong RR , R on T, Triplet, Multiform , Vent Rhythm, Not Capt, Not Pacing, S Couplet, VPC, SVT, SVPC, S Frequent HR, ST, RR, APNEA, SpO_2, BP1 to BP4, TEMP1 to TEMP6, Tb, CO_2, SpCO, SpMet, SpHb, BIS	All ON	Backup	Backup

Recall

Item	Description	Default	At Power ON	At Discharge
List	5 Waves (Compressed: 12 sec.)	5 Waves (Compressed: 12 sec.)	Backup	Backup
Recall Display Selection	Asystole, VF, VT, Slow VT, Run, Bigeminy, Trigeminy, Pause, Couplet, Tachy, Brady, Frequent, ExtTachy, ExtBrady, RR Ireg, Prolong RR , R on T, Triplet, Multiform , Vent Rhythm, Not Capt, Not Pacing, S Couplet, VPC, SVT, SVPC, S Frequent HR, ST, NIBP, RR, APNEA, SpO_2, PR, BP1 to BP4, TEMP1 to TEMP6, Tb, CO_2, Event 1 to Event 8, SpCO, SpMet, SpHb, BIS	All ON	Backup	Backup

ST Measurement

Item	Description	Default	At Power ON	At Discharge
Measurement Point	0 ms to 560 ms	120 ms	Backup	Initialize
Reference Point	0 ms to -240 ms	-80 ms	Backup	Initialize
ST Waveform Size	x1/4, x1/2, x1, x2, x4	x1	Backup	Backup
ST Waveform Interval	10 sec., 1 min., 5 min., 10 min.	10 sec.	Backup	Backup

NOTE

- The graphic trend, tabular trend, alarm history will be saved even after the power is turned OFF.
- If the SD card for full disclosure waveform is not inserted, and the power is turned OFF, the latest 10 recall data will be saved. ST data and OCRG data will be deleted.

12-Lead Analysis

Item		Description	Default	At Power ON	At Discharge
ECG Analysis		Real Time, Review	Real Time	Backup	Initialize
Limb Lead Size		x1/4, x1/2, x1, x2, x4	x1	Backup	Initialize
Chest Lead Size		x1/4, x1/2, x1, x2, x4	x1	Backup	Initialize
Filter	AC Filter	ON, OFF	OFF	Backup	Initialize
	EMG Filter	OFF, Strong (25Hz), Weak (35Hz)	OFF	Backup	Initialize
	Drift Filter	OFF, Strong (0.50Hz), Weak (0.25Hz)	Strong (0.50Hz)	Backup	Initialize
Background Color		White, Black	Black	Backup	Backup
Displaying Leads		Limb Lead, Chest Lead, All Leads	All Leads	Backup	Backup

ECG Waveform Display

Item	Description	Default	At Power ON	At Discharge
Filter Mode	Monitor, ESIS, Diagnosis	Monitor	Backup	Backup
Waveform Size	x1/4, x1/2, x1, x2, x4	x1	Backup	Backup
Displaying Leads	Limb Lead, Chest Lead, All Leads	All Leads	Backup	Backup

MPDR

Item	Description	Default	At Power ON	At Discharge
Graphic Trend	(Same as graphic trend settings)		Backup	Backup
Tabular Trend Setup	(Same as tabular trend settings)		Backup	Backup
Full Disclosure Waveform Setup	(Same as full disclosure waveform settings)		Backup	Backup

Basic Setup

Tone/Volume

Item	Description		Default	At Power ON	At Discharge
Vital Alarm Sound	Urgent	Volume: 11 levels	4	Depends on the "Monitor Mode" setting under [Setup>Initial Settings>User I/F>Power ON/ Discharge].	
		Tone: 5 types*	1		
	Caution	Volume: 11 levels	4		
		Tone: 5 types*	1		
	Status	Volume: 11 levels	4		
		Tone: 4 types*	1		
Ventilator Alarm Sound	ON/OFF		OFF		
	Volume: 11 levels		4		
	Tone: 1 type		1		
Status Alarm Control Alarm Sound	Urgent	Volume: 11 levels	4		
		Tone: 1 type*	1		
	Caution	Volume: 11 levels	4		
		Tone: 1 type*	1		
	Status	Volume: 11 levels	4		
		Tone: 1 type*	1		
Sync. Tone	Volume: 11 levels		2		
	Tone: 5 types		1		
	Sync. Tone: Selected Tone, Sync. with SpO_2 Value		Selected Tone		
Key Sound	Volume: 11 levels		4		
	Tone: 3 types		1		
Other Bed Alarm	Volume: 11 levels		4		
	Tone: 1 type		1		
Boot/Shutdown Sound	Volume: 11 levels		2		
	Tone: 3 types		1		
Other	Volume: 11 levels		4		
	Tone: 1 type		1		

* When [Fukuda Tone] is selected for "Alarm System", the tone can be selected from 8 levels.

Display Configuration

Item	Description		Default	At Power ON	At Discharge
Layout	Numeric Data: Side/Right (1 to 2 columns) + Bottom (0 to 2 rows) Numeric Data: Side/Left (1 to 2 columns) + Bottom (0 to 2 rows) Numeric Data: Bottom (1 to 7 rows)		Numeric Data: Side/Right (1 column) + Bottom (0 row)	Depends on the setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].	
Palette	Refer to the Color Setup.				
Numeric Data	OFF, HR/PR, HR, PR_IBP, VPC/PACE, ST/VPC, ST-A to ST-C, BP1 to BP4, NIBP, NIBP List, SpO_2, PR_SpO_2, RR_IMP, RR_GAS, RR_SpO_2,TEMP1 to 6, TEMP1/2, TEMP3/4, TEMP5/6, Tb, SpO_2/PR_SpO_2, ΔTEMP-A to ΔTEMP-C , BIS, CO_2, Stopwatch, SpCO, SpMet, SpHb		HR/PR, SpO_2, NIBP, RR_IMP	Depends on the setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].	
Waveform	OFF, ECG1 to ECG12, ECG1 Cascade to ECG12 Cascade, BP1 to BP4, BP Overlap 1 to BP Overlap 3, SpO_2, RESP, EEG1 to EEG2, CO_2, Block Cascade, Link with Numeric		ECG1, SpO_2, RESP		
User Key	OFF, Home, Menu, Alarm Silence, Alarm Suspend, NIBP Start/Stop, NIBP Cont., Print Start/Stop, Monitor Suspend, Night Mode, Freeze, Key Lock, Mode Select, Admit/Disch., Rapid Discharge, HR/PR, HR/PR Source, BP Zero, Lead, ECG Size (All Leads), Scale/Baseline, SpO_2 Display ON/OFF, CO_2 Display ON/OFF, CO_2 Suspended, Short Trend ON/OFF, Transparent Window ON/OFF, Change Palette, Graphic Trend, Trend (Group), Tabular Trend, Tabular Trend (Group), NIBP List, Recall, OCRG, ST, Cardiac Output, PCWP, Hemodynamics, Lung Function, Full Disc. Wave, 12L Analysis, ECG Waveform, Tone/Volume, NIBP Auto Mode, Alarm Setup (All), Alarm Setup (Basic), Manual Printing, Display Config., Time/Date, Other Bed, MPDR, Stopwatch, Print (LBP) Cancel, Adult Mode, Child Mode, Neonate Mode, Initial_Adult, Initial_Child, Initial Neonate, Display, Group 1, Group 2, Group 3, Group 4, Group 5, Event		Alarm Silence, Display, Admit/Discharge, Alarm Setup (Basic), NIBP Auto Mode, Monitor Suspend, Full Disclosure Waveform	Depends on the setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].	
Sweep Speed	Circ.: 6.25, 12.5, 25, 50 Vent.: 6.25, 12.5, 25		Circ.: 25 Vent.: 6.25		
Short Trend	ON, OFF, Overlap Link with Numeric, Link with Waveform, User Setup Display Length: 0, 10, 20, 30, 40, 50, 60 min.		OFF Link with Numeric 30 min.		
Detail Setup (Numeric Data)	Alarm Limit Display	Graph, Numeric, OFF	Graph		
	At Alarm Occurrence	Reversed, 3D	Reversed		

Display Configuration

Item	Description		Default	At Power ON	At Discharge
Detail Setup (Wave)	Grid	OFF, ON, Bold	ON	Depends on the setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].	
	Scale	ON, Bold1, Bold2	ON		
	Thickness	Thin, Regular, Thick	Regular		
	Clip	ON, OFF	OFF		
	Fill CO_2 Waveform	ON, OFF	ON		
	BP Overlap 1	BP1 to 4	BP1 to 4		
	BP Overlap 2, 3		(No setting)		
	ST/VPC/Arrhy. Alarm Display	ON, OFF	ON	Backup	Backup
	Block Cascade	Waveform Quantity: 2 to 6 Displayed Waveform: OFF, ECG1 to ECG12, BP1 to BP4, SpO_2, RESP, CO_2, EEG1, EEG2	Waveform Quantity: 2 Displayed Waveforms: ECG1, ECG2	Depends on the setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].	
Detail Setup (Short Trend)	Short Trend Scale	Trend, Waveform	Trend	Depends on the setting under [Setup>Initial Settings>User I/F>Power ON/Discharge].	
	Short Trend Overlap	OFF, HR/PR, HR, VPC, ST, SpO_2, PR_SpO_2, SpCO, SpMet, NIBP, RR_IMP, RR_GAS, RR_SpO_2, CO_2, BP1, BP2, BP3, BP4, PR_IBP, T1, T2, T3, T4, T5, T6, Tb, BIS	OFF, OFF, OFF, OFF		
	Display Parameter	ON, Gray, OFF	OFF		
	Data Resolution	10 sec., 30 sec., 60 sec.	10 sec.		
	Display Duration	0 min., 10 min., 20 min., 30 min., 40 min., 50 min., 60 min.	30 min.		

