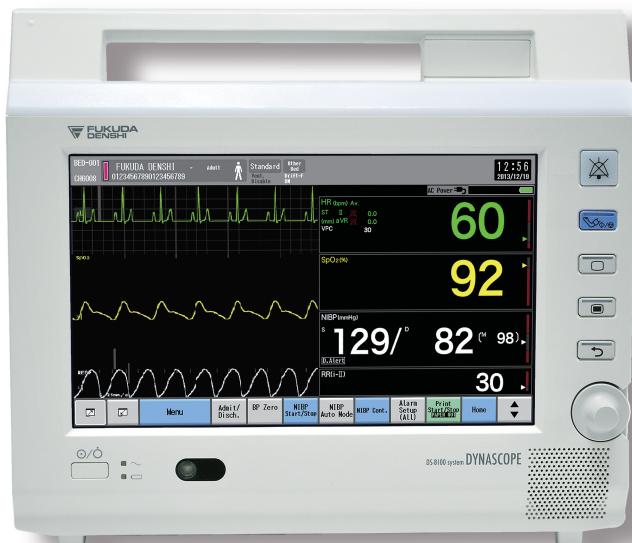


DYNASCOPE 8000 Series Patient Monitor

DS-8100 system

Ver. 02

Operation Manual



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

This manual is for the DS-8100 System Version 02.



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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If this manual has pages missing or out of order, contact Fukuda Denshi for replacement.

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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>

Use of the Fukuda Denshi DynaScope Model DS-8100N/8100M Patient Monitor is indicated in those situations where observation of one or more of the following parameters on an individual patient may be required. ECG (waveform, heart rate, ST-Level and ventricular arrhythmias), respiration, non-invasive blood pressure (NIBP), pulse rate, arterial oxygen saturation (SpO₂), carboxyhemoglobin saturation (SpCO)*, methemoglobin saturation (SpMet)*, total hemoglobin concentration (SpHb)*, plethysmograph, temperature, invasive blood pressure (IBP), cardiac output, and carbon dioxide concentration (CO₂).

*: DS-8100M only

The target populations of the system are adult, pediatric and neonatal patients with the exception of the ST segment, arrhythmia analysis, and SpHb for which the target populations are adult and pediatric excluding neonates. These observations can include an audible and visual alarm if any of these parameters exceed values that are established by the clinician. The observations may include the individual or comparative trending of one or more of these parameters over a period of up to 24 hours. The DS-8100N/8100M Patient Monitor is indicated in situations where an instantaneous display of waveform, numeric and trended values is desired. The DS-8100N/8100M Patient Monitor is also indicated where a hard copy record of the physiological parameters, the alarms conditions or the trended values may be required.

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

The operation and maintenance of this equipment should be performed by well-trained and authorized personnel. 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-8100 System is available from your local Fukuda Denshi sales representative.

Contact

If you need more detailed information, please contact following.

- (1) Fukuda Denshi Co., Ltd., Head Office
3-39-4 Hongo, Bunkyo-ku, Tokyo, Japan
Phone:+81-3-5684-1455 Fax:+81-3-3814-1222
E-mail: info@fukuda.co.jp
Home Page: <http://www.fukuda.com>

- (2) Sales Representative
Write the name, address, phone, fax number of your local sales representative.

(Name of Sales Representative, Address, Phone/Fax)

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.)

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 stop watch, 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
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 details 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 CF card	Procedure to use the CF/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

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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	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.

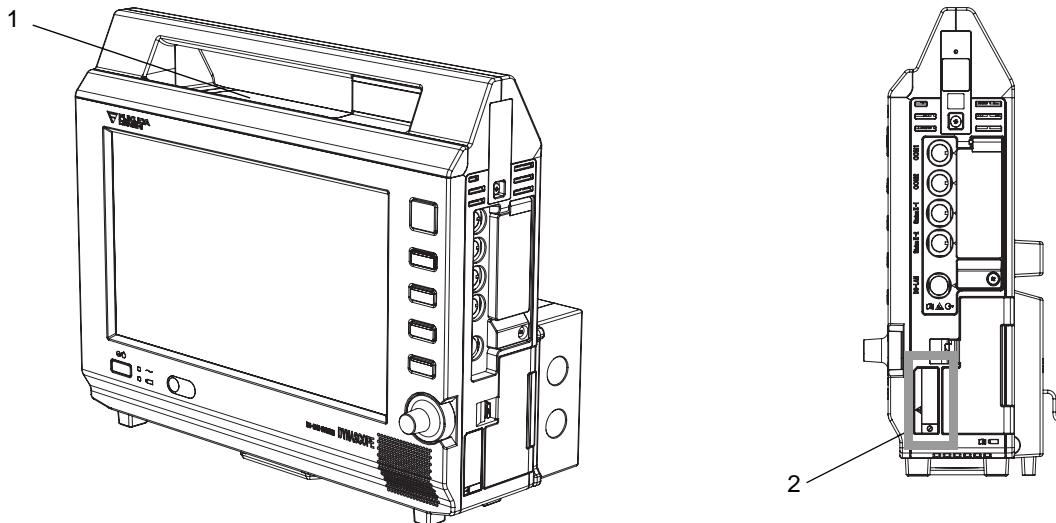
Warning Labels Attached to the Unit

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

CAUTION

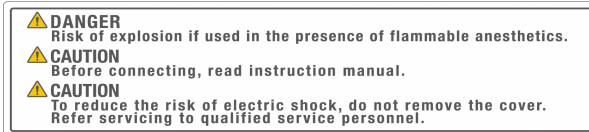
- Do not damage or erase the warning labels attached to the unit.
These warning labels contain important descriptions for handling and operating the equipment properly and safely. A damaged label may compromise safe operation.

DS-8100 Series Main Unit



Warning Labels Attached to the Unit

1



2



Warning Label

Graphic Symbols

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

Symbol	Description
	Warning; indicated in yellow
	Follow operating instructions (Warning); indicated in blue Failure to follow operating instructions could place the patient or operator at risk.
	Follow operating instructions (Information)
	General Precaution
	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
	GAS Output
	Battery
	Alarm Silence Key: Silences the alarm.
	NIBP Start/Stop Key Starts/stops the NIBP measurement. Stops the measurement if pressed while measurement is in progress.
	Home Key: Displays the home display.
	Menu Key: Displays the menu screen.
	Previous Display: Displays the previous display.

Precautions for Safe Operation of Medical Electrical Equipment

CAUTION

- ♦ Users should have a thorough knowledge of the operation before using this equipment.

□ 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 a place where the equipment will not be adversely affected by atmospheric pressure, temperature, humidity, ventilation, sunlight, dust or atmosphere containing salt or sulfur.
- ♦ 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 gasses 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 monitor using the stand (OAO-66A), etc.

□ 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 patient, take appropriate measures such as ceasing operation of the equipment in the safest way for the patient.
- ♦ 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, make sure to pull from the connector part of the cable and avoid applying excessive force.
- ♦ 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.
- ♦ When reusing the equipment which was left unused for a while, always check that the equipment operates properly and safely before use.

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 "Zone Manager"). However, when using such telemetry in a local medical institution, one person can perform both functions.
- ♦ Select a telemetry manager who understands the characteristics and functionality of telemetry systems, and is skilled in operating telemetry.
- ♦ When installing telemetry, the Overall Manager and the Zone Manager have to understand the precautions for use of the telemetry in advance.
- ♦ The Overall Manager takes responsibility of wireless channel management and transmitter storage for the whole Institution by giving proper instruction.
- ♦ 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 Zone Manager assumes responsibility for managing the wireless channels, storing, and managing telemetry.
- ♦ The Zone Manager 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 Zone Manager 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 zone manager and the overall manager of the problems. The Zone Manager and Overall Manager are to deal with the problem properly and/or contact their nearest Fukuda Denshi representative for service.

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.
- ♦ 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.

- ♦ 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 wireless devices that emits radio waves. The TCON user should fully understand these precautions beforehand, and use the TCON system 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, please refer to the HTC-702 Instruction 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 communication devices set to the same TCON ID and channel (group).
- ♦ When symptoms such as being unable to communicate, unstable communication, or poor reception occur.
- ♦ When the radio communication is bad because there are metal, concrete, or other such obstacles between the Bidirectional Wireless Communications Modules (TCON).
- ♦ When a different wireless device is using the same frequency (channel).
- ♦ When there are other TCON devices nearby using different channels (groups).
- ♦ When a cell telephone or other wireless device is being used nearby.
- ♦ When citizens broadcast bands such as amateur radio or truck radios are used in the vicinity of the TCON operating area.
- ♦ When a computer or word processor, or electrical device that has an internal computer, is used near the TCON device antenna.
- ♦ When the TCON device is installed or moved to a location that is outside the radio communication range.
- ♦ If a nearby different group is set with a TCON channel frequency that is too close to the channel frequency set for the current TCON group.



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.
- ♦ When TCON is used, 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) function will be [ON] since the central monitor will not be on Standby mode.
- ♦ Check that three antenna bar marks () are displayed.
- ♦ Make sure that the TCON group number between the bedside monitor and central monitor is the same.
- ♦ If the equipment is moved during TCON operation, the radio waves signal may become interrupted.
- ♦ There are following restrictions when connecting the DS-8100 System to the TCON network.

- ♦ When the BP measurement unit is [kPa], the central monitor does not receive the NIBP/BP1/BP2 Data. Also, the NIBP/BP1/BP2 Alarm Setup cannot be changed on 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.
- ♦ If the measurement unit of CO₂ concentration is [mmHg], the CO₂ value of 100mmHg or above will be transmitted as 99mmHg.

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 burn injury and 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 electrical 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

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. 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.

MRI (Magnetic Resonance Imaging)

WARNING

- ♦ MRI-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 (subject) or performance degradation of this equipment.

For details, refer to the operation manual for the MRI testing device.

Precautions about Connections to Peripheral Devices

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

WARNING

- ♦ When multiple equipments are connected to the patient, the total amount of leakage current may exceed the limit specified on IEC 60601-1.
- ♦ For the connector with  mark, only the peripheral devices specified by Fukuda Denshi should be connected with the given procedure. Use of an unspecified device may cause electric shock to the patient and/or operator due to excessive leakage current.

CAUTION

- ♦ Although the peripheral device connectors on the DS-8100 System are isolated from the power supply, the connecting peripheral devices should comply with IEC 60601-1 inside the patient environment. In other cases, to maintain operator and patient safety, consider the requirements of IEC 60601-1. It is the user's responsibility to ensure that the overall system provides a level of safety in compliance with IEC 60601-1.
- ♦ 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. Never use a multiple portable socket-outlet or extension cord when combining equipment unless the socket outlet 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. If done so by mistake, the device cannot deliver its maximum performance and the connected units 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.

WARNING Warnings about the Monitoring

- The patient classification selection influences the precision of the QRS detection and NIBP measurement. Make sure the correct selection is made.
- The pacemaker use selection 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] or [20ms], the pace pulse may be erroneously be detected as a QRS complex and HR, Asystole alarms may not generate due to incorrect HR (counting pace pulse as QRS complex). Select [OFF], [10ms], or [20ms] only if you are sure that pacing failure will not occur, or when the patient can be constantly monitored.
- When measuring the SpO₂ 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 2 to 3°C due to the sensor heat which may result in burn injury.
- For the following case, accurate measurement of SpO₂ 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
- Before the NIBP 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 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 arrhythmia alarm is set to [OFF], alarm will not function even if the system alarm is set to [ON]. Pay attention when setting them [OFF].
 - ♦ Objective and constant arrhythmia detection is possible through the fixed algorithm incorporated in this monitor. However, excessive waveform morphology change, motion artifact, or the inability to determine the waveform pattern may cause an error, or fail to make adequate detection. Therefore, physicians should make final decisions using manual recording, alarm recording and recall waveform for evaluation.
 - ♦ The RR/APNEA alarm will not be generated unless the parameter key (Numeric Data Box) corresponded to the selected RR/APNEA source is displayed. Make sure to display the parameter key (Numeric Data Box) for the RR/APNEA source.
 - ♦ 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.

⚠ WARNING Warnings about the SpO₂ Monitoring (DS-8100M)

- ♦ Pulse rate measurement is based on the optical detection of a peripheral flow pulse and therefore may not detect certain arrhythmias. The pulse oximeter should not be used as a replacement or substitute for ECG based arrhythmia analysis.
- ♦ A Pulse CO-Oximeter should be considered an early warning device. As a trend towards patient hypoxemia is indicated, blood samples should be analyzed by laboratory instruments to completely understand the patient's condition.
- ♦ For measurements of high or low SpHb readings, blood samples should be analyzed by laboratory instruments to completely understand the patient's condition.
- ♦ SpO₂ is empirically calibrated to functional arterial oxygen saturation in healthy adult volunteers with normal levels of carboxyhemoglobin (COHb) and methemoglobin (MetHb). A pulse oximeter can not measure elevated levels of COHb or MetHb. Increases in either COHb or MetHb will affect the accuracy of the SpO₂ measurement.
- ♦ For increased COHb: COHb levels above normal tend to increase the level of SpO₂. The level of increase is approximately equal to the amount of COHb that is present.

NOTE

- ♦ High levels of COHb may occur with a seemingly normal SpO₂. When elevated levels of COHb are suspected, laboratory analysis (CO-Oximetry) of a blood sample should be performed.
- ♦ For increased MetHb: the SpO₂ may be decreased by levels of MetHb of up to approximately 10% to 15%. At higher levels of MetHb, the SpO₂ may tend to read in the low to mid 80s. When elevated levels of MetHb are suspected, laboratory analysis (CO-Oximetry) of a blood sample should be performed.
- ♦ Interfering Substances: Dyes, or any substance containing dyes, that change usual blood pigmentation may cause erroneous readings.
- ♦ Hemoglobin synthesis disorders may cause erroneous SpHb readings.
- ♦ Elevated levels of Total Bilirubin may lead to inaccurate SpO₂, SpMet, SpCO, SpHb, SpOC measurements.
- ♦ Motion artifact may lead to inaccurate SpMet, SpCO, SpHb, SpOC measurements.
- ♦ Severe anemia may cause erroneous SpO₂ readings.
- ♦ Very low arterial Oxygen Saturation (SpO₂) levels may cause inaccurate SpCO and SpMet measurements.

- ♦ With very low perfusion at the monitored site, the readings may read lower than core arterial oxygen saturation.
- ♦ Do not use tape to secure the sensor to the site; this can restrict blood flow and cause inaccurate readings. Use of additional tape can cause skin damage or damage the sensor.
- ♦ If the sensor is wrapped too tightly or supplemental tape is used, venous congestion/pulsations may occur causing erroneous readings.
- ♦ Venous congestion may cause under reading of actual arterial 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).
- ♦ Venous pulsations may cause erroneous low readings (e.g. tricuspid valve regurgitation).
- ♦ Loss of pulse signal can occur when:
 - The sensor is too tight.
 - The patient has hypotension, severe vasoconstriction, severe anemia, or hypothermia.
 - There is arterial occlusion proximal to the sensor.
 - The patient is in cardiac arrest or is in shock.
- ♦ The pulsations from intra-aortic balloon support can be additive to the pulse rate on the oximeter pulse rate display. Verify patient's pulse rate against the ECG heart rate.
- ♦ Misapplied sensors or sensors that become partially dislodged may cause either over or under reading of actual arterial oxygen saturation.
- ♦ Avoid placing the sensor on any extremity with an arterial catheter or blood pressure cuff.
- ♦ High intensity extreme lights (including pulsating strobe lights) directed on the sensor may not allow the Pulse CO-Oximeter to obtain readings.
- ♦ The Pulse CO-Oximeter can be used during defibrillation, but the readings may be inaccurate for up to 20 seconds.
- ♦ Before use, carefully read the sensor's Directions for Use.
- ♦ Tissue damage can be caused by incorrect application or use of a sensor, for example by wrapping the sensor too tightly. Inspect the sensor site as directed in the sensor's Directions for Use to ensure skin integrity and correct positioning and adhesion of the sensor.
- ♦ The Pulse CO-Oximeter is NOT intended for use as an apnea monitor.
- ♦ To avoid cross contamination only use Masimo single use sensors on the same patient.
- ♦ Unless otherwise specified, do not sterilize sensors or patient cables by irradiation, steam, autoclave or ethylene oxide. See the cleaning instructions in the directions for use for the Masimo re-usable sensors.

 WARNING Warnings about the CO₂ Monitoring (HPD-800/HPD-810, HCP-800/HCP-810)

- ♦ For HPD-800/HPD-810 with Capnostat 5;
 - ♦ Use only the specified airway adapter manufactured by Resironics Novametrix, LLC. Refer to the section on "Optional Accessories" for list of specified airway adapters.
(☞ Operation Manual "CO₂ Concentration Measurement (Resironics)" P13-6)
These accessories may be purchased from Fukuda Denshi or any authorized Resironics Novametrix, LLC distributor.
 - ♦ Always consider the circumference of the intubation tube when using the airway adapter. If inappropriate airway adapter is used for a patient with low ventilation, CO₂ may mix in to the inspired air resulting in incorrect measurement, or apnea detection may become difficult.
- ♦ For HCP-800/HCP-810;
 - ♦ 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 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. Cutting the sample line could lead to erroneous readings.
- ♦ If too much moisture enters the sampling line (i.e., from ambient humidity or breathing of unusually humid air), the message "Check Sample Line" will appear in the message area. Replace the sampling line once the "Check Sample Line" message appears.
- ♦ Carefully route the sampling line to reduce the possibility of patient entanglement or strangulation.
- ♦ Do not lift the HCP-800/HCP-810 by the sampling line, as the sampling line could disconnect from the equipment, causing the equipment to fall on the patient.
- ♦ CO₂ readings and respiratory rate can be affected by sensor application errors, certain ambient environmental conditions, and certain patient conditions.

CAUTION Precautions for Installing the Equipment

- ♦ Make sure to secure the equipment using the stand (OAO-66A), etc. Otherwise, the equipment may fall down, resulting in injury to the operator or damage to the equipment.

CAUTION Precautions about the System

- ♦ Use only the accessories specified for this system. Otherwise, proper function cannot be executed.
- ♦ Do not use the touch panel with the film attached. Malfunction of the touch panel or damage may result.
- ♦ Due to its material characteristic, the touch panel expands/contracts depending on the temperature/humidity. When the touch panel is left unused for a while, or when the ambient temperature is low, the surface film of the touch panel may expand, but this is not an abnormal condition. This expansion will be reduced in few hours or half a day after the power is turned ON.
- ♦ For quality improvement, specifications are subject to change without prior notice.
- ♦ The display unit 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 our 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 the main unit will be unused for a long period, disconnect the power cable, module connection cable and lithium-ion battery from the main unit.
- ♦ 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 result in electric shock to the patient and/or operator.
- ♦ 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 arrhythmia detection level is related with the displayed waveform size. Set a proper waveform size for monitoring.
 - ♦ When the ECG waveform size is x1/4, x1/2, or x1 the detection threshold is 250 µV.

- ♦ When the ECG waveform size is x2, x4 the detection threshold is 150 µV.
- ♦ The arrhythmia detection leads, monitoring leads on the central monitor, recording leads are fixed as ECG1 and ECG2. Especially for arrhythmia detection, set the most appropriate leads with high QRS for ECG1 and ECG2.
- ♦ In ESIS Mode, although artifacts such as electrosurgical noise or EMG can be largely reduced, QRS amplitude attenuation, waveform distortion, or ST segment change may occur compared with other filter modes.
- ♦ There are some cases when the pacemaker pulse can not be detected depending on the pacemaker type, pulse voltage, pulse width, electrode lead type (unipolar, bipolar), or electrode placement which causes the pacemaker pulse amplitude to decrease and disables 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 SpO₂ Monitoring

- ♦ Make sure to use only the specified sensor/relay cable. Otherwise inaccurate measurements may be caused.
- ♦ Discontinue use if patient sensor is damaged in anyway.
- ♦ 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 wrap the supplemental tape on the sensor too tight. At the same time, check the blood flow constantly so that congestion is not generated at the peripheral.
- ♦ Do not use tape to secure the sensor to the site.
- ♦ Even a short duration of attachment may inhibit the blood flow and generate compression necrosis and burn injury.
- ♦ 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/ low birth weight infant is immature, change the sensor attachment site more frequently depending on the condition.
- ♦ Direct sunlight to the sensor area can cause measurements error. Place a black or dark cloth over the sensor.
- ♦ When not performing the measurement, unplug the relay cable and sensor from the SpO₂ connector. Otherwise, the measurement data may be erroneously displayed by the ambient light.
- ♦ The pulse wave is normalized for SpO₂ measurement. It does not indicate perfused blood volume. Check proper probe attachment by observing the pulse wave.
- ♦ Precautions for Reusable Type Sensor
The light-emitting part of the sensor should be over the root of the fingernail. Do not insert the finger too far

into the sensor as it may hurt the patient. For additional warnings, cautions, or contraindications when using sensors with Nellcor Unit (DS-8100N)/Masimo Unit (DS-8100M), refer to SpO₂ 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 additional warnings, cautions, or contraindications when using sensors with Nellcor Unit (DS-8100N)/Masimo Unit (DS-8100M), refer to SpO₂ sensor instruction manual.

- ♦ If " - - " is displayed for the SpO₂ 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 SpO₂ Monitoring (DS-8100M)

- ♦ Do not use the Pulse CO-Oximeter or oximetry sensors during magnetic resonance imaging (MRI) scanning. Induced current could potentially cause burns. The Pulse CO-Oximeter may affect the MRI image, and the MRI unit may affect the accuracy of the oximetry measurements.
- ♦ If using pulse CO-oximetry during full body irradiation, keep the sensor out of the irradiation field. If the sensor is exposed to the irradiation, the reading might be inaccurate or the unit might read zero for the duration of the active irradiation period.
- ♦ Exercise caution when applying a sensor to a site with compromised skin integrity. Applying tape or pressure to such a site may reduce circulation and/or cause further skin deterioration.
- ♦ Circulation distal to the sensor site should be checked routinely.
- ♦ A functional tester cannot be utilized to assess the accuracy of the Pulse CO-Oximeter or any sensors.
- ♦ Do not modify or alter the sensor in any way. Alterations or modification may affect performance and/or accuracy.

⚠ CAUTION Precautions about the NIBP Monitoring

- ♦ 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

- ♦ 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 CO₂ Monitoring (HCP-800/HCP-810)

- ♦ Conduct CO₂ calibration for the following case.
If the CO₂ gas calibration is not performed at a specified interval, CO₂ 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 EtCO₂ 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 EtCO₂ was not measured for a while.
- ♦ Perform the calibration 5 minutes after turning ON the power on the HCP-800/HCP-810.
- ♦ 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® EtCO₂ 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.
- ♦ 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® EtCO₂ sampling tube.
- ♦ Only use Microstream® EtCO₂ sampling lines to ensure the monitor functions properly.

⚠ CAUTION Precautions about the CO₂ Monitoring (HPD-800/810 Gas Unit I/F)

- ♦ The airway adapter should be attached with the thicker side facing to the patient. If attached oppositely, it may damage the CO₂ sensor or airway adapter.

⚠ 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 priority, the alarm message for the newer alarm will be displayed.
- ♦ The alarm message for the arrhythmia alarm will continue to be displayed for 30 seconds after the alarm is resolved.
- ♦ While the "LEAD OFF" or "Check Electrodes" message is displayed, HR alarm and arrhythmia alarm will not function. Leaving this condition unresolved may result in missing a sudden change of the patient. Promptly check the electrodes when these messages are displayed.
- ♦ For the HPD-800/810 and HCP-800/810, the measurement range is 0 to 99mmHg/0 to 13.3kPa, and the upper

EtCO₂ alarm will not generate if the upper alarm limit is set to 100mmHg/13.4kPa and above.

- ♦ Whether to use the SpO₂ second alarm function and its threshold selection should be based on the patient's clinical indication portent and medical evaluation.
- ♦ If the SpO₂ 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 DS-8100 System 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.
- ♦ 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.



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 is set to [SpO₂], and if SpO₂ waveform/numeric data is set to [Disp. OFF], the PR value will not be displayed.
- ♦ If the RR source is set to [CO₂/GAS], and if CO₂ waveform/numeric data is set to [Disp. OFF], the RR value will not be displayed.
- ♦ Do not set the same remote control bed ID to more than one monitors on the same floor.
Otherwise, it may cause to remote control more than one monitor at the same time.
- ♦ After the remote control setup, check that the remote control unit is properly operating.
- ♦ If the time/date is not correctly set, or changed during monitoring, malfunction may occur with NIBP measurement, periodic recording, trend, NIBP list data, and age calculation from the birth date.



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.



Precautions about the CF/SD Card

- ♦ Use only the specified CF/SD card.
- ♦ Use only the CF/SD card formatted with this equipment.
- ♦ Make sure to turn the power OFF and ON again after the setup data is read from the CF/SD card.
The read setup data will become effective after the power is turned OFF and ON again.
- ♦ Reading the patient data from the CF/SD card will erase all previous patient data stored in the patient monitor.



Precautions about the Maintenance

- ♦ When cleaning the touch panel, never use strong-acidic cleaning solution.
- ♦ A special coating is applied to the surface of the touch panel. Do not wipe the surface with a cloth or gauze with coarse texture. Wipe the surface with an eyeglass cleaning cloth.
- ♦ Clean the equipment frequently so stains can be removed easily.
- ♦ To prevent injury, it is recommended to wear gloves when cleaning the equipment.
- ♦ Do not allow liquids or cleaning solution to enter the equipment or connectors.
- ♦ Do not use organic solvents, thinner, toluene and benzene to avoid damaging the resin case.
- ♦ Do not polish the housing with abrasive or chemical cleaner.

- ♦ When sterilizing the entire room using a spray solution, pay close attention not to have liquids get into the equipment or connectors.
- ♦ The surface resin coating may be damaged, resulting in discoloration, scratches, or other problems.
Example:
Do not use chemical cloth, scrub brush, abrasive, polishing powder, hot water, volatile solvent and chemicals (cleanser, thinner, benzine, benzol, and synthetic detergent for house and furniture), or sharp-edged tools.
- ♦ Do not open the housing.
- ♦ Avoid alcohol or other liquids from getting into 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

- ♦ When using the 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.
- ♦ The Bed ID is factory set to 000. If connected to the wired network with the ID unchanged, monitoring on the central monitor will not be possible.
- ♦ When connected to the wired network, make sure that there are no other bedside monitors with the same Bed ID. If there are more than one bedside monitors with the same Bed ID, the duplicated bedside monitors cannot be monitored on the central monitor.
- ♦ When connected to the DS-LANII network, set the Bed ID in the range from "001" to "048".
- ♦ When connected to the DS-LANIII network, set the Bed ID in the range from "001" to "100".
- ♦ There are following restrictions when connecting the DS-8100 System to the wired network.
 - ♦ The BP measurement unit setting should be the same for all central monitors and bedside monitors. If the BP measurement unit 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. Also, the alarm limit setup from the central monitor cannot be performed.
 - ♦ For the DS-LANII network, arrhythmia alarm of TACHY, BRADY, COUPLET, PAUSE, TRIGEMINY will not be transmitted.
 - ♦ For the DS-LANII network, arrhythmia alarm of "SLOW VT" will be transmitted as "VT".
 - ♦ For the wired network, waveform, numeric data, and alarm of TEMP3 to 4 will not be transmitted. Also, the displayable waveform, numeric data, and alarm will differ depending on the central monitor model type. 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 [CO₂] (Or, if [Auto] selects a setting other than [CO₂]), the CO₂ 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 CO₂ concentration is mmHg and [99mmHg] is selected for "CO₂ (mmHg) Upper

"Limit of Transmission" ([Initial Settings]>[System]>[DS-LAN]), the CO₂ value of 100mmHg or above will be transmitted as 99mmHg.

- ♦ As the DS-8100 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 by the DS-LAN network.
- ♦ When connected to the wired network, time/date will be synchronized with the central monitor. Even if the time/date is changed on the DS-8100 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-8100 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 the DS-8100 System will be displayed. The RR and APNEA monitored on the central monitor and the DS-8100 System will be the same.

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 CO₂ concentration is mmHg and [99mmHg] is selected for "CO₂ (mmHg) Upper Limit of Transmission" ([Initial Settings]>[System]>[Telemeter]), the CO₂ 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.
- ◆ To protect the data during voltage dip, short interruptions and voltage variations on power supply input lines or during short duration of power turned OFF, this equipment performs 5-minute (approx.) data backup using the secondary battery. The data may not be protected if the power is turned OFF within 30 minutes from power ON.

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 Sound setup screen.
- ◆ If the DS-8100 System does not generate an alarm even though the ventilator is generating an alarm, or if any other malfunction occurs, immediately check the ventilator, DS-8100 System, cable, and replace the cable if necessary. If the malfunction persists, stop using the equipment.
- ◆ The alarm generation on the DS-8100 System is not assured if the alarm other than specified generates at the ventilator.
( Maintenance Manual "Ventilator Measurement and Alarm Input" P4-1)

⚠ CAUTION

- ◆ The ventilator operation should be performed by well-trained and authorized personnel.
- ◆ When connecting this equipment and the 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 is OFF.
- ◆ RESISTANCE (Insp, Exp), COMPLIANCE, P-V loop, F-V loop display function is not available for the current version.

Precautions about the SpO₂ Sensor

⚠ DANGER

Danger of Burn Injury Caused by the SpO₂ Sensor

- ◆ When monitoring SpO₂, 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 SpO₂ 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.)

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 within 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 of factory setting or user setting, or the display mode which was last set, only if the equipment was operated for 30 minutes or more before the power failure.

HCP-800/HCP-810, HPD-800/HPD-810 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.
- ♦ Check once a week that there is no wire break on the patient cable.

Battery Pack

- ♦ Even if the battery pack is not in use, the remaining capacity decreases due to self-discharge. Make sure to verify periodically 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 device under electromagnetic environment complies with IEC 60601-1-2: 2007.

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 magnetic 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 equipment complies with 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.

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.)

□ Compliance to the Electromagnetic Emissions

The DS-8100 System is intended for use in the electromagnetic environment specified below. The customer or the user of the DS-8100 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-8100 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	
Harmonic Emissions IEC 61000-3-2	Class A	The DS-8100 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.
Voltage Fluctuations/ Flicker Emissions IEC 61000-3-3	Complies	

Compliance to the Electromagnetic Immunity (1)

The DS-8100 System is intended for use in the electromagnetic environment specified below. The customer or the user of the DS-8100 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-8100 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-8100 System is intended for use in the electromagnetic environment specified below. The customer or the user of the DS-8100 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
Conducted RF IEC 61000-4-6	3Vrms 150kHz to 80MHz	3Vrms	Portable and mobile RF communications equipment should be used no closer to any part of the DS-8100 System, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended Separation Distance $d = 1.2 \sqrt{P}$
Radiated RF IEC 61000-4-3	3V/m 80MHz to 2.5GHz	3V/m	<p>$d = 1.2\sqrt{P}$ 80MHz to 800MHz $d = 2.3\sqrt{P}$ 800MHz to 2.5GHz</p> <p>Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). 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:</p> 
<p>Note 1: At 80MHz and 800MHz, the separation distance for the higher frequency range applies.</p> <p>Note 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.</p> <p>*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-8100 System is used exceeds the applicable RF compliance level above, the DS-8100 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-8100 System.</p> <p>*2: Over the frequency range 150kHz to 80MHz, field strength should be less than 3V/m.</p>			

Recommended Separation Distances between Portable and Mobile RF Communications Equipment and the DS-8100 System

The customer or the user of the DS-8100 System can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the DS-8100 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-8100 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. 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.

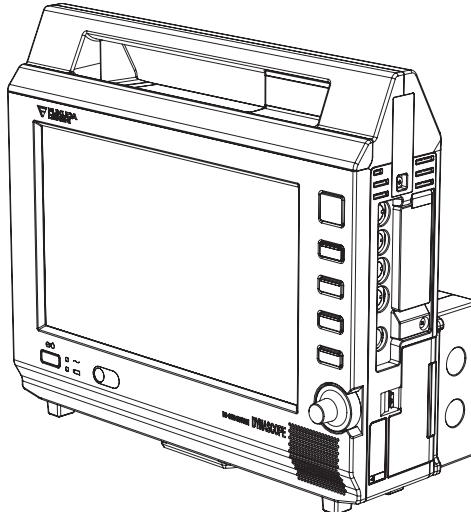
Chapter 1 General Description

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Chapter 1 General Description

Composition of the System

The DS-8100 System is composed of the main unit, recorder unit, expansion port unit, and recorder/expansion port unit, gas unit.



Configuration Example of the DS-8100 System.

Lineup of Main Unit

Model Type	Fixed Parameter	SpO ₂ Unit	Multiparameter Measuring Items	CO ₂ Measurement (Optional)
DS-8100N	ECG (Max.7-Leads), RESPx1, NIBPx1 SpO ₂ x1, TEMPx2	Covidien®	1 port TEMP x2 (maximum) BP x2 (maximum) CO Measurement x1 (maximum)	
DS-8100M	ECG (Max.7-Leads), RESPx1, NIBPx1, SpO ₂ x1, TEMPx2, SpMet x1*, SpCO x1*, SpHb x1*, SpOC x1*	Masimo®		Yes

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

Lineup of Option Unit

Model Type	Analog Output	External Monitor Output	Module-LAN or General LAN	Printer Output
HR-810	No	No	No	Yes
HR-811	Yes	Yes	Yes	Yes
CU-810	Yes	Yes	Yes	No

Features

- ♦ Option units can be additionally attached to this patient monitor.
- ♦ Maximum of 14 waveforms can be displayed.
Also, various displays such as enlarged numeric data, trend, or ventilator can be selected according to monitoring conditions.
- ♦ The operation can be performed with the jog dial, touch panel, or fixed keys. Also, frequently used keys can be assigned on the screen as user keys.
- ♦ The alarm indicator notifies the alarm with different flashing patterns corresponding to the alarm level so that the users can easily identify the alarm level of the generating alarm.
- ♦ Using the CF-820 IR Remote Control Unit allows to remotely control the patient monitor.
- ♦ Battery operation (up to 3 hours) is possible, and can therefore be used as a transport monitor.
- ♦ Fixed keys are equipped for improved operability during life-threatening situations.
- ♦ Using the multiparameter amplifier allows to monitor parameters in combination of BP (max. 2 ch.), temperature (max. 4ch.), and CO (max. 1ch.).
In addition to ECG, respiration, SpO₂ (pulse wave), BP, NIBP, temperature and CO, CO₂ measurement is also available as optional function.
- ♦ For the SpO₂ measurement, two model types with different built-in SpO₂ modules are available, which are Covidien®/Nellcor™ and Masimo®.
- ♦ SpCO, SpMet, SpHb, SpOC, and PVI are optional parameters which can be measured on the DS-8100M with the Masimo® built-in SpO₂ module.
- ♦ By connecting the ventilator to Status II port on the DS-8100, airway flow, airway pressure waveform, minute ventilation, airway resistance , etc. can be monitored. Also, ventilator alarm can be notified to the central monitor via telemetry system and wired network. The following ventilators can be connected.
 - ♦ SV-900C/900D/900E
 - ♦ SV-300/300A
 - ♦ Servo-i/Servo-s
- ♦ Wired network (DS-LANII/DS-LANIII) construction is possible.
DS-LANII is a network based on 10BASE-T with transmission speed of 10Mbps and maximum transmission distance of 100m. DS-LANIII is a network based on 100BASE-TX with transmission speed of 100Mbps and maximum transmission distance of 100m.
- ♦ Wireless network construction is possible using the optional telemetry transmitter module (HLX-801).
- ♦ The following operation is possible by using the optional Bidirectional Wireless Communications Module, TCON (HTC-702).
 - ♦ Transmits the DS-8100 measurement data to the central monitor.
 - ♦ Allows to mutually set the alarm limit from both the bedside monitor and the central monitor.
 - ♦ Allows to operate NIBP measurement from the central monitor.
- ♦ By using the optional recorder unit (HR-810, HR-811), the measurement data can be output on the recorder.
- ♦ By using the optional Expansion Port Unit (CU-810) or Recorder/Expansion Port Unit (HR-811), analog output of ECG, BP, or QRS synchronized signal is possible.
- ♦ By connecting the Gas Unit I/F (HPD-800/HPD-810) or CO₂ Gas Unit (HCP-800/HCP-810) to the AUX connector on the DS-8100, CO₂ concentration can be measured.
- ♦ By connecting the oximeter to the status input/output connector or serial connector (COM 1) on the DS-8100, SvO₂ (mixed venous oxygen saturation), CO (cardiac output), etc. can be monitored. The following oximeter/CCO measurement devices can be connected.
 - ♦ Vigilance

- ♦ Vigilance CEDV
- ♦ Vigilance II
- ♦ Vigileo by Edwards Lifesciences
- ♦ By connecting the A-2000 BIS Monitor (ASPECT® MEDICAL SYSTEMS) /BIS Monitor Vista A-3000(Covidien®) to status input/output connector or serial connector (COM1) on the DS-8100, the patient's wakeful state can be monitored.
- ♦ By connecting the INVOS 5100C Non-Invasive Cerebral Oximeter (Covidien®) to status input/output connector or serial connector (COM1) on the DS-8100, regional cerebral oxygen saturation data can be monitored.

Menu Configurations

The menu configuration of the system is as follows.

Menu Screen

The menu screen is a group of shortcut keys to jump to each menu.

The menu is composed of the following 9 groups and can be accessed from the menu screen.

Function Groups	Displayed Menu
Admit/Discharge	Admit/Discharge
Basic Setup	Maximum of 8 functions are displayed.
Alarm	Maximum of 7 functions are displayed.
Parameter	Maximum of 9 functions are displayed.
Data Review	Maximum of 5 functions are displayed.
Waveform Review	Maximum of 3 functions are displayed.
Calculation	Maximum of 3 functions are displayed.
Other Bed	Other bedside monitors connected to the DS-LAN will be displayed.
Initial Settings/Maintenance	Initial settings/maintenance menu will be displayed.

REFERENCE

- ♦ Other than the "Initial Settings"/"Maintenance", the items to be displayed on the menu screen can be customized by groups.
( Maintenance Manual "Menu Setup" P5-18)

Admit/Discharge

Admit/Discharge	Mode Select
	ID, Name, Classification, Sex, Team, Birth Date, Age, Height, Weight, BSA, Blood Type (ABO, Rh), Pacemaker, Impedance Meas., Admit Date/Time
	Monitor Suspend
	Discharge

□ Basic Setup

Display Configuration	Layout, Background, Palette, Detail Setup, Meas., Wave (Sweep Speed, Short Trend), User Key
Manual Printing	Basic (Printer, Waveform, Print Duration, Delay Time), 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, Background, Palette, User Key
Brightness	Brightness
Night Mode	Night Mode, Detail Setup (Volume, Display, Alarm Indicator)

□ Alarm

Basic	The parameters to be displayed are selectable.
	Alarm Suspend, Mode Select, Print Setup, All Auto, Resume All Alarm Sound
Circulatory	Alarm setup for HR, SpO ₂ , PR_SpO ₂ , NIBP (S, D, M), PR_IBP, BP1/BP2 (S, D, M), T1 to T4, Tb, SpCO, SpMet, SpHb
	Alarm Suspend, Mode Select, Print Setup, All Auto, Resume All Alarm Sound
Respiratory/Gas	Alarm setup for RR, APNEA, InspCO ₂ , EtCO ₂
	Alarm Suspend, Mode Select, Print Setup, All Auto, Resume All Alarm Sound
Arrhythmia Alarm	Arrhythmia Alarm and details can be set.
ST	ST Alarm Setup, Waveform Review (ST), Update Ref. Wave
List	List of alarm ON/OFF setting and lower/upper limits, Meas. List/All List, Print Setup, Recall Setup
Detail Setup	Suspend Time, Silence Time, Alarm Silence, Alarm Sound Suspend, Status Alarm Control, Alarm Limit Display

□ Parameter

ECG	Arrhythmia Learn Arrhythmia Alarm Setup, ST Setup, HR
	Size/Lead, Optimize Size, Alarm Assist, Disp. ON/OFF, HR/PR
	Detail Setup (Filter, Synchronized Mark/Tone, Pacemaker, Pace, Pulse, Pace Pulse Mask Time, HR Average, ECG Drift Filter, AC Filter, Auto Lead, 3Lead Override, ST/VPC/Arrhy, Alarm Display, ECG Analog Output, ECG waveform display during Lead-OFF, Noise Detection, Chest Lead-OFF)
RESP	Size, Common Setup (RR Synchronized Mark, RR Alarm APNEA Source), Impedance Setup (CVA Detect, Impedance Measurement, Impedance Detection Lead), RR, APNEA, Alarm Assist, Disp. ON/OFF
NIBP	Detail Setup (Patient Classification, Dyna Alert, Oscillograph Display/Print, PR Display, NIBP Erase Time, Measure at Alarm, Quick Measurement, Sight Inflation, MAP, End Tone, User Interval, Auto Mode with Start/Stop key, Time Display, Alarm Assist, Cancel Error, NIBP, NIBP Auto Mode)
BP	BP Zero (BP1 to BP2), BP1, BP2
	Scale Selection, Label, Detail Setup (Synchronized Mark/Tone, Display Type, Wave Filter, Mean Wave, Resp. Filter, IBP Analog Output, Alarm during NIBP), Alarm Assist, Display ON/OFF, HR/PR
SpO ₂	Size, Alarm Assist, Display ON/OFF, HR/PR, SpO ₂ , PR_ SpO ₂
	DS-8100N Detail Setup (Alarm during NIBP, Synchronized Mark/Tone, Second Alarm)
	DS-8100M 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*	SpCO, SpMet, SpHb (Averaging), Alarm Assist
TEMP	Label, ΔT, Alarm Assist, T1 to T4, Display ON/OFF, T1, T2, T3, T4, Tb
CO ₂	Scale, Calibrate Airway Adapter, Detail Setup (EtCO ₂ Peak Duration, N ₂ O Compensation, Atmos. Pressure, O ₂ Compensation, Anesthetic Compensation) , Alarm Assist, Display ON/OFF, InspCO ₂ , EtCO ₂
Ext. Device	Vigilance/Vigileo, VENT, STAT Mode, Index Display, INVOS, AWF Scale, AWV Scale, AWP Scale, P-V, F-V Scale, Lt-rSO ₂ , Rt-rSO ₂ , S1-rSO ₂ , S2-rSO ₂

□ Data Review

Graphic Trend	Latest Data, Alarm Review, Trend Group, Alarm Disp. Sel., Print
Tabular Trend	Latest Data, Alarm Review, List Group, Setup, Print, Print (All)
Recall	Latest Data, Display Selection, Print, Select All, Setup, Delete Sel.
OCRG	Latest Data, Resp. Wave Size, Print, Resp. Wave (Impedance, CO ₂)
Alarm History	Latest Data, Display Selection, Print

□ Waveform Review

Zoom Wave	Latest Data, Alarm Review, Meas., Print, Delete *1 *1 (When CF card for full disclosure waveform is inserted; Setup, Size/Scale)
ST	ST Wave, Reference Wave, Setup, Slide Show, Size, Latest Data, Print
Full Disclosure Waveform	Latest Data, Alarm Review, Slide Show, Time Search, Size/Scale, Setup, Alarm Display, Print

□ Calculation

Hemodynamics	New Regist., Index Display, Print
Lung Function	New Regist., Index Display, Print
CO	Setup, Hemodynamics, Average CO Input, Delete Sel., Scale, Start, Print

□ Other Bed

Other Bed	Area Selection (Area 1 to 4), Alarm Sound, Alarm Display, Area Setup (Area 1 to 4), Bed List, Area name / Color, Select All, Cancel All, Enter, All
	Area Selection (Area 1 to 4), Other Bed Alarm Silence, Waveform Selection

□ Initial Settings

Alarm	-	Alarm System, Basic Alarm Parameter, Asystole/VF/VT Alarm, Buzzer Tone at Speaker Failure, Suspend Arrhy. Analysis during Noise Interference, Lower Limit for Alarm Volume, Alarm Indicator, Alarm Level, HR/PR Low Limit during Alarm Auto Setting
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 Priority, HR/PR Source Priority
User I/F	Display/Print	Date Format, BP Alarm Increment, Trend Clip, BP Printing Scale, Night Mode Cancel, ST Display Lead Setup, Auto Display Configuration, Dim All Data Other than Numeric, All Window Opaque, Built-in Printer Message Display, Message Icon, Time Bar Scale, Notification when Changing Equipment Configuration, Waveform Size Display, Shift Time (Day Shift, Twilight Shift, Night Shift), Key Group Setup, 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, Automatic Start by AC Connection, Automatic Start by M-LAN Connection
	Menu	Items to be displayed on the menu screen can be selected.
	Key Mask	Items not to be displayed on the menu screen can be selected.
	Remote Control	Remote Control Key Function, Room ID, Bed ID
	Operation	Auto Hide Window, Auto Minimize
External Device	Main Unit Port	COM, Status II Vent.(SV-900, SV-300, Servo-i/s, PB, Evita) ,SvO ₂ /CCO (Vigilance), Other (PC Comm., TCON, BIS, INVOS)
	Network	Main Unit (IP Address, Sub-Network Mask, Default Gateway), Printer (Network Printer, IP Address, MAC Address, Printer Specification, Paper Size), Regist, Cancel, Test Print, Central Monitor, General LAN/ Module LAN
	Status Output	Sync. Signal Output (Signal Output, Output Logic) Alarm Output: Alarm Level, Output Logic (Status II-1, Status II-2)
	Analog Output	Analog Output Setup: ECG, IBP Analog/Sync. Signal Output
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 Filter, Search Patient ID, Numeric Data External Output, Data Transfer Function
User Mode Registration		Regist., Change, Initialize, Change Mode Name, Set All Modes, Initialize All Modes
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, Card, Parts Usage Time, Install, Module Install, Test Menu
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Chapter 2 Name of Parts and Their Functions

Name of Parts and Their Functions	2-1
DS-8100 Main Unit	2-1
Recorder Unit: HR-810	2-3
Expansion Port Unit: CU-810	2-4
Recorder/Expansion Port Unit: HR-811	2-5
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Chapter 2 Name of Parts and Their Functions

Name of Parts and Their Functions

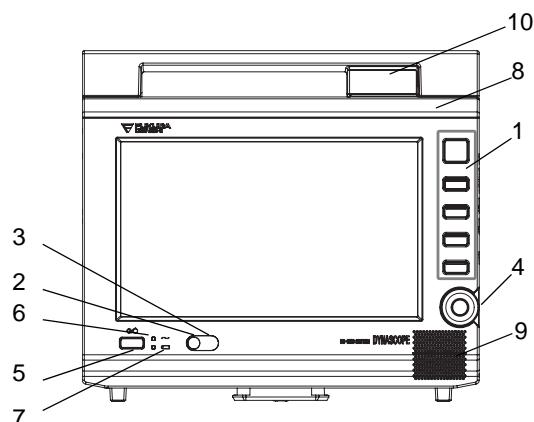
⚠️ WARNING

- 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-8100 Main Unit

Front Side

- 1 Fixed Keys
(☞ "Fixed Keys" P3-1)
- 2 Ambient Light Sensor
Detects the ambient light.
- 3 Remote Control Sensor
Receives the signal from the specified remote control.
- 4 Jog Dial
Allows key control.
- 5 Standby Switch
Sets ON/OFF the Standby Mode.
- 6 Power Supply LED
Indicates the power supply status. Extinguishes when the AC power is not supplied to the monitor.
Orange: Standby Mode
Green: In normal operation
Light Off: In battery operation (AC power cable is not connected.)
- 7 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



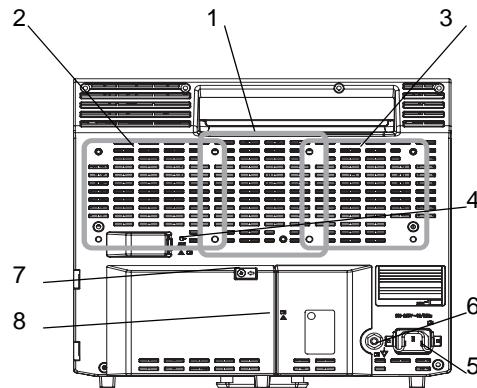
NOTE

- 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.