NOTE

- The display configuration setting can be saved to be used after power ON or discharge by selecting [Backup] for "Display Configuration" under [Initial Settings>User I/F>Power ON/Discharge]. If [Initialize] is selected, the setting will be initialized to the currently selected mode.

Manual Printing

Item		Description	Default	At Power ON	At Discharge
Basic	Printer	Bedside, Central	Bedside	Backup	Backup
	Waveform	ECG1, ECG2, ECG3, BP1 to BP4, SpO_2, RESP, CO_2, EEG1, EEG2	ECG1	Backup	Backup
	Print Duration	24 sec., Cont.	24 sec.	Backup	Backup
	Delay Time	None, 8sec., 16 sec.	8 sec.	Backup	Backup
12-lead	Print Calibration	ON, OFF	ON	Backup	Backup
	Position	Center, Proportional, OFF	Proportional	Backup	Backup
	Wave Format	Regular, Reverse	Regular	Backup	Backup
	Printer Auto Scale	ON, OFF	ON	Backup	Backup
	12-Lead Waveform Format	Printer: Bedside 3 wavesx4, 2 wavesx6	3 waves x 4	Backup	Backup
		Printer: Laser 3 wavesx4, 3 wavesx4+Rhy., 6 wavesx2, 12 waves	3 waves x 4	Backup	Backup
	12-Lead Analysis Format	Printer: Bedside 3 waves x 4	3 waves x 4 (fixed)	Backup	Backup
		Printer: Laser 6 wavesx2 (2 pages), 6 wavesx2 (1 page), 3 wavesx4+Rhythm	6 waves x 2 (2 pages)	Backup	Backup
	Lead Boundary	ON, OFF	ON	Backup	Backup
Other Setup: Graphic Printing	Graphic Trend	Bedside, Central, Laser	Bedside	Backup	Backup
	Tabular Trend	Bedside, Central, Laser	Bedside	Backup	Backup
	OCRG	Bedside, Laser	Bedside	Backup	Backup
	Zoom Wave (Recall, Full Disc.)	Bedside, Central, Laser	Bedside	Backup	Backup
	ST	Bedside, Central, Laser	Bedside	Backup	Backup
	Full Disc. Compressed Wave	Bedside, Laser	Bedside	Backup	Backup
	Hemodynamics	Bedside, Central, Laser	Bedside	Backup	Backup
	Lung Function	Bedside, Central, Laser	Bedside	Backup	Backup
	CO	Bedside, Central, Laser	Bedside	Backup	Backup
	12-Lead Waveform	Bedside, Laser	Bedside	Backup	Backup
	12-Lead Analysis Result	Bedside, Laser	Bedside	Backup	Backup
Other Setup: Recall Printing		Graphic Printing, Manual Printing	Graphic Printing	Backup	Backup

Auto Printing

Item		Description	Default	At Power ON	At Discharge
Alarm Printing	Printing	ON, OFF	OFF	Backup	Backup
	Factor	Alarm for each arrhythmia, parameter	All	Backup	Backup
	Printer	Bedside, Central	Bedside	Backup	Backup
	Waveform	ECG1, ECG2, ECG3, BP1 to BP4, SpO_2, RESP, CO_2, EEG1, EEG2, Alarm	ECG1, Alarm Factor	Backup	Backup
	Print Duration	12 sec., 24 sec.	12 sec.	Backup	Backup
Periodic Printing	Periodic Printing	ON, OFF	OFF	Backup	Backup
	Printer	Bedside, Central	Bedside	Backup	Backup
	Waveform	ECG1, ECG2, ECG3, BP1 to BP2, SpO_2, RESP, CO_2	ECG1	Backup	Backup
	Periodic Interval	Interval, Timer	Timer	Backup	Backup
	Interval	1, 2, 3, 5, 10, 15, 20, 30, 60, 120 min.	120 min.	Backup	Backup
	Timer	0:00 to 23:00 (1:00 interval)	None	Backup	Backup
	Print Duration	6, 12, 24 sec.	12 sec.	Backup	Backup

Common Setup for Printing

Item	Description	Default	At Power ON	At Discharge
QRS Classification	ON, OFF	ON	Backup	Backup
Speed	50 mm/s, 25 mm/s	25 mm/s	Backup	Backup
Print Calibration	Top, Each Page, OFF	OFF	Backup	Backup
Print NIBP Data	ON, OFF	OFF	Backup	Backup

Other Setup

Item		Description	Default	At Power ON	At Discharge
Night Mode	Mode	Manual, Timer	Manual	Backup	Backup
	Start Time	00:00 to 23:59	Start Time: 21:00	Backup	Backup
	End Time	00:00 to 23:59	End Time: 07:00	Backup	Backup
	Volume	No Change, 3, 1, 0	1	Backup	Backup
	Display	No Change, Dark, Darker, Time Only	Darker	Backup	Backup
	Alarm Indicator	ON, OFF	OFF	Backup	Backup

Other Setup

Item		Description	Default	At Power ON	At Discharge
Color	Palette	Light, Clear, Deep, Vivid	Vivid	Backup	Backup
	HR:	12 colors + White	6	Backup	Backup
	ST		6	Backup	Backup
	VPC, PACE		White	Backup	Backup
	NIBP		White	Backup	Backup
	SpO_2, SpCO, SpMet, SpHb		4	Backup	Backup
	CO_2		8	Backup	Backup
	RESP		White	Backup	Backup
	BP1, ART		1	Backup	Backup
	PAP		4	Backup	Backup
	CVP		8	Backup	Backup
	ICP		8	Backup	Backup
	IAP		12	Backup	Backup
	LVP		2	Backup	Backup
	US1 to US5 (BP)		White	Backup	Backup
	BP2		8	Backup	Backup
	BP3		4	Backup	Backup
	BP4		6	Backup	Backup
	TEMP1 to TEMP4, Tb		2	Backup	Backup
	Tsk, Tre, Tes, Tco, US1 to US7 (TEMP)		2	Backup	Backup
	BIS		2	Backup	Backup
	Stopwatch		White	Backup	Backup
	User Key Color			Backup	Backup
Brightness	Brightness	7 levels	4th from top	Backup	Backup
Stopwatch Label	1	8 alphanumeric characters	TIMER1	Backup	Backup
	2		TIMER2	Backup	Backup

Chapter 13 Accessories

Chapter 13 Accessories

Accessories

This section lists the accessories for the main unit (DS-8007).

⚠ CAUTION

- Use only the spare parts specified for this equipment. Otherwise, proper function cannot be executed.
- For quality improvement, specifications are subject to change without prior notice.

- Power Cable: CS-24 (3m)
- DS-8007 System Operation Manual (This Manual)
- DS-8007 System Maintenance Manual
- Parts Replacement Label
- Cleaning Cloth

Optional Accessories

The following products are available as optional accessories for the DS-8007 System.
Purchase them as required.

⚠ CAUTION

- Use only the accessories specified for this system. Otherwise, proper function cannot be executed.
- For quality improvement, specifications are subject to change without prior notice.

ECG, Impedance Respiration Measurement (Manufactured by Fukuda Denshi)

Item	Model Type	Note
ECG Lead Cable	CMO-07FT-3NAB	3-electrode AAMI, clip type
ECG Lead Cable	CMO-07FT-4NAB	4-electrode AAMI, clip type
ECG Lead Cable	CMO-07FT-5NAB	5-electrode AAMI, clip type
ECG Relay Cable	CIO-07CTP-3NA	3-electrode AAMI, standard type
ECG Relay Cable	CIO-07CTP-4NA	4-electrode AAMI, standard type
ECG Relay Cable	CIO-07CTP-5NA	5-electrode AAMI, standard type
ECG Lead Patient Cable	CMO-07FTP-10NAB	10-electrode AAMI, clip, type, standard type

Invasive Blood Pressure Measurement (Manufactured by Fukuda Denshi)

Item	Model Type	Note
BP Relay Cable	CJO-P01B-SA3.6	1 channel, 3.6m For use with Argon Medical Devices CDX III/Press Disposable Pressure Transducers
BP Relay Cable	CJO-P01B-SB3.6	1 channel, 3.6m For use with Argon Medical Devices DTX Plus Disposable Pressure Transducers
2ch BP Relay Cable	CJO-P01B-DA0.8	2 channels, 0.8m For use with Argon Medical Devices CDX III/Press Disposable Pressure Transducers
2ch BP Relay Cable	CJO-P01B-DA4.3	2 channels, 4.3m For use with Argon Medical Devices CDX III/Press Disposable Pressure Transducers
2ch BP Relay Cable	CJO-P01B-DB0.8	2 channels, 0.8m For use with Argon Medical Devices DTX Plus Disposable Pressure Transducers
2ch BP Relay Cable	CJO-P01B-DB4.3	2 channels, 4.3m For use with Argon Medical Devices DTX Plus Disposable Pressure Transducers
2ch BP Conversion Cable	CJO-P01B-DJ0.5	2 channel-1 channel Conversion Relay Cable

REFERENCE

- Argon Medical Devices: Former Becton Dickinson

Non-Invasive Blood Pressure Measurement (Manufactured by Fukuda Denshi)

Item	Model Type	Note
Infant Cuff	CUF-8501	Width 8 cm to 13 cm
Pediatric Cuff	CUF-8502	Width 12 cm to 19 cm
Adult Cuff (Small)	CUF-8503	Width 17 cm to 25 cm
Adult Cuff (Medium)	CUF-8504	Width 23 cm to 33 cm
Adult Cuff (Large)	CUF-8505	Width 31 cm to 40 cm
Adult Cuff (Thigh)	CUF-8506	Width 38 cm to 50 cm
Air Hose (1.5m) General	OA-80APR1.5	For Rectus Connector Type
Air Hose (3.5m) General	OA-80APR3.5	For Rectus Connector Type
Air Hose (1.5m) Neonate	OA-80NE1.5	For SunTech Medical Neonatal Soft Disposable BP Cuff
Air Hose (3.5m) Neonate	OA-80NE3.5	For SunTech Medical Neonatal Soft Disposable BP Cuff

Temperature Measurement (Manufactured by Fukuda Denshi)

Item	Model Type	Q'ty	Note
2ch Temperature Relay Cable	CJO-P01T-DA0.5	1	0.5m Use with YSI400 compatible probe
2ch Temperature Relay Cable	CJO-P01T-DA4.0	1	4m Use with YSI400 compatible probe

NOTE

- 700 series temperature probe cannot be used.

Pulse Oximetry Measurement (Manufactured by Covidien)

Item	Model Type	Note
DURASENSOR	DS-100A	Reusable For adult finger (weight of 40kg and over)
OxiMax	MAX-N	Single-Patient-Use For neonate foot/adult finger (Neonate: weight of less than 3kg, Adult: weight of 40kg and over)
OxiMax	MAX-I	Single-Patient-Use For infant toe (weight of 3 to 20kg)
OxiMax	MAX-P	Single-Patient-Use For pediatric finger (weight of 10 to 50kg)
OxiMax	MAX-A	Single-Patient-Use For adult finger (weight of 30kg and over)
OxiMax	MAX-R	Single-Patient-Use For adult nose (weight of 50kg and over)
OxiMax	MAX-FAST	Single-Patient-Use For adult/pediatric forehead (weight of 10kg and over)
SpO_2 Relay Cable	DOC-10	3m

NOTE

- There are various types of sensors available. For details, refer to your nearest service representative.

❑RR_SpO_2 Measurement

Item	Model Type	Remarks
Nellcor Respiratory Sensor	10068119	For adult weighing 30 kg and above, usable only with DS-8007N

Pulse Oximetry Measurement (Manufactured by Masimo)

❑SpO_2, PR, PI, PVI Measurement

Item	Model Type	Note
Masimo SET Sensor	LNCS DCI	Reusable Sensor for Adult
Masimo SET Sensor	LNCS Adtx	Adhesive Sensor for Adult
Masimo SET Sensor	LNCS Pdtx	Adhesive Sensor for Pediatric
Masimo SET Sensor	LNCS Neo-L	Adhesive Sensor (L-Shape) for Neonate
Masimo SET Sensor	LNCS Inf-L	Adhesive Sensor (L-Shape) for Infant
Masimo SET Sensor	LNCS NeoPt-L	Adhesive Sensor (L-Shape) for Premature Neonate
Masimo RD SET Sensor	RD SET DCI	Reusable Sensor for Adult
Masimo RD SET Sensor	RD SET Adt	Adhesive Sensor for Adult
Masimo RD SET Sensor	RD SET Pdt	Adhesive Sensor for Pediatric
Masimo RD SET Sensor	RD SET Inf	Adhesive Sensor for Infant
Masimo RD SET Sensor	RD SET Neo	Adhesive Sensor for Neonate
Masimo RD SET Sensor	RD SET NeoPt	Adhesive Sensor for Premature Neonate
LNCS Patient Cable	Red LNC-04	For LNCS sensor, 1.2m
LNCS Patient Cable	Red LNC-10	For LNCS sensor, 3.0m
LNCS Patient Cable	Red LNC-14	For LNCS sensor, 4.2m
RD Patient Cable	RD SET MD20-1.5	For RD SET sensor, 0.5m
RD Patient Cable	RD SET MD20-05	For RD SET sensor, 1.5m
RD Patient Cable	RD SET MD20-12	For RD SET sensor, 3.7m

❑SpO_2, PR, PI, PVI, SpMet, SpCO Measurement

Item	Model Type	Note
Masimo Rainbow Sensor	Rainbow DCI-dc3	Reusable Direct Connect Sensor for Adult (0.9m)
Masimo Rainbow Sensor	Rainbow DCI-dc8	Reusable Direct Connect Sensor for Adult (2.4m)
Masimo Rainbow Sensor	Rainbow DCI-dc12	Reusable Direct Connect Sensor for Adult (3.6m)
Masimo Rainbow Sensor	Rainbow R25	Adhesive Sensor for Adult
Masimo Rainbow Sensor	Rainbow R25-L	Adhesive Sensor (L-Shape) for Adult/Neonate
Masimo Rainbow Sensor	Rainbow R20	Adhesive Sensor for Pediatric
Masimo Rainbow Sensor	Rainbow R20-L	Adhesive Sensor (L-Shape) for Pediatric/Infant
Rainbow RC Patient Cable	Rainbow RC-1	For Rainbow Sensor, 0.3m
Rainbow RC Patient Cable	Rainbow RC-4	For Rainbow Sensor, 1.2m
Rainbow RC Patient Cable	Rainbow RC-12	For Rainbow Sensor, 3.6 m
RD Rainbow Patient Cable	RD Rainbow SET MD20-1.5	For RD SET sensor, 0.5m
RD Rainbow Patient Cable	RD Rainbow SET MD20-05	For RD SET sensor, 1.5m
RD Rainbow Patient Cable	RD Rainbow SET MD20-12	For RD SET sensor, 3.7m

❑SpO_2, PR, PI, PVI, SpMet, SpHb, SpOC Measurement

Item	Model Type	Note
Masimo Rainbow ReSposable Sensor System (For Adult)	Rainbow ReSposable R2-25	ReSposable Sensor Cable (For Adult) x1 ReSposable Sensor (Adhesive Tape for Adult) x10
Masimo Rainbow ReSposable Sensor System (For Child)	Rainbow ReSposable R2-20	ReSposable Sensor Cable (For Child) x1 ReSposable Sensor (Adhesive Tape for Child) x10
Masimo Rainbow ReSposable Sensor Tape (For Adult)	Rainbow ReSposable R2-25a	To be used with ReSposable sensor (adhesive tape for adult), ReSposable sensor cable (for adult), 25 per box
Masimo Rainbow ReSposable Sensor Tape (For Child)	Rainbow ReSposable R2-20a	To be used with ReSposable sensor (adhesive tape for child), ReSposable sensor cable (for child), 25 per box
Masimo Rainbow ReSposable Sensor Cable (For Adult)	Rainbow ReSposable R2-25r	To be used with ReSposable sensor tape (for adult), 5 per box
Masimo Rainbow ReSposable Sensor Cable (For Child)	Rainbow ReSposable R2-20r	To be used with ReSposable sensor tape (for child), 5 per box
Rainbow RC Patient Cable	Rainbow RC-1	For Rainbow Sensor, 0.3m
Rainbow RC Patient Cable	Rainbow RC-4	For Rainbow Sensor, 1.2m
Rainbow RC Patient Cable	Rainbow RC-12	For Rainbow Sensor, 3.6 m
RD Rainbow Patient Cable	RD Rainbow SET MD20-1.5	For RD SET sensor, 0.5m
RD Rainbow Patient Cable	RD Rainbow SET MD20-05	For RD SET sensor, 1.5m
RD Rainbow Patient Cable	RD Rainbow SET MD20-12	For RD SET sensor, 3.7m

NOTE

- SpCO and SpHb cannot be measured at the same time for all the sensors.