- 8 Alarm Indicator
Lights/blinks when the alarm generates.
- 9 Speaker
Generates alarm sound, HR synchronized sound, etc.
- 10 Color Panel
Useful for distinguishing between monitors. (color options: white, blue, red, yellow, green)

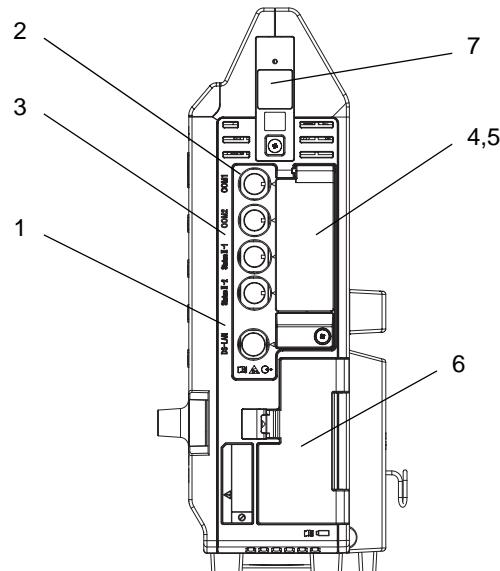
□ Rear Side

- 1 Four VESA Mount Screw Holes
Connects to the VESA standard mount.
- 2 Four HTC Mount Screw Holes
Attaches the HTC-702 Bidirectional Wireless Communications Module.
- 3 Four GAS Unit Mount Screw Holes
Attaches the CO₂ Module (HCP-800/HCP-810, HPD-800/HPD-810).
- 4 AUX Connector
Attaches the CO₂ Module (HCP-800/HCP-810, HPD-800/HPD-810).
- 5 Power Supply Connector
Connects the power supply cable.
- 6 Potential Equalization Terminal
Used for equipotential connection.
- 7 Fixing Screw for Option Unit
Used to attach the option unit.
- 8 Option Unit Connector
Connects the option unit after removing the blanking cover.



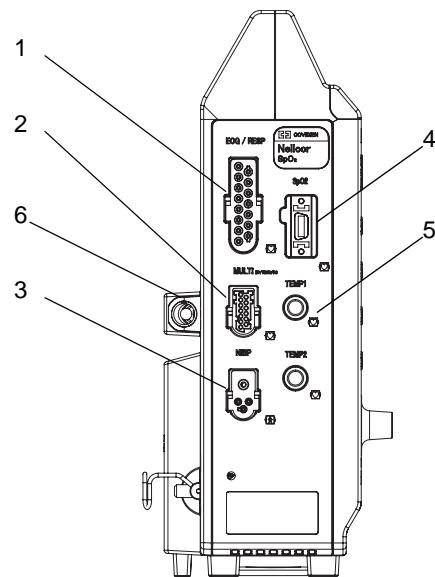
□ Right Side

- 1 DS-LAN Connector
Connects to the wired network using the Branch Cable (CJ-520/CJ-522).
- 2 Serial Connector (COM1, 2)
Connects the specified equipment.
- 3 Status Input/Output Connector (Status II-1, 2)
Connects the specified equipment.
- 4 CF Card Slot
Inserts the specified CF memory card.
- 5 SD Card Slot
Inserts the specified SD memory card.
- 6 Battery Cover
Stores the specified lithium-ion battery.
- 7 Telemeter Cover
Stores the HLX-801.



□ Left Side

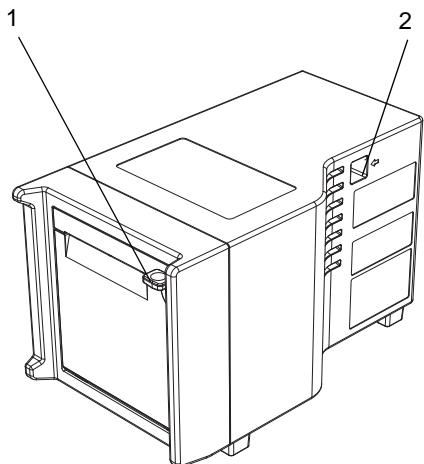
- 1 ECG Connector
Connects the specified cable.
- 2 Multiparameter Connector
Connects the specified cable.
- 3 NIBP Connector
Connects the specified cable.
- 4 SpO₂ Connector
Connects the specified cable.
- 5 Temperature Connector x2
Connects the specified cable.
- 6 AUX Connector
Attach the CO₂ Module (HCP-800/HCP-810, HPD-800/HPD-810).



Recorder Unit: HR-810

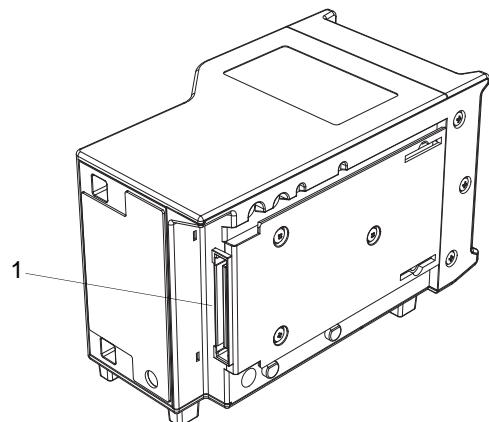
□ Front Side

- 1 Open/Close Lever
Press to open the paper holder.
- 2 Fixing Screw for Option Unit
Use the Sems screw (M3 x 50mm) to secure the DS-8100 and the option unit.



□ Rear Side

- 1 Main Unit Connector
Connects to the DS-8100.



Expansion Port Unit: CU-810

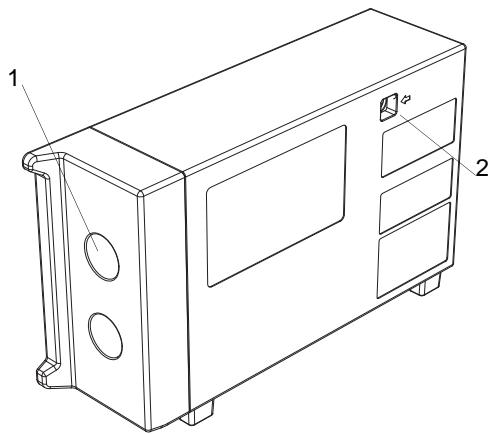
Front Side

1 Analog Output Connector

Connects the analog output cable.

2 Fixing Screw for Option Unit

Use the Sems screw (M3 x 50mm) to secure the DS-8100 and the option unit.



Rear Side

1 VGA Output Connector

Connects to the external monitor via the VGA cable.

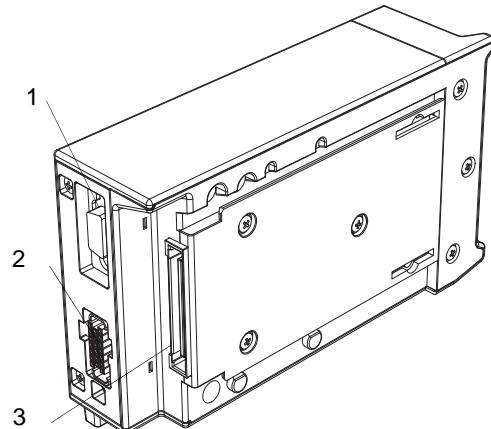
2 Module-LAN Connector

Connects to other bedside monitor (DS-8500) via the module connection cable.

Connects to the laser printer via the network connection cable.

3 Main Unit Connector

Connects to the DS-8100.



Recorder/Expansion Port Unit: HR-811

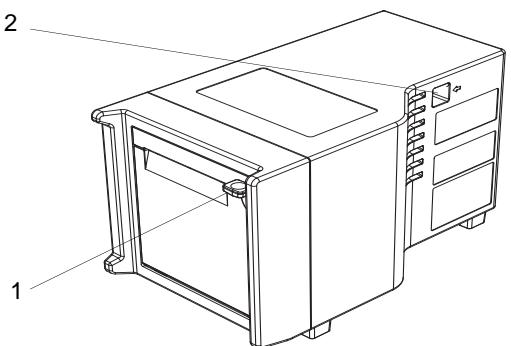
□Front Side

1 Open/Close Lever

Press to open the paper holder.

2 Fixing Screw for Option Unit

Use the Sems screw (M3 x 50mm) to secure the DS-8100 and the option unit.



□Rear Side

1 Analog Output Connector

Connects the analog output cable.

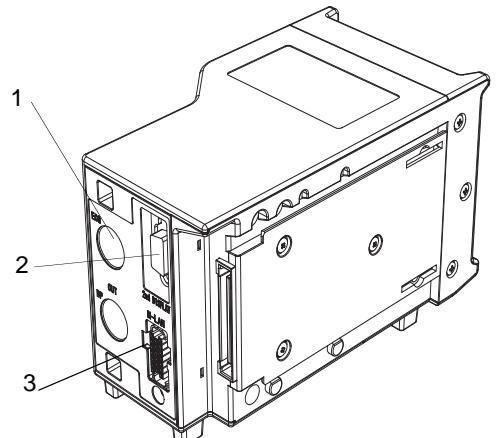
2 VGA Output Connector

Connects to the external monitor via the VGA cable.

3 Module-LAN Connector

Connects to other bedside monitor via the module connection cable.

Connects to the laser printer via the network connection cable.



CO₂ Gas Unit: HCP-800

Front Side

1 Power Supply Indicator

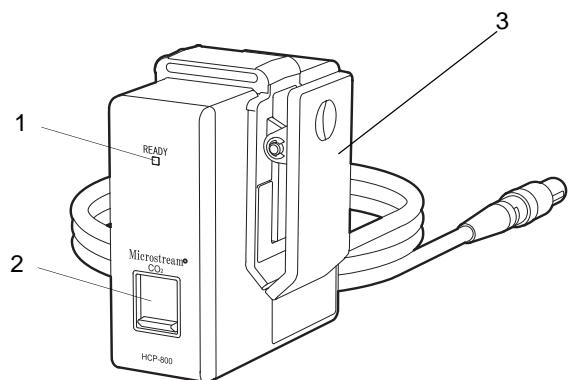
Indicates the power ON/OFF status. It will light in green while the power is ON.

2 Sampling Tube Connector

Connects the sampling tube manufactured by Covidien®.

3 Clip

Attaches to the bedside rail or headboard for bedside use.



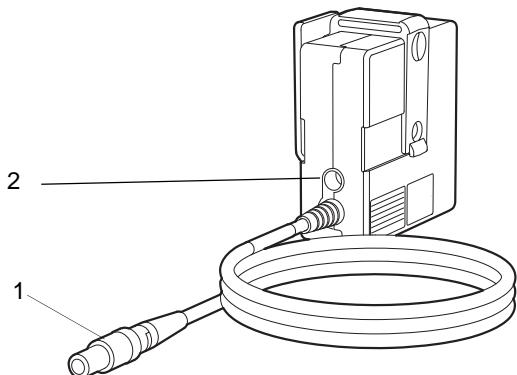
Rear Side

1 AUX Connector

Connects to the AUX connector of the DS-8100.

2 Exhaust Hole

Connects the gas exhaust system and exhausts sampling gas.



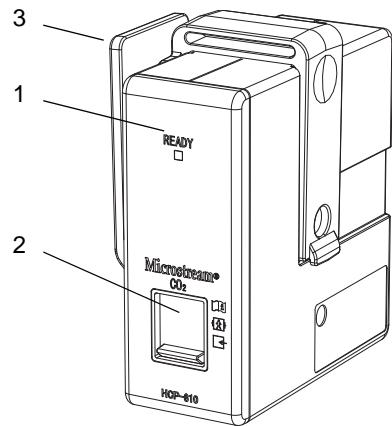
CAUTION

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

CO₂ Gas Unit: HCP-810

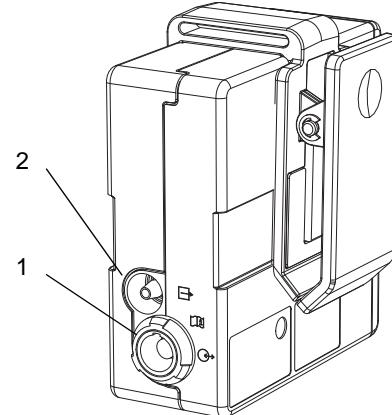
□ Front Side

- 1 Power Supply Indicator
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. (supplied as accessory)



□ Rear Side

- 1 AUX Connector
Connects to the AUX connector of DS-8100 with AUX connection cable, CJO-15RR0.65.
- 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-800

□Front Side

1 Power Supply Indicator

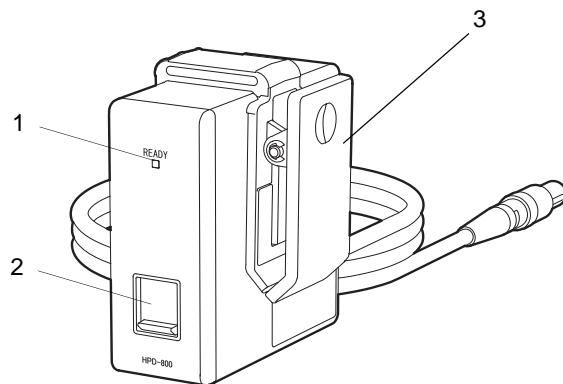
Indicates the power ON/OFF status. It will light in green while the power is ON.

2 CO₂ Connector

Connects to the Capnosta 5 manufactured by Respiration.

3 Clip

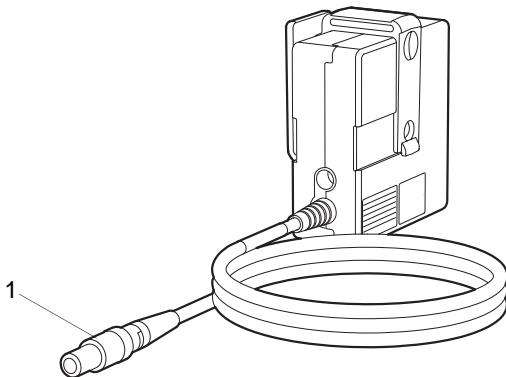
Attaches to the bedside rail or headboard for bedside use.



□Rear Side

1 AUX Connector

Connects to the AUX connector of the DS-8100.



Gas Unit I/F: HPD-810

□Front Side

1 Power Supply Indicator

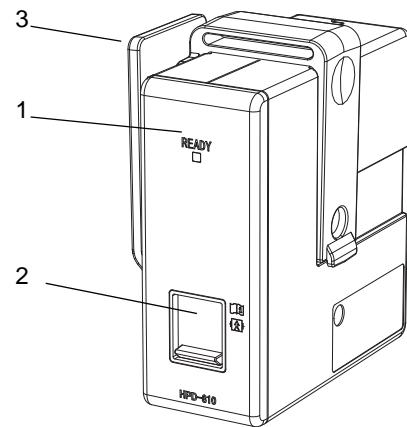
Indicates the power ON/OFF status. It will light in green while the power is ON.

2 CO₂ Connector

Connects to the Capnosta 5 manufactured by Resironics.

3 Clip

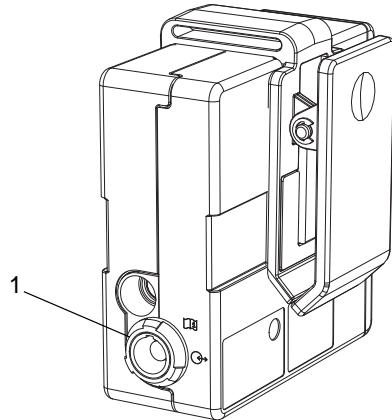
Attaches to the bedside rail or headboard for bedside use.



□Rear Side

1 AUX Connector

Connects to the AUX connector of DS-8100 with AUX connection cable, CJO-15RR0.65.



Chapter 3 Operation Procedure and Screen Examples

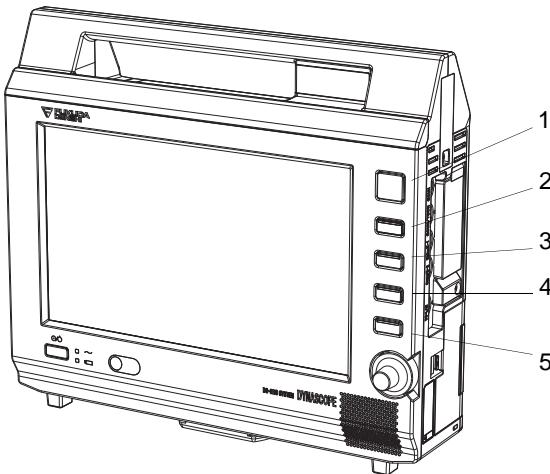
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Chapter 3 Operation Procedure and Screen Examples

Operation Procedure

All operation of this equipment is performed using fixed keys, touch screen and jog dial. Remote control is also possible using the remote control unit.

Fixed Keys



- 1 Alarm Silence Key

Uses to silence the alarm.

- 2 NIBP Start/Stop Key

Starts/stops the NIBP measurement.

Stops the measurement if pressed while measurement is in progress.

- 3 Home Key

Displays the home display.

- 4 Menu Key

Displays the menu.

- 5 Previous Display

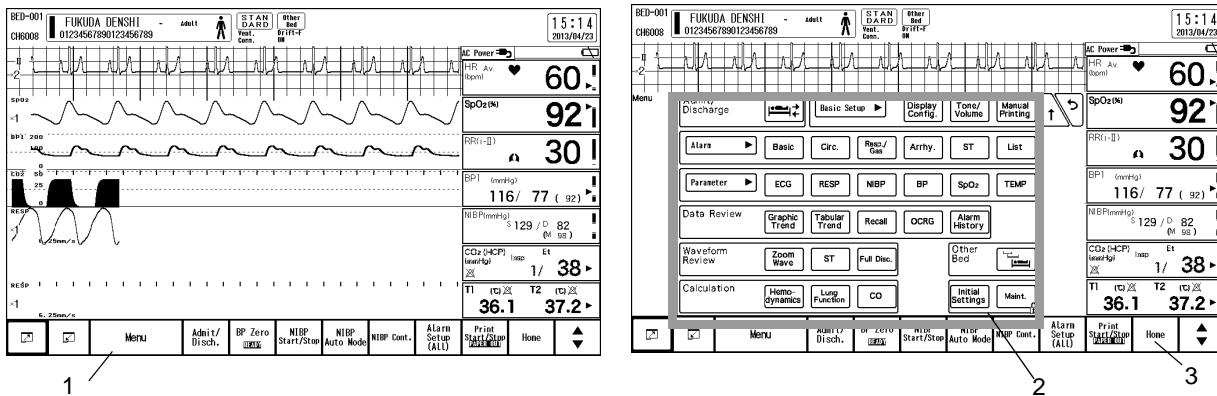
Returns to the previous display.

Touch Key

CAUTION

- Do not use the touch panel with the film attached. Malfunction of the touch panel or damage may result.
- Due to its material characteristic, the touch panel expands/contracts depending on the temperature/humidity. When the touch panel is left unused for a while, or when the ambient temperature is low, the surface film of the touch panel may expand, but this is not an abnormal condition. This expansion will be reduced in few hours or half a day after the power is turned ON.

General Key Control

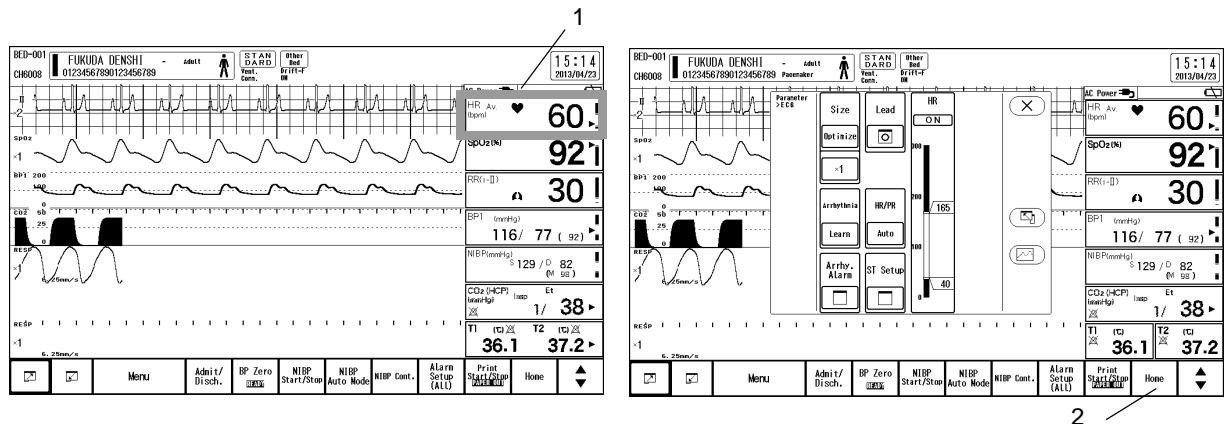


- Pressing the [Menu] or the fixed key will switch the screen with a pip sound.
- The touch key will respond by pressing any part of the key.
- The display will return to home display by pressing the [Home] key (fixed key or user key).

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" P10-5)

□ Key Control for Each Parameter



1 Touch on the numeric data box.

The touch key will respond by pressing any part of the numeric data box.

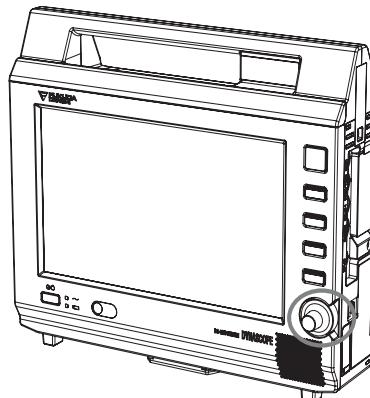
2 The display will return to home display by pressing the [Home] key (fixed key or user key).

REFERENCE

- Frequently used touch keys can be programmed as user key. The user key can be positioned to the user keys display area at the bottom of the screen and also on the numeric data area.
(☞ "For Easier Use" P3-25)

Jog Dial

The jog dial can be used for menu operation.



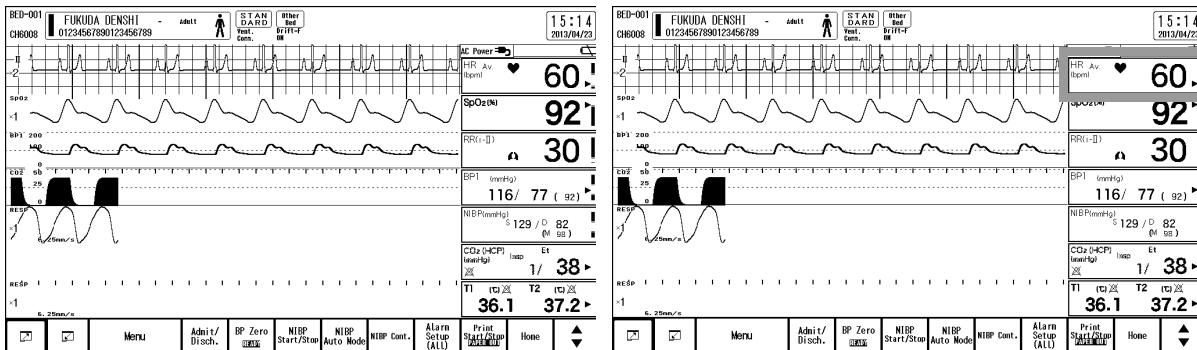
The jog dial marker (i.e. a blue frame indicating the operation target of the jog dial) is usually hidden while the Home Display is being displayed.

Turning or pressing the jog dial while the jog dial marker is hidden will make the jog dial marker appear on the screen.

Pressing the jog dial while the jog dial marker is visible will perform the same operation as pressing the marker on the display.

The jog dial marker on the home display will be hidden if no operation is performed for 30 seconds.

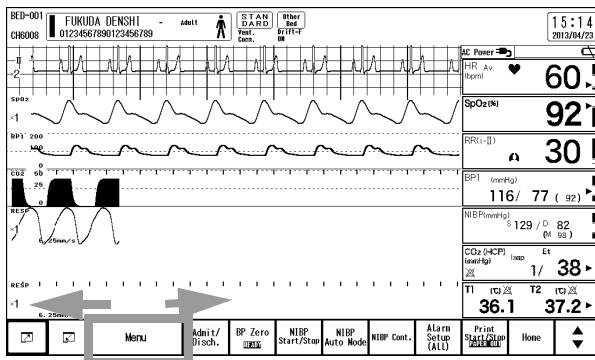
Home Display



Jog dial marker is hidden

Jog dial marker is visible

Turning the jog dial while the jog dial marker is visible will cause the jog dial marker to move to left and right.

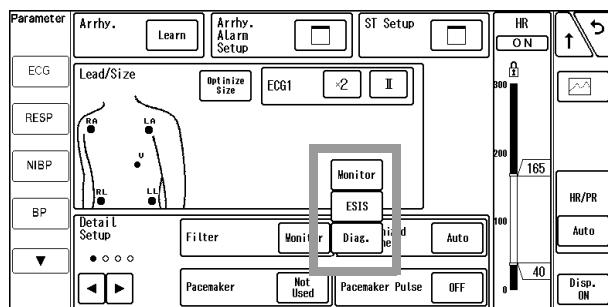


Turning the jog dial will perform operations such as changing the selection in the dropdown list or increasing/decreasing the alarm threshold.

REFERENCE

- The jog dial on the CF-820 IR Remote Control will function the same as the jog dial on the main unit.

Example of Item Selection Operation



1 Set the jog dial marker to [Monitor] on the "Filter mode".

2 Press the jog dial.

- The filter mode dropdown list will be displayed and the jog dial marker will move into the selection list.

3 Turn the jog dial to set the jog dial marker on the mode to be set.

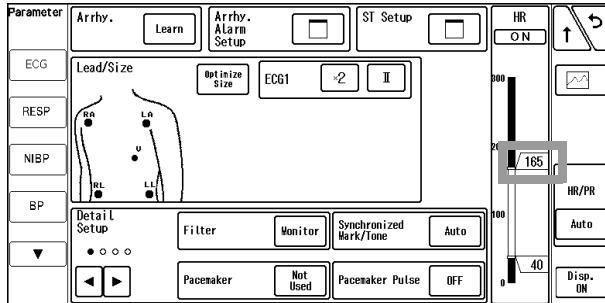
4 Press the jog dial.

- The dropdown list will be closed and the filter mode will be switched.

⚠ CAUTION

- Note that moving the jog dial marker in the dropdown list does not select any setup item. To select an item, press the jog dial.
- Pressing the other key while the dropdown list is displayed will close the list.

□ Example of Alarm Threshold Changing Operation



- 1 Set the jog dial marker to the upper limit "120".
- 2 Press the jog dial.
► The mode will switch to the mode in which the threshold can be changed.
- 3 Turn the jog dial to change the upper threshold limit.
- 4 Press the jog dial.
► The screen will return to the mode in which the jog dial marker can be moved.

⚠ CAUTION

- The alarm limit changed by turning the jog dial will become effective without pressing the jog dial.

Home Display

About the Home Display

The display can be configured according to the monitoring purpose.

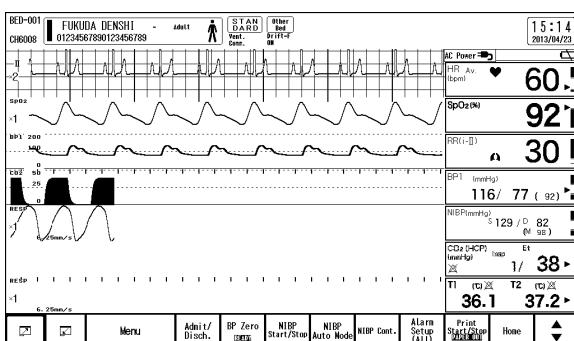
Also, there are 2 types of basic display mode, which are "Standard" and "Standard & Bottom".

"Standard" is the most basic layout.

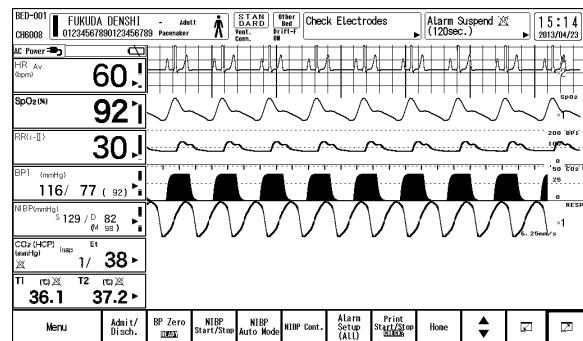
"Standard & Bottom" is the layout with numeric data box at the bottom, which allows it to increase the number of measurement parameter to be displayed .

The numeric data box area can be selected from "Right", "Bottom/Right", "Left", "Bottom/Left", "Bottom", "Left (Large)", "Right (Large)" and "Numeric/Max. Size".

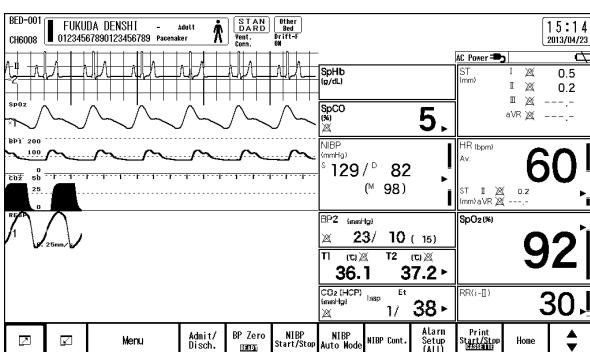
Display Example:



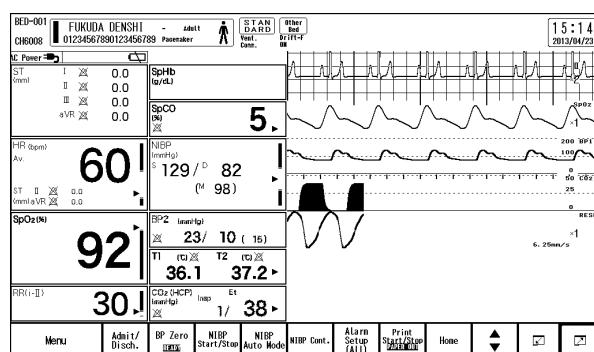
Numeric Data: Standard/Right



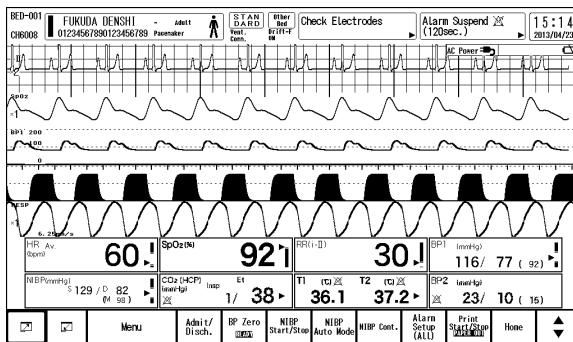
Numeric Data: Standard/Left



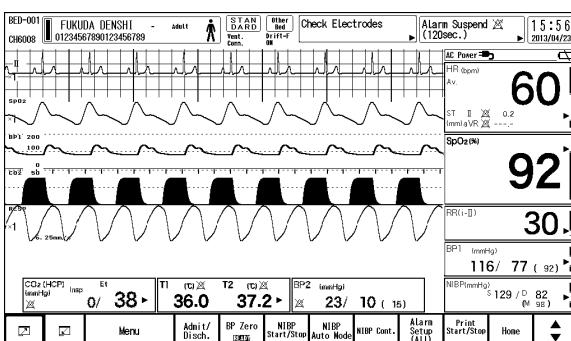
Numeric Data: Standard/Right(Large)



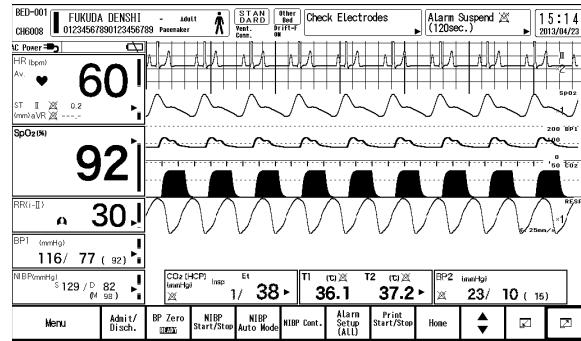
Numeric Data: Standard/Left(Large)



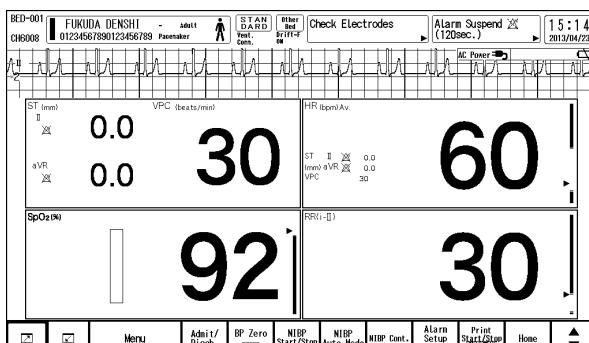
Numeric Data: Standard/Bottom



Numeric Data: Standard&Bottom/Right



Numeric Data: Standard&Bottom/Left



Numeric Data: Maximum Size

REFERENCE

- The display layout can be configured and registered as necessary.
(☞ "To Configure the Display" P10-5)

Displayed Items

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

□ Numeric Data, Waveform, Patient Name, etc.

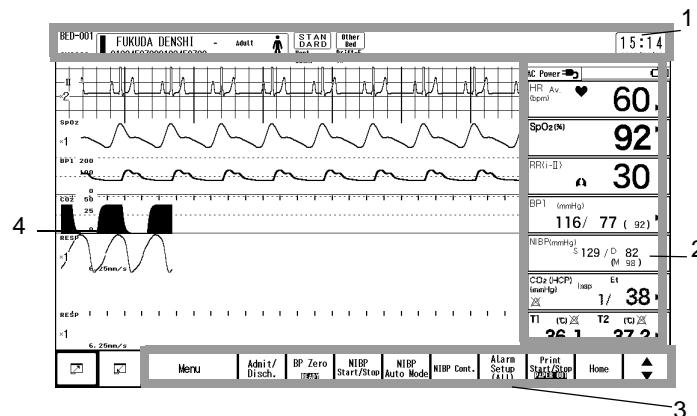
1 Information Display Area

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

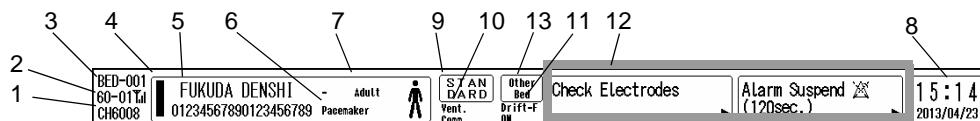
2 Numeric Data Area

3 User Area

4 Waveform Area



□ Information Display Area



1 Telemetry Channel (When HLX-801 is connected)

Displays the telemetry channel ID.

2 TCON Status

Displays the TCON connection status, TCON ID and etc.

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 Name

Displays the patient name set on the "Admit/Discharge" menu.

6 Pacemaker Usage

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

7 Patient Classification

Displays the patient classification (Adult, Child, Neonate) set on the "Admit/Discharge" menu.

8 Date / Time

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

9 Display Mode

Displays the user mode currently set.

10 Ventilator Connection Status

Displays the connection status to the ventilator.

<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.
 No Display: Ventilator is not set for "External Device" setting.

11 Drift Filter

When drift filter is set to ON, "Drift-F ON" will be displayed.

12 Message Area

Displays the message when an alarm generates.

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

13 Other Bed Status

Displayed when connected to central monitor.

Pressing the [Other Bed] key will display the Other Bed display.

□ Waveform Area

1 ECG

2 ECG Lead

3 ECG Size

The waveform size of ECG, RESP, SpO₂ can be displayed in numeric or bar.

(Maintenance Manual "Display/Print Setup" P5-13)

4 SpO₂ Waveform

5 SpO₂ Size

6 BP Scale

7 BP Label

8 BP Waveform

9 CO₂ Scale

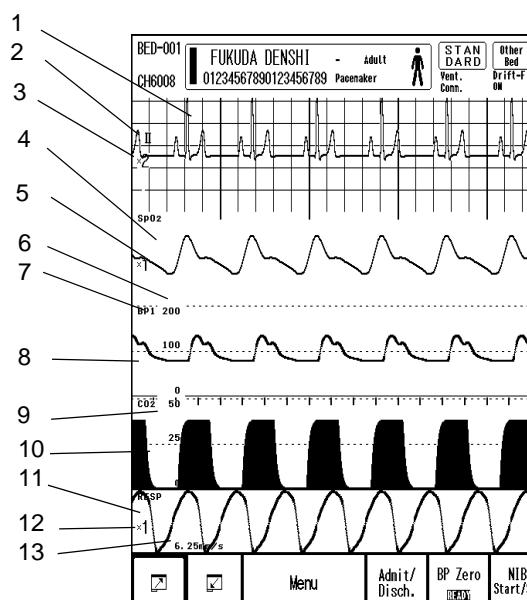
10 CO₂ Waveform

11 Respiration Waveform

12 RESP Size

13 Respiratory Sweep Speed

Displays the sweep speed for the impedance respiration waveform, CO₂ waveform, AWP, AWF waveform.

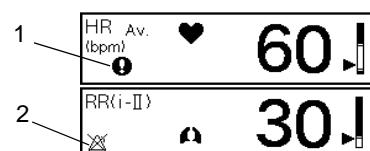


□ Numeric Data Box Display (for all parameters)

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" P5-13)

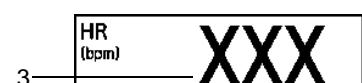


2 Alarm OFF Symbol

Displayed when the alarm is set to OFF.

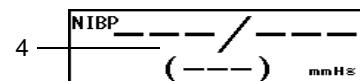
3 Out of Measurement Range (xxx)

Displayed when the measurement is out of range.



4 Measurement Error (---)

Displayed when 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 / PR Synchronized Mark

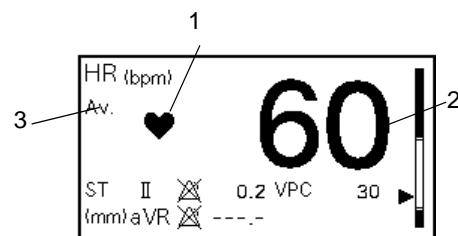
When HR or PR according to the setting of "Synchronized Mark/Tone" is detected, HR/PR synchronized mark will be displayed inside the corresponding numeric data box.