NOTE

- There are various types of sensors available.For details, contact your nearest service representative.

CO Measurement (Manufactured by Fukuda Denshi)

Item	Model Type	Note
Catheter Relay Cable	CJO-P01C-C2.4	
Flow-through Sensor Relay Cable	CJO-P01C-F2.4	
In-line Sensor Relay Cable	CJO-P01C-L2.4	
Injectate Probe Relay Cable	CJO-P01C-T2.4	

CO_2 Concentration Measurement (Manufactured by Philips)

❑For HPD-810/HPD-820 Gas Unit I/F with Capnostat 5 CO_2 Sensor

Item	Model Type	Note
Capnostat 5 CO_2 Sensor	1015928	
Single-Patient Use Adult Airway Adapter	6063-00	Single patient use, for ET tube sizes > 4.0 mm (10 per box)

Item	Model Type	Note
Single-Patient Use Neonatal Airway Adapter	6312-00	Single patient use, for ET tube sizes = < 4.0 mm (10 per box)
Reusable Adult Airway Adapter	7007-00 7007-01	Reusable, for ET tube sizes > 4.0 mm (7007-00: 10 per box, 7007-01: 1 per box)
Reusable Neonatal Airway Adapter	7053-00 7053-01	Reusable, for ET tube sizes = < 4.0 mm (7053-00: 10 per box, 7053-01: 1 per box)

NOTE

- There are various types of sampling device available. For details, refer to our service representative.

CO_2 Concentration Measurement (Manufactured by Covidien)

❑For HCP-810/HCP-820 CO_2 Gas Unit

Sampling Devices

Item	Model Type	Note
Intubated $EtCO_2$		
Filter Line H Set (Adult/Pediatric)	XS04624	For long term use
Filter Line H Set (Infant/Neonate)	006324	For long term use
Vital Line H Set (Adult/Pediatric)	010787	For long term use
Vital Line H Set (Infant/Neonate)	010807	For long term use
Non-Intubated $EtCO_2$		
Smart CapnoLine Plus (Adult/Intermediate)	009818	For oral nasal, short term use
Smart CapnoLine Plus O_2 (Adult/Intermediate)	009822	For oral nasal, short term use
Smart CapnoLine (Pediatric)	007266	For oral nasal, short term use
Smart CapnoLine H Plus O_2 (Adult/Intermediate)	010433	For oral nasal, long term use
Smart CapnoLine H (Pediatric)	010581	For oral nasal, long term use
Smart CapnoLine H/O_2(Pediatric)	010582	For oral nasal, long term use
CapnoLine H (Adult)	008177	For nasal, long term use
CapnoLine H (Pediatric)	008178	For nasal, long term use
CapnoLine H (Infant/Neonate)	008179	For nasal, long term use
Smart CapnoLine H/O_2 (Adult)	008180	For nasal, long term use
CapnoLine H/O_2 (Pediatric)	008181	For nasal, long term use

*Packaged in 25 units unless otherwise specified.

NOTE

- There are various types of sampling device available. For details, refer to our service representative.

BIS Measurement (Manufactured by Covidien)

Item	Model Type	Remarks
BISx	186-0195-SF	SW 1.13
Patient Interface Cable	186-0107	
BIS Extended Use Sensor	186-0160	
BIS Pediatric Sensor	186-0200	
BIS Quatro Sensor	186-0106	

⚠ CAUTION

- Avoid liquid ingress to the patient interface cable (PIC). Contact of fluids with the PIC sensor connector can interfere with PIC performance.
- To minimize the risk of patient strangulation, the patient interface cable (PIC) must be carefully placed and secured.
- When installing the BISx, it should not be closely attached to the patient. Secure it on the bedside rail or pole using a clip.
- BIS sensor is disposable. Do not reuse it.
- Do not reuse the BIS sensor to other patients. It may cause cross-infection.
- The duration for one usage should be within 24 hours.

Others (Manufactured by Fukuda Denshi)

Accessory	Model Type	Remarks
Ground cable	CE-01A	
Cleaning Cloth	OA-57	
Ethernet Branch Cable	CJ-522A	Length 1m (For DS-LAN)
Ethernet Branch Cable	CJ-522B	Length 2m (For DS-LAN)
Ethernet Branch Cable	CJ-522C	Length 4m (For DS-LAN)
Ethernet Branch Cable	CJ-522D	Length 10m (For DS-LAN)
Ethernet Branch Cable	CJ-522E	Length 20 m (For DS-LAN)
RS-232C Cable	CJ-725	Cross Cable with Core
Telemetry Transmitter Module	HLX-801 (FA) / HLX-801 (G)	
SD Card	FSD-8GA	8GB (For full disclosure waveform)
SD Card	SD-16G	16GB (For full disclosure waveform)
Module Connection Cable	CJO-08SS0.3	module-LAN Cable 0.3m
Module Connection Cable	CJO-08SS1.5	module-LAN Cable 1.5m
Module Connection Cable	CJO-08SS3.5	module-LAN Cable 3.5m
Module Connection Cable	CJO-08SS5	module-LAN Cable 5.0 m
Module Connection Cable	CJO-08SS10	module-LAN Cable 10m
Unit Connection Cable	CJO-09SS0.3	U-Link Cable 0.3m
Unit Connection Cable	CJO-09SS1.5	U-Link Cable 1.5m
Unit Connection Cable	CJO-09SS5	U-Link Cable 5.0m

Accessory	Model Type	Remarks
Lithium-Ion Battery Pack	BTO-008	For battery operation
GCX Attachment	OAO-70A (EXP)	
AUX Connection Cable LEM (0.65)	CJO-25TR0.65	For HPD-810, HCP-810, HBX-800
AUX Connection Cable LEM (1.5)	CJO-25TR1.5	
AUX Connection Cable LEM (2.7)	CJO-25TR2.7	
3ch Analog Output Cable (0.5)	CJO-26JJ0.5	
3ch Analog Output Cable (2.7)	CJO-26JJ2.7	
Bed Mount for Patient Monitor	OAO-102A (EXP)	
AUX Unit Mounting Bracket	OAO-103A (EXP)	
Countertop for Patient Monitor	OAO-104A (EXP)	
Mounting Bracket for Pole Clamp	OAO-105A (EXP)	
HLX Holder for DSA-81	OAO-111A (EXP)	
Printing Paper	OP-050-01TDR	10 per box

❑External Equipment Connection Cable

Equipment	Model Type	Remarks
SV-300	CJ-401RI-70SV3	For Status II Connector
SERVO-i / SERVO-s/ SERVO-U/ SERVO-n/ SERVO-air	CJ-402RI-70SVi	For Status II Connector
SERVO-U/n/air (Alarm Detection Only)	CJO-27DJ2	For Status II Connector
PB 740/760/840	CJ-403RI-70PB	For Status II Connector
Evita XL/4/dura	CJ-402RI-70SVi	For Status II Connector
BIS	CJ-407-RI-70BIS	For Status II Connector
	CJO-03RS4	For Serial Connector
VELIA/ASTRAL	CJO-23DR2	For Status II Connector
VS-ULTRA	CJO-24DR2	For Status II Connector
Magnetic Card Reader/ Barcode Reader	CJ-756	For Serial Connector

Chapter 14 Specification

Chapter 14 Specification

Specification

This section states the specification of this equipment.