2 Heart Rate / Pulse Rate

Heart rate and pulse rate will be displayed. When the value exceeds the measurable range, "xxx" will be displayed.

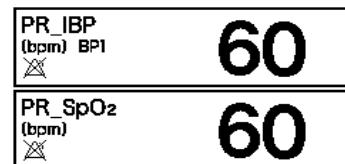
3 HR Average (Instant / Average)

Displays the averaging method of HR. ("HR Average" setting on ECG setup.)



PR, HR/PR

1 Pulse Rate (BP)

2 Pulse Rate (SpO₂)SpO₂1 SpO₂ Value

The arterial oxygen saturation will be displayed.

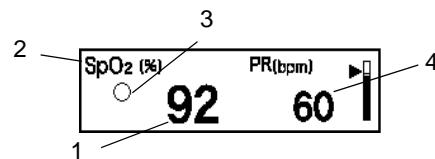
2 SpO₂ Label

The label set for SpO₂ will be displayed.

3 Second Alarm Indicator

When the second alarm is set, the second alarm indicator is displayed.

The second alarm will only be valid with DS-8100N equipped with SpO₂ Unit manufactured by Nellcor™.



4 Pulse Rate

Pulse rate will be displayed. When the value exceeds the measurable range, "xxx" will be displayed.

5 PI Value (Masimo only)

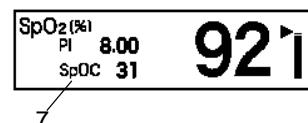
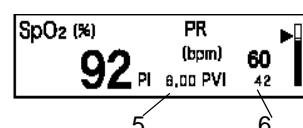
The perfusion index will be displayed.

6 PVI Value (Masimo only, optional)

The pleth variability index will be displayed.

7 SpOC Value (Masimo only, optional)

The arterial oxygen content will be displayed.



SpCO Value (Masimo only, optional)

SpCO Value: The carboxyhemoglobin concentration will be displayed.



SpMet Value (Masimo only, optional)

SpMet Value: The methemoglobin concentration will be displayed.



SpHb Value (Masimo only, optional)

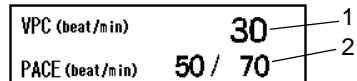
SpHb Value: The total hemoglobin concentration will be displayed.



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. During arrhythmia learning, "---" will be displayed.

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.

ST (mm)	I ☒	0.5	1
	II ☒	0.2	2
	III ☒	---	-
aVR ☒		---	-

- ♦ During "Arrhythmia Learn" condition
- ♦ 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.

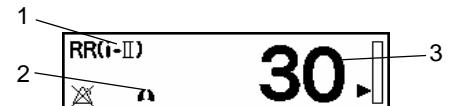
REFERENCE

- ♦ The leads displayed inside the ST level box can be changed.
(Maintenance Manual "Display/Print Setup" P5-13)

RR

1 RR Source

A source of RR measurement will be displayed in accordance with the "RR/APNEA Alarm Source" setup. "i" for the impedance measurement, "GAS" for the CO₂/GAS measurement, and "VENT" for the ventilator measurement will be displayed. A detection lead (I/II) will also be displayed for the impedance measurement.



2 RR Synchronized Mark

Synchronizing to the set RR/APNEA alarm source, a mark will be displayed inside the numeric data box.

3 Respiration Rate

Impedance RR, CO₂ RR, ventilator RR will be displayed. When the value exceeds the measurable range, "xxx" will be displayed.

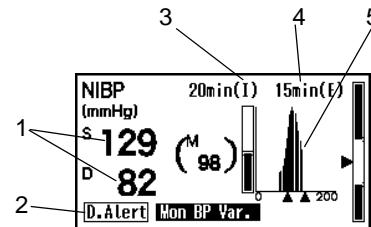
When the impedance measurement is set to OFF, impedance RR will not be displayed.

NIBP**1 NIBP Value/Cuff Pressure**

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

On the "NIBP Setup", ON/OFF of mean NIBP display can be selected. 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**

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 switched in accordance with the setting made for "Time Display" under NIBP setup.

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.

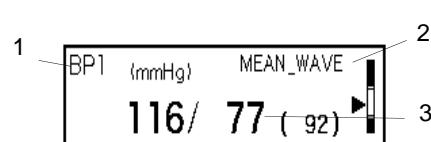
6 NIBP List

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

6	9/24 09:15 110 / 64 (90) 09:10 --- / --- (---) 09:05 --- / --- (---)
---	--

BP Value**1 BP Label**

The BP label setup for the blood pressure will be displayed.

**2 "MEAN_WAVE"**

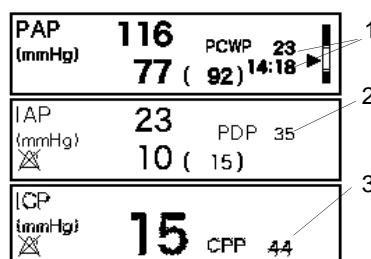
The message "MEAN_WAVE" is displayed when mean waveform is set ON on the "BP detail setup".

3 BP

The BP measurement value (systolic(SYS)/diastolic(DIA)/mean(MEAN)) will be displayed. On the BP setup, 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).

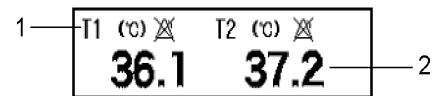
3 CPP Value

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.

Temperature

1 TEMP Label

The BP label setup for the blood pressure will be displayed.



2 TEMP Value

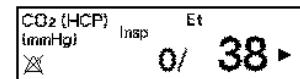
Temperature value will be displayed. The 400 series temperature sensor can be used. When the value exceeds the measurable range, "xxx" will be displayed. When 700 series is connected, "---" will be displayed.

Blood Temperature

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

EtCO₂/ InspCO₂EtCO₂ Value/ InspCO₂ Value

The end-tidal CO₂ concentration and inspiratory CO₂ concentration measurement value will be displayed.

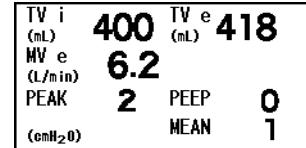


The measurement unit can be selected from mmHg / kPa / % under the "Initial Settings" menu.

Ventilator

Ventilator Data

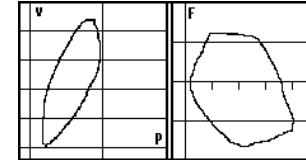
When ventilator is connected, the ventilator measurement data will be displayed.



P-V, F-V

P-V, F-V Loop

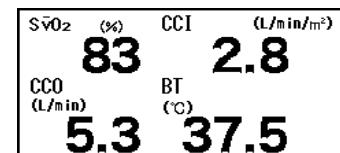
When a ventilator is connected, P-V loop (airway pressure / ventilation) and F-V loop (airway flow / ventilation) will be displayed.



Oximeter/CCO Measurement Device:

Oximeter Data

When oximeter/CCO measurement device (Vigilance/Vigilance CEDV/Vigilance/Vigileo) is connected, the measured data (SvO₂, CO, etc.) will be displayed. The displayed data will differ depending on the used oximeter/CCO measurement device.



Oximeter/CCO Measurement Device	Displayed Data			
Vigilance (CCO mode/STAT OFF/Index OFF)	SvO ₂ (ScvO ₂)	CCO	EDV	BT
Vigilance (CCO mode/STAT ON/Index OFF)	SvO ₂ (ScvO ₂)	CCO STAT	EDV STAT	BT
Vigilance (CCO mode/STAT OFF/Index ON)	SvO ₂ (ScvO ₂)	CCI	EDVI	BT
Vigilance (CCO mode/STAT ON/Index ON)	SvO ₂ (ScvO ₂)	CCI STAT	EDVI STAT	BT
Vigilance (ICO mode)	SvO ₂ (ScvO ₂)	CO AVG	CI AVG	-

Hemodynamic Data

Hemodynamic Data (Vigilance)

Based on the CCO data measured by the Vigilance (or Vigilance CEDV / Vigilance / Vigileo), the following hemodynamic data are calculated and displayed every second based on the following condition.

- It is measured on Vigilance with CCO mode. (It will not be displayed during ICO mode.)
- SvO₂ parameter key (oximeter numeric data box) is displayed.
- BP label is set as ART, PAP, CVP.
(If the unit is "kPa", the data is converted to "mmHg" for calculation.)

SV	65	SVR	1363
RVW	0.54	RVSW	8.1
SVI	38	SVRI	2304
RVWI	0.32	RVSWI	4.2

Data	Description	Formula
SV	Stroke Volume (mL/beat)	$\frac{\text{CCO} \times 1000}{\text{HR}}$
SVR	Systemic Vascular Resistance (dynes·sec·cm ⁻⁵)	$\frac{(\text{MAP} - \text{CVP}) \times 79.90}{\text{CCO}}$
RVW	Right Ventricular Work (kg·m)	$\text{CCO} \times (\text{MAP} - \text{CVP}) \times 0.0136$
RVSW	Right Ventricular Stroke Work (g·m)	$\text{SV} \times (\text{MAP} - \text{CVP}) \times 0.0136$
SVI	Stroke Volume Index (mL/beat/m ²)	$\frac{\text{SV}}{\text{BSA}}$
SVRI	Systemic Vascular Resistance Index (dynes·sec·cm ⁻⁵ ·m ²)	$\text{SVR} \times \text{BSA}$
RVWI	Right Ventricular Work Index (kgm/m ²)	$\frac{\text{RVW}}{\text{BSA}}$
RVSWI	Right Ventricular Stroke Work Index (g·m/m ²)	$\frac{\text{RVSW}}{\text{BSA}}$

NOTE

- The calculated hemodynamic data will not be stored as Vigilance list data. For the Vigilance list, the actual measured data will be stored.

TIMER

Stopwatch Key

Functions as stopwatch.

TIMER1	00:00:00
TIMER2	00:00:00

BIS

BIS Value

When the A-2000 BIS Monitor is connected to the multiport module, BIS data (BIS, SQI, EMG, SR) will be displayed.

BIS	SQI (%)	87
	SR (%)	---
	EMG (dB)	---

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

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

INVOS

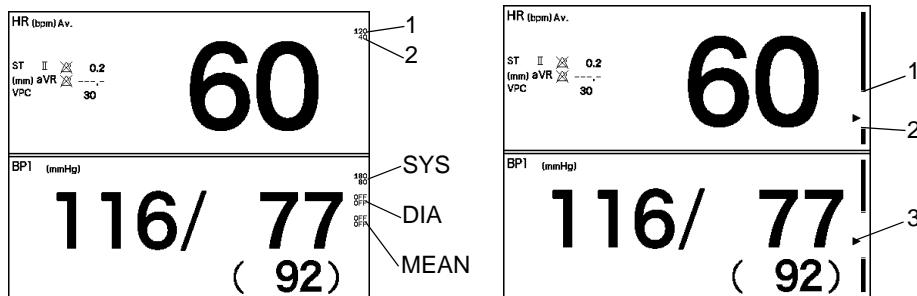
INVOS 5100C Measurement Data

When connected to INVOS 5100C, regional cerebral oxygen saturation value will be displayed.

Lt- indicates left brain, and Rt- indicates right brain.

Lt-rSO ₂ (%)	83	Rt-rSO ₂ (%)	86
-------------------------	-----------	-------------------------	-----------

□ Alarm Limit Display



The alarm limit can be displayed beside each measurement value. 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 and NIBP, each alarm limit of SYS, DIA, mean BP/MAP will be displayed from the top.

ON/OFF of alarm limit display can be selected.

(☞ "List of Alarm Settings" P6-5)

- 1 Upper Alarm Limit
- 2 Lower Alarm Limit
- 3 Current numeric data (SYS)

NOTE

- ♦ If 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

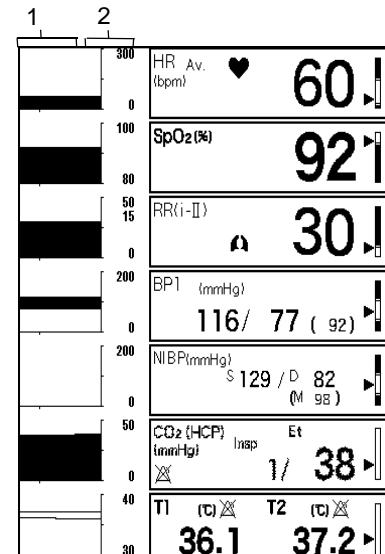
Short trend will be displayed beside the numeric data.

Pressing the waveform display area will change the displayed trend time to the pressed position. The trend display is in 5-minute increment from 0 minute to 30 minutes.

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

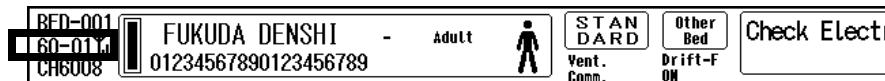
2 Trend Scale

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.
- 03: Indicates TCON ID set on this equipment. (1 to 16)
- 60: Indicates the group of the TCON network. There are groups from 01 to 60, and assigned automatically at the TCON base station.
- : Indicates the current communication status.

Display				
Communication Condition	Good	Moderately Good	Bad	Cannot Communicate

□ Displayed number of waveform and numeric data

Screen	Maximum Waves Displayed	Display Duration (25mm/s)	Maximum Displayed Boxes
Standard (Right/Left)	14	6 seconds and above	7
Standard & Bottom (Right/Left)	12	6 seconds and above	10
Standard (Right/Left)/Large	14	4 seconds and above	14
Bottom (1 row)	12	8 seconds and above	4
Bottom (2 rows)	10	8 seconds and above	8
Bottom (3 rows)	8	8 seconds and above	12
Numeric/Max. Size	1	8 seconds and above	4

NOTE

- The maximum number differs according to the waveform and numeric data to be displayed. (For example, if ECG waveform is selected, it will require at least 2 rows of display area on the screen.)

Description of the Display

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

Icon	Description
	Alarm OFF Indicates the alarm is OFF.
	Pulse Tone This mark flashes synchronizing to the heartbeat.
	RR Synchronized Mark This mark flashes synchronizing to the inspiration.
	Message Icon This mark will be displayed inside the parameter key when an alarm message is present for that parameter. Whether or not to display this icon can be selected on the Initial Settings.
	TCON Displays the Bidirectional Wireless Communication (TCON) connection status while in communication.
	Key Lock Mark Indicates that the item requires password input when changing its setting.
	Key Unlocked Mark Indicates that the key is unlocked
	Indicates that AC power or the module connection cable is connected.
	Displays the remaining battery level. This icon (full green) indicates that the battery is fully charged. *The icon flashes while charging and the flashing icon varies depending on the remaining battery level.
	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 is low and needs to be charged.
	This icon (1/3 red) indicates that the battery 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 empty and flashes to alert the status. Make sure to charge the battery immediately when this icon appears. The remaining operable time is about 5 minutes. The remaining operable time is based on when measurement of NIBP 15 minutes interval, ECG, SpO ₂ is performed with a new battery pack. It will vary depending on the optional unit composition, NIBP measurement interval, recorder operating condition, etc.
	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 in Level S (top priority), Level H (high priority, life threatening), Level M (medium priority, cautionary), Level L (low priority, treatment needed), and Notification, and the message will be displayed according to the priority of Level S>Level H> Level M> Level L> Notification.

The displayed messages will flash in red and white for Level S, red for Level H, yellow for Level M, blue for Level L, and white for Notification.

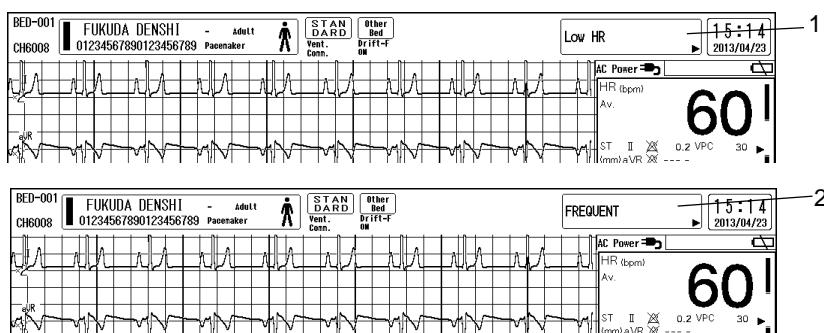
Alarm Priority, Level		Details	Sound	Displayed Color
Top Priority	S	Top Priority Alarm	Continuous	Red/white
High Priority	H	Life Threatening Alarm	Continuous	Red
Medium Priority	M	Cautionary Alarm	5 seconds interval	Yellow
Low Priority	L	Treatment Needed Alarm	15 seconds interval	Blue
Notification	N	Notification Alarm	Display Only	White

CAUTION

- When more than one alarms are generated in the same priority level, the newer alarm message will be prioritized.

Vital Alarm Message

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



1 Numeric Alarm Message

2 Arrhythmia Alarm Message

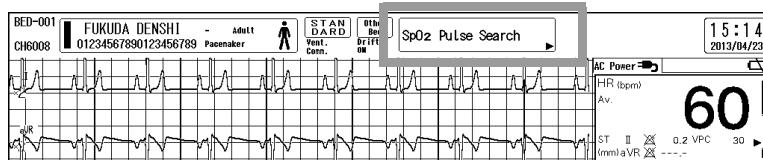
There are 2 types of vital alarm messages; numeric data alarm and arrhythmia alarm. If both alarms occur at the same time, the numeric alarm message and arrhythmia alarm message will be displayed alternately in 2-seconds intervals. The alarm messages will be displayed according to the priority. If the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

CAUTION

- The arrhythmia alarm message will continue to be displayed for 30 seconds after the alarm is resolved.

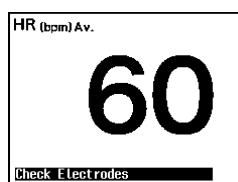
❑ Equipment Status Alarm Message

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.



❑ Numeric Data Box Message

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

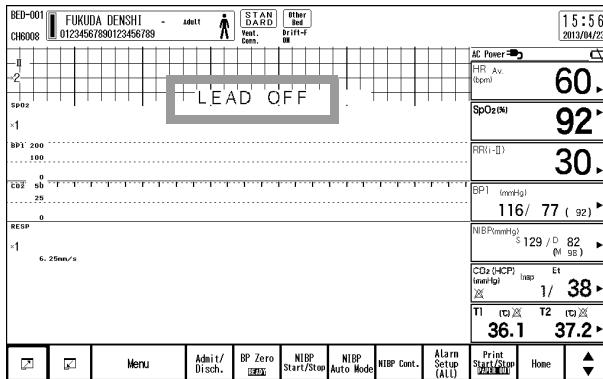


❑ Lead-Off Message

If the ECG electrodes used for HR measurement or arrhythmia analysis are detached, the status will be notified.

⚠ WARNING

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



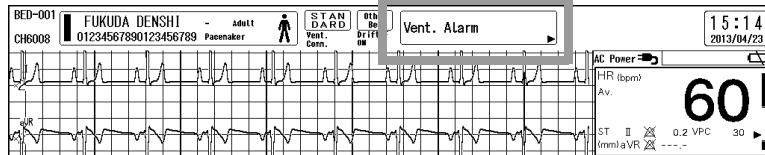
❑ Ventilator Alarm Message

When a ventilator is connected to 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 at factory default setting.
- The alarm sound can be turned ON on the "Tone/Volume" menu.
(⇒ "Tone/Volume" P10-17)



□ Ventilator Alarm Factor Message

For the SV-300, Servo-i, Servo-s, ventilator alarm factor if specified will be notified and displayed on the central monitor.

⚠ CAUTION

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

Window Display

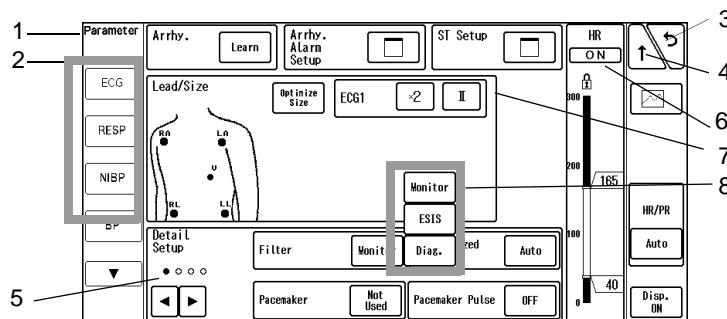
About the Window Display

The screens that are displayed when operating this system are referred to as windows. (The windows that appear by pressing the numeric data area are called floating windows, as they can be moved to any desired position.)

The target window can be displayed by using various method, such as selecting the menu items, pressing a parameter key or using a short cut key such as user key.

Display

The items displayed on the window depend on the parameter, but there are some common items displayed which 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

The screens belonging to the same hierarchical level can be switched from each other in one-touch operation without returning to the "Menu".

For example, when changing the blood pressure scale after changing the ECG waveform size, it is not necessary to return to "Menu".

Additionally, since the data presented on review screens are linked to the time information, it is possible to view multiple data for the same hour in graphic or tabular format, or check their waveforms in a one-touch operation.

3 Previous Display

Pressing this key will return the display to the previous window.

4 Up One Level Key

Pressing this key will cause the display to move up one level in the hierarchy.

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 Key Lock Icon

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

Password input is required to unlock these locked items.

It will be locked if 30 seconds has elapsed without key operation.

- ♦  : Locked item
- ♦  : Unlocked item

NOTE

- ♦ The color of each key lock icon indicates its administrative level, and a higher level password must be entered to unlock it.

7 Setup Item

Most setup items are selected from their corresponding dropdown list.

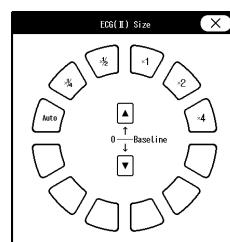
The dropdown list will close once a setup item has been selected.

Pressing the item again or selecting a different item will also close the list.

Some items will show a sub window in which the setup operation is performed.

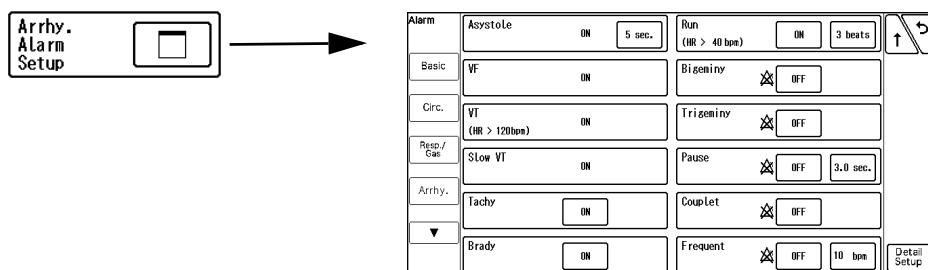
To close the sub window, press either the  key, [Home] or [Prev. Disp.] key.

- ♦ <Sub window example>



When the key with the  icon is pressed, another screen will be displayed. To return to the original screen, either press the  key or "Prev. Disp." key.

- ♦ Example of screens which make a transition to another screen



8 Dropdown List

Select one from the displayed selection list.

Floating Window Screen Display

The descriptions of the floating window which is displayed by pressing the numeric data area are as follows.

The displayed items on the floating window depends on the parameter, but there are some common items as follows.

1 Window Title

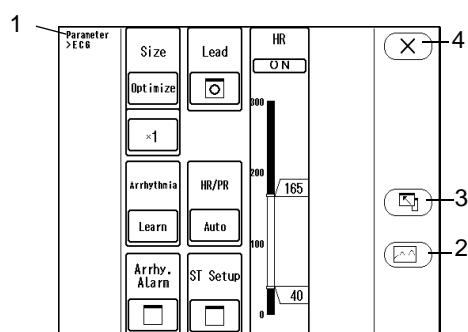
The windows can be moved to any desired position by dragging the window title.

2 Alarm Assist Key

Displays the alarm assist screen. On the alarm assist screen, maximum of 24 hours of trend data for the corresponding parameter will be displayed.
(☞ "Alarm Assist Screen" P6-12)

3 Detail Key

On the floating window, minimum items are displayed. Press the  key to display more detailed items.



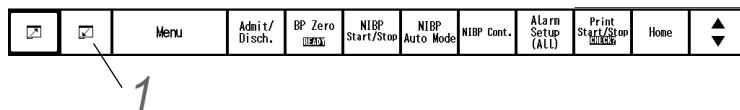
4 Close Key

Pressing the  key will close the window. The window can also be closed by pressing the fixed key, [Prev. Disp.] or [Home].

Minimize Window

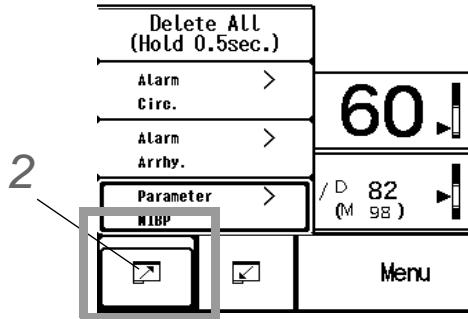
To temporarily display the home display during the setup, press the  (Minimize) key. The current window will be minimized. By pressing the  (Restore Window) key, the window will be redisplayed.

1 Press the key.



► The window will be minimized.

- 2** To restore the minimized window, press the  (Restore Window) key and select the window to be displayed from the list.



▶ The original window will be displayed again.

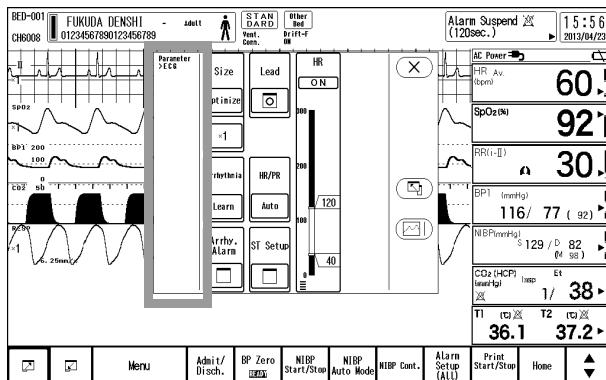
NOTE

- Maximum of 9 windows can be minimized. If exceeded, the oldest window will be deleted.
- To delete all minimized window, press the [Delete All] key which will be displayed when  is pressed for more than 1 second.
- The window which has been automatically erased after fixed amount of time can be remained minimized by selecting [ON] for "Auto Minimize" ([Initial Settings] > [User I/F] > [Operation]).

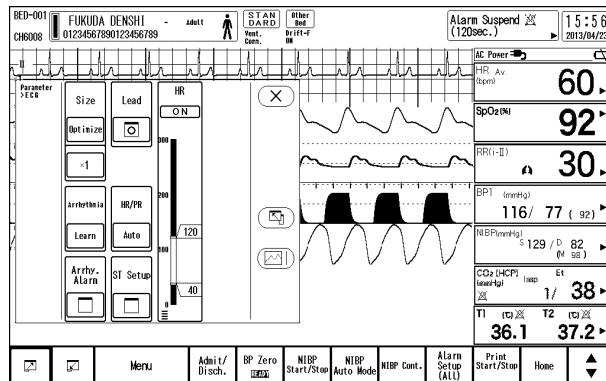
Transfer Window

The floating window which is displayed by pressing the numeric data area can be moved by dragging the window title bar on the left. This operation is possible on the touch panel.

- 1** Press the title bar.



2 Place the finger on the window title and drag to the desired position.



NOTE

- The floating window cannot be overlapped to the numeric data area or information display area.
- The window which is displayed from "Menu" cannot be moved.
- The displayed position of the floating window will be stored until the power is turned OFF.

Operation Restriction

To restrict the operator to change the setup items, key lock function can be used.

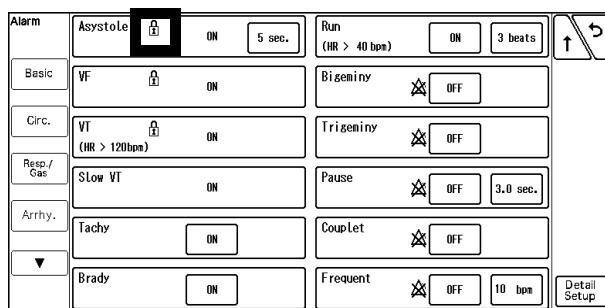
(Maintenance Manual "Key Lock" P5-2)

For the items that are key locked, the settings cannot be changed unless the password is entered.

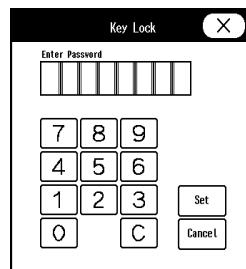
The unlocked condition will return to locked condition if operation has not been performed for about 30 seconds.

For the key locked item, icon will be displayed.

When the password is entered and key is unlocked, the icon will change to .



Example of Key Locked Item



Password Window

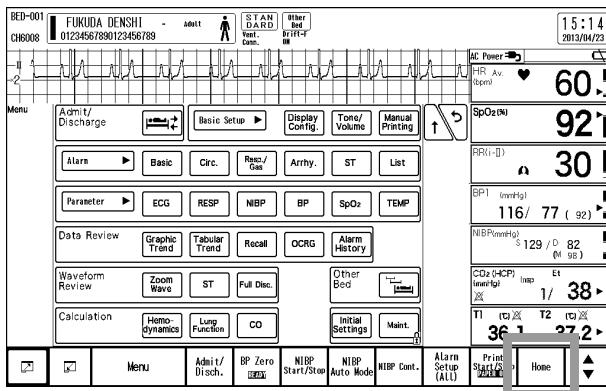
NOTE

- 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 home display by pressing the [Home] key (fixed key or user key).



To Return to One Previous Display

The display will return to previous display by pressing the [Prev. Disp] key (fixed key) or  key displayed on each setup window.

For Easier Use

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

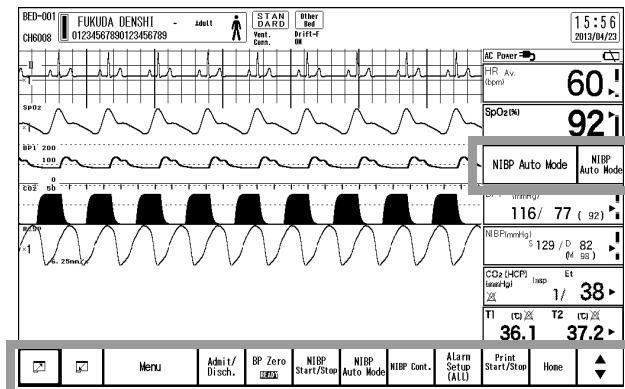
REFERENCE

- From the preprogrammed user mode, the display configuration and alarm settings can be selected according to the monitoring purpose.
( Maintenance Manual "User Mode Registration" P5-26)

User Key

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

(☞ "To Configure the Display" P10-5)



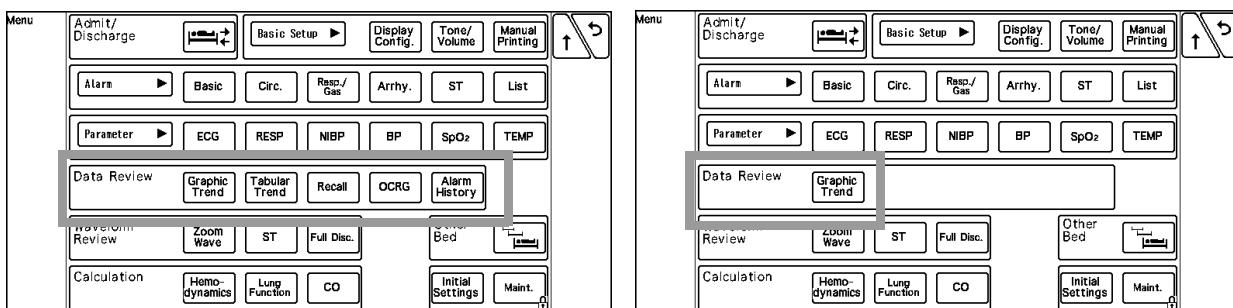
By assigning the [User Key ▲] to the user key area, 2 pages of user keys can be registered. Press the [User Key ▲] to switch the pages. The user key can be enlarged by using 2 display areas.

The user key can be also assigned to the numeric data area. It is useful if the key related to numeric data is assigned near the numeric data.

Menu Screen

The key position can be changed and unnecessary keys can be deleted on the "Menu" screen.

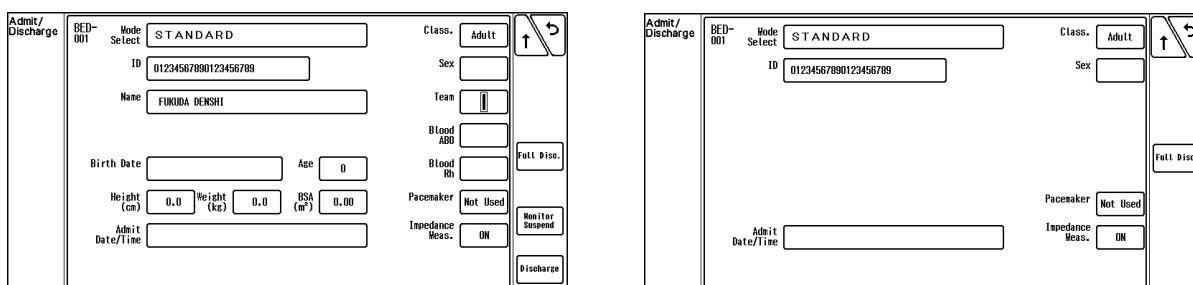
(☞ Maintenance Manual "Display/Print Setup" P5-13)



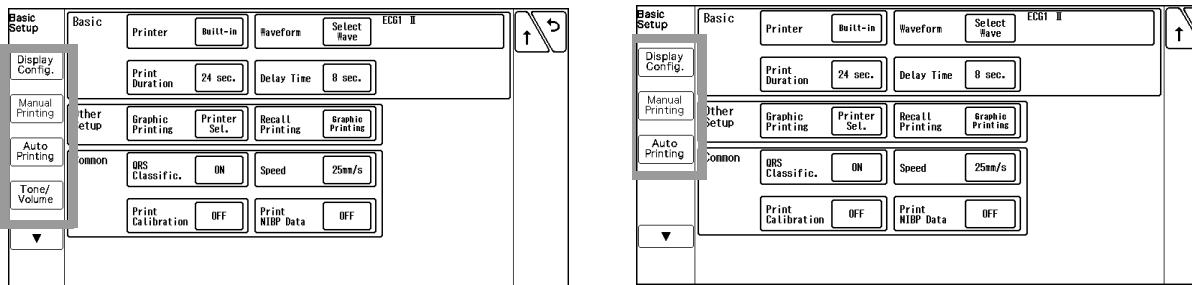
To Delete the Unnecessary Keys (Key Mask)

Unnecessary keys, items, tabs can be deleted.

(☞ Maintenance Manual "Key Mask" P5-19)



Example on "Admit/Discharge" Screen



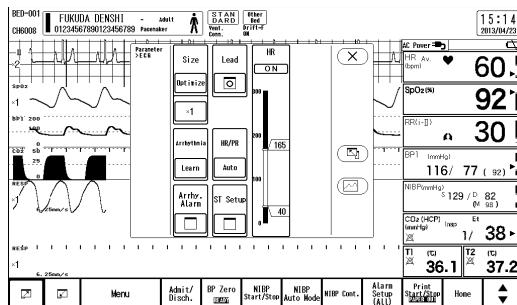
Example on Tab Display

Display on the External Monitor

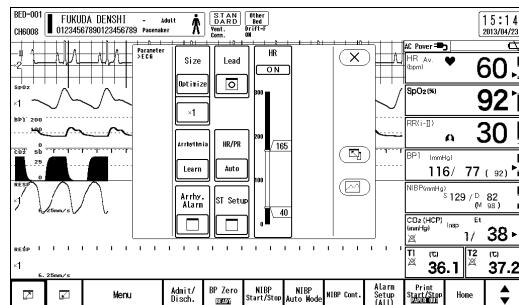
For the DS-8100 System, in addition to the main display, another display unit can be used for extended display.

External Monitor Display

The monitoring can be performed on two display units.
However, operation is not possible on the external monitor.



<Main Display>



Display on the External Monitor

CAUTION

- With the default setting, menu cannot be displayed on the external monitor even if it is displayed on the main display. To display the menu on the external monitor, contact your nearest service representative.

Chapter 4 Preparation

Daily Check	4-1
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Check Discharge When Start Monitoring a New Patient	4-4
To Stop Monitoring	4-5
Clock Setup	4-6
Installing the Recording Paper	4-7

Chapter 4 Preparation

Daily Check

Conduct the following daily check before using the equipment.

Daily Check List

Checked Date: Day Month Year		Checked by:	No. Location:
Model Type (Main Unit)		Serial Number:	Date of Purchase: Day Month Year
Model Type (Module)		Serial Number:	Date of Purchase: Day Month Year
Model Type (Module)		Serial Number:	Date of Purchase: Day Month Year
Model Type (Module)		Serial Number:	Date of Purchase: Day Month Year
Model Type (Module)		Serial Number:	Date of Purchase: Day Month Year
Item	Check Details	Criteria	Judgment
External appearance	Visually check the exterior for scratches, cracks, and rust.	No abnormality should be found.	OK / NG
Installation	Check whether the equipment is installed on a level surface.	The installation area must be level and free from vibration and shock.	OK / NG
	Check whether the equipment is installed in a place susceptible to adverse environment.	The environmental condition (e.g. temperature, humidity) of the installed unit should be as specified. The equipment should not be subjected to splashing water or chemicals.	OK / NG
Function	Turn ON the power of the main unit, and check whether it operates normally.	The home display should appear, and the power LED of the DS-8100 should light.	OK / NG
		The date and time should be correct.	OK / NG
		With BP relay cable and BP transducer connected, pressing the BP Zero Balance Switch should start the zero balance.	OK / NG
		Pressing the NIBP Start/Stop key should inflate the NIBP cuff.	OK / NG
		Connecting the SpO ₂ sensor should light the sensor LED.	OK / NG
Function	(When HPD-800/HPD-810 or HCP-800/HCP-810 is used)	The home display should appear, and power LED should light in green.	OK / NG
		When the sampling tube is connected, "0" should be displayed in the numeric data box.	OK / NG
Cables	Visually check all cables for any damage.	No damage should be found.	OK / NG
CO ₂ Calibration (When HCP-800/ HCP-810 is used)	Check the date of the previous calibration. Previous Date: Day Month Year	Should be within 1 year.	OK / NG
	Check the remaining time until the next calibration. [Menu][CO ₂][CO ₂ Cal.] Remaining Time until Next Calibration: hrs.	Should not be 0 hrs.	OK / NG
Periodic Check	Check the date of the previous periodic inspection. Previous Periodic Check Date: Day Month Year	Should be within 1 year.	OK / NG

Comment

To Start Monitoring

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

CAUTION

- If the main unit will be unused for a long period, disconnect the power cable and lithium-ion battery from the main unit.
 - When lifting this equipment, hold it by the handle or the bottom part of the main unit.
During transportation, firmly grasp the handle and make sure that the equipment does not fall.
-

1

If operating with AC power supply, verify that the power supply cable is properly connected to the main unit.

If operating with battery, verify that the lithium-ion battery (BTO-008) is properly installed in the main unit.

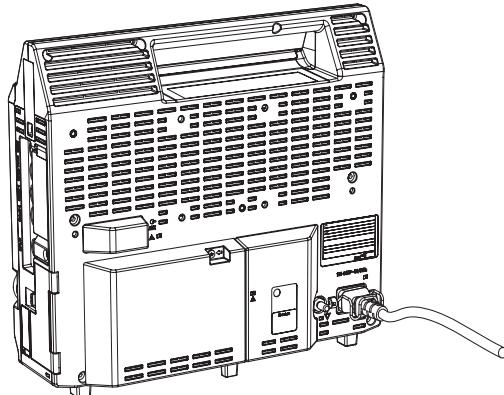
( Maintenance Manual "Power Connection of the Main Unit" P1-7)

( Maintenance Manual "Installing the Lithium-Ion Battery Pack (BTO-008)" P1-10)

► 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 in operation): 8 hours



WARNING

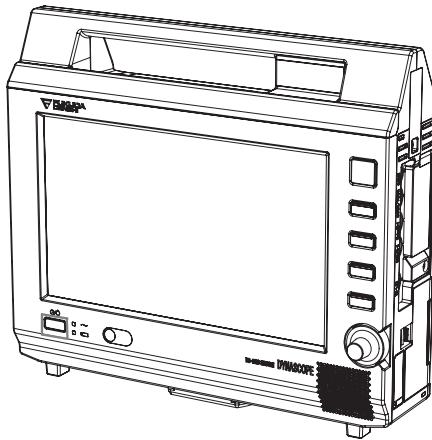
- Do not connect a battery other than the lithium-ion battery (BTO-008).
-

2 Turn ON 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: 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

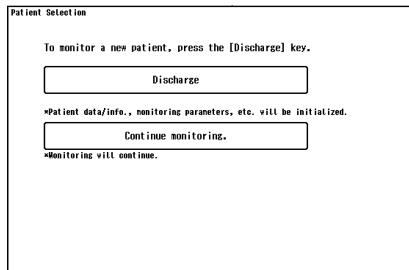
- ♦ The operation after the power is turned ON will be according to the setting made on [Initial Settings]>[User I/F]>[Power ON/Discharge]. However, if the power was turned OFF for less than 30 seconds, the setting before the power was turned OFF will remain.

REFERENCE

- ♦ The power of the main unit, recorder unit, expansion port unit and recorder expansion port unit interlock with the power supply switch operation (ON/OFF) on the main unit.

Check Discharge When Start Monitoring a New Patient

The trend data, tabular trend data, recall, ST measurement, OCRG data will be stored for 5 minutes even after the standby switch is turned OFF. If the previous data is remained when the standby switch is turned ON again, the discharge confirmation screen 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

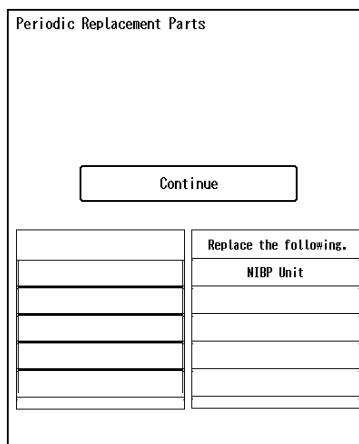
- ♦ If the standby switch was turned OFF for less than 30 seconds, the discharge confirmation screen will not be displayed. To perform the discharge procedure, press the [Discharge] key on the "Admit/Discharge" screen.
(☞ "Discharge" P5-7)
- ♦ To start monitoring a new patient, select [Discharge] and enter the new patient information on the "Admit/Discharge" screen.

REFERENCE

- ♦ Whether or not to display the discharge confirmation screen can be selected.
(☞ Maintenance Manual "Power ON/Discharge" P5-15)

□ Periodic Replacement Message

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



REFERENCE

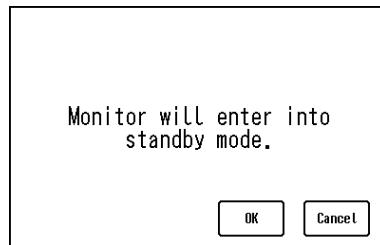
- ◆ The part of which replacement period is approaching is the NIBP unit in the main unit.
( Maintenance Manual "Periodic Replacement" P7-1)
- ◆ Even if it is set not to display the discharge confirmation screen, it will be displayed when the replacement period approaches.

To Stop Monitoring

This section explains about a procedure to stop monitoring.

1 Turn OFF 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 expansion port unit will also stop.

**CAUTION**

- ◆ If the main unit will be unused for a long period, disconnect the power cable and lithium-ion battery from the main unit.

NOTE

- ◆ When the power is turned OFF, trend data, tabular trend data (Vigilance, respiration), recall, ST measurement, OCRG data will be erased after 5 minutes.

Clock Setup

This section explains about the clock setup procedure.

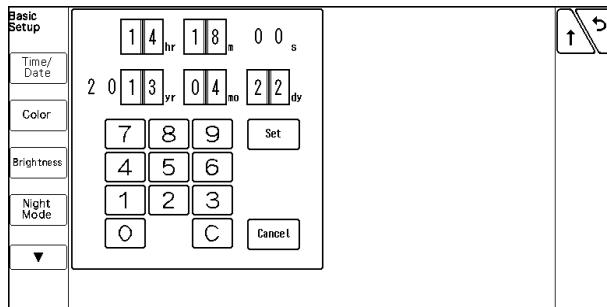
CAUTION

- If the time/date is not correctly set, or changed during monitoring, malfunction may occur with NIBP measurement, periodic recording, trend, list data, and age calculation from the birth date.
- If connected to a wired network system, time/date can not be set, thus it will be the same with the central monitor.
- If the date/time is changed, all the patient data stored such as the trend, NIBP list, recall data will also be changed.
The printed time/date before changing and the displayed time/date after changing will differ.

1 Press the [Menu], [Time/Date] ("Basic Setup") keys.

Or, press the time/date on the information display area at the upper part of the screen.

- ▶ Time/Date setup screen will be displayed.



2 Press on the area to perform the setup.

- ▶ A blue frame will be displayed on the selected area.

REFERENCE

- When the screen is first displayed, the blue frame will be positioned on "hour".

3 Use the numeric keys to change the numbers.

- ▶ The blue frame will automatically move to the next item.

4 Set to the current time and press [Set].

- ▶ The time/date will change to the entered time/date. (Seconds will be set to "00" sec.)
- ▶ Press [Cancel] to cancel the time/date setup.

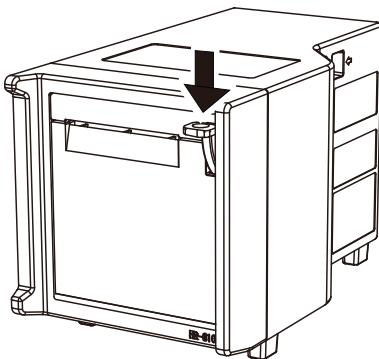
Installing the Recording Paper

CAUTION

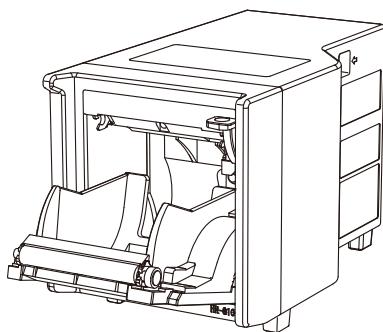
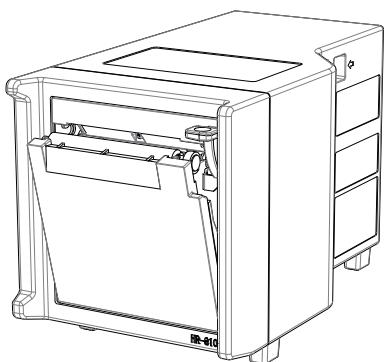
- Recording paper
 - Use only "OP050-01TDR" for the recording paper.
The surface treatment and thickness of the recording paper affects the printing quality.
- Storing the Recording Paper
Since the recording paper is thermal type, inappropriate storage may change the quality of the printed content, and 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 or 122°F or 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.

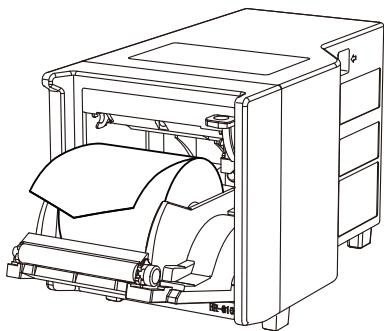


- ▶ The paper holder opens.

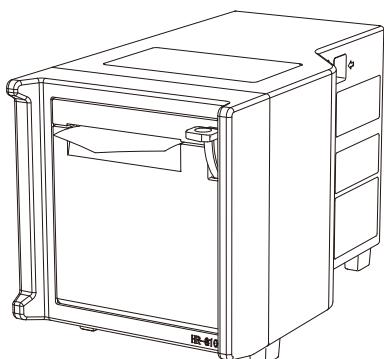


2 Set the recording paper.

The outside surface of the paper is heat-sensitive. 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

To Display the "Admit/Discharge" Screen	5-1
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Chapter 5 Admit/Discharge

This menu allows setup of admitting, discharging, suspend monitoring of a patient, and selection of the user mode (display configuration) according to the monitoring purpose.

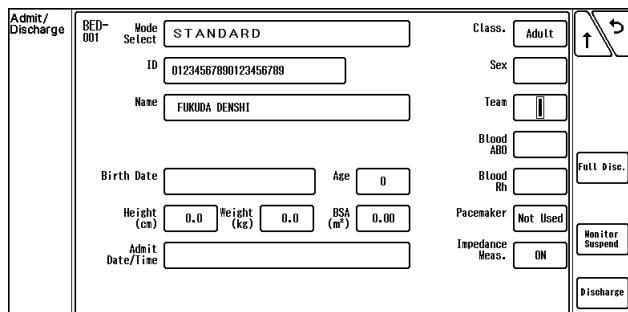
CAUTION

- If monitoring of new patient is started without performing a discharge procedure of the previous patient, new data will be added to the previous data which will result in inaccuracy.

To Display the "Admit/Discharge" Screen

- Press the [Menu], "Admit/Discharge" icon.

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

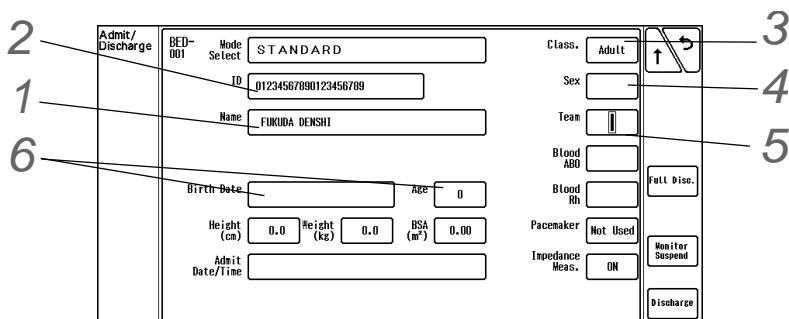


Admit

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 Name



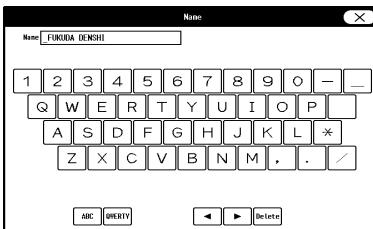
- Enter the patient name.

REFERENCE

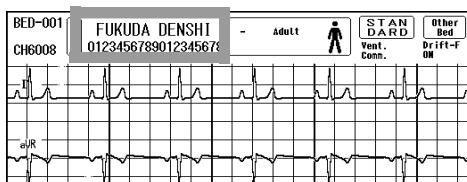
- Up to 16 alphanumeric characters can be entered. Symbols can be also used.
- When entering alphabets, numbers, or symbols, press [ABC] or [QWERTY] to switch the

displayed keyboard.

- 1** Press the entering space for "Name".
► The "Name" screen will be displayed.
- 2** Enter the name using the alphanumeric keypad.



- The entered patient's name will be displayed on the home display.



- 2** Enter the patient ID.

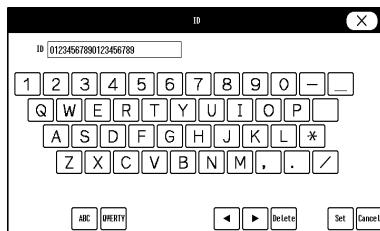
NOTE

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

REFERENCE

- ♦ Up to 20 characters of alphabets, numbers, or symbols can be used for the patient ID.
- ♦ The entered ID will be printed on the recording paper.

- 1** Press the key for "ID".
► "ID" window will be displayed.
- 2** Enter the ID using the alphanumeric keypad.



NOTE

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

- 3** Enter the patient classification.

- ♦ The patient classification selection will affect the accuracy of NIBP, HR, RR measurement. It will also affect

the delay time of numeric 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 functions for HR/PR, BP, RR, SpO₂, TEMP, EtCO₂/InspCO₂, TACHY, BRADY.

		Adult	Child	Neonate
NIBP Measurement Range	SYS	30 to 280mmHg	30 to 180mmHg	30 to 130mmHg
	MAP	15 to 235mmHg	15 to 160mmHg	15 to 100mmHg
	DIA	10 to 200mmHg	10 to 150mmHg	10 to 90mmHg
HR		0bpm, 12 to 300bpm		0bpm, 30 to 300bpm
Filter	Monitor	0.5 to 40Hz		1.6 to 40Hz
	ESIS	1.6 to 15Hz		1.6 to 15Hz
	Diagnosis	3-electrode: 0.05 to 100Hz 4, 5, 10 electrode: 0.05 to 150Hz		
Impedance Respiration		1.5Hz		2.5Hz
Alarm Delay Time		5 sec.		0 sec.

WARNING

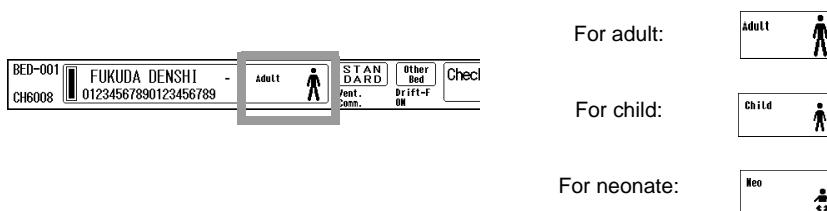
- The patient classification selection influences the precision of the QRS detection and NIBP measurement. Make sure the correct selection is made.
- To perform correct NIBP measurement, appropriate NIBP air hose corresponded to the set patient classification must be used. (However, if the patient classification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

1 Press the key for "Class.".

- The patient classification dropdown list will be displayed.

2 Select from [Adult] / [Child] / [Neonate].

- The selected patient classification and icon will be displayed on the home display.



4 Select the patient's sex.

REFERENCE

- At default, no selection is made. The entered sex will be printed on the recording paper.
- This selection will not affect the measurement accuracy of the monitoring.

1 Press the key for "Sex".

- The dropdown list will be displayed.

2 Select [Male] or [Female].

5 Set the nurse team.

- 1 Press the key for "Team".
- The dropdown list for nurse team will be displayed.

- 2 Select the color of the nurse team.

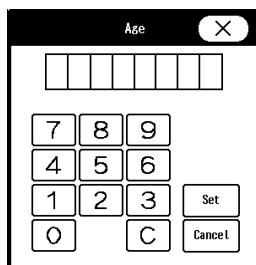
6 Enter the patient's age.

REFERENCE

- ♦ 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 type, age will be displayed in days.

To Manually Enter the Age:

- 1 Press the key for "Age".
- "Age" window will be displayed.

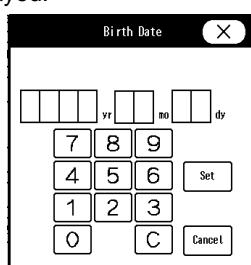


- 2 Enter the age using the numeric keys.

- 3 Press the [Input] key.

To Calculate the Age from the Birth Date:

- 1 Press the key for "Birth Date".
- "Birth Date" window will be displayed.



- 2 Enter the year, month, day using the numeric keys.

- 3 Press the [Set] key.

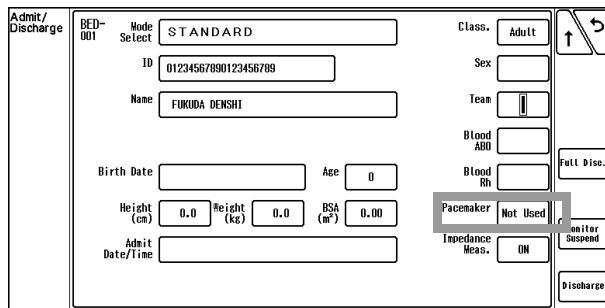
REFERENCE

- ♦ To change the entered birth date, select the entered area, and enter the correct birth date.

When Pacemaker is Used

⚠ WARNING

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



If [Used] is selected for "Pacemaker", the monitor will detect the pacing pulse (pacemaker pulse) to perform the following process.

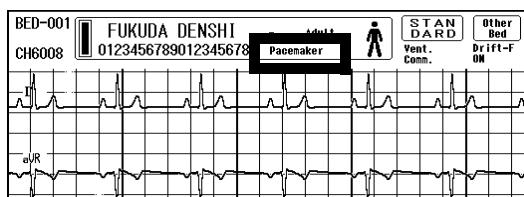
- The artificial pacemaker pulse will be displayed.
- When pacing waveform does not appear (pacing failure), erroneously detecting the pacemaker pulse as QRS will be prevented.
- The arrhythmia analysis will detect pacing beat as P (Pacemaker Beat) or F (Fusion Beat) to prevent erroneous judgment of VPC.

1 Press the key for "Pacemaker".

- The dropdown list will be displayed.

2 Select from [Used]/[Not Used].

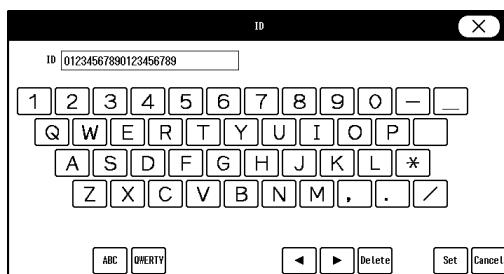
- When [Used] is selected, "Pacemaker" will be displayed on the home display.



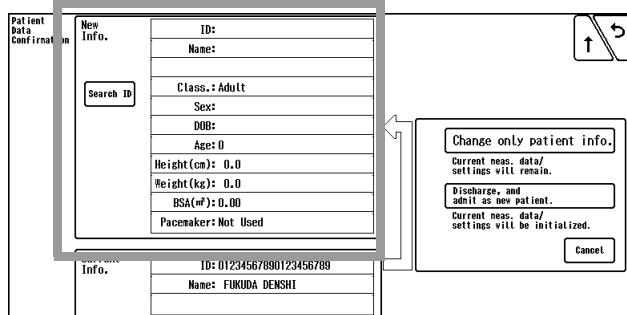
Entering Patient Information from the Patient Data Server (When DS-LANIII, TCON is used)

- 1** Press the [Menu], "Admit/Discharge" icon, [ID].
"ID" window will be displayed.

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



- 1 Use the touch keys to enter the ID.
 - 2 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 input the information.

NOTE

- [Discharge and admit as new patient.] will be effective when the ID is searched through TCON network.
- If the ID is searched through the DS-LAN III network, make sure the patient is discharged before replacing the patient information.
- The item not acquired from the patient data server will be left blank.
- For the blank item, manually input the information.

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

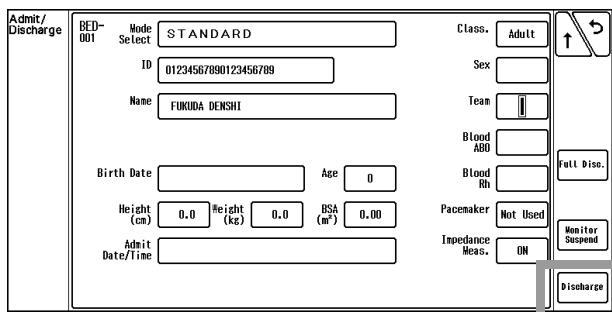
- If monitoring of new patient is started without discharging the previous patient, the measurement data of the previous and new patient will become mixed up on the recall and trend data.
- When the discharge procedure is performed, patient data such as recall and trend will be initialized. The parameter and alarm will be reset according to the setting on [Menu]>[Initial Settings]>[User I/F]>[Power ON/Discharge].
When the discharge procedure 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" P5-15](#))

NOTE

- Depending on the setting made for "At Discharge" ([Initial Settings]>[User I/F]>[Power ON/Discharge]), some items may not be initialized.
([Maintenance Manual "Power ON/Discharge" P5-15](#))
- If discharge procedure is performed during stopwatch operation, the counting will stop and the stopwatch time will be reset to "00:00:00".

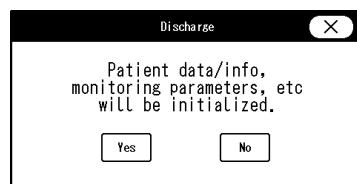
1 Press the [Menu], "Admit/Discharge" icon.

- ▶ The "Admit/Discharge" screen will be displayed.



2 Press the [Discharge] key.

- ▶ The discharge confirmation window will be displayed.



REFERENCE

- If [No] or [X] is pressed, the discharge process will be cancelled and the confirmation window will close.

3 Press the [Yes] key.

- ▶ The patient data, patient information will be initialized.
- ▶ The screen will return to the home display with the selected user mode.
- ▶ The alarm settings will be initialized to the settings of the selected "Alarm System".

Data	Description
Patient Data	Trend, Tabular Trend, Recall, ST, OCRG, CO, Hemodynamics, Lung Function, P-V/F-V control data 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 will be erased. The BP zero-balance condition will be initialized.

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" P5-26)

REFERENCE

- For the user mode, up to 9 main modes of display configuration and alarm settings can be registered according to the patient's age and monitoring purpose.
( Maintenance Manual "User Mode Registration" P5-26)

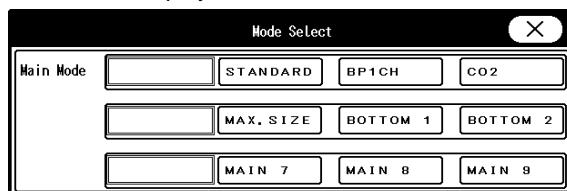
To Select the User Mode

1

Press the [Menu], "Admit/Discharge" icon, "Mode Select" key.

Or, press the mode key on the information display area at the upper part of the 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 main mode appropriate for the patient.**REFERENCE**

- The selected user mode will be stored even after the power is turned OFF. If a new patient is admitted without changing the user mode, the monitoring will start with the previous user mode.
- The mode setting after the discharge operation can be set under the [Initial Settings]>[User I/F]>[Power ON/Discharge].
- Refer to "Setup Item/Default Value" for the default setting of each mode.
( Maintenance Manual "User Mode Registration" P5-26)

Suspend Monitoring

This section explains about the monitoring suspend/resume function.

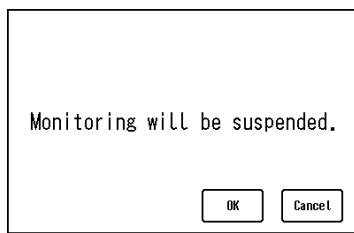
Monitoring suspend function can be used when a patient temporarily leaves the bed. If the monitoring is ceased by turning the power OFF, recall and ST data will be erased.

By using the monitoring suspend function, measurement, alarm, printing will be suspended but data and settings will remain, which allows to resume monitoring smoothly.

To Suspend Monitoring

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

- The monitor suspend confirmation window will be displayed.

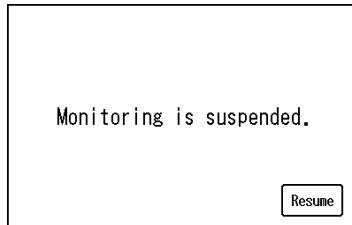
**REFERENCE**

- 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.
-

To Resume Monitoring

⚠ CAUTION

- ♦ Resuming monitoring will also resume the suspended alarm.
-

1

Press the [Resume] key.

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

Chapter 6 Alarm Function

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Chapter 6 Alarm Function

Alarm

To Set the Arrhythmia Alarm

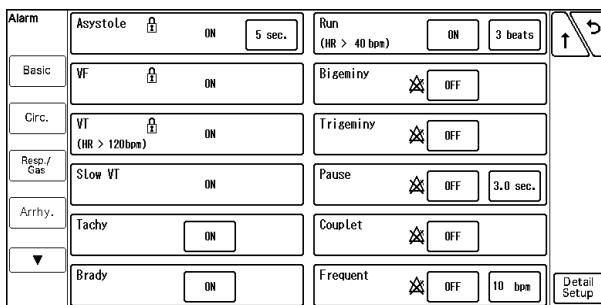
The arrhythmia alarm can be turned ON or OFF, and arrhythmia detection level can be set.

⚠ 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 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 system alarm is set to ON. Pay attention when setting them OFF.

1 Press the [Menu], [Arrhy.] ("Alarm") key.

- 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 ASYSTOLE, VF, VT, SLOW_VT, and HR alarm is OFF.
- If [Always ON] is selected for "Asystole, VF, VT Alarm" under "Initial Settings", Asystole, VF, VT, Slow_VT alarm can not be set to OFF.
([Maintenance Manual "Alarm Related Setup" P5-5](#))

REFERENCE

- The arrhythmia detection level for tachycardia (Tachy) and bradycardia (Brady) alarm links with the upper and lower alarm limit for HR/PR.
- The tachycardia (Tachy) alarm generates when the measurement exceeds the HR/PR upper alarm limit. When the upper alarm limit is OFF, alarm will not generate.

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

3 Select the level to detect each arrhythmia.

- 1 Press the detection level key for each arrhythmia.
▶ The detection level dropdown list will be displayed.
- 2 Set the detection level.

Item	Description
Asystole	3 to 10 sec.
Run	2 to 8 beats
Pause	1.5 to 5 sec.
Frequent	1 to 50 beats/min.

4 Set the HR Lower Limit for VT and RUN.

- 1 Press the [Detail Setup] key.
▶ The "Detail Setup" window will be displayed.
- 2 Set the "HR Lower Limit for VT".
▶ Select the lower limit of HR value from 120 / 140bpm to generate VT.
▶ If the HR is below the selected value, Slow_VT will generate.
- 3 Set the "HR Lower Limit for RUN".
▶ If the HR is same or above the selected value, RUN will generate.

SpO₂ Second Alarm Setup

NOTE

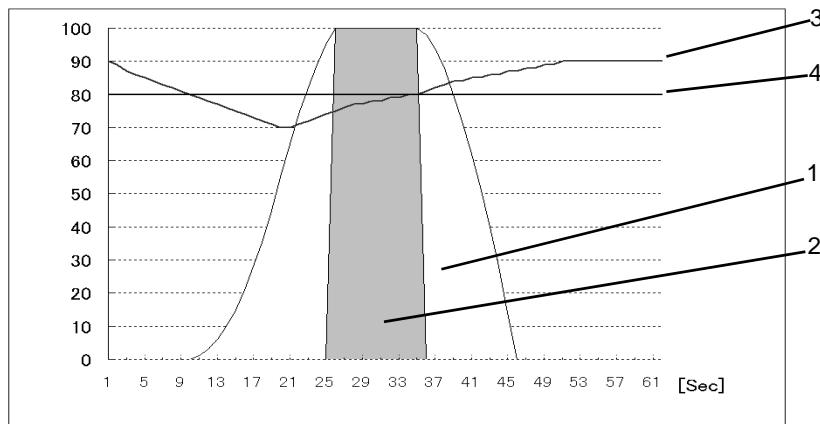
- The SpO₂ second alarm function utilizes SatSeconds™ technology of Covidien. SatSeconds™ is a trademark of Covidien.

The SpO₂ second alarm function is available when DS-8100N is connected.

When the SpO₂ 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 SpO₂ 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 SpO₂ Value

4 Alarm Limit

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

The SpO₂ value begins to fall below the alarm limit at approximately 10 seconds. At the same time, the integral value begins to increase. (Alarm limit) – (SpO₂ value) is accumulated each second.

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

The SpO₂ value begins to fall below the alarm limit at approximately 36 seconds. At the same time, the integral value begins to decrease. [(Alarm limit) – (SpO₂ 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 SpO₂ value frequently falls below the alarm limit but does not last long enough to reach the second alarm threshold.

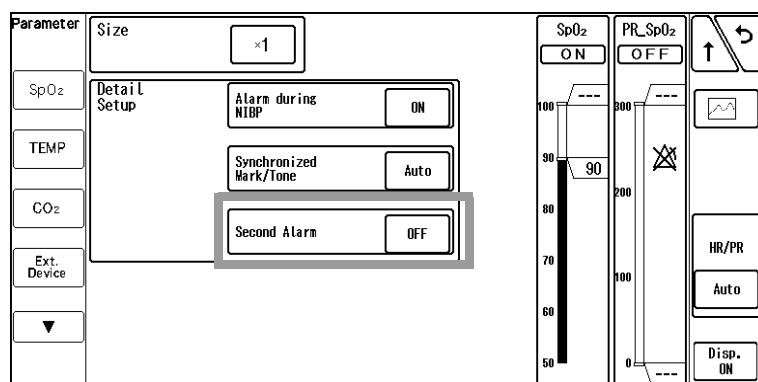
If the SpO₂ value falls below the limit 3 times or more during the last 60 seconds, an alarm will be generated even if the second alarm threshold is not reached.

⚠ 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 SpO₂ alarm and second alarm setup is set to [OFF], the second alarm integral value will be set to 0.

1 Press the [Menu], [SpO₂]("Parameter") keys.

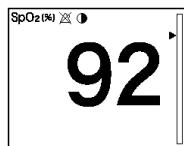
► The SpO₂ setup screen will be displayed.



2 Press the key for "Second Alarm".

- ▶ The "Second Alarm" screen will be displayed.

3 Select from [10]/[25]/[50]/[100]/[OFF].



- ▶ [10]/[25]/[50]/[100]: A circular second alarm indicator will be displayed inside the parameter key.
- ▶ [OFF]: Second alarm indicator will not be displayed.

REFERENCE

- ♦ As the integral value increases, the indicator will begin to fill, and when it is completely filled, an alarm will be generated.

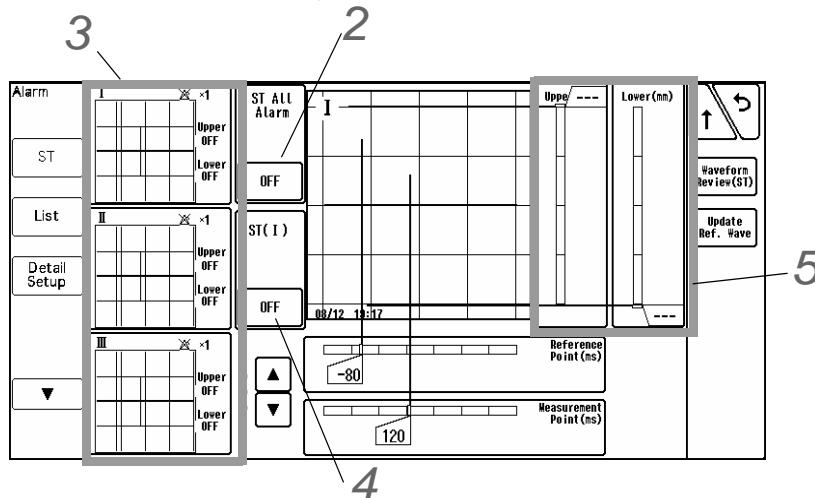
ST Alarm Setup

Set the ST upper limit and lower limit for the reference waveform.

The alarm value is to be set for each measurement unit (mm / mV). The upper/lower limit can be set in 1mm/0.1mV increments.

1 Press the [Menu], [ST] ("Alarm") key.

- ▶ 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 right.

4 Select [ON]/[OFF] of alarm for the selected lead.

5 Slide the \backslash XXX $/$ \backslash XXX $/$ and set the upper, lower limit ($\pm 20\text{mm} / \pm 2.0\text{mV}$).

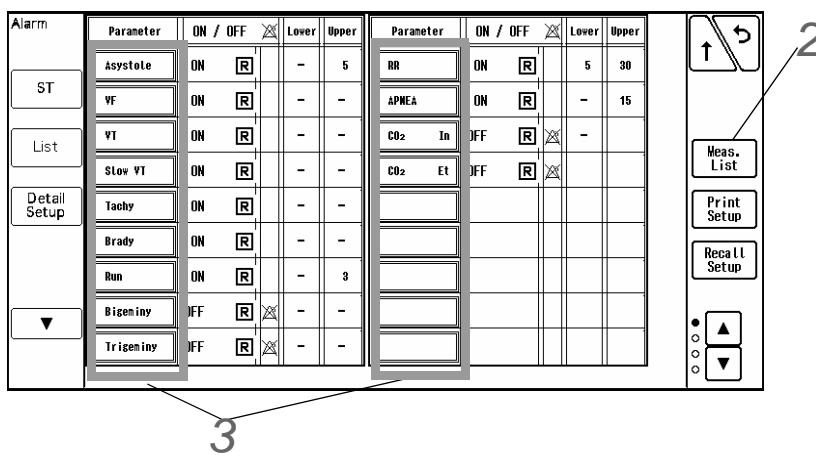
- ▶ Alarm will be set to OFF if the value -20mm / -2.0mV or lower is selected.
- ▶ Alarm will be set to OFF if the value +20mm / +2.0mV or above is selected.

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], [List] ("Alarm") key.

- ▶ The alarm settings list will be displayed.



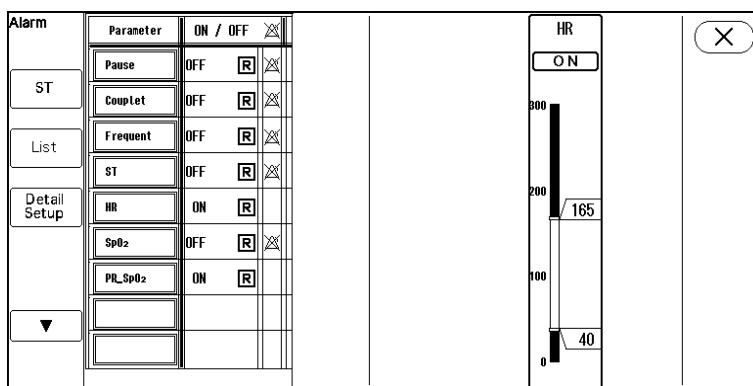
- 2** Select from [All List]/[Meas. List].

- ▶ [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 screen will be displayed.



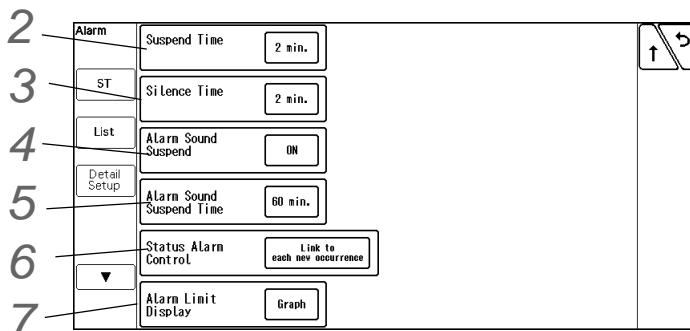
- 2** Press / to set the threshold level.

Detail Setup

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

- 1** Press the [Menu], [Detail Setup] ("Alarm") keys.

► The alarm detail setup screen will be displayed.



- 2** Press the key for "Suspend Time". (To change the setup, a password is required.)

► The dropdown list will be displayed.

- 1** Select from [1min.]/[2min.].

- 3** Press the key for "Silence Time". (To change the setup, a password is required.)

► The dropdown list will be displayed.

- 1** Select from [1min.]/[2min.].

- 4** Press the key for "Alarm Sound Suspend".

► The dropdown list will be displayed.

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

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

- 5** Press the key for "Alarm Sound Suspend Time". (To change the setup, a password is required.)

► The dropdown list will be displayed.

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

- 6** Press the key for "Status Alarm Control".

► The dropdown list will be displayed.

REFERENCE

- ♦ 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)

- 1** Select from [Link to Alarm Silence Time]/[Link to each new occurrence].

► [Link to Alarm Silence Time]: When the [Alarm Silence] key is pressed, alarm will be silenced for fixed amount of time set for "Silence Time".

If the alarm cause still remains at completion of silence time, the alarm sound will generate again.

If the same alarm occurs during the alarm silence time, the alarm sound will not generate.

If the new alarm occurs during the alarm silence time, the alarm sound for the new alarm will generate.

- ▶ [Link to each new occurrence]: When the [Alarm Silence] key is pressed, equipment status alarm will be silenced as long as the alarm cause remains regardless of the "Silence Time" setting.

While the same equipment status alarm is generated, alarm will remain silenced.

If the alarm cause is resolved during the alarm silence time, the alarm will be cancelled.

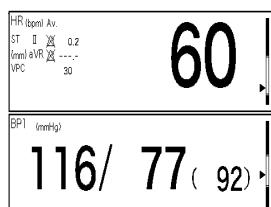
If the same alarm generates again during the alarm silence time, the alarm sound will generate.

7 Press the key for "Alarm Limit Display".

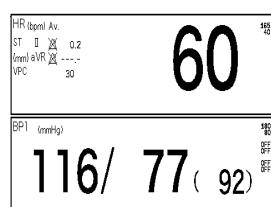
- ▶ The dropdown list will be displayed.

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

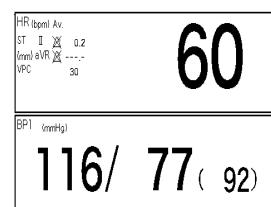
- ▶ The upper and lower alarm limit will be displayed on the home display.



Graph



Numeric



OFF

NOTE

- The alarm limit for the parameter with the alarm turned OFF will not be displayed regardless of this setup.
- If 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 for setting the alarm ON or Suspend, and setting the upper and lower limit to generate the alarm.

On this system, 9 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 (ICU or surgery), and if necessary, perform unique setup for each patient.

To Set the System Alarm (ON or Suspend)

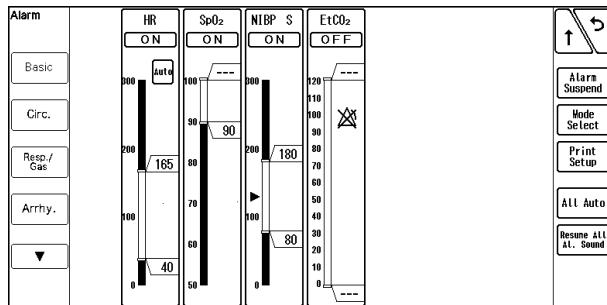
The system alarm can be set to ON or suspend, but it cannot be turned OFF.

WARNING

- 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 system alarm is set to ON. Pay attention when setting them OFF.

1 Press the [Menu], [Basic] or [Circ.] or [Resp./Gas] ("Alarm") keys.

- The alarm setup screen will be displayed.



2 Select whether to turn ON or suspend the alarm.

<To Suspend the Alarm>

1 Press the [Alarm Suspend] key.

- The key will change to blue.
- The alarm will suspend temporarily.
- "Alarm Susp:xxxs" message will be displayed.



REFERENCE

- ♦ "xxxs" indicates the remaining time. The alarm will turn ON when the suspended time completes.

<To Turn ON the Alarm>

1 Press the [Alarm Suspend] key while in alarm suspended condition.

- The key will change to gray.
- The set alarm limits for parameters and ON/OFF will be enabled.
- The alarm suspend condition is cancelled.

To Silence or Suspend the System Alarm Sound

There are two functions to suspend the alarm sound for fixed amount of time, which are "Alarm Silence" and "Alarm Sound Suspend".

The "Alarm Silence" function suspends the alarm sound for fixed amount of time (1 or 2 min.).

The "Alarm Sound Suspend" function suspends the alarm generation at a time such as during operation when the alarm generation is expected. The alarm monitoring continues while in the "Alarm Sound Suspend" condition. The "Alarm Sound Suspend" time can be selected from 1min., 2min., 5min., 10min., 30min., 60min., 90min., 120min., 240min., 360min.,.

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 cause still remains at completion of the silence duration, the alarm sound will generate again.

REFERENCE

- The [Alarm Silence] can also be operated on user keys or remote control.

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

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

When [Fukuda Tone] is set for the "Alarm System", 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, alarm sound will generate.

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

The alarm silence state for all parameters will cease in the event of any of the following.

- When the power is turned ON.
- When the system alarm status (ON/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 state for each parameter will cease in the event of any of the following.

- 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 [Linked to each new occurrence] is selected for "Status Alarm Control", the equipment status alarm sound will not resume after the alarm silence time unless a new status alarm generates.

□Precautions about Suspending the Alarm

If the same alarm occurs during the alarm sound suspend time, the recall or alarm recording will still function.

The Alarm Sound Suspend state 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.

Alarm Limit Setup for Each Parameter

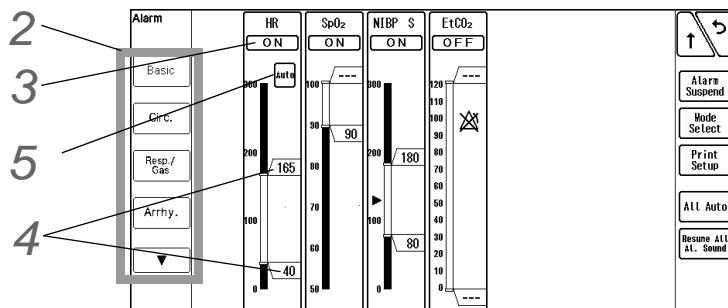
The alarm for each parameter can be turned ON or OFF, and upper and lower alarm limit can be set.

⚠ 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 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 system alarm is set to ON. Pay attention when setting them OFF.

1 Press the [Menu], [Basic] ("Alarm") key.

- The alarm setup screen 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 Set the upper/ lower limit.

- Slide / on the right of the bar.
 - : Adjusts the upper limit.
 - : Adjusts the lower limit.
- When the finger is released from the key, the fine-tune button will appear for a fixed period of time.

REFERENCE

► indicates the current measurement value.

5 Adjust the limit or use [Auto] for automatic setup.

► **Auto**: Sets the upper and lower alarm limit automatically.

<To Store the Alarm Limit>

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" P5-13)

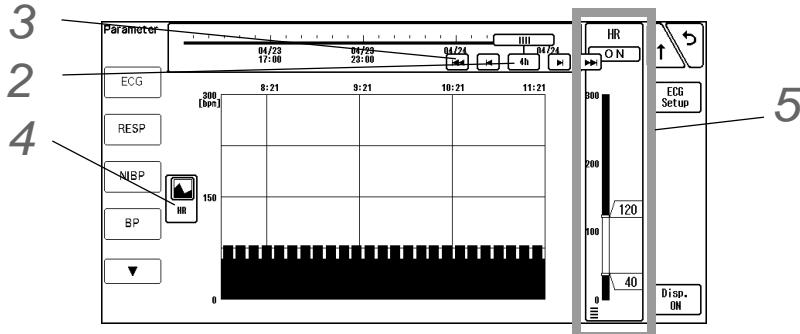
Alarm Limit Range		
Item	Description	
HR/PR_IBP/PR_SpO ₂	ON, OFF	20 to 300bpm
ST1 to ST7	ST All Alarms	ON/OFF
	ST1 to ST12	± 2.0mV, ± 20.0mm Indiv. Alarm ON, OFF
BP1 to BP2	ON, OFF	0 to 300mmHg 0 to 40.0kPa
SpO ₂	ON, OFF	50 to 100%
RR	ON, OFF	5 to 150Bpm
APNEA (Upper Limit)	ON, OFF	10 to 60 sec.
TEMP1 to TEMP4	ON, OFF	30 to 45°C
T _b	ON, OFF	30 to 45°C
NIBP	ON, OFF	10 to 300mmHg 1.5 to 40.0kPa
EtCO ₂	ON, OFF	1 to 100mmHg 0.1 to 13.3kPa 0.1 to 13.3%
InspCO ₂ (upper limit)	ON, OFF	1 to 4mmHg 0.1 to 0.4kPa 0.1 to 0.4%
SpCO Value (Masimo only)	ON, OFF	1 to 40%
SpMet Value (Masimo only)	ON, OFF	1 to 15%
SpHb Value (Masimo only)	ON, OFF	1.0 to 24.5g/dL

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** To display the alarm assist screen, press [Menu], select a parameter, and press "Alarm Assist" on the corresponding parameter setup screen.
Or, press the numeric data box on the home display, and press "Alarm Assist" on the corresponding parameter setup screen.

► The alarm assist screen will be displayed.



- 2** Select the display interval.

- 1** Press the key on the time bar.
► The dropdown list will be displayed.
- 2** Select from [24h]/[16h]/[12h]/[8h]/[4h]/[2h]/[1h]/[10min].

- 3** Scroll the displayed data.

- 1** Scroll the slider left and right.
► Right: Scrolls to the newer data.
► Left: Scrolls to the older data.
- 2** Press the / keys.
► The display will switch by page.
- 3** Press the / keys.
► The display will switch by half page.

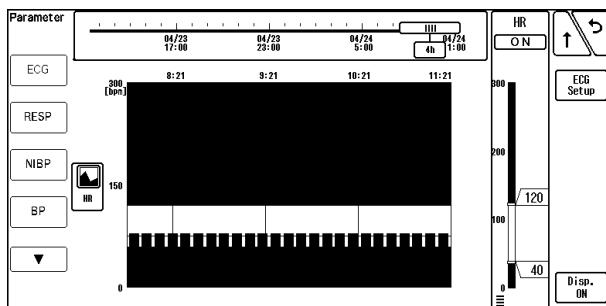
- 4** Select the trend display format.

- 1** Press the key for display format selection.
► The dropdown list will be displayed.
- 2** Select the display format from , , , etc.

- 5** Set the upper and lower alarm limit.

- 1** Press / on the right of the bar.

- Alarm zone will be displayed on the trend.



► The displayed alarm zone will slide by sliding the or .

► The displayed alarm zone will also slide by pressing the / .

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

Chapter 7 Monitoring

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Chapter 7 Monitoring

To Display the Parameter Setup Screen

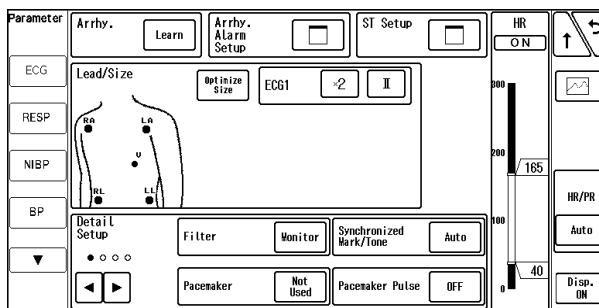
This section explains how to display the monitoring parameters setup screen.

1

Press the [Menu], and then select the parameter to perform the setup.

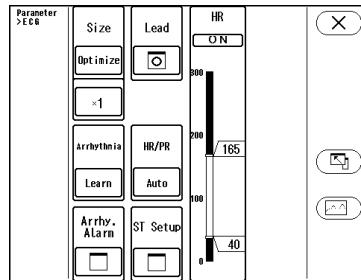
Or, press the numeric data box on the home display, and press  on the corresponding parameter setup screen.