Main Unit: DS-8007

Size

DS-8007	200 (W) mm x 108 (D) mm x 185 (H) mm (not including the protrusion)

Weight

DS-8007	2.4 kg (not including the accessory)

Environmental Conditions

Operating Temperature	10°C to 40°C/50°F to 104°F
Operating Humidity	30% to 85% (non-condensing)
Operating Atmospheric Pressure	70 kPa to 106 kPa
Transport/Storage Temperature	-10°C to 60°C/14°F to 140°F
Transport/Storage Humidity	10% to 95% (40°C/104°F, non-condensing)
Storage Atmospheric Pressure	70 kPa to 106 kPa

Safety

General Standard	IEC 60601-1:2005+A1:2012 (Medical electrical equipment - Part 1: General requirements for basic safety and essential performance)
EMC Standard	IEC 60601-1-2:2007 (Medical Electrical Equipment- Part 1-2: General Requirements for Safety – Electromagnetic Compatibility – Requirements and Tests)
Type of protection against electric shock	Class I Equipment (During AC power operation) Internally Powered Equipment (During battery operation)
Degree of protection against electric shock	ECG/RESP, SpO_2,SpCO*,SpMet*,SpHb*,TEMP,BP,CO: Type CF Applied Part NIBP, CO_2 Concentration: Type BF Applied Part *DS-8007M only
Operation Mode	Continuous Operating Equipment
Waterproof/Dustproof	DS-8007 Main Unit: IP32 Only when temperature connector cover, USB memory slot cover, CO2 I/F connector cover, button cover, battery cover is attached.
Protection against Ignition of Flammable Gas	Not provided

Power Supply

Voltage	AC 100-240 V (When DSA-81 is used) DC18 V (When DSA-82 is used)
Frequency	50 Hz / 60 Hz
Power Consumption	During AC power operation: 70 VA and below During battery operation: 40 W and below
Battery Operation Time	4 hours (ECG, RESP, SpO2, NIBP 15 min. interval, Brightness [5%])5 hours (ECG, Brightness [Power Save])*The above battery operation time is based on the following conditions; A new battery pack is fully charged with the DSA-81, the option units are not used, and the alarms are not generated.
Battery Charging Time	Rapid Charge (when the equipment is not operating): 4 hours, Normal Charge (when the equipment is operating): 8 hours (when the DSA-81 is used)

Usable Life

6 years	According to self-certification. (☞Maintenance Manual "Periodic Replacement" P7-1)

AC Unit: DSA-81

Size

224 (W) mm x 167 (D) mm x 109 (H) mm (not including the protrusion)

Weight

1.1 kg (not including the accessory)

Environmental Conditions

Operating Temperature	10°C to 40°C/50°F to 104°F
Operating Humidity	30% to 85% (non-condensing)
Operating Atmospheric Pressure	70 kPa to 106 kPa
Transport/Storage Temperature	-10°C to 60°C/14°F to 140°F
Transport/Storage Humidity	10% to 95% (40°C/104°F, non-condensing)
Storage Atmospheric Pressure	70 kPa to 106 kPa

Safety

General Standard	IEC 60601-1:2005+A1:2012 (Medical electrical equipment - Part 1: General requirements for basic safety and essential performance)
EMC Standard	IEC 60601-1-2:2007 (Medical Electrical Equipment- Part 1-2: General Requirements for Safety – Electromagnetic Compatibility – Requirements and Tests)
Type of protection against electric shock	Class I equipment (DS-8007 System)/Internally Powered Equipment (DS-8007 System)
Waterproof/Dustproof	IPX1
Protection against Ignition of Flammable Gas	Not provided
Voltage	100-240 V AC
Frequency	50 Hz / 60 Hz

Usable Life

6 years	According to self-certification.

DS-8007 Adapter: DSA-82:

Size

224 (W) mm x 76 (D) mm x 133 (H) mm (not including the protrusion)

Weight

0.7 kg (not including the accessory)

Environmental Conditions

Operating Temperature	10°C to 40°C/50°F to 104°F
Operating Humidity	30% to 85% (non-condensing)
Operating Atmospheric Pressure	70 kPa to 106 kPa
Transport/Storage Temperature	-10°C to 60°C/14°F to 140°F
Transport/Storage Humidity	10% to 95% (40°C/104°F, non-condensing)
Storage Atmospheric Pressure	70 kPa to 106 kPa

Safety

General Standard	IEC 60601-1:2005+A1:2012 (Medical electrical equipment - Part 1: General requirements for basic safety and essential performance)
EMC Standard	IEC 60601-1-2:2007 (Medical Electrical Equipment- Part 1-2: General Requirements for Safety – Electromagnetic Compatibility – Requirements and Tests)
Type of protection against electric shock	Depends on the host monitor.
Protection against Ignition of Flammable Gas	Not provided
Degree of Protection against Ingress of Water	IPX0
Voltage	DC 18 V (Supplied from the host monitor.)

Usable Life

6 years	According to self-certification.

Recorder Unit: HR-800

Size

HR-800 Recorder Unit	87 (W) x109 (H) x100 (D) mm (not including the protrusion)

Weight

HR-800	0.54 kg (not including the accessory)

Environmental Conditions

Operating Temperature	10°C to 40°C/50°F to 104°F
Operating Humidity	30% to 85% (non-condensing)
Transport / Storage Temperature	-10°C to 60°C/14°F to 140°F
Transport / Storage Humidity	10% to 95% (40°C/104°F) (non-condensing)
Storage Atmospheric Pressure	70 kPa to 106 kPa

Safety

General Standard	IEC 60601-1:2005+A1:2012 (Medical electrical equipment - Part 1: General requirements for basic safety and essential performance)
EMC Standard	IEC 60601-1-2:2007 (Medical electrical equipment - Part 1-2: General requirements for basic safety and essential performance - Collateral standard: Electromagnetic compatibility - Requirements and tests)
Type of protection against electric shock	Class I Equipment (DS-8007 System) Internally Powered Equipment (DS-8007 System)
Waterproof/Dustproof	IPX0
Protection against Ignition of Flammable Gas	Not provided

Power Supply (During AC power operation)

Voltage	DC18V

Usable Life

6 years	According to self-certification.

Gas Unit I/F: HPD-810 and CO2 Gas Unit: HCP-810

Size

36(W) mm x 91(H) mm x 87(D) mm (not including the protrusion)

Weight

HPD-810	0.18 kg (not including the accessory)
HCP-810	0.22 kg (not including the accessory)

Environmental Conditions

Operating Temperature	10°C to 40°C/50°F to 104°F
Operating Humidity	30% to 85% (non-condensing)
Operating Atmospheric Pressure	70 kPa to 106 kPa
Transport/Storage Temperature	-10°C to 60°C/14°F to 140°F
Transport/Storage Humidity	10% to 95% (40°C/104°F, non-condensing)
Storage Atmospheric Pressure	70 kPa to 106 kPa

Safety

General Standard	IEC 60601-1:2005+A1:2012 (Medical electrical equipment - Part 1: General requirements for basic safety and essential performance)
EMC Standard	IEC 60601-1-2:2007 (Medical electrical equipment - Part 1-2: General requirements for basic safety and essential performance - Collateral standard: Electromagnetic compatibility - Requirements and tests)
Type of protection against electric shock	Class I Equipment (DS-8007 System)/Internally Powered Equipment (DS-8007 System)
Degree of protection against electric shock	CO_2 : Type BF Applied Part
Waterproof/Dustproof	IPX0
Protection against Ignition of Flammable Gas	Not provided

Power Supply

Voltage	HCP-810/HCP-820:DC 12 V HPD-810/HPD-820:DC 5 V/DC 12 V (Supplied from DS-8007 Main Unit)

Usable Life

6 years	According to self-certification (☞Maintenance Manual "Periodic Replacement" P7-1)

Gas Unit I/F: HPD-820 and CO2 Gas Unit: HCP-820

Size

HCP-820/HPD-820	120 (W) mm x 53 (D) mm x 80 (H) mm (not including the protrusion)

Weight

HCP-820	0.3 kg (not including the accessory)
HPD-820	0.2 kg (not including the accessory)

Environmental Conditions

Operating Temperature	10°C to 40°C/50°F to 104°F
Operating Humidity	30% to 85% (non-condensing)
Operating Atmospheric Pressure	70 kPa to 106 kPa
Transport/Storage Temperature	-10°C to 60°C/14°F to 140°F
Transport/Storage Humidity	10% to 95% (40°C/104°F, non-condensing)
Storage Atmospheric Pressure	70 kPa to 106 kPa

Safety

General Standard	IEC 60601-1:2005+A1:2012 (Medical electrical equipment - Part 1: General requirements for basic safety and essential performance)
EMC Standard	IEC 60601-1-2:2007 (Medical Electrical Equipment- Part 1-2: General Requirements for Safety- Electromagnetic Compatibility -Requirements and Tests)
Type of protection against electric shock	Class I Equipment (DS-8007 System)/Internally Powered Equipment (DS-8007 System)
Degree of protection against electric shock	CO_2 : Type BF Applied Part
Protection against Ignition of Flammable Gas	Not provided
Waterproof/Dustproof	IPX0

Power Supply

Voltage	HCP-820: DC 12 V HPD-820: DC 12 V / 5 V (Via DS-8007 Main Unit)

Usable Life

6 years	According to self-certification. (☞Maintenance Manual "Periodic Replacement" P7-1)

BISx I/F Unit: HBX-800

Size

36 (W) mm x 87 (D) mm x 91 (H) mm (not including the protrusion)

Weight

0.2 kg (not including the accessory)

Environmental Conditions

Operating Temperature	10°C to 40°C/50°F to 104°F
Operating Humidity	30% to 85% (non-condensing)
Operating Atmospheric Pressure	70 kPa to 106 kPa
Transport/Storage Temperature	-10°C to 60°C/14°F to 140°F
Transport/Storage Humidity	10% to 95% (40°C/104°F, non-condensing)
Storage Atmospheric Pressure	70 kPa to 106 kPa

Safety

General Standard	IEC 60601-1:2005+A1:2012 (Medical electrical equipment - Part 1: General requirements for basic safety and essential performance)
EMC Standard	IEC 60601-1-2:2007 (Medical electrical equipment - Part 1-2: General requirements for basic safety and essential performance - Collateral standard: Electromagnetic compatibility - Requirements and tests)
Type of protection against electric shock	Class I equipment (DS-8007 System)/Internally Powered Equipment (DS-8007 System)
Degree of protection against electric shock	BIS: Type BF Applied Part (When connected to BISx)
Protection against Ignition of Flammable Gas	Not provided
Waterproof/Dustproof	IPX0
Voltage	DC 12 V / 5 V

Usable Life

6 years	According to self-certification

Performance

This section describes the performance of this equipment. The EMC essential performance is indicated with ※.