► The "Parameter Setup" screen will be displayed.



NOTE

- When the numeric data box on the home display is pressed, a floating window for the basic setup such as size/scale will be displayed. To display the "Parameter Setup" screen for detailed setup, press .



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

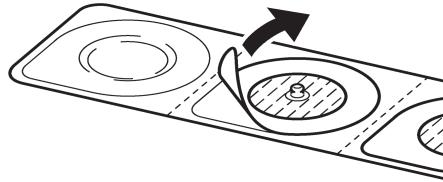
patient's heart.

-
- 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.

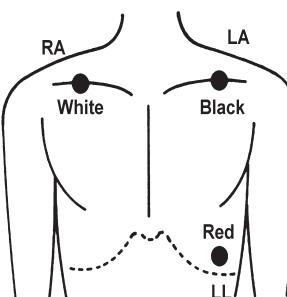
Electrode Placement

Depending on the lead cable type, 3-electrode/4-electrode/5-electrode placements are available. Using the 4-electrode or 5-electrode application allows simultaneous monitoring of 2 ECG waveforms, and high accuracy of arrhythmia analysis can be attained. (1 to 7 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]

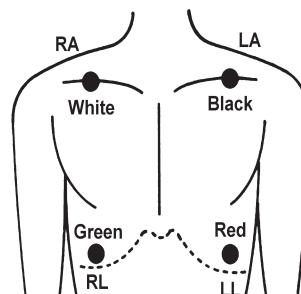
Symbol	Color	Electrode Site
RA	White	On the right infraclavicular fossa
RL	Black	On the left infraclavicular fossa
LL	Red	On the left midclavicular line, near the suprasternal line.



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

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

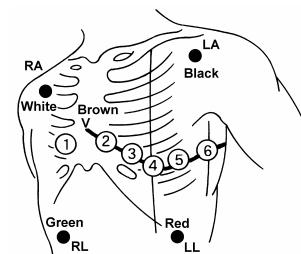
Symbol	Color	Electrode Site
RA	White	On the right infraclavicular fossa
RL	Black	On the left infraclavicular fossa
LL	Red	On the left midclavicular line, near the suprasternal line.
RL	Green	On the right midclavicular line at the same height as LL.



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
RL	Black	On the left infraclavicular fossa
LL	Red	On the left midclavicular line, near the suprasternal line.
RL	Green	On the right midclavicular line at the same height as LL.
V	Red/Brown	Chest Lead (V1 to V6)



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" 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.

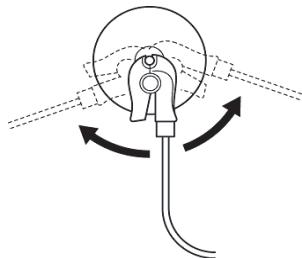
NOTE

- Use only the specified relay cables, lead cables, and electrodes.
- The conductive parts of electrodes and associated connectors for applied parts, including

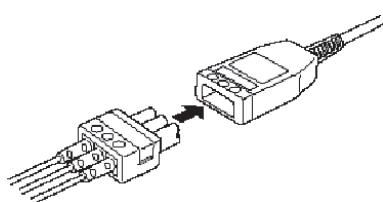
the neutral electrode, should not contact other conductive parts including earth.

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

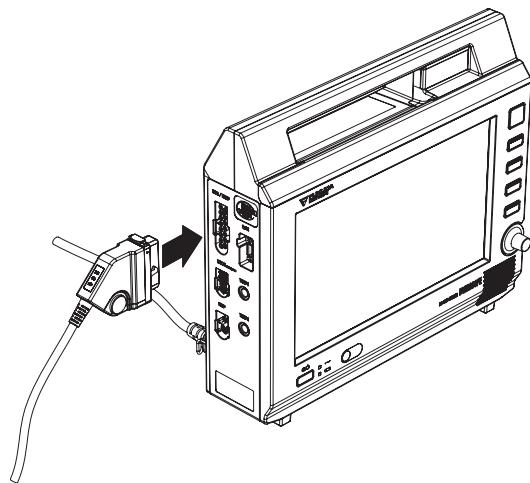
2 Turn right and left to verify that it is securely connected.



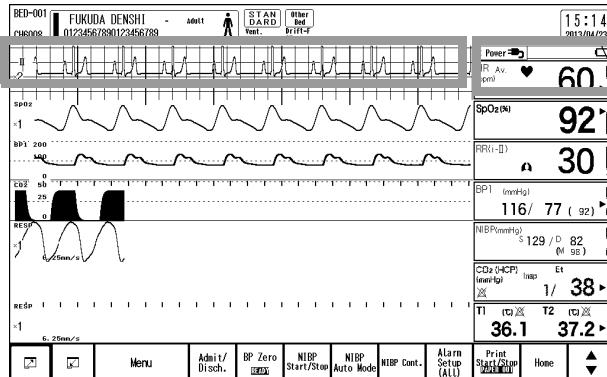
3 Connect the lead cable to the relay cable.



4 Plug in the relay cable to the ECG input connector (green) of the DS-8100.



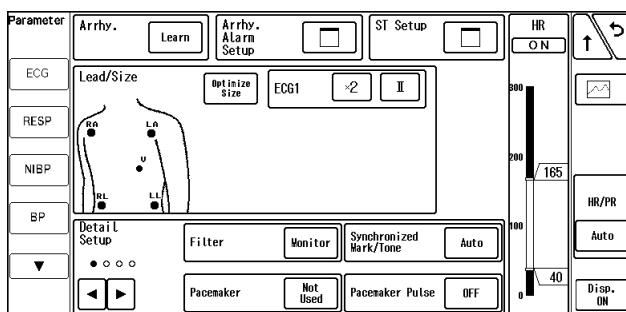
- ECG waveform and HR data will be displayed on the monitor.



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

ECG Parameter Setup

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



□ Adjustment of Waveform Size and Baseline Position

Adjust the waveform size and baseline position.



CAUTION

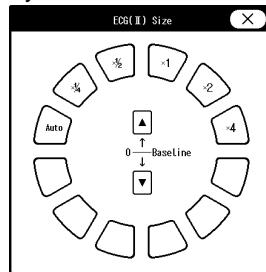
- The arrhythmia detection level and QRS detection changes with ECG waveform size. Set a proper waveform size for monitoring. When the waveform size is 1/4, 1/2, or 1, the detection level is 250µV. When the waveform size is 2 or 4, the detection level is 150µV.
- Automatic size/position of the ECG is effective only at the time the [Auto] key is pressed. This does not continually adjust size and position.
- The waveform size and position cannot be set if the waveform is not displayed. Refer to "To Configure the Display" P10-5, and change the display configuration as necessary.

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" P10-14)

- 1** Press the key for Size of "ECG1" to "ECG7".

- The "RESP Size" screen will be displayed.



2 Select the waveform size for displaying and recording.

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

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

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

REFERENCE

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

□ Lead Selection

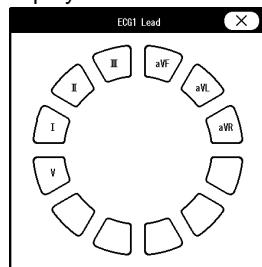
Set the monitoring lead.

⚠ 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.
- Alarm for HR, Tachy, and Brady will not be generated when the electrode for ECG1 or ECG2 lead is detached, and for 30 seconds after the electrode is reattached.

1 Press the key for Lead of "ECG1" to "ECG7".

- 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" P6-10)

NOTE

- Set the upper limit in the range of 22 to 300bpm. If the range is exceeded above 300bpm, the upper alarm will turn OFF.
- Set the lower limit in the range of 20 to 295bpm. If a value below 20bpm is set, the lower alarm will turn OFF.

REFERENCE

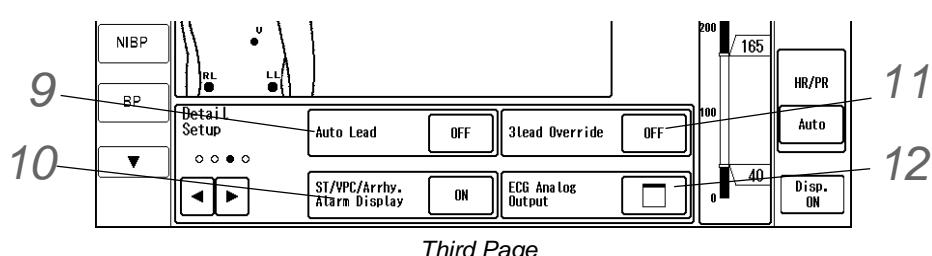
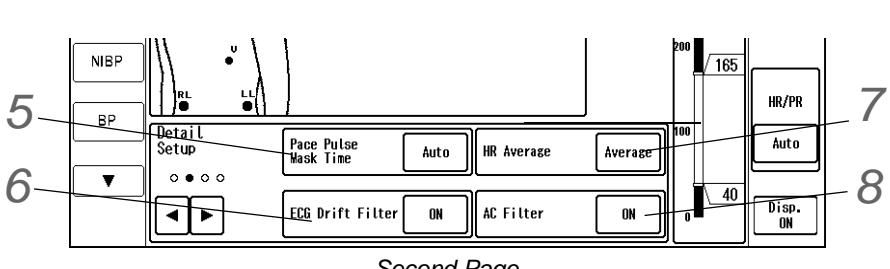
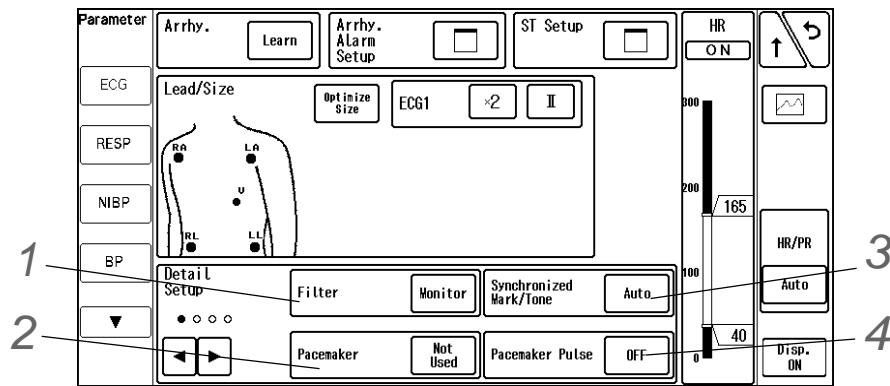
- When [Auto] is set, the upper and lower limit will be automatically set to +40bpm and -40bpm to the current value respectively. The maximum value for the auto lower limit can be forced to [30bpm], [40bpm] or [OFF] on the [HR/PR Low Limit during Alarm Auto Setting] (Menu>Initial Settings>Alarm).

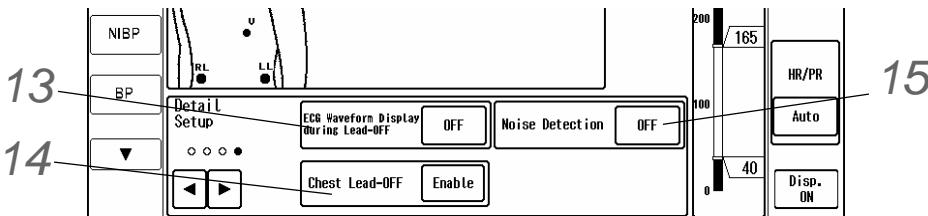
□ Arrhythmia Alarm Setup

Set the arrhythmia alarm.

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

□ Detail Setup





Fourth Page

- 1** Set the filter mode.

CAUTION

- The ESIS mode can largely reduce the artifact such as electrosurgery noise and EMG, but it may also reduce the QRS amplitude.
Using the ESIS mode may erroneously detect the pacemaker spike.
- The ESIS mode should be selected only when a high frequency noise largely affects the HR measurement.

REFERENCE

- Select the filter mode from Monitor Mode, ESIS Mode, or Diagnosis Mode according to the monitoring purpose. Each mode has different frequency characteristic.
- The selected filter mode will be printed along with other data.

Monitor Mode (Frequency Characteristic: Adult / Child 0.5–40Hz, Neonate 1.6–40Hz)	This is the standard mode for ECG monitoring. The highest frequency is set to 40Hz to reduce artifact caused by EMG, etc.
ESIS Mode (Frequency Characteristic: Adult/Child/Neonate 1.6–15Hz)	By selecting this mode during electrosurgery, noise can be largely reduced.
Diagnosis Mode (Frequency Characteristic: 3-electrode Adult/Child/Neonate 0.05–100Hz 4, 5-electrode Adult/Child/Neonate 0.05–150Hz)	Select this mode if ST measurement or high frequency ECG monitoring is performed. As the lowest frequency is set to 0.05Hz, ST level can be accurately measured.

- 1** Press the key for "Filter".

► The dropdown list will be displayed.

- 2** Select from [Monitor]/[ESIS]/[Diag.]

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

- 1** Press the key for "Pacemaker".

► The dropdown list will be displayed.

2 Select from [Used]/[Not Used].

- ▶ [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.

3 Set the "Synchronized Mark/Tone".

1 Press the key for "Synchronized Mark/Tone".

- ▶ The dropdown list will be displayed.

2 Select from [ECG]/[SpO₂]/[BP]/[Auto]/[OFF].

- ▶ [OFF]: Synchronized mark will not be displayed.
- ▶ [Auto]: The priority will be according to the setting of "Synchronized Mark/Tone Priority" [Menu>Initial Settings>Meas.>Other].

(☞ Maintenance Manual "Other Setup" P5-11)

[ECG]: The synchronizing priority will be set in the order of ECG>SpO₂>BP. The synchronized tone will be set to [ON].

[SpO₂]: The synchronizing priority will be set in the order of SpO₂>ECG>BP. The synchronized tone will be set to [ON].

- ▶ [ECG]: HR synchronized mark will be displayed. The synchronized tone will be set to ON.

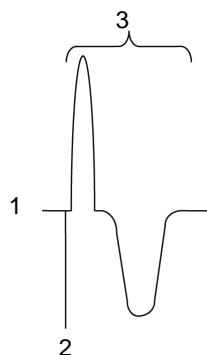
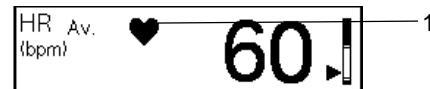
- ▶ [SpO₂]: SpO₂ synchronized mark will be displayed.

The synchronized tone will be set to ON.

- ▶ [BP]: BP synchronized mark will be displayed. The synchronized tone will be set to ON.

1 HR Synchronized Mark

4 Set the "Pace Pulse".



Pacemaker Pulse Detection Algorithm

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 Cancelling of Arrhythmia Detection

Arrhythmia detection of the waveform following the pacemaker pulse will be cancelled.

CAUTION

- ◆ Precautions about Pacemaker Pulse Detection
- ◆ There are some cases when the pacemaker pulse can not be detected depending on

the pacemaker type, pulse voltage, pulse width, electrode lead type (unipolar, bipolar), or electrode placement which causes the pacemaker pulse amplitude to decrease and disables 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.

1 Press the key for "Pacemaker Pulse."

- ▶ The dropdown list will be displayed.

2 Select from [ON] or [OFF].

- ▶ [ON]: The pacemaker artificial pulse will be displayed on to the ECG waveform with a different color.
- ▶ [OFF]: The pacemaker artificial pulse will not be displayed.

REFERENCE

- ♦ "Pacemaker Pulse" will be automatically set to [ON] when [Used] is selected for "Pacemaker" on the "Admit/Discharge" screen.

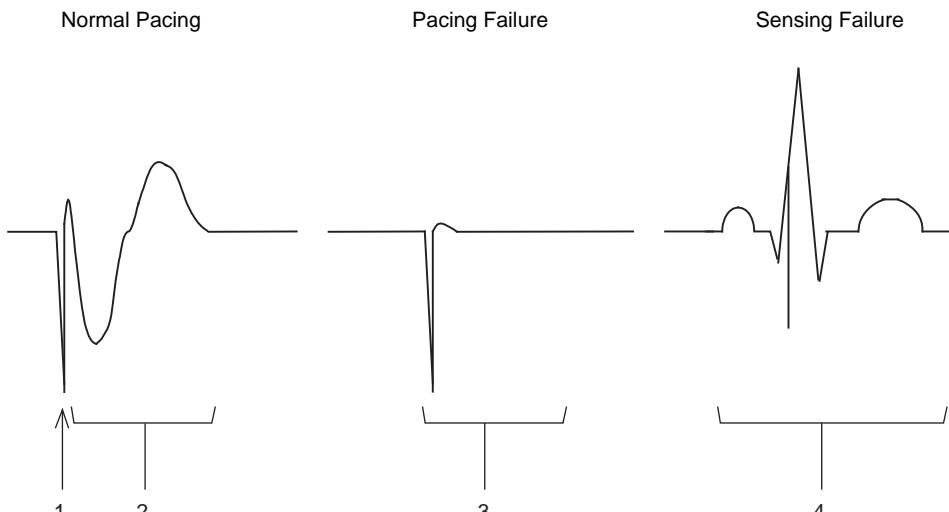
5 Set the "Pace Pulse Mask Time".

⚠ WARNING

- ♦ If the QRS pace mask function is set to [Auto]/ [10ms]/ [20ms]/ [40ms]/ [OFF], the pace pulse may be erroneously be detected as a QRS complex and HR, asystole alarms may not generate due to incorrect HR (counting pace pulse as QRS complex). Select [Auto]/ [10ms]/ [20ms]/ [40ms]/ [OFF] only if you are sure that pacing failure will not occur, or when the patient can be constantly monitored.

REFERENCE

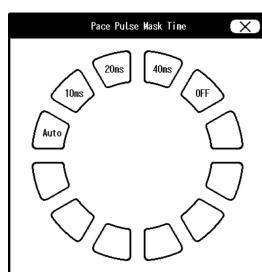
- ♦ For the patients using pacemakers, there are cases when the pacing waveform may not occur in spite of the pacing stimulus. This condition is called "pacing failure". To avoid detecting pacemaker pulses as a QRS complex, this monitor has a function to suspend QRS detection for a fixed amount of time 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

1 Press the key for "Pace Pulse Mask Time".

- ▶ The "Pace Pulse Mask Time" selection window will be displayed.



2 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 0ms.

6 Set the "Drift Filter".

1 Press the key for "ECG Drift Filter".

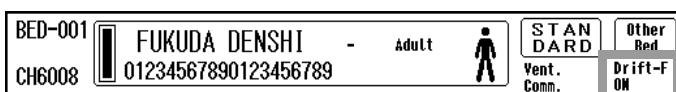
- ▶ The dropdown list will be displayed.

2 Select from [ON] or [OFF].

- ▶ [ON]: Only the amplitude with frequency component under 1Hz will be attenuated to prevent the ECG baseline drift.

The patient signal display will delay about 0.5 seconds.

On the information area of the home display, "Drift-F ON" will be displayed.



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

7 Set the "HR Average".

1 Press the key for "HR Average".

- ▶ The dropdown list will be displayed.

2 Select from [Inst.]/[Ave.].

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

8 Set the "AC Filter".

REFERENCE

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

1 Press the key for "AC Filter".

- ▶ The dropdown list will be displayed.

2 Select from [ON] or [OFF].

- ▶ [ON]: AC filter which attenuates the AC noise of 50 to 60Hz will be set.
- ▶ [OFF]: AC filter will not be set.

9 Set the "Auto Lead".

REFERENCE

- ♦ By setting "Auto Lead" to [ON], "LEAD OFF" message will be displayed and a new ECG lead will be automatically set when lead-off condition occurs.
- 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
	RL	II	II
5-electrode	RA/RA+V	III	III
	RL/RL+V	II	II
	V	II	aVR

1 Press the key for "Auto Lead".

- ▶ The dropdown list will be displayed.

2 Select from [ON] or [OFF].

- ▶ [ON]: When lead-off condition occurs, the lead will automatically switch.
The "LEAD OFF" message will be displayed.
- ▶ [OFF]: The lead will not automatically switch even when lead-off condition occurs.

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

1 Press the key for "ST/VPC/Arrhy. Alarm Display".

- ▶ The dropdown list will be displayed.

2 Select from [ON] or [OFF].

- ▶ [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.

11 Set the "3lead Override".

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 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-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 RL, RA and LL.

1 Press the key for "3lead Override".

- ▶ The dropdown list will be displayed.

2 Select from [ON] or [OFF].

12 Set the "ECG Analog Output".

1 Press the key for "ECG Analog Output".

- ▶ The "ECG Analog Output" window will be displayed.

2 Select the lead to 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.

13 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.

1 Press the key for "ECG Waveform Display during Lead-OFF".

- ▶ The dropdown list will be displayed.

2 Select from [ON] or [OFF].

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

- ▶ [OFF]: Baseline will be displayed during lead-off condition.

14 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.

1 Press the key for "Chest Lead-OFF".

- ▶ The dropdown list will be displayed.

2 Select from [Enable] or [Disable].

- ▶ [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.

15

Set the "Noise Detection".

When a noise generating from electrosurgery, body motion, etc. is detected, whether or not to retain the HR data before the noise detection and to switch the synchronizing source to SpO₂/BP can be selected.

1 Press the key for "Noise Detection".

► The dropdown list will be displayed.

2 Select from [ON] or [OFF].

► [ON]: HR data before the noise detection will be retained, and synchronizing source will switch to SpO₂, BP.

► [OFF]: HR data before the noise detection will not be retained, and synchronizing source will not switch to SpO₂, BP.

NOTE

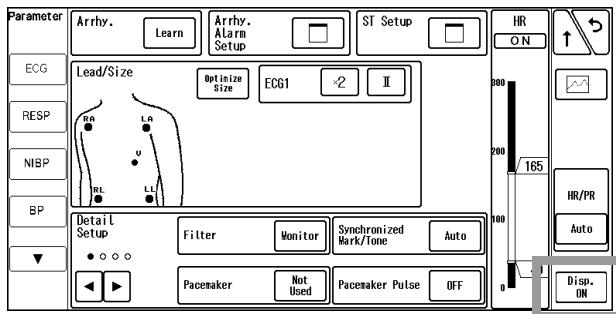
- Even if the synchronizing source is switched to SpO₂, the ECG tone will remain and not change.

□ ON/OFF of Parameter Display

Select ON/OFF for parameter display.

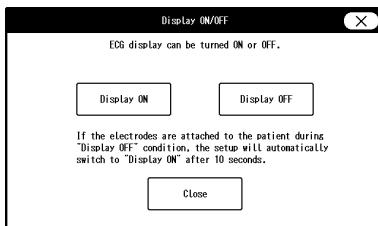
⚠ CAUTION

- 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.

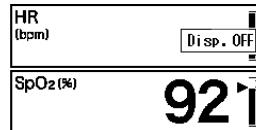
**2**

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.

A message will be displayed inside the numeric data display area.



REFERENCE

- 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

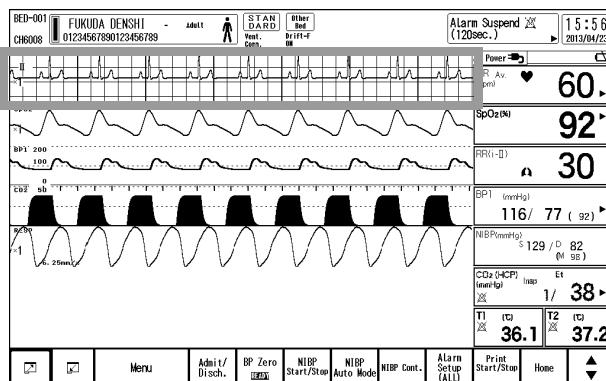
This section explains about the respiration measurement by the impedance, CO₂, or ventilator method and the measurement condition settings.

⚠ 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.

Respiration Monitoring (Impedance Method)

- 1** Check that the displayed ECG waveform is stable.

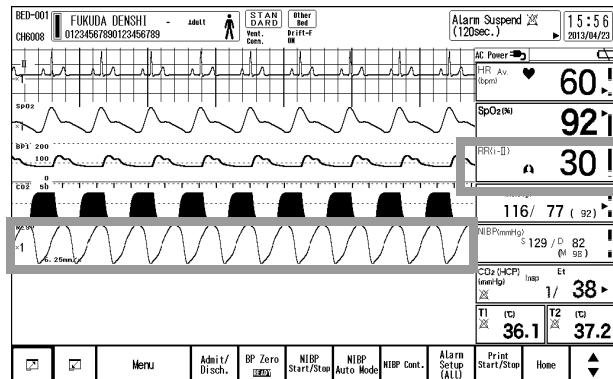


REFERENCE

- 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.

2

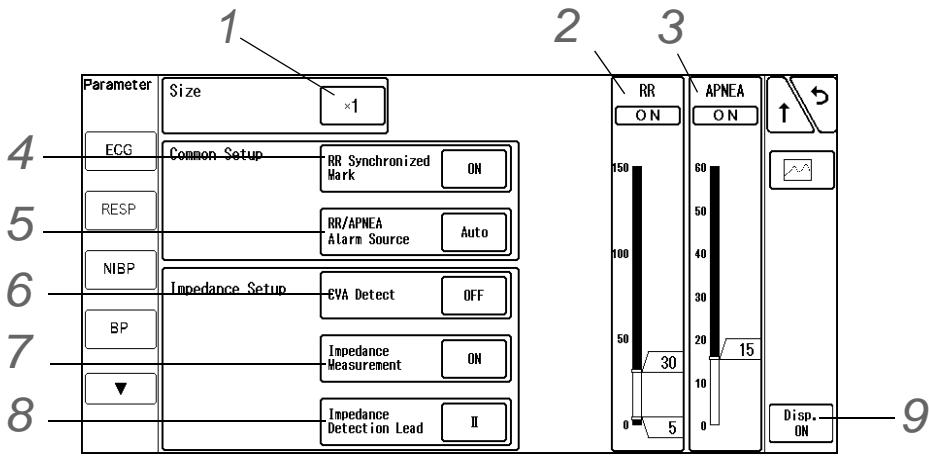
Verify that the respiration waveform and respiration rate is displayed on the home display.

**NOTE**

- Adjust the waveform size, baseline position and sweep speed as necessary.
(☞ "To Configure the Display" P10-5)

RESP Parameter Setup

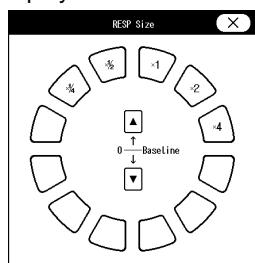
Press the [Menu], [RESP] keys to display the "RESP" setup screen.

**1**

Set the waveform size.

1 Press the key for "Size".

► The "RESP Size" screen will be displayed.



2 Select from [x1/4] / [x1/2] / [x1] / [x2] / [x4].

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

REFERENCE

- If the waveform is difficult to see due to impedance waveform amplitude, set the baseline position to 0Ω . The baseline position for printing will not change.

2

Set the RR alarm.

(☞ "Alarm Limit Setup for Each Parameter" P6-10)

NOTE

- The same RR alarm setting will be applied for impedance, CO_2 , ventilator, and gas unit measurement.
- For RR measured from CO_2 waveform, 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.
- Set the upper limit within the following range for each patient classification.
Adult: 10 to 150Bpm
Child/Neonate: 4 to 150Bpm
The upper limit alarm will turn OFF if the value above 150Bpm is set.
- Set the lower limit within the following range for each patient classification.
Adult: 5 to 145Bpm
Child/Neonate: 2 to 148Bpm
If a value below 5Bpm/2Bpm is set, the lower alarm will turn OFF.
- For the impedance respiration, RR 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 will not generate unless 2 or more respiration is detected after completion of the airway adapter calibration.

REFERENCE

- When [Auto] is set, the upper and lower limit will be automatically set to +20bpm and -20bpm to the current value respectively.
- The adjustable increment for upper and lower limit depends on the patient classification and "RR Alarm Increment" setting under "Initial Settings" > "User I/F".

	Alarm Increment (Initial Settings > User I/F)	
	Normal	Small
Adult	5Bpm increment	1Bpm increment
Child/Neonate	2Bpm increment	1Bpm increment

3

Set the APNEA alarm.

(☞ "Alarm Limit Setup for Each Parameter" P6-10)

NOTE

- The same APNEA alarm setting will be applied for impedance, CO_2 , and ventilator measurement.
- For apnea measured from CO_2 waveform, 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.
- Set the upper limit in the range of 10 to 60 sec. If a value above 60 sec. is set, the upper alarm will turn OFF.

- For the impedance respiration, 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, apnea alarm will not generate unless 2 or more respiration is detected after completion of the airway adapter calibration.

REFERENCE

- If [Auto] is set, the apnea alarm setting registered for the currently selected mode will be applied.
- The upper limit can be set in 1-second increment. There is no lower limit.

4 Set the "RR Synchronized Mark".

1 Press the key for "RR Synchronized Mark".

► The dropdown list will be displayed.

2 Select from [ON] or [OFF].

► [ON]: The mark synchronized to impedance respiration or CO₂ waveform will be displayed.

1 RR Synchronized Mark

► [OFF]: Synchronized mark will not be displayed.



1

5 Set the "RR/APNEA Alarm Source".**⚠ WARNING**

- The RR/APNEA alarm will not be generated unless the numeric data box corresponding to the selected RR/APNEA alarm source is displayed. Make sure to display the numeric data box for the RR/APNEA source.

⚠ 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.

REFERENCE

- The parameter to display the RR synchronized mark and to generate the RR/APNEA alarm can be selected from impedance, CO₂, and ventilator.

1 Press the key for "RR/APNEA Alarm Source".

► The dropdown list will be displayed.

2 Select a parameter.

- [Impedance]: RR alarm will be generated based on the impedance respiration curve. The RR synchronized mark based on impedance respiration will be displayed.
- [CO₂]: RR alarm will be generated based on the RR measured by the HPD-800/HPD-810 (Capnostat 5) or HCP-800/HCP-810. The RR synchronized mark based on CO₂ waveform will be displayed.
- [Ventilator]: RR alarm will be generated based on the RR measured by the ventilator. The RR synchronized mark based on ventilator measurement will be displayed.
- [Auto]: The measurable parameter will be automatically selected in the priority of CO₂>ventilator>impedance, and generates the alarm if the corresponding numeric data box is displayed

on the home display.

6 Set the "CVA Detect".

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 30Bpm and above for more than 20 seconds (10 seconds for neonates) and if the "CVA Detect" is set to [ON], the <CVA detected> message will be displayed, and an alarm sound will be generated.

1 Press the key for "CVA Detect".

► The dropdown list will be displayed.

2 Select from [ON] or [OFF].

► [ON]: When CVA is detected, alarm will generate and message will be displayed.

► [OFF]: CVA detection will not be performed.

7 Set the "Impedance Measurement".

⚠ 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.

1 Press the key for "Impedance Measurement".

► The dropdown list will be displayed.

2 Select from [ON] or [OFF].

► [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.

8 Set the "Impedance Detection Lead".

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

NOTE

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

- 9** Select ON/OFF for parameter display.
 (☞ "ECG Parameter Setup" P7-5)

BP

This section explains about the procedure of BP1 to BP 2 measurement preparation and measurement condition setup.

⚠ CAUTION

- 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

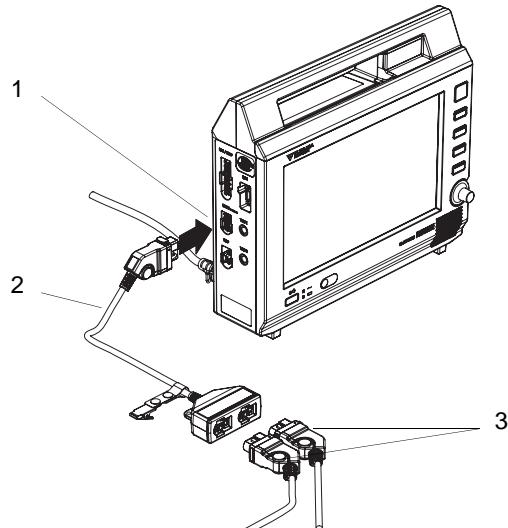
DS-8100 utilizes multiparameter amplifier input method which allows monitoring of 2 channels of BP through the 2ch BP conversion cable, CJO-P01B-DJ0.5. The BP relay cable can be directly connected to the multiparameter connector.

(☞ "Multiparameter Connector Setup for BP, TEMP, CO Measurement" P7-85)

- 1** Connect the BP interface cable to DS-8100.

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

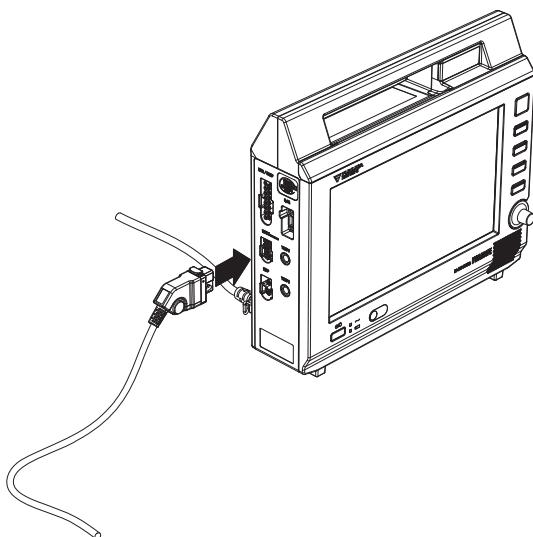
- 1 Connect the interface cable to the multiparameter connector via 2ch BP conversion cable (CJO-P01B-DJ0.5).
 - 1 Multiparameter Connector
 - 2 2ch BP Conversion Cable
CJO-P01B-DJ0.5
 - 3 1ch BP Relay Cable
CJO-P01B-S**



For Direct Connection:

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

- 1 1ch BP Relay Cable
CJO-P01B-S**
- 2 2ch BP Relay Cable
CJO-P01B-D**



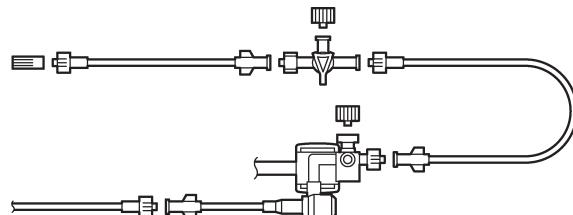
2 Assemble the BP measurement device.

REFERENCE

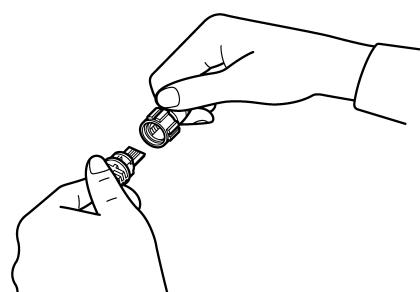
- The following procedure explains the case when a BP transducer (LS575 series) is used.
If using other transducers, refer to the operation manual for the corresponding transducer.

1 Inspect transducer packaging for damage prior to opening.

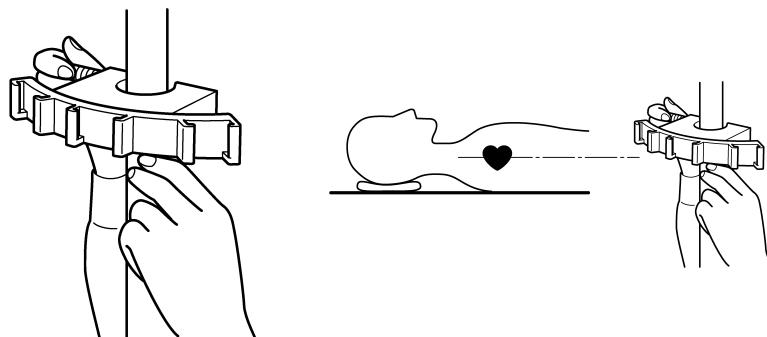
2 Verify that each connector is securely connected.



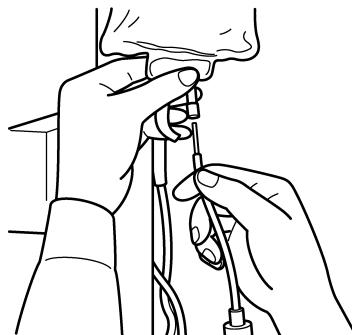
3 Connect the BP relay cable to the transducer.



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

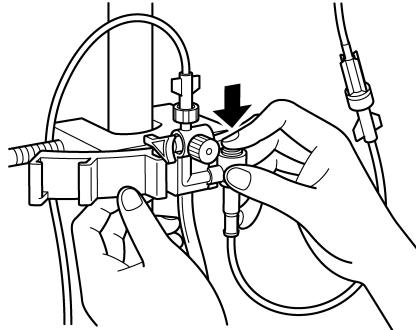


- 5 Inject 1000 units of heparin into the saline bag, mix thoroughly and puncture the infusion line through the same hole.

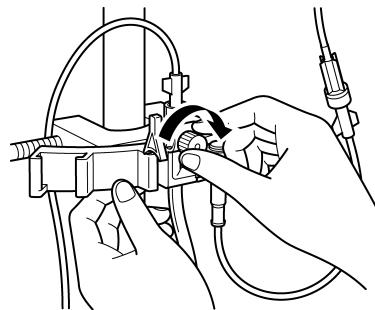


- 6 Set the saline bag to pressure bag, and hang from the infusion device. Fill saline to about 1/3 of the drip.

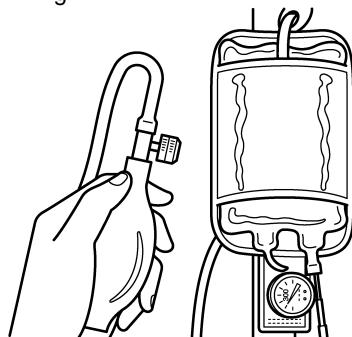
- 7 After loosening the zero-port plug, push the flash button to perform priming to remove air bubbles.



- 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.



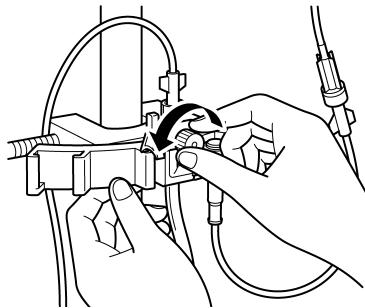
- 9 Inflate the pressure bag to 300mmHg.



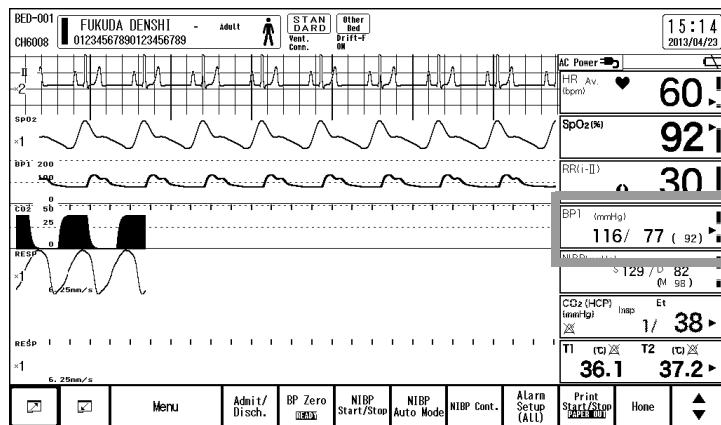
- 10 Set the BP device and wait for about 5 minutes.

- 3 Perform zero balance.

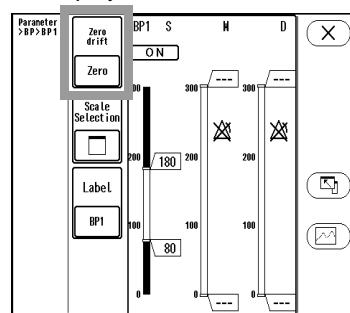
- 1 Loosen the zero-port plug on open-air three-way valve one-half turn.



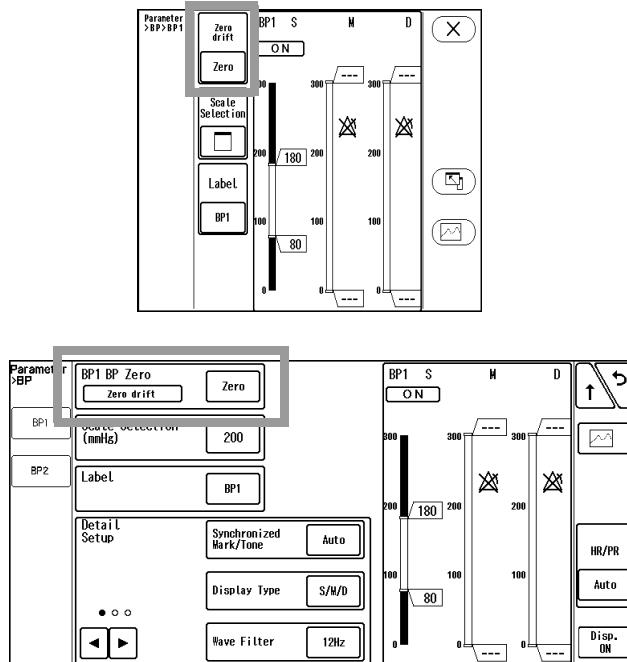
- 2 Press the BP numeric data box (parameter key) on the home display.



► The BP floating window will be displayed.

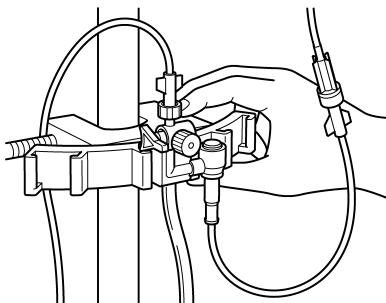


3 Press the [Zero] key on the BP floating window or BP parameter setup screen.

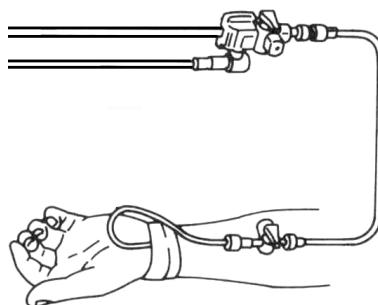


► Zero balance will start.

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



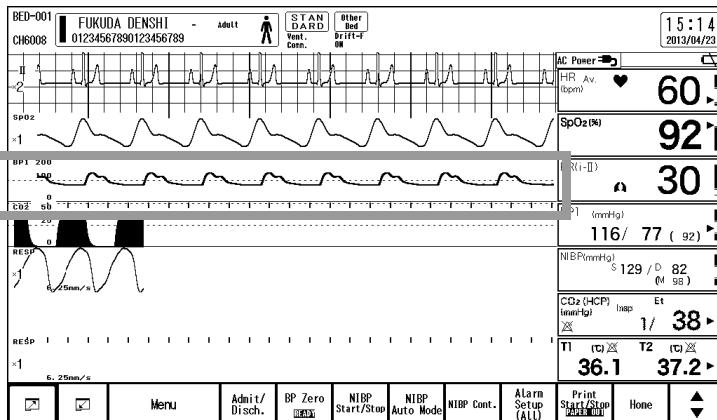
5 Connect the catheter to the end of monitoring line.



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

4 Press the [Home] key on user key or fixed key.

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



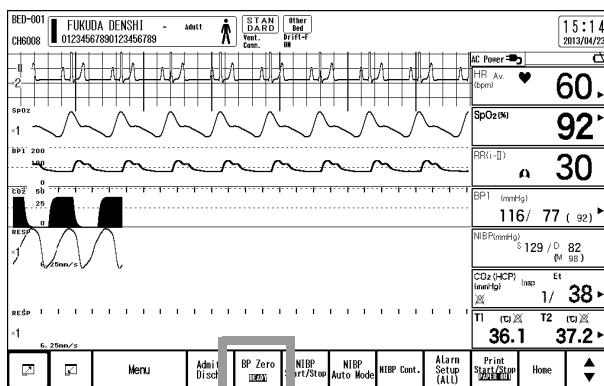
⚠ CAUTION

- 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.



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

► A message, "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.

- ▶ A message, "COMPLETE" will be displayed when the procedure is complete.
- ▶ A message, "FAILED" will be displayed when the process fails.
- ▶ A message, "DRIFT" will be displayed when the BP relay cable is not connected.

NOTE

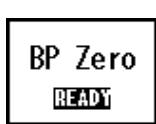
- ♦ If a message, "FAILED" is displayed, the three-way valve may not be opened to air, artifact is present, or the transducer may be defective. Check the cause and try the zero balance procedure again.
- ♦ If a message, "DRIFT" is displayed, verify that all the connections are secure.

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

CAUTION

- ♦ Each time the blood pressure transducer or tubing is replaced, the zero balance procedure is required to ensure accurate measurements.
- ♦ "READY" message 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" message is displayed, check if the three-way valve of pressure transducers are opened to air.

BP zero status displayed inside the user key



No display	: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 of All Pressure Lines ([BP Zero] Key)

By using the [BP Zero] key on the user key area, zero balance can be performed for all the BP channels even if not displayed.

- ♦ When the BP zero balance properly completes, a beep sound will generate for 1 second.
- ♦ When the BP zero balance fails, a beep sound will generate for 3 seconds.

NOTE

- ♦ Using the [BP Zero] key will allow to perform zero balance for all the BP even if not displayed on the home display.
For the BP channel with the transducer in progress of measurement, zero balance will not be performed.

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 BP2, 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.
 - 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.

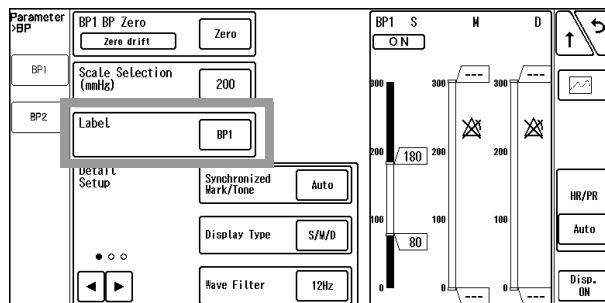
NOTE

- ♦ 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.

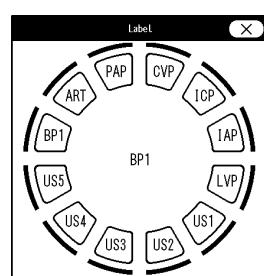
- 4** Close the three-way valve when the zero balance is complete.

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

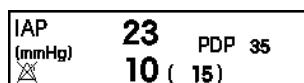
- ♦ Description of Each Label:
ART (Arterial Pressure)
PAP (Pulmonary Artery Pressure)
CVP (Central Venous Pressure)
ICP (Intra-cranial Pressure)
IAP (Intra-aortic Balloon Pumping Pressure)
LVP (Left Ventricular Pressure)
US1 to US5: User labels (3 characters) which can be set on the "Initial Settings".
( Maintenance Manual "User Label Setup" P5-10)

NOTE

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

□ When the BP Label is IAP

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

**⚠ CAUTION**

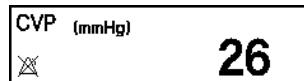
- ♦ Pay attention when monitoring graphic trend, data base, and alarm, as Systolic Pressure (SYS) = Peak Systolic Pressure (PSP).
- ♦ When ECG is not measured, PDP cannot be calculated.

□ When the BP Label is CVP

The measurement unit can be set to "mmHg", "kPa" or "cmH₂O".

The measurement unit can be set on the "Initial Settings". The set measurement unit will be displayed on the BP numeric data box.

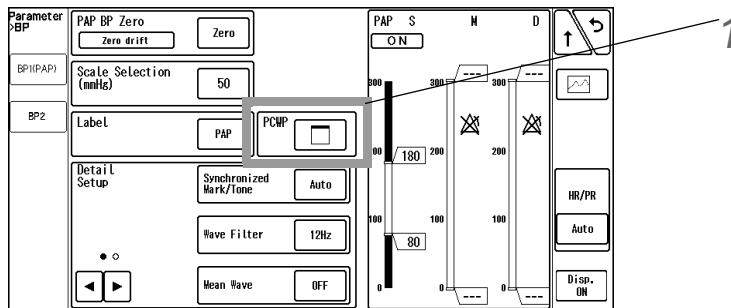
( Maintenance Manual "Measurement Unit" P5-11)

**□ 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 value, the data will not be displayed. Also, alarm cannot be set for CPP.



□ PCWP Measurement

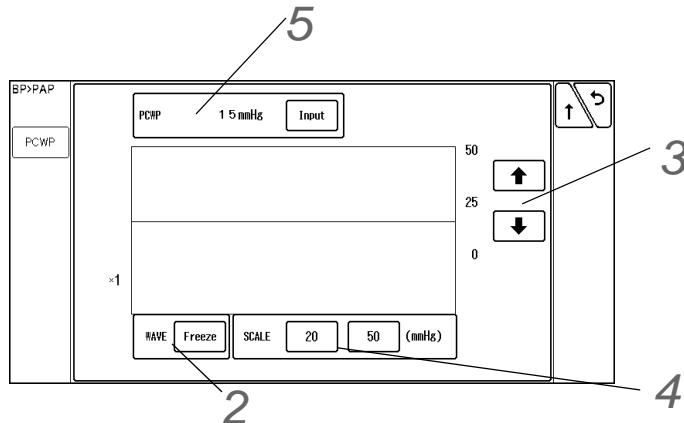


REFERENCE

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

1 Press the key for "PCWP".

- PCWP measurement screen will be displayed.



2 Press the [Freeze] key.

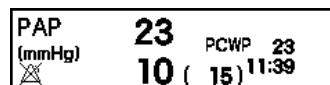
- The displayed waveform will freeze and cursor will be displayed. The cursor position indicates the current mean blood pressure.

3 Use the \uparrow / \downarrow keys to set the PCWP value.

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

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.

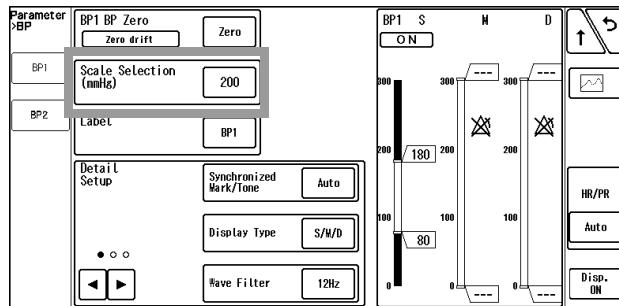
NOTE

- Select the full scale for displaying and printing.
- The scale selection will differ depending on the label as shown below.

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	
BP1 to BP2 User Label				Yes			Yes								
ART, IAP, LVP							Yes								
PAP				Yes		Yes									
CVP		Yes		Yes	Yes										
ICP	Yes	Yes	Yes	Yes			Yes								

REFERENCE

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

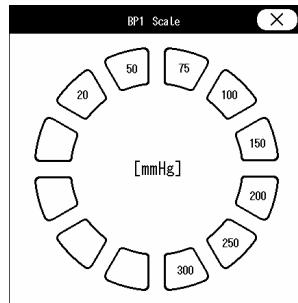


1

Press the key for "Scale Selection".

- The scale selection window will be displayed.

2 Select the scale from the displayed selection.



Alarm

1 Set the BP alarm.

(☞ "Alarm Limit Setup for Each Parameter" P6-10)

NOTE

- Set the upper limit in the range of 2 to 300mmHg/0.2 to 40.0kPa. If a value above 300mmHg/40.0kPa is set, the upper alarm will turn OFF.
- Set the lower limit in the range of 0 to 295mmHg/0 to 39.5kPa. If a value below 0mmHg/0kPa 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

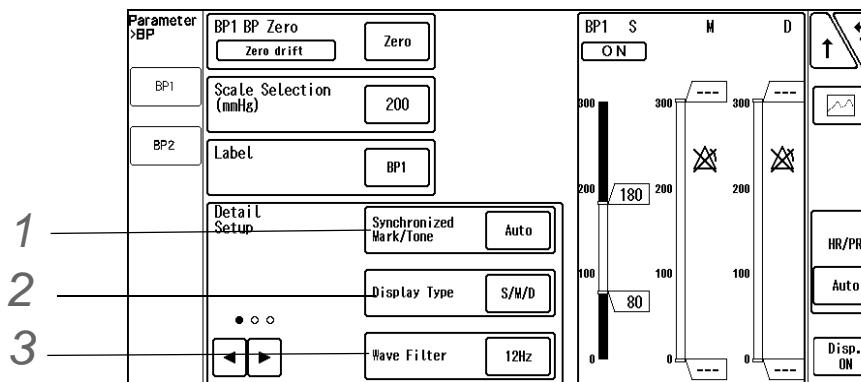
- Select ON/OFF of BP alarm and set the upper and lower alarm limit for systolic (S), diastolic (D), and mean (M) BP.
- The alarm limit should be set for each unit (mmHg/kPa).
- The adjustable increment will be according to the "BP Alarm Increment" setting. (Normal / Small).
(☞ Maintenance Manual "Display/Print Setup" P5-13)
- The adjustable increment for upper and lower limit changes from 50mmHg/7kPa.
- When the BP label is BP1/ART, the upper and lower limit will be automatically set to +40mmHg/+5kPa and -20mmHg/-3kPa respectively to the current value.
- When the BP label is other than BP1/ART, the upper and lower limit will be automatically set to +20%, -20% respectively to the current value.

"BP Alarm Increment" Setup		
	If [Normal] is selected;	If [Small] is selected;
0 to 50mmHg	2mmHg increment	1mmHg increment
50 to 300mmHg	5mmHg increment	
0 to 7.1kPa	0.2kPa increment	0.1kPa increment
7 to 40.0kPa	0.5kPa increment	

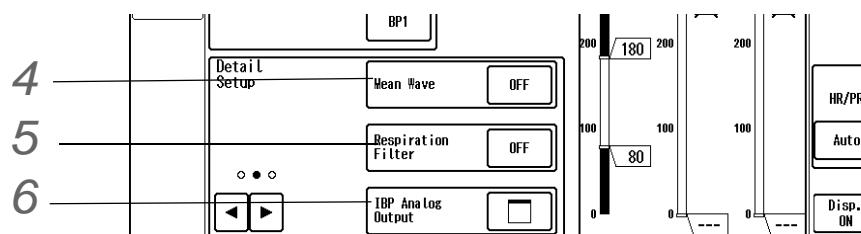
Detail Setup (BP Parameter)

Press the [Menu], [BP] keys to display the "BP" setup screen.

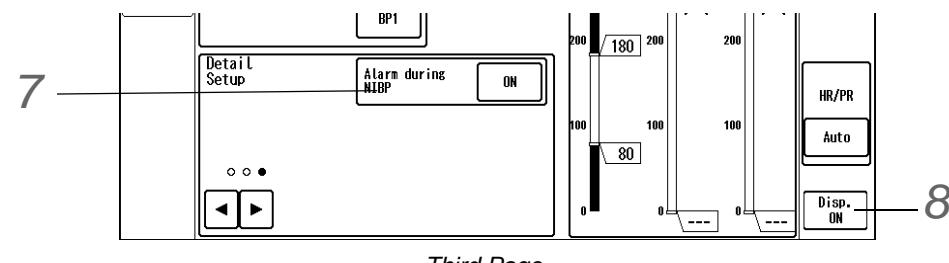
The "BP" setup screen can be also displayed by pressing the detail key  on the BP floating window.



Display Example when BP Label is BP1/ART: First Page



Second Page



Third Page

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

REFERENCE

- The parameter to display the HR synchronized mark can be selected from ECG/SpO₂/BP (BP1 or ART). If BP1 and ART is simultaneously measured, ART will be prioritized.

- 1** Press the key for "Synchronized Mark/Tone".
- The dropdown list will be displayed.
- 2** Select from [ECG]/[SpO₂]/[BP]/[Auto]/[OFF].
- [Auto]: The synchronized mark will be displayed in the priority of "ECG>SpO₂>BP".
 - [ECG]: HR synchronized mark will be displayed.
 - [SpO₂]: SpO₂ 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

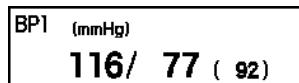
- The display type of BP numeric data can be selected from [S/M/D]/[S/D]/[M]. The undisplayed BP data will not generate a BP alarm.
- If the BP label is CVP, IAP, PAP, ICP, the display type is fixed.

1 Press the key for "Display Type".

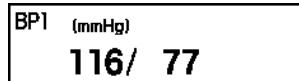
► The dropdown list will be displayed.

2 Select from [S/M/D]/[S/D]/[M].

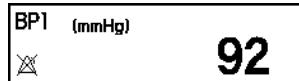
► [S/M/D]: The systolic/mean/diastolic BP value will be displayed.



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



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



3 Set the "Wave Filter".

REFERENCE

- Select the 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.

1 Press the key for "Wave Filter".

► The dropdown list will be displayed.

2 Select from [6Hz]/[8Hz]/[12Hz]/[40Hz].

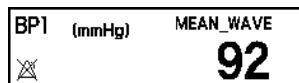
4 Set the "Mean Wave".

1 Press the key for "Mean Wave".

► The dropdown list will be displayed.

2 Select from [ON] or [OFF].

► [ON]: The mean BP waveform will be displayed and "MEAN_WAVE" will be displayed inside the numeric data box.



5 Set the "Respiration Filter".

REFERENCE

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

1 Press the key for "Respiration Filter".

► The dropdown list will be displayed.

2 Select from [ON] or [OFF].

► [ON]: Respiration Filter will turn ON.

► [OFF]: Respiration Filter will turn OFF.

6 Set the "IBP Analog Output".

1 Press the key for "IBP Analog Output".

► The "IBP Analog Output" window will be displayed.

2 Select the signal to output.

7 Set the "Alarm during NIBP".

1 Press the key for "Alarm during NIBP".

► The dropdown list will be displayed.

2 Select from [ON] or [OFF].

► [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 Select ON/OFF for parameter display.

(☞ "ECG Parameter Setup" P7-5)

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 SpO₂ measurement for DS-8100N (NellcorTM) and DS-8100M (Masimo).

SpO₂ Monitoring

WARNING

- ♦ Pulse oximeter should not be used as a replacement or substitute for ECG based arrhythmia

analysis.

- ♦ When measuring the SpO₂ 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 2 to 3°C due to the sensor heat which may result in compression necrosis and burn injury.
- ♦ For the following case, accurate measurement may not be possible.
 - ♦ Patient with excessive abnormal hemoglobin (COHb, MetHb)
 - ♦ Patient with excessive total bilirubin
 - ♦ 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
- ♦ For the following case, loss of pulse signal can occur.
 - ♦ Sensor is too tight.
 - ♦ Patient has hypotension, severe vasoconstriction, severe anemia, or hypothermia.
 - ♦ There is arterial occlusion proximal to the sensor.
 - ♦ Patient is in cardiac arrest or is in shock.
- ♦ Do not connect a sensor 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 equipments may be damaged, resulting in a safety hazard.

 **CAUTION**

- ♦ Make sure to use only the specified sensor/relay cable. Otherwise inaccurate measurements may be caused.
- ♦ Discontinue use if patient sensor is damaged in anyway.
- ♦ 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.
- ♦ Even a short duration of attachment may inhibit the blood flow and generate compression necrosis and burn injury.
- ♦ 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/ low birth weight infant is immature, change the sensor attachment site more frequently depending on the condition.
- ♦ 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).
- ♦ Direct sunlight to the sensor area can cause measurements error. Place a black or dark cloth over the sensor.

- ♦ When not performing the measurement, unplug the relay cable and sensor from the SpO₂ connector. Otherwise, the measurement data may be erroneously displayed by the ambient light.
- ♦ The pulse wave is normalized for SpO₂ measurement. It does not indicate perfused blood volume. Check proper probe attachment by observing the pulse wave.
- ♦ Precautions for Reusable Type Sensor
The light-emitting part of the sensor should be over the root of the fingernail. Do not insert the finger too far into the sensor as it may hurt the patient.
For additional warnings, cautions, or contraindications when using sensors with Nellcor Unit (DS-8100N)/Masimo Unit (DS-8100M), refer to each SpO₂ 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 additional warnings, cautions, or contraindications when using sensors with Nellcor Unit (DS-8100N)/Masimo Unit (DS-8100M), refer to each SpO₂ sensor instruction manual.
- ♦ If "——" is displayed for the SpO₂ numeric data, make sure that the sensor is properly attached.

NOTE

- ♦ SpCO, SpMet, SpHb, PI, PVI, and SpOC are parameters which can be measured only on the DS-8100M. On the DS-8100N, various settings can be performed for these parameters, but measurement cannot be performed.

1

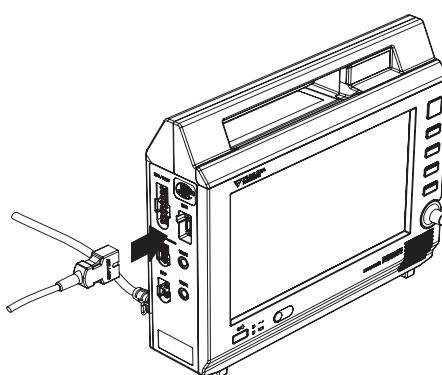
Prepare an appropriate probe or sensor for the patient.

2

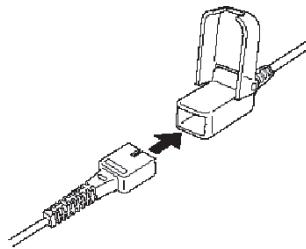
Connect the sensor to DS-8100.

In Case of NellcorTM Unit:

- 1 Connect the DOC-10 SpO₂ Relay Cable to the SpO₂ connector on the DS-8100N.
The illustration is example of connection with DS-8100N.



- 2** Insert the sensor into the SpO₂ relay cable connector, and lock it with the transparent cover.



In Case of Masimo Unit:

- 1** Connect the SpO₂ patient cable (LNOP®, LNCS®, Rainbow®) to the SpO₂ connector on the DS-8100M.

- 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 SpO₂ patient cables (LNOP®, LNCS®, Rainbow®)are for Masimo SET sensor only. Connect them only to the DS-8100M. Otherwise, the equipment will not properly function.

NOTE

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

- 3** Attach the sensor to the patient.

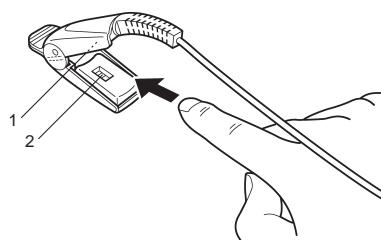
⚠ CAUTION

- 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.

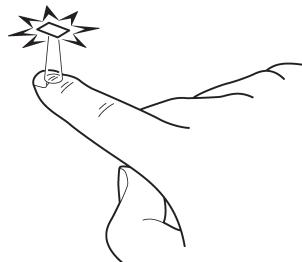
Probe Type Sensor

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

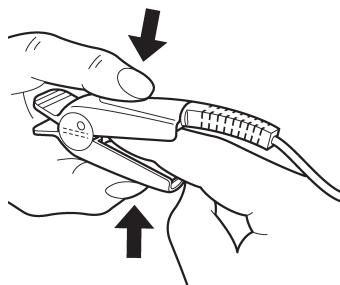
- 1 Light Emitting Part
- 2 Light Receiving part



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



- 3** Press the probe lightly so that the finger and the rubber cover are appressed.



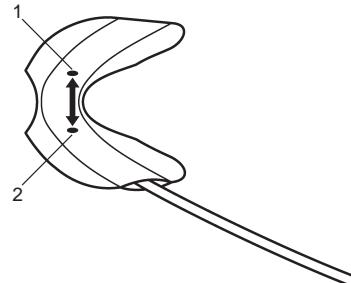
REFERENCE

- This is to stabilize the probe, and to avoid ambient light.

Single-use Type

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

- 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.



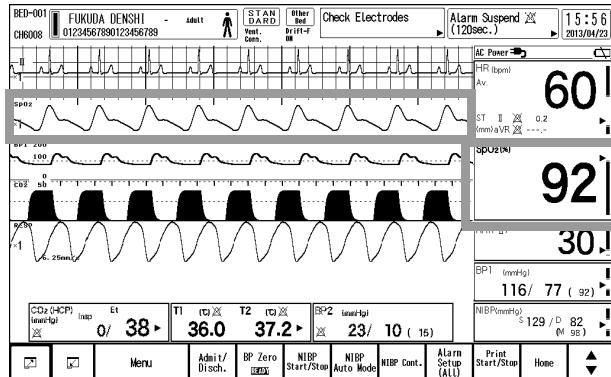
Attachment to the toe



Attachment to the finger

4

Verify that the SpO₂ measurement and SpO₂ 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-8100M.



CAUTION

- The SpCO, SpMet, SpHb, SpOC can be measured only when using the Rainbow series sensor.
However, SpCO, SpMet, SpHb measurements are not possible for some Rainbow series sensor.
SpCO and SpHb cannot be measured at the same time for all the sensors. By using the sensor for SpCO, SpMet, SpHb, SpOC, carboxyhemoglobin concentration (SpCO [%]), methemoglobin concentration (SpMet [%]), total hemoglobin concentration(SpHb [g/dL]) can be measured.
- For details, please refer to our service representative.

REFERENCE

- SpCO, SpMet, SpHb, SpOC measurements are optional function.
- SpCO is a value that represents the percentage of carboxyhemoglobin saturation within the blood.
(☞ "SpO₂ Parameter Setup (Masimo)" P7-42)
- SpMet is a value that represents the percentage of methemoglobin saturation within the blood.
(☞ "SpO₂ Parameter Setup (Masimo)" P7-42)
- SpHb is a measure of the total hemoglobin (SpHb) concentration in arterial blood. It relies on the same principles of pulse oximetry to determine the SpHb measurement.
(☞ "SpO₂ Parameter Setup (Masimo)" P7-42)

1

Select the Rainbow sensor for the patient.

(☞ "Pulse Oximetry Measurement (Masimo)" P13-4)

2

The measurement procedure is the same with that of the SpO₂.

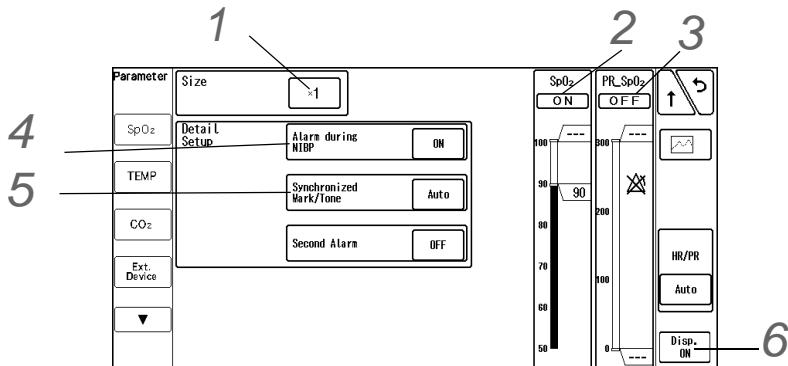
Verify that the SpCO, SpMet, SpHb, SpOC value is displayed on the monitor.

(☞ "SpO₂ Monitoring" P7-34)

SpO₂ Parameter Setup (Nellcor)

This section explains the measurement procedure when using the DS-8100N.

Press the [Menu], [SpO₂] keys to display the "SpO₂" setup screen.

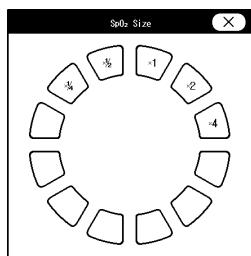


When Using the DS-8100N

1 Set the waveform size.

1 Press the key for "Size".

► The "Size" screen will be displayed.



2 Select from[1/4]/[x1/2]/[x1]/[x2]/[x4].

2 Set the SpO₂ alarm.

(☞ "Alarm Limit Setup for Each Parameter" P6-10)

NOTE

- Whether to use the SEC 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 to 100%. If a value above 100% is set, the upper alarm will turn OFF.
- Set the lower limit in the range of 50 to 99%. If a value below 50% is set, the lower alarm will turn OFF.

REFERENCE

- Also, when the SpO₂ value is unstable around the lower alarm limit, the frequently generated alarm can be corrected by setting the second alarm function.
(☞ "SpO₂ Second Alarm Setup" P6-2)
- When the limit is automatically set, the upper limit will be OFF, and the lower limit will be 90%.
- The upper/ lower limit can be set in 1% increment.
- indicates the current measurement value.

- The following delay occurs for the SpO₂ alarm depending on the patient classification and second alarm setting. (For Nellcor)

	Second Alarm Setup	Patient Classification	
		Adult/Child	Neonate
SpO ₂ Alarm Status Delay	For all settings	About 7 to 9 sec.	About 7 to 9 sec.
SpO ₂ Alarm Signal Delay	OFF	About 5 sec.	0 sec.
	10	About 5 to 7 sec.	About 5 to 7 sec.
	25	About 11 to 13 sec.	About 11 to 13 sec.
	50	About 19 to 22 sec.	About 19 to 22 sec.
	100	About 36 to 38 sec.	About 36 to 38 sec.

3 Set the PR alarm.

(☞ "Alarm Limit Setup for Each Parameter" P6-10)

NOTE

- Set the upper limit in the range of 22 to 300bpm. If the range is exceeded above 300bpm, the upper alarm will turn OFF.
- Set the lower limit in the range of 20 to 295bpm. If a value below 20bpm is set, the lower alarm will turn OFF.

REFERENCE

- When [Auto] is set, the upper and lower limit will be automatically set to +40bpm and -40bpm to the current value respectively.
- 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 Status Delay: <Adult/Child/Neonate> About 5 to 6 sec.
 - PR Alarm Signal Delay: <Adult/Child> About 5 sec., <Neonate> 0 sec.

4 Set the "Alarm during NIBP".

NOTE

- During the NIBP measurement, the cuff inflation restricts the blood flow which disables the correct detection of the SpO₂ and PR, and may generate an improper alarm.
- Selecting [OFF] for "Alarm during NIBP" will not generate the SpO₂, PR, SpCO (Masimo only), SpMet (Masimo only), SpHb (Masimo only) alarm until the NIBP measurement is complete.

REFERENCE

- This setup can be used when the SpO₂ sensor and the NIBP cuff is placed on the same limb for measurement.

1 Press the key for "Alarm during NIBP".

- The dropdown list will be displayed.

2 Select from [ON] or [OFF].

- ▶ [ON]: Alarm will be generated even during NIBP measurement.
- ▶ [OFF]: SpO₂, PR alarm will not be generated during NIBP measurement.

5 Set the "Synchronized Mark/Tone".

(☞ "BP Parameter Setup" P7-27)

6 Select ON/OFF for parameter display.

(☞ "ECG Parameter Setup" P7-5)

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 SpO₂ will not be displayed either.

REFERENCE

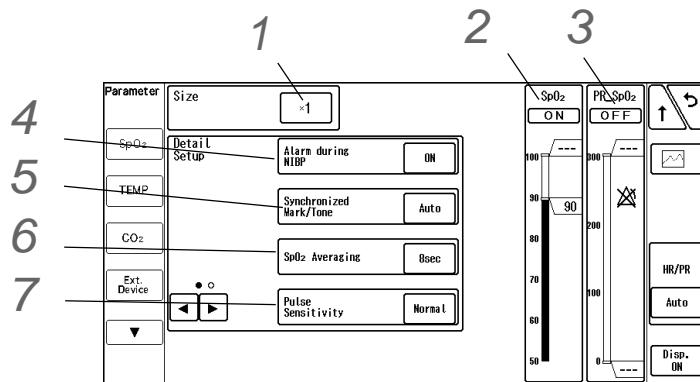
- ♦ When SpO₂ sensor is attached to the patient with the SpO₂ display set to OFF, and SpO₂ is measured for 10 seconds, the pulse wave and numeric data will be automatically displayed.

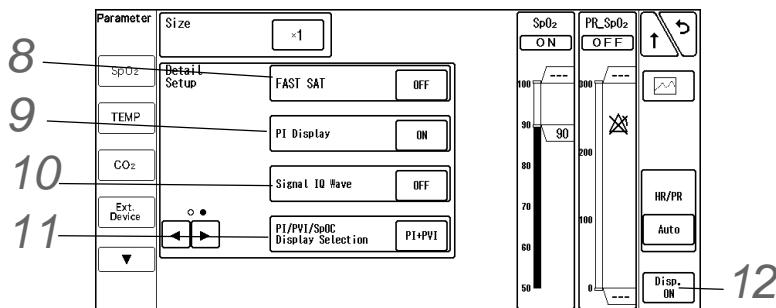
SpO₂ Parameter Setup (Masimo)

This section explains the procedure to set the monitoring condition when using the DS-8100M. Press the [Menu], [SpO₂] keys to display the "SpO₂" setup screen.

REFERENCE

- ♦ This setting is available when using the DS-8100M. PVI, SpCO, SpMet, SpHb, SpOC measurements are optional function.

When Using the DS-8100M SpO₂ Setup: 1st Page

*SpO₂ Setup: 2nd Page*

1 Select the waveform size.

(☞ "SpO₂ Parameter Setup (Nellcor)" P7-40)

2 Set the SpO₂ alarm.

(☞ "SpO₂ Parameter Setup (Nellcor)" P7-40)

REFERENCE

- The following delay occurs for the SpO₂ alarm depending on the patient classification and SpO₂ averaging duration setting. (For Masimo)

	SpO ₂ Averaging	Patient Classification	
		Adult/Child	Neonate
SpO ₂ Alarm Status Delay	For all settings	About 7 to 9 sec.	About 7 to 9 sec.
SpO ₂ Alarm Signal Delay	For all settings	About 5 sec.	0 sec.

3 Set the PR alarm.

(☞ "SpO₂ Parameter Setup (Nellcor)" P7-40)

REFERENCE

- The following delay occurs for the PR alarm depending on the patient classification. (For Masimo)
- PR Alarm Status Delay: <Adult/Child> About 8 to 10 sec. <Neonate> About 7 to 9 sec.
- PR Alarm Signal Delay: <Adult/Child> About 5 sec., <Neonate> 0 sec.

4 Set the "Alarm during NIBP".

(☞ "SpO₂ Parameter Setup (Nellcor)" P7-40)

NOTE

- Selecting [OFF] for "Alarm during NIBP" will not generate the SpO₂, PR, SpCO, SpMet, SpHb alarm until the NIBP measurement is complete.

5 Set the "Synchronized Mark/Tone".

(☞ "BP Parameter Setup" P7-27)

6 Set the "SpO₂ Averaging".

⚠️ WARNING

- Be careful when setting the "SpO₂ Averaging" duration as the SpO₂ alarm is based on the displayed SpO₂ value which is averaged from the duration set in "SpO₂ Averaging". The alarm occurrence time will be affected or may not occur for the transient value of SpO₂ depending on the set duration.

- 1 Press the key for "SpO₂ Averaging".
 - ▶ The dropdown list will be displayed.
- 2 Select from [2-4sec.]/[4-6sec.]/[8sec.]/[10sec.]/[12sec.]/[14sec.]/[16sec.].

NOTE

- To pick up the abrupt change of the value sooner, and to take advantage of the qualities of FAST SAT mode, SpO₂ averaging time will be fixed at [2-4 sec.] when FAST SAT is set ON.

7 Set the pulse detection sensitivity.

- 1 Press the "Pulse Sensitivity" key.
 - ▶ The pulse sensitivity dropdown list will be displayed.
- 2 Select from [High] / [Normal].

⚠️ CAUTION

- If [High] is selected for pulse sensitivity, sensor-detached detection will become somewhat inaccurate.

NOTE

- To improve the low perfusion condition, or to perform fast tracking when the SpO₂ value changes abruptly, select [High].
- For standard use, select [Normal].

8 Set the "FAST SAT".**NOTE**

- To pick up the abrupt change of the value sooner, and to take advantage of the qualities of FAST SAT mode, SpO₂ averaging time will be fixed at [2-4 sec.] when FAST SAT is set ON.

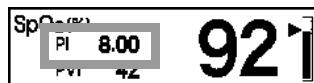
- 1 Press the key for "FAST SAT".
 - ▶ The dropdown list will be displayed.
- 2 Select from [ON] or [OFF].
 - ▶ [ON]: Abrupt change of the SpO₂ value can be monitored.
 - ▶ [OFF]: FAST SAT will be cancelled.

9 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.
- This can be used to find a good perfusion site to attach the sensor. Also, it can be used as diagnosis index to predict the patient's critical condition when at low perfusion.

- 1 Press the key for "PI Display".
▶ The dropdown list will be displayed.
- 2 Select from [ON] or [OFF].
▶ [ON]: PI will be displayed.



- ▶ [OFF]: PI will not be displayed.



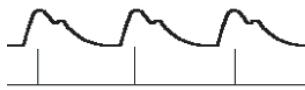
- 10 Set the signal IQ wave display.

NOTE

- The signal IQ wave cannot be printed.

REFERENCE

- The signal IQ wave indicates the signal force and pulse wave timing. The vertical length indicates the signal quality. A low vertical line indicates a bad signal quality.



- 1 Press the key for "Signal IQ Wave".
▶ The dropdown list will be displayed.
- 2 Select from [ON] or [OFF].

- 11 Set the PI/PVI/SpOC display selection.

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.
$$\text{SpOC}(\text{mL/dL}^*) = 1.31(\text{mL O}_2/\text{g Hb}) \times \text{Hb}(\text{g/dL}) \times \text{SpO}_2 + 0.3\text{mL/dL}$$

* When mL O₂/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.

1 Press the key for "PI/PVI/SpOC Display Selection".

► The dropdown list will be displayed.

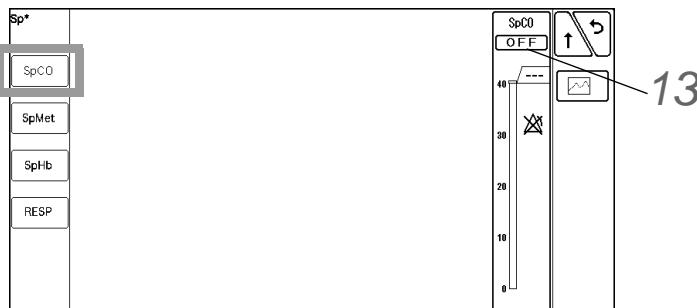
2 Select from [PI+PVI]/[PI+SpOC]/[PVI+SpOC].

12 Select ON/OFF for parameter display.

(☞ "SpO₂ Parameter Setup (Nellcor)" P7-40)

13 Set the SpCO alarm.

Press the [▶], [Sp*], [SpCO] keys to display the SpCO alarm setup screen.



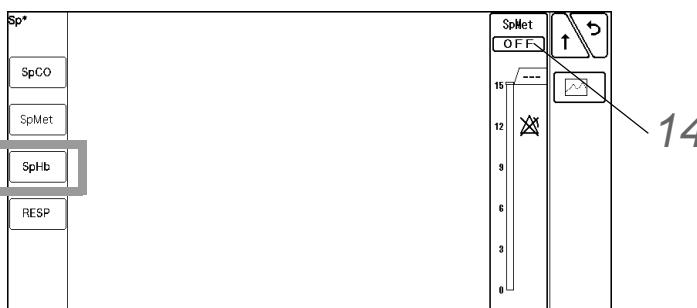
CAUTION

- Set the upper limit in the range of 1 to 40%. If a value above 40% is set, the upper alarm will turn OFF.
- The lower limit cannot be set.
- The automatic alarm cannot be set.

14 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*], [SpMet] keys to display the SpMet alarm setup screen.



CAUTION

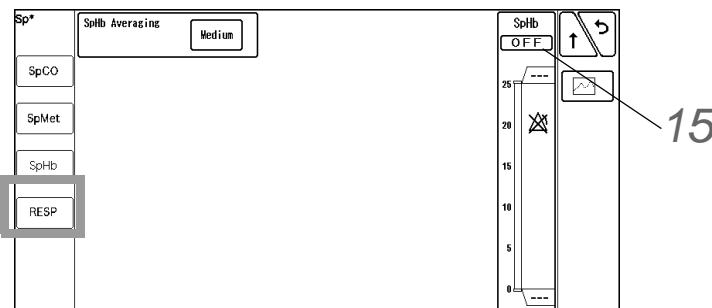
- Set the upper limit in the range of 1 to 15%. If a value above 15% is set, the upper alarm will turn OFF.
- The lower limit cannot be set.

- The automatic alarm cannot be set.

15 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*], [SpHb] keys to display the SpHb alarm setup screen.



CAUTION

- Set the upper limit in the range of 2.0 to 24.5g/dL. If a value above 24.5g/dL is set, the upper alarm will turn OFF.
- Set the lower limit in the range of 1.0 to 24.0g/dL. If a value below 1.0g/dL is set, the lower alarm will turn OFF.
- The automatic alarm cannot be set.

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 300mmHg for adult, 210mmHg for child, and 150mmHg for neonate.
- If used with incorrect patient classification, it will not only cause erroneous measurement, but the inflating level for the adult may be applied to child or neonate which will compromise the safety of the patient.

Lineup of Cuffs

REFERENCE

- According to the AHA (American Heart Association) guideline, the appropriate cuff width is 40% of the arm circumference.
Select the appropriate cuff from the following selections.
For other usable cuffs, refer to the section on "Optional Accessories".

(☞ "Non-Invasive Blood Pressure Measurement" P13-2)

NIBP Monitoring

WARNING

- 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.

CAUTION

- Correct NIBP measurement cannot be performed if artificial heart lung machine is used or if the pulse is difficult to detect.
- Pay attention when measuring the NIBP of patient with bleeding disorders or hyper coagulation. The cuff inflation may cause petechia or circulatory failure by the 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 the NIBP continuous measurement mode 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

1 Select the appropriate cuff type for the patient.

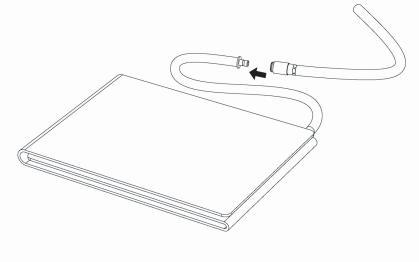
(☞ "Lineup of Cuffs" P7-47)

CAUTION

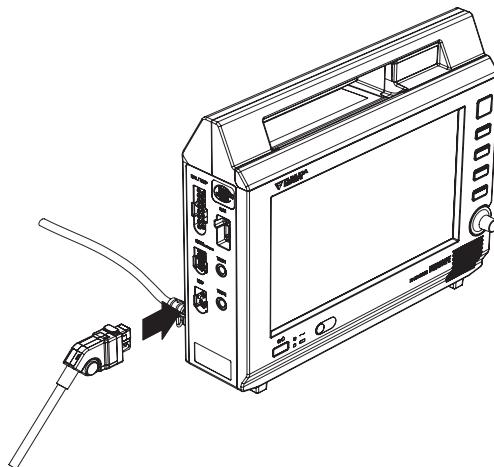
- Select the appropriate cuff size which best fits the arm circumference. If the cuff size is inappropriate, it may cause measurement error.
- Do not use a cuff which is worn out.

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-8100.



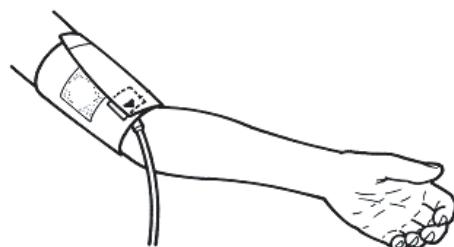
CAUTION

- 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.
DS-8100 automatically determines the patient classification (neonate or adult/child) according to the connected air hose. If the air hose is not connected to the cuff connection connector, the measurement will not start.

4 Apply cuff to the patient.

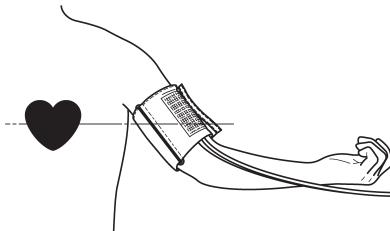


NOTE

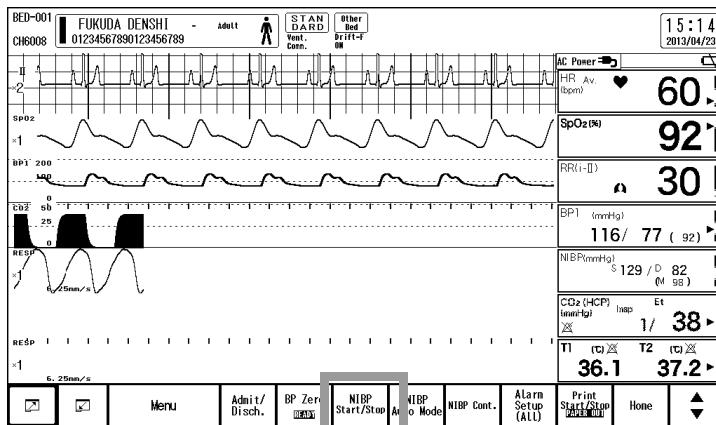
- Position the ARTERY ▼ mark over the artery on the patient's arm and wrap the cuff around.
- One or two fingers should just fit in between the cuff and arm.

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, the measured value will be displayed inside the NIBP numeric data box. The measurement can be also started by pressing the [NIBP Start/Stop] key on the DS-8100. The LED on the fixed key will light during the measurement. After the measurement, the LED on the fixed key will turn OFF, a beep tone will generate for 1 second and the measurement result will be displayed on the monitor.

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 SpO₂ waveform.

Inflation Mode Setup

The maximum inflation value and measurement duration needs to be changed according to the patient classification. Set the appropriate inflation mode (Adult/Child/Neonate) according to the used cuff size on "Admit/Discharge" screen or NIBP parameter setup screen.

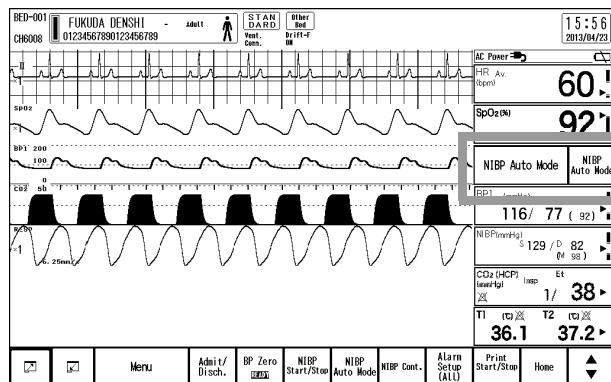
The NIBP measurement on this equipment is provided with forced exhaust system for safety purpose. When the maximum inflation value is reached or when the fixed measurement duration is exceeded, the system will automatically start to exhaust. The maximum inflation value, maximum measurement duration, initial inflation value for this exhaust system is fixed according to the patient classification (Adult/Child/Neonate).