Display Panel

Display Device	7 inch color LCD
Resolution	800 pixel x 480 pixel
Function Control	Touch Screen Method
Waveform Trace	Stationary Trace
Sweep Speed	ECG/SpO_2/BP/EEG (6.25 mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s) RESP/ CO_2 (6.25 mm/s, 12.5 mm/s, 25 mm/s)

Operation

Touch Panel	Capacitive Touch Panel
Fixed Keys	5 keys (HOME, MENU, PRINT START/STOP, NIBP START/STOP, Alarm Silence)

Sound Pressure

Alarm Sound (Standard Tone)	Maximum: 83.0 dB, Minimum: 52.0 dB
HR Synchronized Tone	Maximum: 85.0 dB, Minimum: 32.0 dB
SpO_2 Synchronized Tone	Maximum: 77.0 dB, Minimum: 51.0 dB

Clock Accuracy

±2 min. per year (25°C/77°F)

Alarm

Alarm Function	For each alarm level, the respective alarm sound generates, and the alarm indicator flashes.
Alarm Indicator	Visual check is possible from 4 m distance.
Alarm Display	Visual check is possible from 1 m distance.

ECG

Lead Type	Wired 3, 4, 5, 10-electrode
Frequency Characteristic	150 Hz / 40 Hz / 15 Hz
Input impedance	2.5 MΩ or above
Maximum Input Voltage	10 mVp-p
Polarization Voltage	±825 mV or above
Common Mode Rejection Ratio	90 dB or above
HR Measurement Range	Adult: 0, 12 bpm to 300 bpm Neonate: 0, 30 bpm to 300 bpm
※ HR Measurement Accuracy	±3 bpm
HR Display Response Time	Adult/Child: 6 sec., Neonate: 3 sec.
Instant HR	Calculated each second based on the latest RR interval.
Waveform Size Selection	1/4, 1/2, 1, 2, 4
Defibrillation Proof	ON
Lead-off Detection Current	100 nA and below

Heart rate meter accuracy and response to irregular rhythm	80 bpm Ventricular Bigeminy : 80 bpm  60 bpm Ventricular Bigeminy : 60 bpm  120 bpm Ventricular Bigeminy : 120 bpm  90 bpm Bidirectional Systoles : 90 bpm 
Response time of heart rate meter to change in heart rate	HR change from 80 bpm to 120 bpm: Range 5 sec. to 7 sec., Average 6 sec. HR change from 80 bpm to 40 bpm: Range 5 sec. to 7 sec., Average 6 sec.
Time to ALARM for tachycardia	Ventricular Tachycardia 1 mVpp, 206 bpm: Range 7 sec. to 10 sec., Average 8 sec.  Ventricular Tachycardia 2 mVpp, 206 bpm: Range 7 sec. to 10 sec., Average 8 sec. Ventricular Tachycardia 0.5 mVpp, 206 bpm: Range 11 sec. to 14 sec., Average 12 sec. Ventricular Tachycardia 2 mVpp, 195 bpm: Range 7 sec. to 10 sec., Average 8 sec.  Ventricular Tachycardia 4 mVpp, 195 bpm: Range 7 sec. to 10 sec., Average 8 sec. Ventricular Tachycardia 1 mVpp, 195 bpm: Range 8 sec. to 12 sec., Average 10 sec.
Tall T-wave Rejection Capability	1.2 mV T-wave can be removed when tested according to IEC 60601-2-27.
Transient Characteristic	3.2 sec, 0.32 sec, 0.1 sec (time constant can be changed)
Rejection of Pacemaker Pulse	a) Pacemaker Pulse without Over/Undershoot Capable to reject pulses of pulse width 0.1 ms to 2 ms, amplitude ±2 mV to ±700 mV b) Pacemaker Pulse with Over/Undershoot Rejection is not possible. c) Pacer Pulse Detector Rejection of Fast ECG Signals Slew Rate 3.2V/S
Sampling Rate	Analog Front End: 8000 samples/s/channel Digital Signal Processing: 500 samples/s/channel and above
Resolution	5 µV/LSB and below
Skew	100 µs and below

Respiration

Method	Impedance Method
Frequency Characteristic	1.5 Hz (adult, child) / 2.5 Hz (neonate)
Current	100 μA and below (at 33.3 kHz±5%)
Measurement Range	0, 4 Bpm to 150 Bpm
Measurement Accuracy	±3 Bpm

Temperature

	Measurement Method	Thermistor Method
	Probe	400 only
	Measurement Range	0°C to 45°C/32°F to 113°F
※	Measurement Accuracy	±0.2°C at 25°C to 45°C/±0.4°F at 77°F to 113°F Outside above range ±0.4°C/±0.7°F
	Number of channels	Maximum 6 channels
	Temperature Delay Time (From temperature probe to monitor display)	10 sec. or less (Not including the time constant of temperature probe.)
	Operating Mode	Direct Mode

SpO_2 (Arterial Oxygen Saturation)

	Measurement Value Update Rate	1 sec.

Nellcor Unit

	Measurement Method	2 Wavelength Pulse Wave Method Wavelength: Approx. 660 nm (red light) Approx. 900 nm (infrared light) Output: 15 mW and below
	Measurement Range	1%SpO_2 to 100%SpO_2
	Resolution	1%SpO_2
※	Measurement Accuracy	±2[digit] (70 to 100[%SpO_2]) At low perfusion: ±2[digit] (70[%SpO_2] to 100[%SpO_2]) With body motion: ±3[digit] (70[%SpO_2] to 100[%SpO_2]) At low oxygen saturation level: ±3[digit] (60[%SpO_2] to 80[%SpO_2])
	PR Measurement Range	20 bpm to 250 bpm
※	PR Accuracy	± 3 bpm when 20 bpm to 250 bpm
	Measurement Response Time	6 sec. to 7 sec.

Respiration Rate

Display Range	4 Bpm to 40 Bpm
RR Accuracy	Mean Error: Within ±1 Bpm Mean Square Deviation: Below 3 Bpm

Masimo Unit

Measurement Method	2 Wavelength Pulse Wave Method MASIMO LNOP/M-LNCS Sensor Wavelength: Approx. 660 nm (red light) Approx. 905 nm (infrared light) Output: 15 mW and below Masimo Rainbow Sensor Wavelength: 12 different wavelengths are used within the range of 620 nm to 1270 nm Output: 25 mW and below
SpO_2	
Measurement Range	1%SpO_2 to 100%SpO_2
Resolution	1%SpO_2
※ Measurement Accuracy	Without body motion Adult: ±2%SpO_2 when 70%SpO_2 to 100%SpO_2 Neonate: ±3%SpO_2 when 70%SpO_2 to 100%SpO_2 With body motion Adult: ±3%SpO_2 when 70%SpO_2 to 100%SpO_2 Neonate: ±3%SpO_2 when 70%SpO_2 to 100%SpO_2
SpCO	
Measurement Range	0%SpCO to 99%SpCO
Minimum Display Unit	1%SpCO
Measurement Accuracy	±3%SpCO (SpCO: 1%SpCO to 40%SpCO)
SpMet	
Measurement Range	0%SpMet to 99.9%SpMet
Minimum Display Unit	0.1%SpMet
Measurement Accuracy	±1%SpMet (SpMet: 1%SpMet to 15%SpMet)
SpHb	
Measurement Range	0 g/dL to 25.0 g/dL
Minimum Display Unit	0.1g/dL
Measurement Accuracy	±1 g/dL (SpHb: 8 g/dL to 17 g/dL)
PI	
Measurement Range	0.02% to 20.0% (disposable sensor), 0.05% to 20.0% (reusable sensor)
Minimum Display Unit	0.01%
PVI	
Measurement Range	0 to 100%
Calculation Time	15 sec.
SpOC	
Measurement Range	0 g/dL to 35ml/dL
Minimum Display Unit	0.1 ml/dL
Pulse Rate	
Measurement Range	26 bpm to 239 bpm
※ Measurement Accuracy	± 3 bpm when 26 bpm to 239 bpm (without body motion)
Measurement Response Time	7 levels 2 to 4 sec., 4 to 6 sec., 8 sec., 10 sec., 12 sec., 14 sec., 16 sec. (averaging duration)

NOTE

- The SpO_2 measurement accuracy is determined based on the values of the root-mean-square (rms) difference between SpO_2 readings of the pulse oximeter equipment and values of SaO_2 determined with a CO-oximeter, by healthy adult volunteers. The pulse oximeter equipment measurements are statistically distributed; ±2% measurement accuracy means that only about two-thirds of pulse oximeter equipment measurements can be expected to fall within ±2% of the value measured by a CO-oximeter.
- PVI, SpCO, SpMet, SpHb, SpOC measurements are optional functions.