Inflation Mode	Initial Inflation Value	Maximum Inflation Value	Maximum Measurement Duration
Adult	180mmHg	300mmHg	160 sec.
Child	140mmHg	210mmHg	160 sec.
Neonate	110mmHg	150mmHg	80 sec.

NIBP Auto Mode Setup

Non-invasive blood pressure can be measured automatically at selected time intervals.

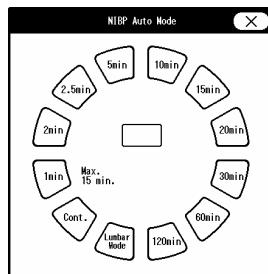
If continuous measurement is started during the NIBP auto mode, the auto mode will automatically resume when the continuous measurement completes.



1

Press the [NIBP Auto Mode] key on the home display.

► The "NIBP Auto Mode" window will be displayed.



2

Select the measurement interval from the displayed selection.

CAUTION

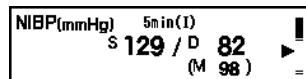
- ◆ When [1min] is selected, the 1-minute interval measurement will start from the time the selection is made.
- ◆ The 1-minute interval measurement will automatically stop after 12 minutes (maximum of 15 minutes when re-measured), and 2.5-minutes interval measurement will start.
- ◆ The continuous mode 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 should be used with sufficient safety measures.

NOTE

- ◆ If [1] minute is selected, 1-minute interval measurement cannot be stopped by pressing the [NIBP Start/Stop] key (Fixed Key or User Key). To stop the 1-minute interval 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.

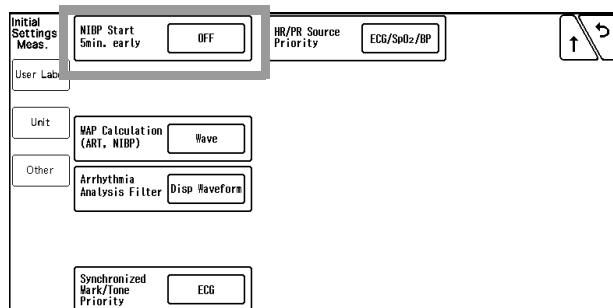
- The measurement will automatically start at selected interval.
- The selected interval will be displayed inside the numeric data box.



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, ...
120min.: 14:00, 16:00, 18:00, ... (The measurement will start at every even hours.)
- When [60min] or [120min] is selected for the interval, the measurement will start 5 minutes before the measurement 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.

[Menu > Initial Settings > Meas. > Other]

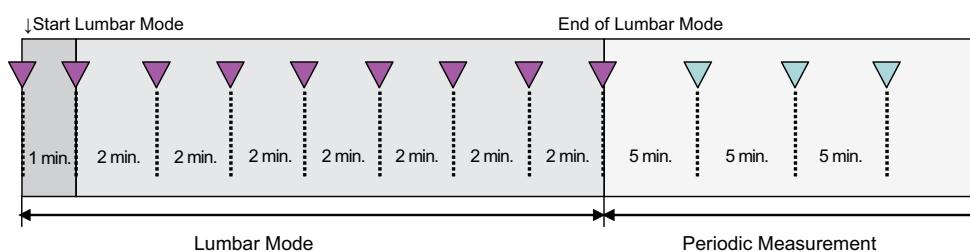


- On the "Initial Settings", whether or not to backup the NIBP measurement interval at discharge/power ON can be selected. (OFF/Backup/OFF→2.5min./OFF→5min.)

□ 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.

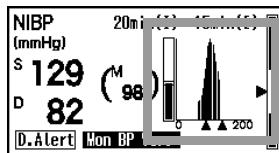
CAUTION

- 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" P7-56)

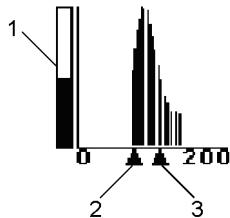


The description of the oscillation graph is as follows.

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-8100N with built-in Nellcor™ 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.

(☞ "Dyna Alert" P7-58)

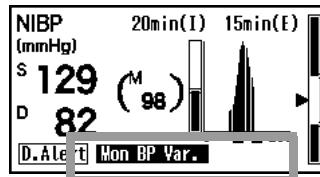
- Patient Classification: Adult (20kg or above)
- Cuff Applied Site: Upper Arm

- SpO₂ Sensor Attachment Site: Fingertip
- NIBP Measurement Interval: 5 to 60 minutes

CAUTION

- When the SpO₂ 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-8100N with built-in Nellcor™ 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
Green	PTG Low Perfusion	PTG amplitude is 200unit or above, and below 800unit.	Enable
	Mon. Variation	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 control software suspends the measurement even when the 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.

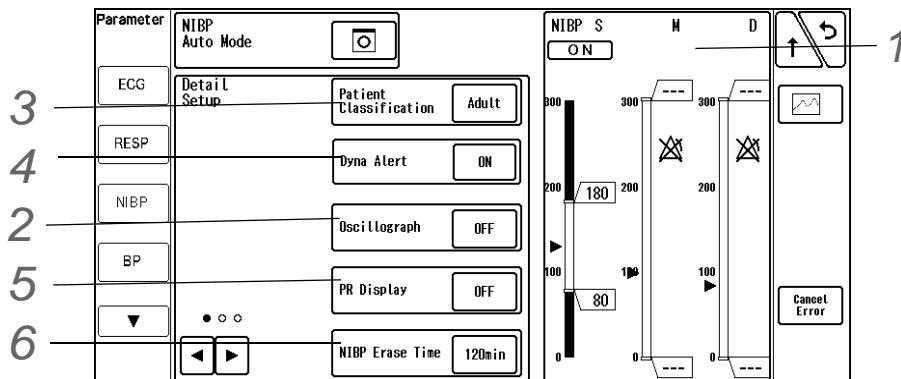
*2: " Measuring BP" indicates the status when IBP (BP1 or ART) measurement is possible and can be displayed on the monitor.

CAUTION

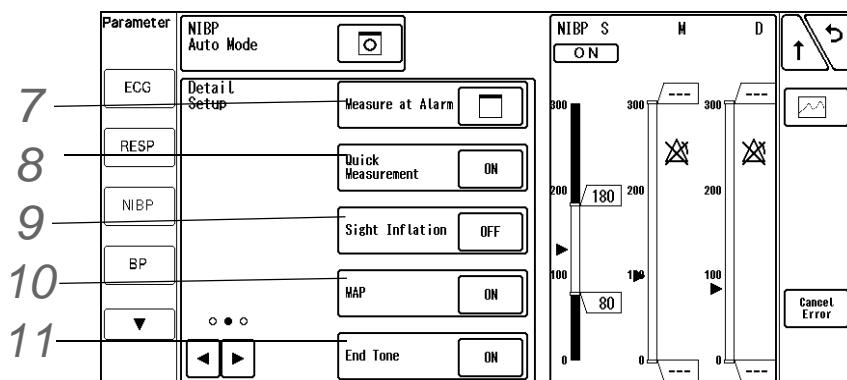
- ♦ When using the Dyna Alert function, be aware of these risks and do not increase the NIBP interval time by relying only on the Dyna Alert function.
- ♦ After the Dyna Alert NIBP measurement, the next Dyna Alert NIBP measurement cannot be performed for 2.5 minutes.
- ♦ The Dyna Alert will not properly function for the following cases.
 - ♦ If peripheral circulatory insufficiency or very low BP is developed.
 - ♦ If highly-frequent arrhythmia is generated.
 - ♦ If an artificial heart lung machine 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

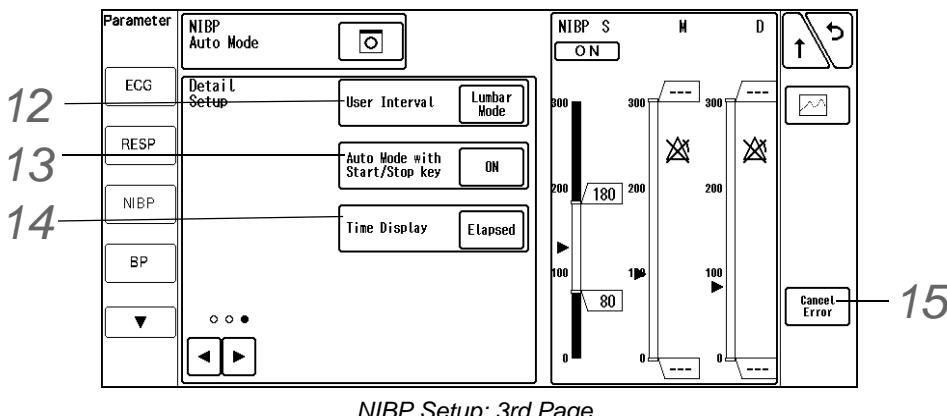
Press the [Menu], [NIBP] keys to display the "NIBP" setup screen.



NIBP Setup: 1st Page



NIBP Setup: 2nd Page



NIBP Setup: 3rd Page

1 NIBP Alarm

(☞ "Alarm Limit Setup for Each Parameter" P6-10)

NOTE

- Set the upper limit in the range of 15 to 300mmHg/2.0 to 40.0kPa. If a value above 300mmHg/40.0kPa is set, the upper alarm will turn OFF.
- Set the lower limit in the range of 10 to 295mmHg/1.5 to 39.5kPa. If a value below 10mmHg/1.5kPa 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 selected, upper alarm limit will be set to +40mmHg/+5kPa to the current value, and the lower alarm limit will be set to -20mmHg/-3kPa to the current value.
- The alarm limit should be set for each unit (mmHg/kPa).
- The upper and lower limit can be set in 5mmHg/0.5kPa increment.

2 Oscillograph 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 HR-810 Recorder Unit.

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.

3 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)



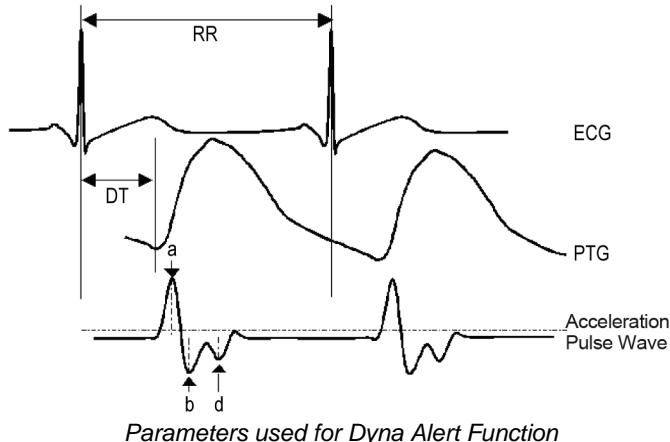
WARNING

- 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.)

4 Dyna Alert

[ON]: Dyna Alert function will turn ON when DS-8100N is used.



CAUTION

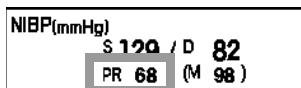
- When the PTG(SpO_2) sensor is applied to the toe or forehead, the circulatory dynamics variation monitoring by the Dyna Alert may not properly function.
- The circulatory dynamics variation monitoring by the Dyna Alert is effective only on the DS-8100N with built-in Nellcor™ module.

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.

5 PR Display

[ON]: PR will be displayed.



NOTE

- PR will be only displayed. It will not generate alarm, or be displayed for the list function.

6 NIBP Erase Time

NIBP data will be erased after the set duration (60min/120min).

7 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.

CAUTION

- If the NIBP measurement has not been performed since the power was turned ON, NIBP measurement at alarm occurrence will not be performed.

REFERENCE

- More than one parameters can be selected.

8 Quick Measurement

[ON]: NIBP measurement will be performed in duration of about 20 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.

9 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.

[OFF]: Sight inflation function will turn OFF.

It will inflate to the target level set according to the previous measurement result.

NOTE

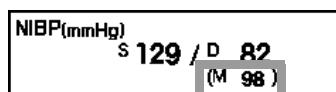
- The sight inflation function can be used only during the NIBP auto mode measurement.
- The sight inflation function cannot be used when the patient classification is "Neonate".
- The sight inflation function cannot be used when performing the 1-minute interval measurement or continuous measurement.
- When performing manual measurement/measurement at alarm occurrence, it will inflate to the fixed value (Adult: 180mmHg, Child: 140mmHg, Neonate: 110mmHg) regardless of the sight inflation setting.

REFERENCE

- 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.

10 Mean BP (MAP) Display

[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.

11

End Tone

[ON]: A buzzer tone will be generated when the NIBP measurement completes.

12

User Interval

The interval is fixed as "Lumbar Mode".

(☞ "About the Lumbar Mode" P7-53)

13

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.

14

Time Display

The time for 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.

15

Cancel Error

By pressing [Cancel Error], the measurement error can be cancelled.

NOTE

- ♦ Make sure that the NIBP measurement can be properly performed after solving the cause of the NIBP system error message.
If the message still remains, equipment failure can be considered.

(☞ "Non-Invasive Blood Pressure" P11-29)

Temperature

This section explains the measurement procedure and measurement condition setup of temperature (T1 to T4).

TEMP Monitoring

- 1** Select the appropriate probe for the patient.

Probe Type

Reusable Type	
	Rectal Temperature Probe (for adult)401
	Rectal Temperature Probe (for child)402
	Body Surface Probe 409B
Probe Cover (disposable)	
	Probe Cover for 401 (x10)

CAUTION

- Do not reuse the probe cover. Use it for only one patient and dispose it after using it.

NOTE

- 700 series temperature probe cannot be used.

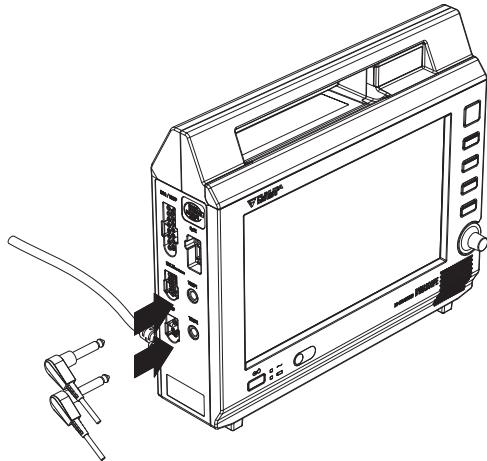
- 2** Connect the probe to DS-8100.

REFERENCE

- The DS-81002 is provided with 2 temperature connectors. T1, T2 will be assigned to these temperature connectors. 2 additional channels of temperature can be monitored by using the multiparameter connector via 2ch temperature relay cable (CJO-P01T-DA**).

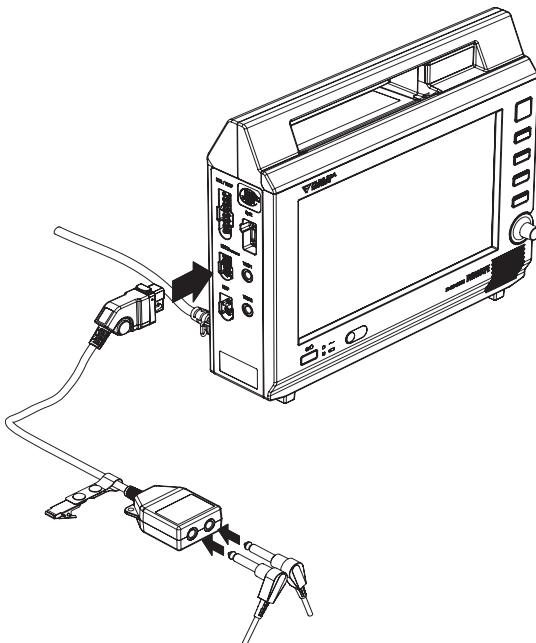
<2ch (T1, T2) Temperature Monitoring>

- 1 Connect the temperature probe to temperature connector (Temp1, Temp2) on the DS-8100.



<4ch (T1, T2, T3, T4) Temperature Monitoring>

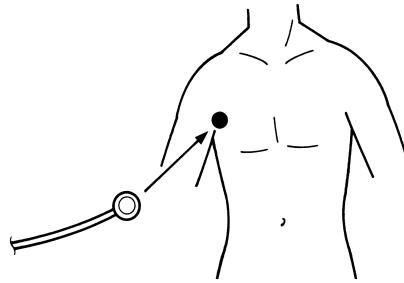
- 1 Connect the 2ch temperature relay cable (CJO-P01T-DA**).
- 2 Connect the temperature probe to the 2ch temperature relay cable.



- 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.

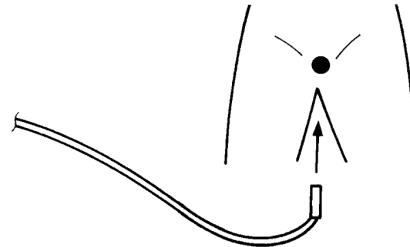


NOTE

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

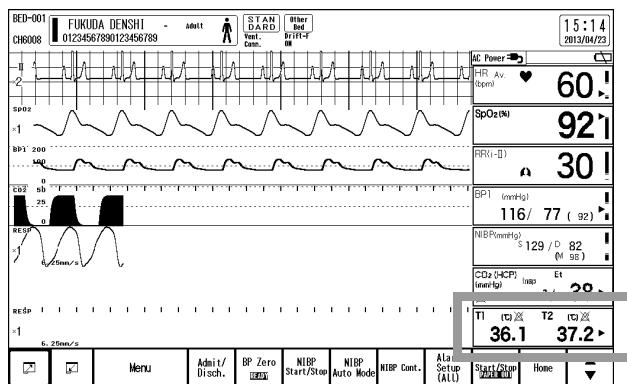


- 4 Check that the temperature is displayed.

1 Press the [Home] key on user key or fixed key.

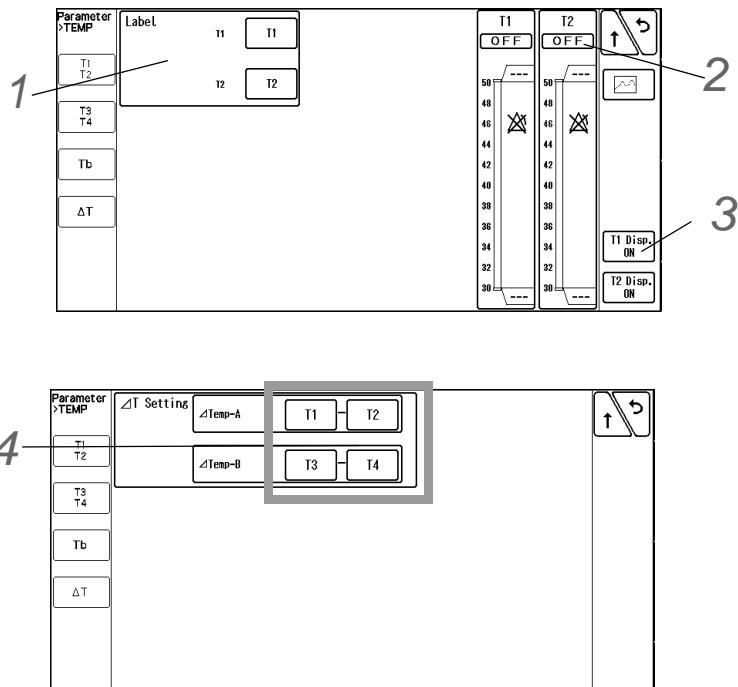
2 Verify that the measured data is displayed on the home display.

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.



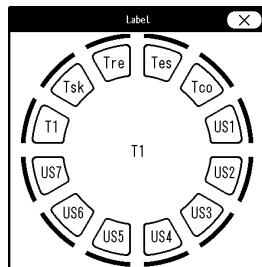
TEMP Parameter Setup

Press the [Menu], [TEMP] keys to display the "TEMP" setup screen.



1 TEMP Label

Select the label from [Tx] to [US7].



REFERENCE

- Description of Each Label:
T1-T4 (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" P5-10](#))

NOTE

- US3 to US7 cannot be selected for the equipment connected to DS-LANII/III.

2 Temperature Alarm

(["Alarm Limit Setup for Each Parameter" P6-10](#))

NOTE

- Set the upper limit in the range of 31.0 to 45.0°C. If a value above 45.0 °C is set, the upper alarm will turn OFF.
- Set the lower limit in the range of 30.0 to 44.0°C. If a value below 30.0 °C is set, the lower alarm will turn OFF.

REFERENCE

- The upper and lower limit can be set in 0.5°C increments.
- When [Auto] is set, the upper and lower limit will be automatically set to +2.0°C and -2.0°C to the current value respectively.

3 Display ON/OFF

(☞ "ECG Parameter Setup" P7-5)

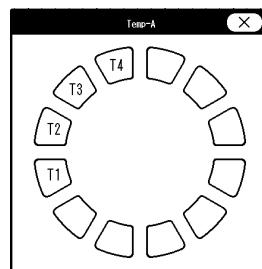
CAUTION

- When the parameter display is set to OFF, the alarm generation and tabular/graphic trend input will also cease.

4 ΔT Display

[ΔT]: ΔT setting screen 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 to 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" P10-5)
- The alarm can not be set for ΔT.

Cardiac Output and Blood Temperature

When thermodilution catheter is used to measure the cardiac output, the blood temperature (T_b) can be monitored. The CO measurement can be performed using the multiparameter connector on the DS-8100. (☞ "Cardiac Output (CO)" P8-37)

Connection with the DS-8100

- 1** Select the catheter relay cable.

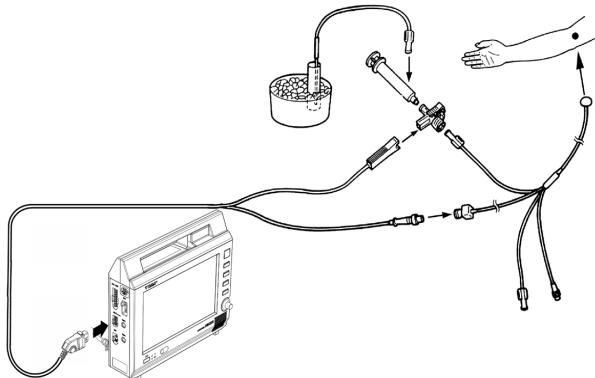
NOTE

- The usable catheter relay cable depends on the injectate temperature measurement method. Select the appropriate cable according to the method.

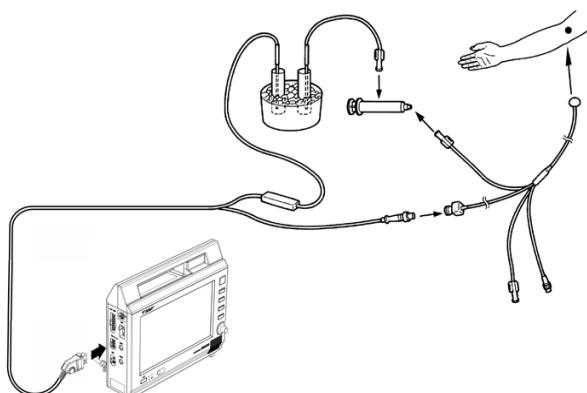
Measurement Method	Catheter Relay Cable
0°C/24°C Temperature	CJO-P01C-C2.4
Flow-through Sensor	CJO-P01C-F2.4
In-line Sensor	CJO-P01C-L2.4
Injectate Temperature Probe	CJO-P01C-T2.4

- 2** Connect the catheter relay cable to the multiconnector on the DS-8100, and connect the catheter to the catheter relay cable.

Example of In-line System



Example of Injectate Probe



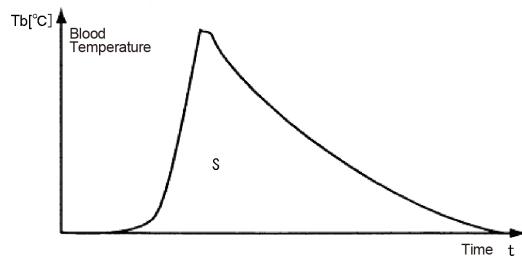
Cardiac Output Measurement Algorithm

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.



$$\text{CO} = 60 \cdot V_i \cdot \frac{S_i \cdot C_i}{S_b \cdot C_b} \cdot \frac{C_t(T_b - T_i)}{S} = CC \cdot \frac{T_b - T_i}{S}$$

CO : Cardiac Output [L/min]

V_i : Injectate Volume [L]

T_b : Blood Temperature [$^{\circ}\text{C}$]

T_i : Injectate Temperature [$^{\circ}\text{C}$]

C_t : Correction coefficient for injectate temperature rise inside catheter

60 : seconds

S : Area of thermodilution curve $\int_0^\infty \Delta T_b(t) dt$ [$^{\circ}\text{C sec}$]

$\Delta T_b(t)$: Temperature change of T_b after "t" seconds. [$^{\circ}\text{C}$]

CC : Catheter Constant (Computation Constant: CC value)

S_i : Specific Gravity of Injectate [g/cm^3]

S_b : Specific Gravity of Blood [g/cm^3]

C_i : Specific Heat of Injectate [$\text{cal}/(\text{g}/^{\circ}\text{C})$]

C_b : Specific Heat of Blood [$\text{cal}/(\text{g}/^{\circ}\text{C})$]

As shown above, cardiac output is directly proportional to the Injectate Volume (V_i) and the difference between Blood Temperature and Injectate Temperature ($T_b - T_i$), and is inversely proportional to the area of the thermodilution curve (S).

□ Hematocrit Value

Hematocrit value of 45%, $(S_i \cdot C_i) / (S_b \cdot C_b) = 1.08$ is programmed for this equipment.

NOTE

- If the hematocrit value is different, an error may be caused in cardiac output measurement.

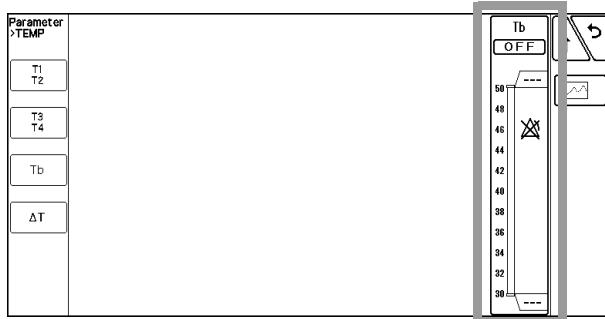
Blood Temperature Alarm Setup

1

Press the [TEMP], [Tb] keys.

(☞ "To Display the Parameter Setup Screen" P7-1)

► The alarm setup screen 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" P6-10)

NOTE

- Set the upper limit in the range of 31.0 to 45.0°C. If a value above 45.0 °C is set, the upper alarm will turn OFF.
- Set the lower limit in the range of 30.0 to 44.0°C. If a value below 30.0 °C is set, the lower alarm will turn OFF.

REFERENCE

- The upper and lower limit can be set in 0.5°C increments.
- When [Auto] is set, the upper and lower limit will be automatically set to +2.0°C and -2.0°C to the current value respectively.

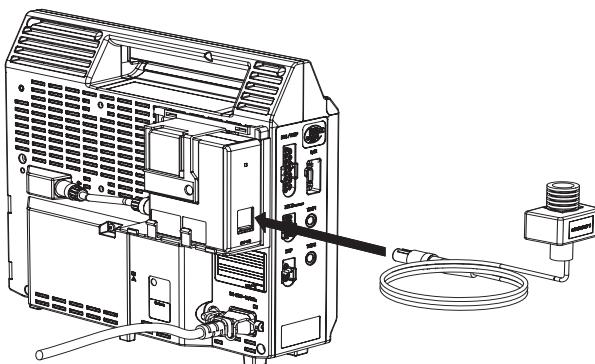
CO₂ Concentration (Mainstream Method)

This section explains about the CO₂ concentration measurement procedure and measurement condition setup when using the RESPIRONICS® Capnostat 5 (Mainstream Method, Gas Unit I/F HPD-800/HPD-810).

Patient Application and Display

By using the HPD-800/HPD-810 Gas Unit I/F, CO₂ measurement by the RESPIRONICS® Capnostat 5 (Mainstream Method) can be performed.

- 1** Connect the HPD-800/HPD-810 Gas Unit I/F to the AUX connector on the DS-8100 and the CO₂ sensor (Capnostat 5) to the CO₂ connector on the HPD-800/HPD-810.



- ▶ The CO₂ sensor will automatically begin warming up.
- ▶ During the warm up period, the message "CO₂ Warming Up" will be displayed on the monitor.
- ▶ When the warm up completes, the message will disappear.

NOTE

- ♦ Warm up process will require minimum of 2 minutes.

REFERENCE

- ♦ The CO₂ sensor requires a warming up process to achieve stable operating temperature.

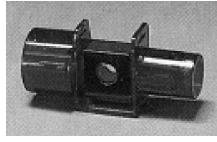
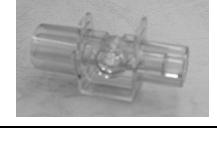
- 2** Prepare an airway adapter suitable for the patient.

**CAUTION**

- ♦ The disposable airway adapter should be opened just before use.
- ♦ Do not reuse the disposable airway adapter. If sterilized, it will become unusable.

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

3 Verify that the warm up is complete, and attach the CO₂ sensor to the airway adapter until a click sound is heard.

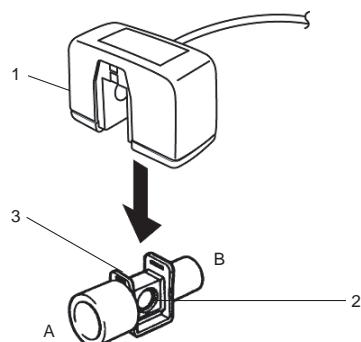
1 Capnostat 5 CO₂ Sensor

2 Window

3 Airway Adapter

A: Thick Side

B: Thin Side



CAUTION

- The airway adapter should be attached with the thicker side facing to the patient. If attached oppositely, it may damage the CO₂ sensor or airway adapter.

4 Perform the setting for the O₂ compensation, N₂O compensation, anesthetic gas compensation, atmospheric pressure
(☞ "CO₂ Parameter Setup" P7-72)

NOTE

- Set these items each time the condition changes.

5 Press the [Menu], [CO₂] ("Parameter"), [Calibrate Airway Adapter] keys and perform the airway adapter calibration.

- The calibration will start.
- During Calibration: "Zeroing" message will be displayed.
- At Completion: A tone will be generated, and "Cal. complete" message will be displayed.

- ▶ When Failed: A tone will be generated, and "Cal. error" message 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 CO₂ Adapter" or "Check airway adapter." message is displayed.
- A clean airway adapter must be used.
If reusing an airway adapter, clean and air-dry it. Then, wipe the window with swab, and sterilize (EOG, etc.) before use.
- During the calibration, the measurement data will not be displayed but 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 next 20 seconds and perform calibration again.
- When "Cal error" message is displayed, perform the airway adapter calibration again.

6

Verify that the airway adapter calibration is properly completed, disconnect the CO₂ sensor from the airway adapter temporarily, and attach the airway adapter to the patient's respiration circuit.

7

Connect the CO₂ sensor to the airway adapter.

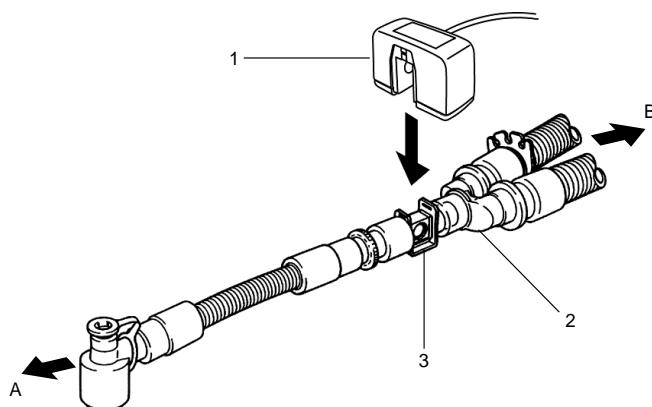
1 Capnostat 5 CO₂ Sensor

2 Y-Piece

3 Airway Adapter for Adult

A: Patient Side

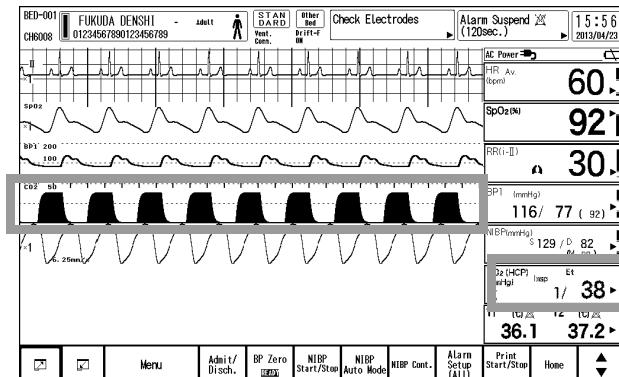
B: Equipment Side

**NOTE**

- Attach the airway adapter between the patient's circuit Y-piece and intubation tube.
- The CO₂ sensor should be facing upward.

8

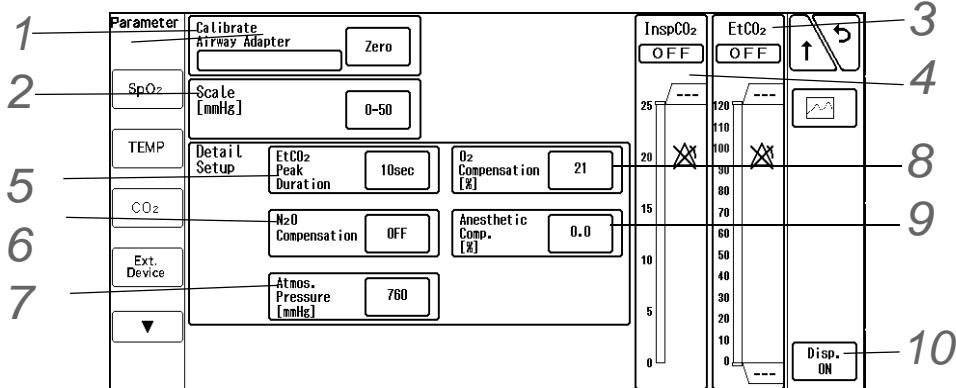
Verify that the CO₂ waveform, EtCO₂ value, InspCO₂ value are displayed.

**NOTE**

- Set the scale, measurement unit, alarm, etc. as necessary.

CO₂ Parameter Setup

Press the [Menu], [CO₂] keys to display the "CO₂" setup screen.

**1**

Calibrate Airway Adapter

The airway adapter will be calibrated.

(☞ "Patient Application and Display" P7-69)

2

Scale

For the measurement unit in mmHg, select from [0-50]/[0-100], and for the unit in kPa or %, select from [0-4]/[0-8]/[0-10].

3

EtCO₂ (End-tidal CO₂)

(☞ "Alarm Limit Setup for Each Parameter" P6-10)

NOTE

- EtCO₂ 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 to 100mmHg/0.3 to 13.3kPa/0.3 to 13.3%. Setting a value above 100mmHg/13.3kPa/13.3% will turn OFF the alarm.
- Set the lower limit in the range of 1 to 98mmHg/0.1 to 13.1kPa/0.1 to 13.1%.

Setting a value below 1mmHg/0.1kPa/0.1% will turn OFF the alarm.

REFERENCE

- Set the alarm condition for each measurement unit (mmHg/kPa/%).
- The upper/lower limit can be set in 1mmHg/0.1kPa/0.1% increment.
- When [Auto] is selected, upper alarm limit will be set to +10mmHg/+1.3kPa/+1.3% , and the lower alarm limit will be set to -10mmHg/-1.3kPa/-1.3% to the current value.

4 InspCO₂ (Inspired CO₂)

(☞ "Alarm Limit Setup for Each Parameter" P6-10)

NOTE

- InspCO₂ 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 to 4mmHg/0.1 to 0.4kPa/0.1 to 0.4%. Setting a value equal to or above 4mmHg/0.4kPa/0.4% will turn the alarm OFF.

REFERENCE

- Set the alarm condition for each measurement unit (mmHg/kPa/%).
- The upper limit can be set in 1mmHg/0.1kPa/0.1% increment. There is no lower limit.
- When [Auto] is selected, upper alarm limit will be set to 3mmHg, 0.4kPa, 0.4%.

5 EtCO₂ Peak Duration

[10sec]/[20sec]: Maximum EtCO₂ value for the selected duration will be displayed.

[OFF]: EtCO₂ value for each respiration will be displayed.

NOTE

- As the EtCO₂ value display is updated each second, EtCO₂ value for each respiration cannot be displayed if respiration rate is 60Bpm and above.

6 N₂O Compensation

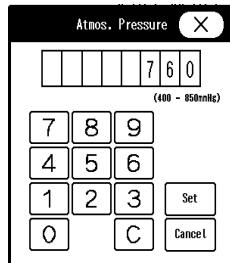
NOTE

- If N₂O is present in the respiration circuit, the CO₂ value tends to be displayed higher than the actual value. By setting the N₂O compensation ON, this can be adjusted.

7 Atmospheric Pressure

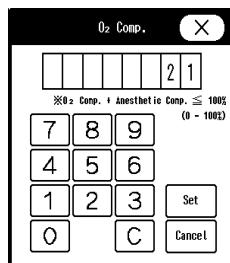
By entering the atmospheric pressure, the pressure difference will be compensated and allows more accurate measurement.

Enter the atmospheric pressure value on the "Atmos. Pressure" screen, and press the [Input] key.



8 O₂ Compensation

By entering the used O₂ concentration value, compensation can be made to display more accurate value.
Enter the O₂ compensation value on the "O₂" screen, and press the [Input] key.



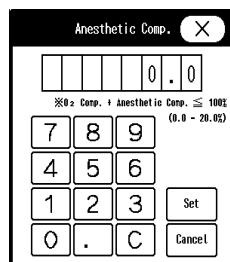
NOTE

- The value cannot be changed if the total value of O₂ compensation and anesthetic agent compensation exceeds 100%. In such case, change the O₂ compensation value after changing the anesthetic agent compensation value.

9 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 [Input] key.



NOTE

- The value cannot be changed if the total value of O₂ compensation and anesthetic agent compensation exceeds 100%. In such case, change the anesthetic agent compensation value after changing the O₂ compensation value.

10 Display ON/OFF

(☞ "ECG Parameter Setup" P7-5)

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 CO₂ 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.

CO₂ Concentration (Sidestream Method)

The HCP-800/HCP-810 is a CO₂ Gas Unit which measures CO₂ concentration by connecting it to the AUX connector on the DS-8100. The HCP-800/HCP-810 CO₂ Gas Unit incorporates Covidien's Microstream® technology for EtCO₂ (End-tidal CO₂ concentration) and InspCO₂ (Inspiratory CO₂ concentration) measurement. This section explains about the procedure and setup of the CO₂ concentration measurement of the HCP-800/HCP-810.

**WARNING**

- When using a sampling tube 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 tube. It could lead to erroneous readings.
- If too much moisture enters the sampling tube (i.e., from ambient humidity or breathing of unusually humid air), the message "Check Sample Line" will appear in the message area. Replace the sampling tube when this message appears.
- Carefully route the filter line to reduce the possibility of patient entanglement or strangulation.
- Do not lift the HCP-800/HCP-810 by the filter line, as the filter line could disconnect from the equipment, causing the equipment to fall on the patient.
- CO₂ readings and respiration rate can be affected by sensor application, ambient environment, and patient conditions.

**CAUTION**

- Microstream® EtCO₂ 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.
- 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® EtCO₂ sampling tube.
- Only use Microstream® EtCO₂ sampling tube to ensure the monitor functions properly.

NOTE

- During nebulization or suction for intubated patient, remove the sampling tube from the HCP-800/HCP-810 to avoid moisture buildup and sampling tube occlusion.

- Replace the sampling tube 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 tube, requiring more frequent replacement.
- When connecting a sampling tube to the HCP-800/HCP-810, screw the sampling tube clockwise into the connector firmly to avoid inaccurate measurement which may be caused by gas leak from the connection point.
- When "Check Sample Line" message appears on the screen indicating that the filter line connected to the HCP-800/HCP-810 is blocked, the CO₂ 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 CO₂ sampling tube to the HCP-800/HCP-810 and patient, check that CO₂ values appear on the monitor display.

Patient Application and Display

CO₂ concentration measurement can be performed by connecting the HCP-800/HCP-810 CO₂ Gas Unit to the AUX connector on the DS-8100.

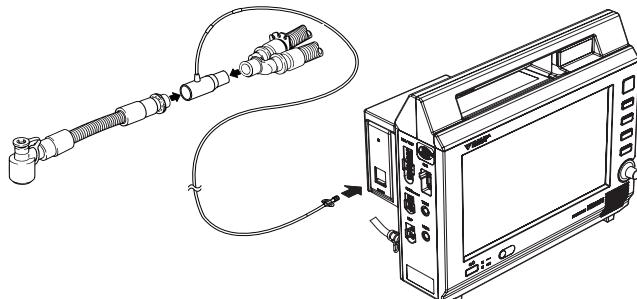
NOTE

- Accurate CO₂ concentration measurement can be acquired after 40 seconds from turning the power ON.

1 Connect the HCP-800/HCP-810 CO₂ Gas Unit to the AUX connector on the DS-8100.

2 Attach the airway adapter, oral/nasal sampling line or nasal sampling line to the patient.

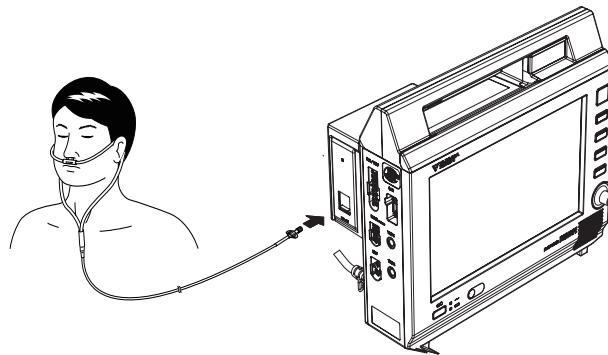
For intubated patient



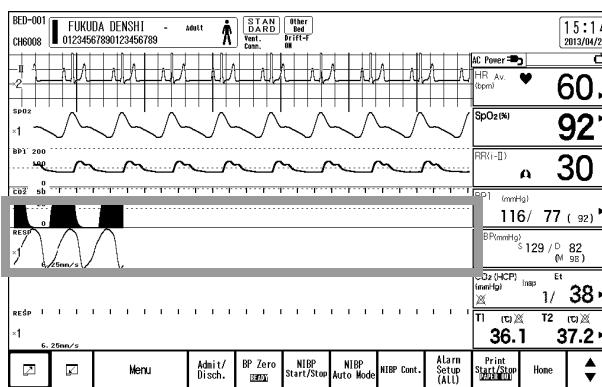
1 Attach the airway adapter to respiration circuit.

2 Connect one end of the sampling tube to the connector on the HCP-800/HCP-810. Verify that all the tubes are properly connected.

For patient using the nasal prong



- 1 Attach the nasal or oral/nasal patient interface of the sampling line to the patient as described in the sampling line directions for use.
- 2 Connect the sampling tube to the connector on the HCP-800/HCP-810. Verify that all the tubes are properly connected.
- 3** Start the CO₂ concentration measurement.