BP

Transducer Sensitivity	5 μV / V / mmHg
Measurement Range	-50 mmHg to 300 mmHg
Frequency Characteristic	DC 6 Hz / 8Hz / 12Hz / 40Hz
Measurement Accuracy	Within ±2% or ±1mmHg of full scale, whichever is greater
Zero Balance Range	Within ±150 mmHg
PR Measurement Range	Adult: 12 bpm to 300 bpm Neonate: 30 bpm to 300 bpm
PR Accuracy	Within ± 3% or 1bpm, whichever is greater
No. of Channels	Maximum 4 channels

NIBP (Non-Invasive Blood Pressure) (AAMI SP10: 2002+A1:2003+A2:2006+(R)2008 Manual, electronic or automated sphygmomanometers) (ISO81060-2:2013 Non-invasive sphygmomanometers -- Part 2: Clinical investigation of automated measurement type)

Measurement Method	Oscillometric Method
Pressure Measurement Range	0 mmHg to 300 mmHg
Resolution	1 mmHg
Pressure accuracy	±3 mmHg
BP Measurement Error according to the Clinical Performance Test	
Mean Error	Within ±5 mmHg
Standard Deviation of Error	8 mmHg and below
Error of Cuff Pressure Display	Within ±3 mmHg
※ Measurement Error (including simulator)	±10 mmHg
PR Measurement Range	40 bpm to 240 bpm
PR Accuracy	±5%
Deflation Speed	5±1 mmHg/sec. (Quick Measurement OFF) 10±2 mmHg/sec. (Quick Measurement ON)
Safety Mechanism	Adult: 300 mmHg and below Child: 210 mmHg and below Neonate: 150 mmHg and below

CO_2 (Carbon Dioxide Concentration)

Philips Capnostat 5 (Gas Unit I/F and Mainstream Module)

Measurement Method	Infra-Red Solid-State Method, Mainstream Method
Measurement Range	0 mmHg to 150 mmHg
※ Measurement Accuracy	0 mmHg to 40 mmHg: ±2 mmHg 41 mmHg to 70 mmHg: ±5% 71 mmHg to 100 mmHg: ±8% 101 mmHg to 150 mmHg: ±10%
CO_2 value error compensation when interference gas is present	
	0 mmHg to 40 mmHg: Additional error of ±1mmHg 41 mmHg to 70 mmHg: Additional error of ±2.5% 71 mmHg to 100 mmHg: Additional error of ±4% 101 mmHg to 150 mmHg: Additional error of ±5% These are maximum error only if compensation of atmospheric pressure, O_2, N_2O, anesthetic agent are properly performed.
RR Measurement Range	0 Bpm to 150 Bpm
RR Measurement Accuracy	±1 Bpm
Rise Time	60 ms and below

Covidien Unit

Measurement Method	Infra-Red Solid-State Method, Microstream Method
Measurement Range	0 mmHg to 99 mmHg
※ Measurement Accuracy	0 mmHg to 38 mmHg: ±2 mmHg 39 mmHg to 99 mmHg: ± { 0.05 x displayed value +0.08x (displayed value - 39 mmHg) } : (RR: 80 Bpm and below) : The larger of ± 4 mmHg or ±12% : (RR: over 80 Bpm)
Variation of Measurement Accuracy	±2 mmHg (Within 6 hours after power ON)
CO_2 measurement accuracy when interference gas is present	
	0 mmHg to 38 mmHg: ± (2 mmHg + 0.04 x displayed value) 39 mmHg to 99 mmHg: ± { 0.09 x displayed value + 0.08 x (displayed value - 39 mmHg) }
RR Measurement Range	0 Bpm to 150 Bpm
RR Measurement Accuracy	0 Bpm to 70 Bpm: ±1 Bpm 71 Bpm to 120 Bpm: ±2 Bpm 121 Bpm to 150 Bpm: ±3 Bpm
Flow Rate	50 mL/min +15, –7.5 mL/min.
System Response Time	4.2 sec.
Delay Time	4.0 sec.
Rise Time	0.2 sec.

CO

Measurement Method	Thermodilution Method
Measurement Range	0.1 L/min to 20.0 L/min
Measurement Range and Accuracy	
Blood Temperature	±0.3°C at 17°C to 45°C/±0.5°F at 63°F to 113°F
Injectate Temperature	±0.5°C at -1°C to 35°C/±0.9°F at 30°F to 86°F

BIS

BISx (Covidien)

Bispectral Index (BIS)

Measurement Range	0% to 100%
Resolution	1%
Signal Quality Index (SQI)	
Measurement Range	0% to 100%
Resolution	0.1%
EMG	
Measurement Range	25 dB to 100 dB
Bar Graph Display Range	30 dB to 55 dB
Graphic Trend Display Range	30 dB to 80 dB
Resolution	1 dB
Suppression Ratio (SR)	
Measurement Range	0% to 100%
Spectral Edge Frequency	
Measurement Range	0.5 Hz to 30 Hz
Total Power (TOTPOW)	
Measurement Range	40 dB to 100 dB
Waveform Display Scale	±25μV, ±50μV, ±100μV, ±250μV ±10%
Frequency Characteristic	
Filter ON	2.0 Hz to 70 Hz, AC Filter ON (50 Hz or 60 Hz)
Filter OFF	0.25 Hz to 100 Hz, AC Filter OFF

Analog Waveform Output

Number of Output Waveforms	3 channels (any combinations of ECG and BP waveforms can be set.)
Output Voltage	ECG Output 1 V/mV (fixed), BP Output 1 V/100 mmHg (fixed)
Output Voltage Accuracy	within ±10% (Both ECG and BP output)
Analog Output Frequency Range	ECG Output: 0.5 Hz to 40 Hz
	BP Output: DC to 40 Hz
Delay Time	35 ms and below (ECG waveform) 35 ms and below (BP waveform: when 40 Hz is set for waveform filter)
Output Impedance	100Ω±10%
Load Impedance	1kΩ to ∞
Pacemaker Pulse	None

QRS Synchronization Output

Output Waveform	Square Wave (Positive/negative logic can be selected.)
Output Voltage	+4.3 V to +5.0 V (High Level) +0.3 V and below (Low Level)
Synchronized Signal Width	100 ms / 60 ms / 20 ms (Selectable)
Delay Time	50 ms and below (when the "Filter" setting is [Monitor] or [Diag.])
Output Impedance	Open Collector Output (with +5 V 500Ω pull-up resistor)

NOTE

- The delay time of analog waveform output and QRS synchronization output depends on the filter setting and the input waveform type. For details, refer to your nearest service representative.

- The QRS synchronized signal is not intended to be used as synchronized signal for defibrillator. When using the QRS synchronized signal, refer to your nearest service representative.

Measurement Unit for Each Parameter

The measurement units that can be displayed on this equipment are as follows.

Description	Parameter	Display	Unit	Default Unit
HR/PR Value	ECG	HR	bpm (beats per minute)	
	Blood Pressure	PR_IBP	bpm	
	Non-Invasive Blood Pressure	PR_NIBP	bpm	
	SpO_2	PR_SpO_2	bpm	
ST Level	ECG	ST	mm, mv	mm
VPC	ECG	VPC	beat/minute	
		PACE	beat/minute	
Respiration Rate	Impedance	RESP	Bpm (breaths per minute)	
	CO_2	RR_CO_2	Bpm	
	SpO_2	RR_SpO_2	Bpm	
Apnea Duration	Impedance	Apnea	s (second)	
	CO_2	Apnea	s (second)	
Blood Pressure	Blood Pressure	BP	mmHg, kPa cmH_2O (CVP only)	mmHg
Non-Invasive Blood Pressure	Non-Invasive Blood Pressure	NIBP	mmHg, kPa	mmHg
Arterial Oxygen Saturation	SpO_2	SpO_2	%	
Perfusion Index	Perfusion Index	PI	%	
	Pleth Variability Index	PVI	%	
Total Hemoglobin	SpHb	SpHb	g/dL	
Carboxyhemoglobin Concentration	SpCO	SpCO	%	
Methemoglobin Concentration	SpMet	SpMet	%	
Arterial Oxygen Content	SpOC	SpOC	mL/dL	
Temperature	Temperature	TEMP	°C, °F	°F
End Tidal CO_2 Concentration	CO_2	$EtCO_2$	mmHg, kPa, %	mmHg
Inspiratory CO_2 Concentration	CO_2	$InspCO_2$	mmHg, kPa, %	mmHg
CO	CO	CO	L/minute	
Blood Temperature	Blood Temperature	Tb	°C, °F	°F
Injectate Temperature	Injectate Temperature	Ti	°C, °F	°F

Description	Parameter	Display	Unit	Default Unit
BIS Data	Bispectral Index	BIS	(no unit)	
	Signal Quality Index	SQI	%	
	Electromyograph	EMG	dB	
	Suppression Ratio	SR	%	
	Spectral Edge Frequency	SEF	Hz	
	Total Power	TOTPOW	dB	
	Impedance	IMP	Kohms	

Alarm Limit Range for Each Parameter

The alarm limit can be set in the following range.

Item	Adjustable Range		[Auto] Setting *
	Lower Limit	Upper Limit	
	Adjustable Increments		
HR	20 bpm to 295 bpm	22 bpm to 300 bpm	Upper: current value +40 bpm Lower: current value –40 bpm
	25 bpm and below: 1 bpm increments 25 bpm and above: 5 bpm increments		
ST 12-Lead ST	-2.0 mV to +1.8 mV	-1.8 mV to +2.0 mV	Upper: current value +0.2 mV (+2 mm) Lower: current value -0.2 mV (-2 mm)
	0.1 mV increments		
	-20 mm to +18 mm	-18 mm to +20 mm	
	1 mm increments		
Ext Tachy	-	22 bpm to 300 bpm	HR Lower Limit +10 bpm
	50 bpm and below: 1 bpm increments 50 bpm and above: 5 bpm increments		
Ext Brady	20 bpm to 295 bpm	-	HR Lower Limit - 10 bpm
	50 bpm and below: 1 bpm increments 50 bpm and above: 5 bpm increments		
RR (Adult)	5 Bpm to 145 Bpm	10 Bpm to 150 Bpm	Upper: current value +20 Bpm Lower: current value –20 Bpm
	5 Bpm increments		
RR (Child/Neonate)	0 Bpm to 148 Bpm	4 Bpm to 150 Bpm	
	2 Bpm increments		
RR_SpO_2 (Adult)	5 Bpm to 30 Bpm	10 Bpm to 35 Bpm	N/A
	5 Bpm increments		
RR_SpO_2 (Child)	6 Bpm to 32 Bpm	8 Bpm to 34 Bpm	
	2 Bpm increments		
Apnea	-	10 sec. to 60 sec.	15 sec.
	1 sec. increments		

Item	Adjustable Range		[Auto] Setting *
	Lower Limit	Upper Limit	
	Adjustable Increments		
BP1 to 4	0 mmHg to 295 mmHg	2 mmHg to 300 mmHg	When BP label is BP1/ART: Upper: current value +40 mmHg (+5.0 kPa) Lower: current value -20 mmHg (-3.0 kPa) When BP label is other than BP1/ART: Upper: current value +20% Lower: current value -20%
	0 mmHg to 50 mmHg: 2 mmHg increments 50 mmHg and above: 5 mmHg increments		
	0.0 kPa to 39.5 kPa	0.2 kPa to 40.0 kPa	
	0 kPa to 7.0 kPa: 0.2 kPa increments 7.0 kPa and above: 0.5 kPa increments		
CVP	0.0 cmH_2O to 38 cmH_2O	2 cmH_2O to 40 cmH_2O	
	1 cmH_2O increments		
NIBP	10 mmHg to 295 mmHg	15 mmHg to 300 mmHg	Upper: current value +40 mmHg (+5.0 kPa) Lower: current value -20 mmHg (-3.0 kPa)
	5 mmHg increments		
	1.5 kPa to 39.5 kPa	2.0 kPa to 40.0 kPa	
	0.5 kPa increments		
SpO_2	50%SpO_2 to 99%SpO_2	51%SpO_2 to 100%SpO_2	Upper: OFF Lower: 90%SpO_2
	1%SpO_2 increments		
Ext SpO_2	50%SpO_2 to 98%SpO_2	-	Upper: OFF Lower: 90%SpO_2
	1%SpO_2 increments		
$EtCO_2$	1 mmHg to 98 mmHg	3 mmHg to 100 mmHg	Upper: current value +10 mmHg (+1.3 kPa / +1.3%) Lower: current value -10 mmHg (-1.3 kPa / -1.3%)
	1 mmHg increments		
	0.1 kPa to 13.1 kPa	0.3 kPa to 15.0 kPa	
	0.1 kPa increments		
	0.1% to 13.1%	0.3% to 15.0%	
	0.1% increments		
$InspCO_2$	-	1 mmHg to 4 mmHg	3 mmHg (0.3 kPa / 0.3%)
	1 mmHg increments		
	-	0.1 kPa to 3.0 kPa	
	0.1 kPa increments		
	-	0.1% to 3.0%	
	0.1% increments		
TEMP	30.0°C to 44.0°C	31.0°C to 45.0°C	Upper: current value +2.0°C/+4.0°F Lower: current value -2.0°C/-4.0°F
	0.5°C increments		
	86.0°F to 111.0°F	88.0°F to 113.0°F	
	1.0°F increments		
SpCO	-	1%SpCO to 40%SpCO	N/A
	1%SpCO increments		
SpMet	-	1%SpMet to 15%SpMet	N/A
	1%SpMet increments		
SpHb	1.0 g/dL to 24.0 g/dL	2.0 g/dL to 24.5 g/dL	N/A
	0.1 g/dL increments		
BIS	1 to 98	2 to 99	N/A
	increments of 1		

*: If the value exceeds the adjustable range, the limit within the range will be set.

The automatic setup will not be performed for the turned OFF limit.

About the SpO_2 Clinical Test

❑Covidien Unit

The SpO_2 and pulse rate measurement accuracy have been validated for each range by testing on healthy adult male and female volunteers against a laboratory CO-Oximeter.

The SpO_2 accuracy has been validated for the range from 70% to 100% by testing on healthy adult male and female volunteers (age: 22 to 46 years old) with light to dark skin pigmentation. Without body motion, the standard deviation is ±2% which encompasses 68% of the population. With body motion, the standard deviation is ±3% which encompasses 68% of the population. For the validation, frictional or contact motion of 1 cm to 2 cm, and random vibration of 1 Hz to 4 Hz were tested.
The validation has been also performed for the low oxygen saturation level (60% to 80%), and the standard deviation was ±3% which encompasses 68% of the population.

The pulse rate accuracy has been validated for the range from 70% to 100% by testing on healthy adult male and female volunteers (age: 22 to 46 years old) with light to dark skin pigmentation The standard deviation is ±3 bpm which encompasses 68% of the population.

These clinical test data are disclosed based on the data provided from Covidien.

❑Masimo Unit

The SpO_2, SpCO, SpMet, and pulse rate measurement accuracy have been validated for each range by testing on healthy adult male and female volunteers against a laboratory CO-Oximeter.

SpO_2 and SpMet accuracy have been validated by testing on 16 neonatal NICU patients ranging in age from 7 days to 135 days old and weighing between 0.5 kg to 4.25 kg. Seventy-nine (79) data samples were collected over a range of 70% to 100% SpO_2 and 0.5% to 2.5% HbMet with a resultant accuracy of 2.9% SpO_2 and 0.9% SpMet.

The SpO_2 accuracy has been validated for the range from 70% to 100% by testing on healthy adult male and female volunteers (age: 21 to 36 years old) with light to dark skin pigmentation. Without body motion, the standard deviation is ±2% which encompasses 68% of the population. With body motion, the standard deviation is ±3% which encompasses 68% of the population. For the validation, frictional or contact motion of 1 cm to 2 cm, and random vibration of 1 Hz to 5 Hz were tested.

The pulse rate accuracy has been validated for the range from 70% to 100% by testing on healthy adult male and female volunteers (age: 24 to 37 years old) with light to dark skin pigmentation The standard deviation is ±3 bpm which encompasses 68% of the population.

The SpCO accuracy has been validated for the range from 0% to 40% by testing on healthy adult male and female volunteers with light to dark skin pigmentation. The standard deviation is ±3% which encompasses 68% of the population.

The SpMet accuracy has been validated for the range from 0% to 15% by testing on healthy adult male and female volunteers with light to dark skin pigmentation. The standard deviation is ±1% which encompasses 68% of the population.

The SpHb accuracy has been validated for the range from 8 g/dL to 17 g/dL by testing on healthy adult male and female volunteers with light to dark skin pigmentation. The standard deviation is ±1 g/dL which encompasses 68% of the population.

These clinical test data are disclosed based on the data provided from Masimo.

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