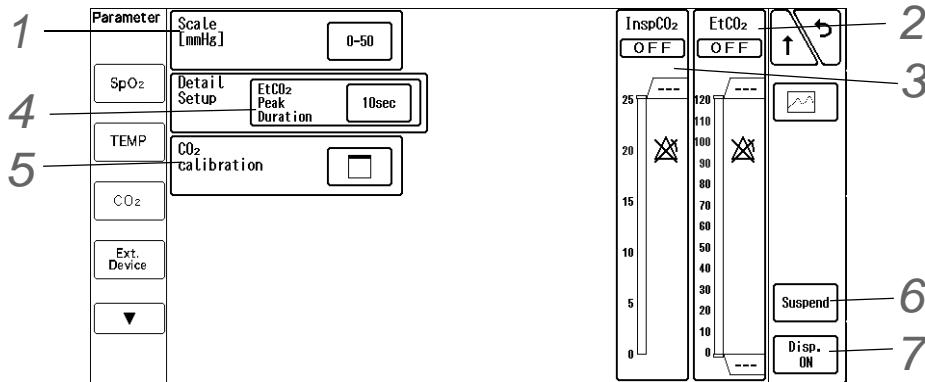


- Verify that the CO₂ waveform, EtCO₂ value, InspCO₂ value are displayed.

NOTE

- Connecting a sampling tube or nasal prong to the HCP-800/HCP-810 will automatically start the sampling pump. To prevent the pump from deteriorating, disconnect the sampling tube and nasal prong from the HCP-800/HCP-810 when not measuring the CO₂ 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 CO₂ numeric data box and CO₂ measurement cannot be performed.
- If the power supply is interrupted due to power failure, etc., HCP-800/HCP-810 will be initialized even if the power interruption was within 30 seconds.

CO₂ Parameter Setup



1 Scale

For the measurement unit in mmHg, select from [0-50]/[0-100], and for the unit in kPa or %, select from [0-4]/[0-8]/[0-10].

2 EtCO₂ (End-tidal Carbon Dioxide)

(☞ "Alarm Limit Setup for Each Parameter" P6-10)

NOTE

- EtCO₂ 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 to 100mmHg/0.3 to 13.3kPa/0.3 to 13.3%. Setting a value above 100mmHg/13.3kPa/13.3% will turn OFF the alarm.
- Set the lower limit in the range of 1 to 98mmHg/0.1 to 13.1kPa/0.1 to 13.1%. Setting a value below 1mmHg/0.1kPa/0.1% will turn OFF the alarm.

REFERENCE

- Set the alarm condition for each measurement unit (mmHg/kPa/%).
- The upper/lower limit can be set in 1mmHg/0.1kPa/0.1% increment.
- When [Auto] is selected, upper alarm limit will be set to +10mmHg/+1.3kPa/+1.3%, and the lower alarm limit will be set to -10mmHg/-1.3kPa/-1.3% to the current value.

3 InspCO₂ (Inspired Carbon Dioxide)

(☞ "Alarm Limit Setup for Each Parameter" P6-10)

NOTE

- InspCO₂ 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 to 4mmHg/0.1 to 0.4kPa/0.1 to 0.4%. Setting the value above 4mmHg/0.4kPa/0.4% will turn OFF the alarm.

REFERENCE

- Set the alarm condition for each measurement unit (mmHg/kPa/%).
- The upper limit can be set in 1mmHg/0.1kPa/0.1% increment. There is no lower limit.

- When [Auto] is selected, upper alarm limit will be set to 3mmHg, 0.4kPa, 0.4%.

4 EtCO₂ Peak Duration

[10sec]/[20sec]: Maximum EtCO₂ value for the selected duration will be displayed.

[OFF]: EtCO₂ value for each respiration will be displayed.

NOTE

- As the EtCO₂ value display is updated each second, EtCO₂ value for each respiration cannot be displayed if respiration rate is 60Bpm and above.

5 CO₂ Calibration

CO₂ calibration can be performed.

( Maintenance Manual "CO₂ Calibration (HCP-800/HCP-810)" P9-3)

6 Suspend CO₂

[Suspend]: The pump operation will stop, CO₂ waveform and numeric data display will disappear, and "Suspended" will be displayed inside the CO₂ numeric data box.

[Resume]: Resumes CO₂ 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.

7 Display ON/OFF

( "ECG Parameter Setup" P7-5)

⚠ 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 CO₂ will not be displayed either.

REFERENCE

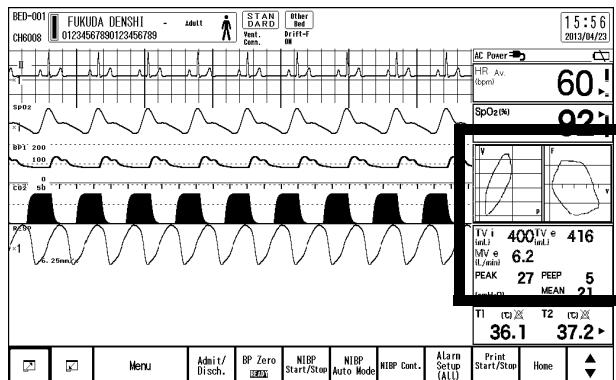
- During "Display OFF" condition, the display will automatically return if the filter line is applied to the patient and more than 2 respirations are detected in 30 seconds.

Ventilator

By connecting a ventilator, numeric data and waveform measured by the ventilator can be displayed on the DS-8100 System.

(Maintenance Manual "Ventilator Connection" P4-3)

By assigning [P-V/F-V] to numeric data box, P-V (pressure-volume) loop/F-V (flow-volume) loop can be also displayed.

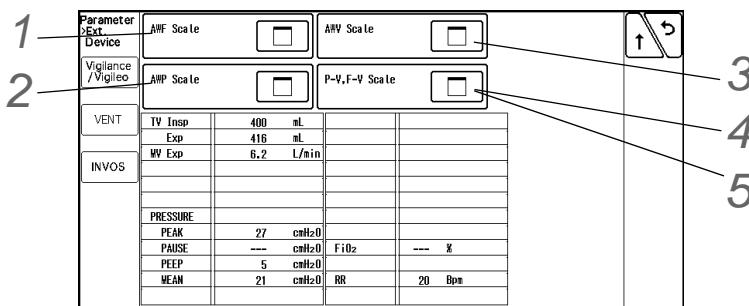


This section explains about the AWP/AWF/AWV scale setup procedure and P-V/F-V screen operation.

AWP/AWF/AWV Scale Setup

Press the [Menu], [Ext. Device], ("Parameter), [VENT] key to display the "VENT" screen.

The ventilator measurement will be displayed, and AWF / AWP / AWV / P-V, F-V scale can be set.



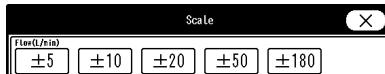
REFERENCE

- The scale setup window can be also displayed by pressing the scale on the waveform display area or [Scale] on the user key.

1 Set the AWF scale.

1 Press the key for [AWF Scale].

► The scale selection for AWF (airway flow) waveform will be displayed.



2 [Select from ±5]/[±10]/[±20]/[±50]/[±180](L/min).

2 Set the AWP scale.

1 Press the key for [AWP Scale].

- The scale selection for AWP (airway pressure) waveform will be displayed.

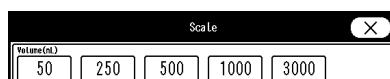


2 Select from [10]/[20]/[30]/[50]/[120](cmH₂O).

3 Set the AWV scale.

1 Press the key for [AWV Scale].

- The scale selection for AWV (airway volume) waveform will be displayed.



2 Select from [50]/[250]/[500]/[1000]/[3000](mL).

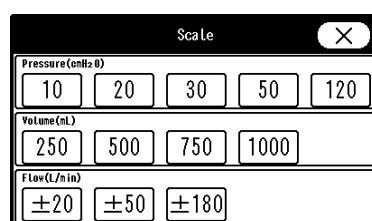
4 Set the P-V Scale.

1 Press the key for [P-V, F-V Scale].

- The scale selection for P-V (pressure-volume) loop will be displayed.

2 Pressure: Select from [10]/[20]/[30]/[50]/[120](cmH₂O).

3 Volume: Select from [250]/[500]/[750]/[1000](mL).



5 Set the F-V Scale.

1 Press the key for [P-V, F-V Scale].

- The scale selection for F-V (flow-volume) loop will be displayed.

2 Flow: Select from [±20]/[±50]/[±180](L/min).

3 Volume: Select from [250]/[500]/[750]/[1000](mL).

P-V/F-V Loop Display

The ventilator data can be displayed in P-V/F-V loop for review.

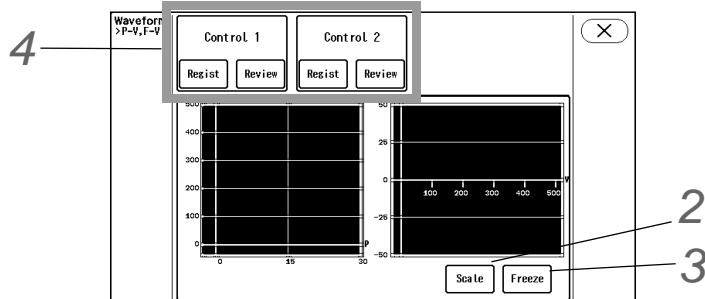


CAUTION

- For PURITAN-BENNETT ventilator, P-V loop and F-V loop cannot be displayed or printed.

1 Press the P-V/F-V numeric data box.

- ▶ The P-V/F-V review screen will be displayed.



- ▶ P-V (pressure-volume) loop/F-V (flow-volume) loop is sampled each 60ms and displayed for each respiration. The beginning of the loop is displayed in cyan, and the rest of the loop is displayed in white.
- ▶ For the P-V loop, the horizontal axis shows AWP (unit: cmH₂O), and vertical axis shows volume (unit: mL).
- ▶ For the F-V loop, the horizontal axis shows volume (unit: mL), and vertical axis shows AWF (unit: L/min).

2 Set the P-V/F-V scale. Press the [Scale] key.

- ▶ P-V/F-V scale selection screen will be displayed. Select the scale.

3 To stop the loop drawing, press the [Freeze] key.

- ▶ The loop drawing will stop.
- ▶ To resume the loop drawing, press the [Freeze] key again.

4 A control loop can be registered to see the change in P-V/F-V loop.

- ▶ Press the [Regist] key to store the displayed P-V/F-V loop as a control loop.
- ▶ Press the [Review] key to display the registered control loop.
The control loop 1 will be displayed in yellow, and control loop 2 will be displayed in green.

SvO₂/CCO Data

The DS-8100 System can display the Vigilance data by connecting the oximeter (Edwards Lifescience)/CCO measurement device (Vigilance, VigilanceCEDV, VigilanceII, Vigileo).

(☞ Maintenance Manual "SvO₂/CCO Monitor Connection" P4-6)

On the Vigilance data screen, the numeric data display can be changed.

Parameter DET. Device	STAT Mode		OFF	↑ ↓ ↺ ↻
	Index Display			
VIGILANCE	OFF			
VENT	SvO ₂	%	RVEF	--- %
	CCO	5 ~ 3 L/min	HR	--- bpm
INVOS	EDV	160 mL	SV	--- mL/beat
	BT	37 ~ 5 °C	ESV	--- mL

Display Example for ICO Mode

STAT Mode: When the Vigilance is in CCO mode, STAT mode display can be set ON or OFF.

Index Display: When the Vigilance is in CCO mode, Index Display can be set ON or OFF.

When the Vigilance is in ICO mode, the 6 latest data of ICO (Intermittent Cardiac Output) and ICI (Intermittent Cardiac Index) will be displayed.

STAT Mode / Index Display

- 1** Press the [Menu], [Ext. Device] ("Parameter") keys.

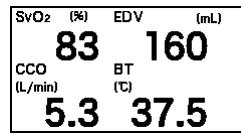
► The Vigilance screen will be displayed.

NOTE

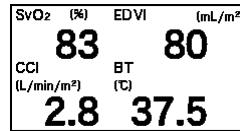
- STAT Mode: When Vigilance is in CCO mode, STAT mode display can be set ON or OFF.
- Index Display: When Vigilance is in CCO mode, Index display can be set ON or OFF.
- When the Vigilance is in ICO mode, the 6 latest data of ICO (Intermittent Cardiac Output) and ICI (Intermittent Cardiac Index) will be displayed.

- 2** Select [ON]/[OFF] for "STAT Mode" and "Index Disp.".

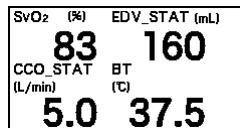
► STAT Mode [OFF], Index Display [OFF]: SvO₂(or ScvO₂), CCO, EDV, BT will be displayed inside the SvO₂+CO numeric data box.



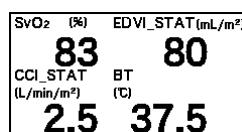
► STAT Mode [OFF], Index Display [ON]: CCI and EDVI will be displayed instead of CCO and EDV.



► STAT Mode [ON], Index Display [OFF]: CCO_STAT and EDV_STAT will be displayed instead of CCO and EDV.



► STAT Mode [ON], Index Display [ON]: CCI_STAT and EDVI_STAT will be displayed instead of CCO and EDV.



NOTE

- STAT mode can be changed only when Vigilance is connected.

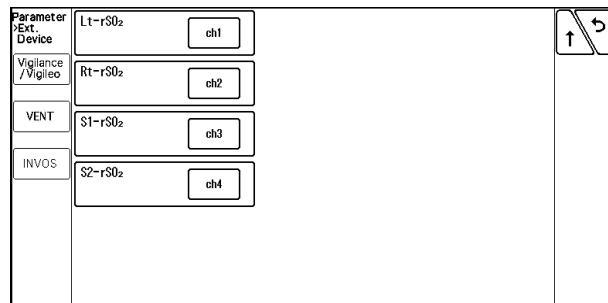
INVOS Data

By connecting the INVOS 5100C Cerebral Oximeter (Covidien[®]), regional cerebral oxygen saturation (rSO₂) can be monitored non-invasively on the DS-8100 System.

(☞ Maintenance Manual "Connecting to the INVOS" P4-10)

On the INVOS screen, the channel can be changed for each INVOS data.

Lt-rSO₂/Rt-rSO₂ data of the selected channel will be displayed inside the INVOS numeric data box.



INVOS Screen

Channel Number Setup for INVOS Data

In the INVOS numeric data box, measurement data of Lt-rSO₂/Rt-rSO₂ will be displayed.

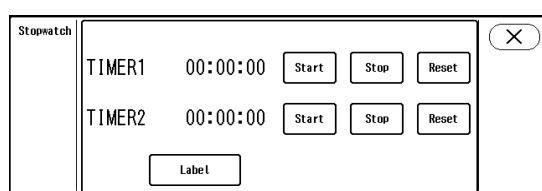
On the INVOS screen, the channel for Lt-rSO₂/Rt-rSO₂ data can be selected.

- 1 Press the [Menu], [Ext. Device] ("Parameter"), [INVOS] keys.
 - ▶ The INVOS screen will be displayed.
- 2 Press the [ch*] key for the INVOS label ("Lt-rSO₂" / "Rt-rSO₂" / "S1-rSO₂" / "S2-rSO₂") to set the channel.
 - ▶ The dropdown list will be displayed.
- 3 Select the channel from [ch1]/[ch2]/[ch3]/[ch4].

Stopwatch

The stopwatch function can be used by setting the [Stopwatch] key on the numeric data box or on the user key.

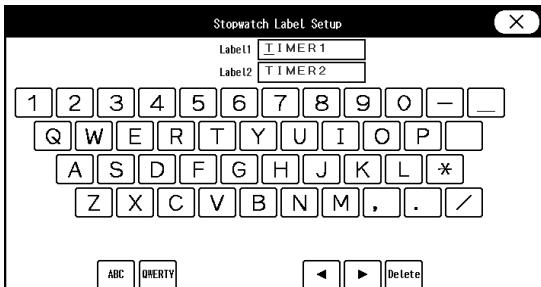
- 1 Press the [Stopwatch] key on the numeric data box or on the user key.
 - ▶ The "Stopwatch" window will be displayed.



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-8100, a multiparameter connector is provided.

Multiparameter Connectors	DS-8100 Main Unit
<u>1 port</u>	
TEMPx4 (maximum)	DS-8100N,DS-8100M
BPx2 (maximum)	
CO x1 (maximum)	

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.

Chapter 8 Review Function

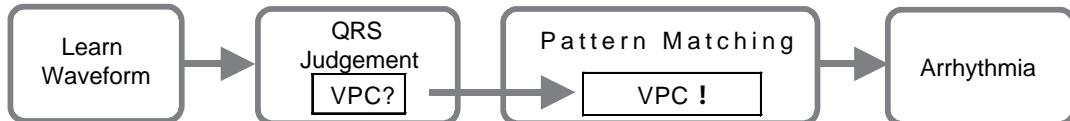
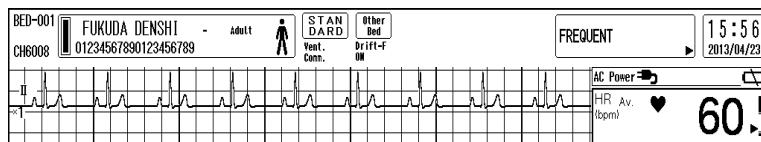
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Chapter 8 Review Function

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 to distinguish the noise and VPC. This will finally determine the VPC and generate 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, waveform size, and filter mode selection. If not properly selected, detection failure or detection error may occur.

□ QRS Classification

Each QRS will be classified to the following pattern.

N (Normal)	Normal QRS beat
V (VPC)	Ventricular extrasystole
P (Pacing Beat)	Pacing beat
F (Fusion Beat)	Fusion beat of pacing and spontaneous beat
S (SVPC)	Supraventricular extrasystole
? (Undetermined Beat)	Learning arrhythmia, or unmatched beat

□ Arrhythmia Type

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

Arrhythmia	Details	Detection Criteria
Asystole	Cardiac Arrest	Cardiac arrest is detected for more than preprogrammed time.
VF	Ventricular Fibrillation	A random, rapid electrical activity of the heart is detected.
VT	Ventricular Tachycardia	9 or more continuous ventricular beats are detected.*1
Slow_VT		9 or more continuous ventricular beats are detected.*2
TACHY	Tachycardia	HR is over the upper alarm limit.
BRADY	Bradycardia	HR is below the lower alarm limit.
RUN	Consecutive VPC	Continuous VPC exceeding the preprogrammed value is detected.
Couplet	Couplet Ventricular Extrasystole	2 continuous VPC beats are detected.
PAUSE		Cardiac arrest exceeding the preprogrammed duration is detected.
Bigeminy	Ventricular Bigeminy	3 or more continuous QRS pattern of V-N is detected.
Trigeminy	Ventricular Trigeminy	3 or more continuous QRS pattern of V-N-N is detected.
Frequent	Frequent VPC	VPC exceeding the preprogrammed value is detected within 1 minute.

*1: HR: 140bpm / 120bpm or over

*2: HR: below 140bpm / 120bpm
 (☞ "To Set the Arrhythmia Alarm" P6-1)

Arrhythmia Alarm Setup

Arrhythmia alarm setup procedure is explained below.

ON/OFF of arrhythmia alarm and arrhythmia detection level can be set.

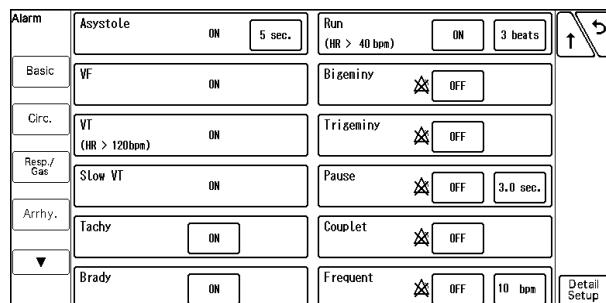
When the measured value exceeds the set arrhythmia detection level, arrhythmia alarm will generate.

Arrhythmia Detection Level Setting

Arrhythmia	Range	Default	Selection
Asystole	3 to 10 sec.	5 sec.	Dropdown List
RUN	2 to 8 beats	3 beats	Dropdown List
PAUSE	1.5 to 5 sec.	3 sec.	Dropdown List
Frequent	1 to 50 bpm	10 bpm	Numeric Keys

1 Press the [Menu], [Arrhy.] ("Alarm") key.

► The arrhythmia alarm setup screen will be displayed.



2 Set the detection level.

For Asystole, Run, Pause:

1 Press the key for detection level.

► The dropdown list will be displayed.

2 Select the detection level.

For Frequent:

1 Press the key for detection level.

► The "Frequent" screen will be displayed.

2 Use the numeric keys to enter the detection level.

3 Press the [Input] key.

3 Select ON/OFF for the alarm.

1 Select [ON]/[OFF] for each alarm.

► The dropdown list will be displayed.

2 Select from [ON] or [OFF].

► [ON]: Alarm will generate.

► [OFF]: Alarm will not generate.

NOTE

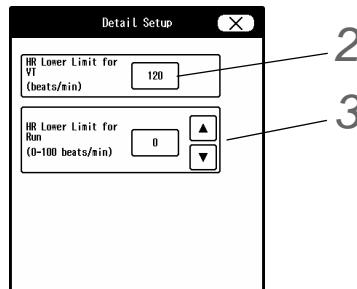
- ♦ If the patient classification is adult or child, Asystole, VF, VT, Slow VT alarm cannot be turned OFF unless [ON/OFF] is selected for "Asystole, VF, VT Alarm" under "Initial Settings".
- ♦ If the patient classification is neonate, VF, VT, Slow VT can be turned OFF regardless of the setting for "Asystole, VF, VT Alarm" under "Initial Settings".

□ Arrhythmia Alarm Detail Setup

HR Lower Limit for VT and RUN can be set on the Arrhythmia Alarm "Detail Setup" screen.

1 Press the [Menu], [Arrhy.] ("Alarm"), [Detail Setup] key.

► The "Detail Setup" screen will be displayed.



2 Set the "HR Lower Limit for VT".

REFERENCE

- ♦ Select the HR lower limit to detect VT from 120 or 140bpm. If the HR is same or above the selected value, VT will be detected. If the HR is below the selected value, Slow_VT

will be detected.

- 1** Press the key for "HR Lower Limit for VT".
► The dropdown list will be displayed.
 - 2** Select from [120] or [140] (beats/min.).
- 3** Set the "HR Lower Limit for RUN".

REFERENCE

- ♦ Set the HR lower limit to detect RUN. If the HR is same or above the set value, RUN will be detected.

- 1** Press the **▲/▼** key for "HR Lower Limit for RUN".
- 2** Set the HR in the range from 0 to 100 (beats/min.).

Arrhythmia Learn

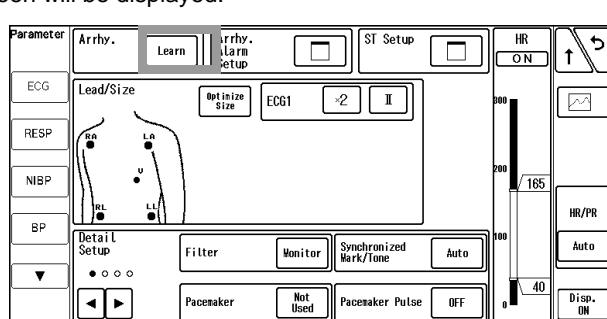
Learning the normal ECG largely affects the accuracy of arrhythmia analysis.

If any error occurs in arrhythmia detection and QRS judgment, performing arrhythmia learning will recover the original analyzing accuracy.

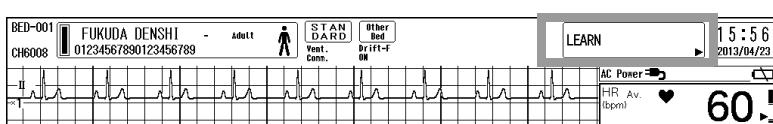
Arrhythmia learning will be performed for about 20 beats for the normal ECG, but it may take longer if the heartbeat is unstable.

During arrhythmia learning, arrhythmia alarm other than ASYSTOLE, VF, VT, TACHY, BRADY will not be generated.

- 1** Press the [Menu], [ECG] "Parameter" keys.
Or, press the HR numeric data box , and press **[OK]**.
► 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", [Learn] key will not change to blue and "LEARN" message will not be displayed, but learning process will be performed.
- Pressing the key while arrhythmia learning is in process will not stop the process.

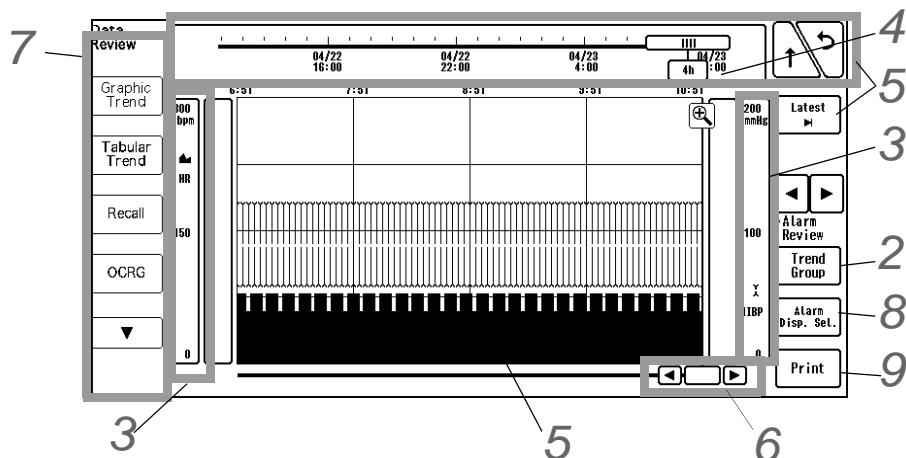
Graphic Trend

This section explains the graphic trend function and printing procedure.

If the numeric data is displayed on the home display, 24 hours of data will be automatically stored and displayed as trend data.

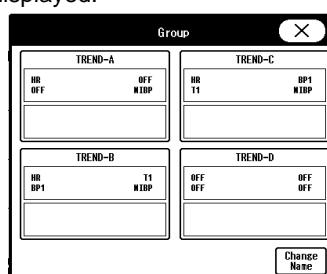
Graphic Trend Setup

- 1 Press the [Menu], [Trend] ("Data Review") keys.
Or, press the [Trend] key on the user key area.
▶ The graphic trend will be displayed.



- 2 Select the trend group.

- 1 Press the [Trend Group] key.
▶ The "Group" window will be displayed.



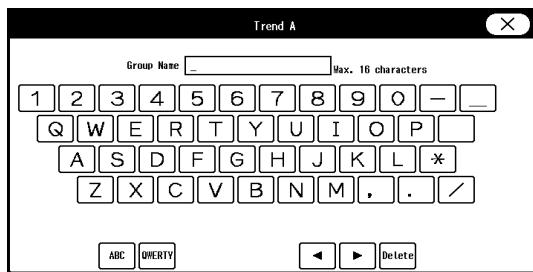
- 2 Select the group.

REFERENCE

- Maximum of 4 groups with 4 parameters each can be registered, and can be selected according to the monitoring purpose.

3 To change the name of trend group, press the [Change Name] key.

► Window to enter the name of trend group will be displayed.



4 Enter the name of trend group in alphanumeric characters.

5 After entering the name, press to close the window.

3 Set the parameter, display type, scale.

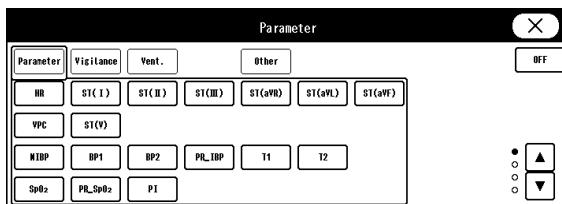
1 Press the scale area for each parameter.

► The "Scale" selection window will be displayed.



2 Press the key for "Parameter Selection".

► The "Parameter" selection window will be displayed.



3 Select a parameter.

NOTE

- The selected parameter will be also registered for the trend group.
- The apnea duration will be stored when it exceeds the alarm threshold level. If lower than the alarm threshold level, it will be stored as "0 (zero)".
- If "GAS" is selected as the RR/APNEA source, the apnea duration will not be stored for the graphic trend.

4 Select the scale.

5 Press the key for "Display Selection".

► The dropdown list will be displayed.

6 Select the display format.

4 Select the display interval.

1 Press the key on the time bar.

► The dropdown list will be displayed.

2 Select the display interval.

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 resolution will differ depending on the parameter.

Display Resolution

Time Span	Minimum Resolution			
	Line Display		Mark Display	
	10 sec. Sample	30 sec. Sample	10 sec. Sample	30 sec. Sample
10 min	10 sec.	30 sec.	10 sec.	30 sec.
1 hours	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

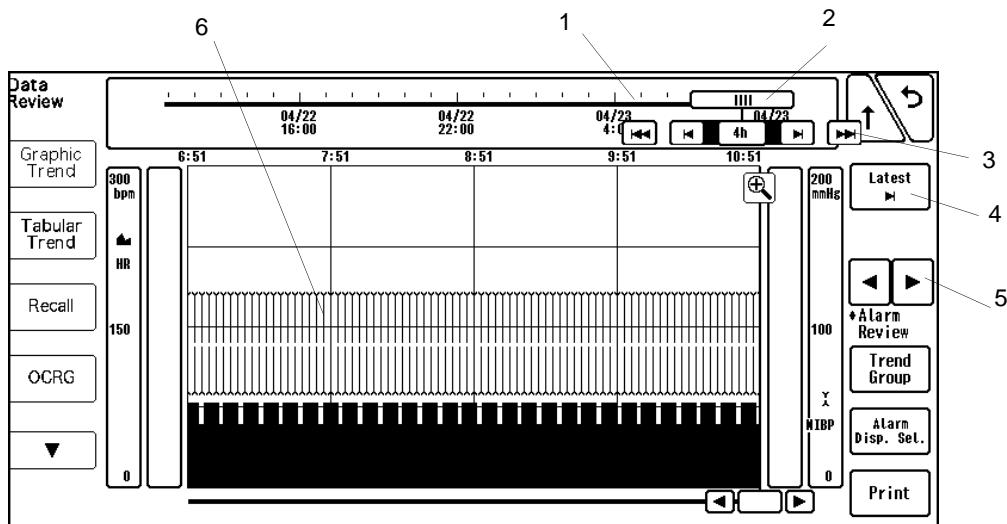
Minimum Resolution	Parameter
10 sec.	HR, ST, SpO ₂ , PR_SpO ₂ , BP1, BP2
30 sec.	Other than above (Excluding NIBP*)

* Actual measured data will be displayed for NIBP.

5 Scroll the displayed data.

NOTE

- 24 hours of data will be stored regardless of the time bar display range.



1 Pressing the time bar will display the data at pressed time.

2 Scroll the slider left and right.

▶ Right: Scrolls to the newer data.

▶ Left: Scrolls to the older data.

3 Press the **◀/▶** keys.

▶ The time display will switch by page.

4 Press **Latest**.

▶ The latest data will be displayed.

5 Press **◀/▶** for "Alarm Review".

▶ The cursor will move to the alarm generated time.

6 The graph can be scrolled by dragging inside the graph.

6 Move the cursor.

1 Press the center part of **◀/▶**.

▶ The trend data at cursor position will be displayed.

2 Scroll **□** left and right.

▶ The cursor will move to left and right.

3 Press the **◀/▶** keys.

▶ The cursor position can be adjusted.

REFERENCE

- ▶ The data display at cursor position will be automatically erased after fixed duration.

4 Press **⊕**.

▶ 10-minute trend data before and after the cursor position will be displayed.

5 Press **⊖**.

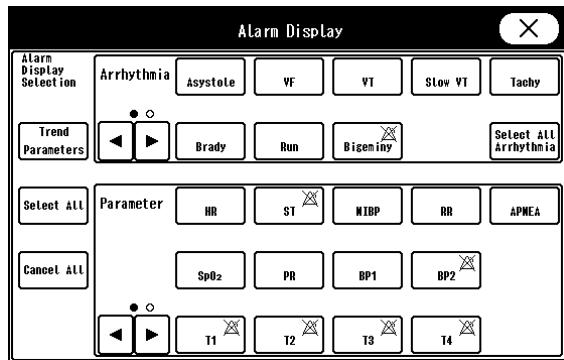
▶ The displayed time range will return to the previous time range.

7 To refer to other review data of the same time, press the tab key on the left side.

8 Select the alarm display status.

1 Press the [Alarm Disp. Sel.] key.

► The "Alarm Display" window will be displayed.



2 Select the alarm display status.

- [Trend Parameters]: The displayed trend parameters will be selected.
- [Select All]: All parameters including arrhythmia will be selected.
- [Cancel All]: All selections will be cancelled.
- [Select All Arrhythmia]: All arrhythmia will be selected.
- Each parameter key: Each time the key is pressed, selected/unselected status will change.

REFERENCE

- ♦ 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.

9 Press the [Print] key.

► To print the trend data, press the [Print] key, select the parameter, and press the [Enter] key.

NOTE

- ♦ When the Recorder Unit (HR-810/HR-811) is not connected, pressing the [Print] key with the CF (or SD) card inserted will store the bitmap data on the CF (or SD) card.
(If both the CF and SD cards are inserted, the data will be stored on the CF card.)
(☞ "CF/SD Card Printing" P9-7)

Description for Each Parameter

Numeric Data	Details	Scale	Unit
HR	HR	100, 200, 300	bpm
VPC	VPC Counts	20, 50, 100	-
ST(I, II, III, aVR, aVL, aVF, V)	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	%
PR_SpO ₂	SpO ₂ Pulse Rate	100, 200, 300	bpm
NIBP	NIBP Value (Systolic / Diastolic)	100, 150, 200, 300	mmHg
		16, 20, 24, 40	kPa
BP1, BP2	Blood Pressure (Systolic / Mean / Diastolic)	20, 50, 100, 150, 200, 300	mmHg
		4, 8, 16, 20, 24, 40	kPa
		20, 40	cmH ₂ O
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
PAP	Pulmonary Artery 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 to T4	TEMP	20 to 45, 30 to 40	°C
Tb	Blood Temperature (Cardiac Output Measurement)	20 to 45, 30 to 40	°C
ΔTEMP-A to B	Temperature Difference	±10, ±25	°C
RR_IMP	Impedance Respiration Rate	50, 100, 150	Bpm
APNEA	Apnea (Impedance, CO ₂ , Ventilator)	15, 30	sec
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	BIS Monitor Data	25, 50, 75, 100	-
SvO ₂	Mixed Venous Oxygen Saturation	0 to 100, 50 to 100, 80 to 100	%
ScvO ₂	Central Venous Oxygen Saturation	0 to 100, 50 to 100, 80 to 100	%
CCO	Continuous Cardiac Output	6, 12, 20	L/min
CCI	Continuous Cardiac Index	6, 12, 20	L/min/m ²
BT	Blood Temperature (Vigilance Data)	20 to 45, 30 to 40	°C
RR_VENT	Ventilator Respiration Rate	50, 100, 150	Bpm
SpCO	Carboxyhemoglobin Concentration	20, 40, 100	%
SpMet	Methemoglobin Concentration	10, 15, 100	%
SpHb	Total Hemoglobin Concentration	10 to 20, 0 to 25	g/dL
PI	Perfusion Index	10, 20	%
PVI	Pleth Variability Index	30, 60, 100	%

Numeric Data	Details	Scale	Unit
Lt-rSO ₂	regional cerebral oxygen saturation	20 to 100	%
Rt-rSO ₂			
S1-rSO ₂			
S2-rSO ₂			

NOTE

- The apnea duration will be stored when it exceeds the alarm threshold level. If lower than the alarm threshold level, it will be stored as "0 (zero)".
- If "GAS" is selected as the RR/APNEA source, the apnea duration will not be stored for the graphic trend.

Tabular Trend

This section explains the tabular trend function and printing procedure.

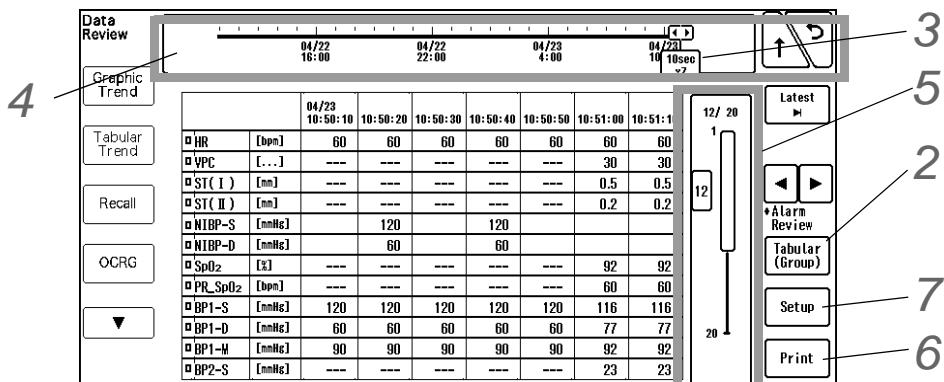
If the numeric data is displayed on the home display, 24 hours of data will be automatically stored and displayed in 10 seconds / 30 seconds interval.

To Display/Print the Tabular Trend

- 1** Press the [Menu], [Tabular Trend] ("Data Review") keys.

Or, press the [Tabular Trend] key on the user key area.

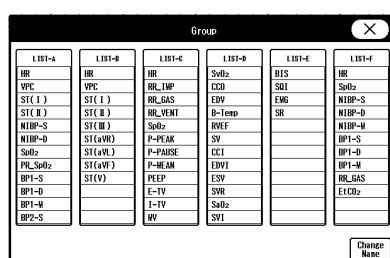
- The tabular trend will be displayed.



- 2** Change the trend group.

- 1** Press the [Trend Group] key.

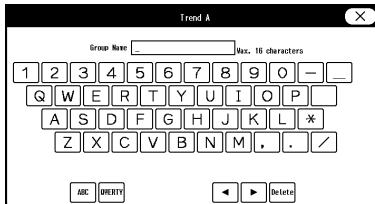
- The "Group" window will be displayed.



REFERENCE

- Maximum of 6 different groups of parameters can be registered to be selected according to the monitoring purpose.

- 2 Select a group from [A]/[B]/[C]/[D]/[E]/[F].
- 3 To change the name of trend group, press the [Change Name] key.
▶ Window to enter the name of trend group will be displayed.



- 4 Enter the name of trend group in alphanumeric characters.
 - 5 After entering the name, press to close the window.
- 3 Select the display interval.
 - 1 Press the key at the right side of the time bar.
▶ The dropdown list will be displayed.
 - 2 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.
- 24 hours of data will be stored regardless of the time bar display range.

Data Resolution

Minimum Resolution	Parameter
10 sec.	HR, ST, SpO ₂ , PR_SpO ₂ , BP1, BP2
30 sec.	Other than above

- 4 Scroll the displayed data.
(☞ "Graphic Trend Setup" P8-5 "5. Scroll the displayed data")
- 5 Shift the displayed page.
 - 1 Drag the slider on the scroll bar up or down.
▶ When the slider is released, / will be displayed for a fixed amount of time.
 - 2 Press the / keys.
▶ The display will switch by page.
- 6 Press the [Print] key.
 - [Print]: The currently displayed tabular trend will be printed.
 - [Print (All)]: All data for 12 parameters (which fits in 1 page) will be printed.

NOTE

- When the Recorder Unit (HR-810/HR-811) is not connected, pressing the [Print] key with the CF (or SD) card inserted will store the bitmap data on the CF (or SD) card.
(If both the CF and SD cards are inserted, the data will be stored on the CF card.)
(☞ "CF/SD Card Printing" P9-7)

7 Set the parameters for the tabular trend.

(☞ "Parameter Setup for Tabular Trend" P8-14)

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 for the alarm generated bed will be displayed for each parameter.
The alarm display for the expiratory and inspiratory parameter such as EtCO₂ and InspCO₂ 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.

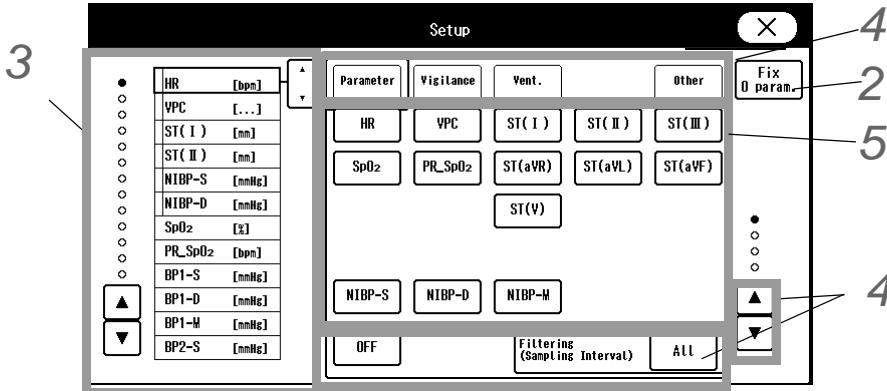
		04/23 10:30:10	10:50:20	10:50:30	10:50:40	10:50:50	10:51:00	10:51:10
<input checked="" type="checkbox"/> HR	[Bpm]	60	60	60	60	60	60	60
<input checked="" type="checkbox"/> VPC	[...]	---	---	---	---	---	30	30
<input checked="" type="checkbox"/> STC(1)	[mm]	---	---	---	---	0.5	0.5	
<input checked="" type="checkbox"/> STC(2)	[mm]	---	---	---	---	0.2	0.2	
<input checked="" type="checkbox"/> NIBP-S	[mmHg]	120	120	120	120	116	116	
<input checked="" type="checkbox"/> NIBP-D	[mmHg]	60	60	60	60	60	60	
<input checked="" type="checkbox"/> SpO2	[%]	---	---	---	---	92	92	
<input checked="" type="checkbox"/> Ptl_SpO2	[Bpm]	---	---	---	---	60	60	
<input checked="" type="checkbox"/> BP1-S	[mmHg]	120	120	120	120	116	116	
<input checked="" type="checkbox"/> BP1-D	[mmHg]	60	60	60	60	77	77	
<input checked="" type="checkbox"/> BP1-M	[mmHg]	90	90	90	90	92	92	
<input checked="" type="checkbox"/> BP2-S	[mmHg]	---	---	---	---	23	23	

On the left side of the parameter, the color assigned for the corresponding parameter will be displayed.

Parameter Setup for Tabular Trend

- 1** Press the [Menu], [Tabular Trend] ("Data Review"), [Setup] keys.

► The tabular trend setup screen will be displayed.



- 2** Select the number of fixed parameters.

- 1** Press the [Fix x param.] key.

► The dropdown list will be displayed.

- 2** Select from [0 param.] to [6 param.].

► The selected numbers of parameters will be fixed on the tabular trend display, and these data will be remained displayed even when scrolled.

- 3** Select the location for the parameter to be displayed.

► The selected location will be displayed with blue frame and will be displayed at the side.

REFERENCE

- To change the location, directly press the desired location or drag the key up or down.
- To change the displayed page, press the / keys at the left side of the screen.

- 4** Select the parameters.

- 1** Filter the data by sampling interval.

► [OFF]: The line where [OFF] is selected will not be displayed.

► [10 sec.]: Only the data with 10 sec. sampling interval will be displayed.

► [All]: All data will be displayed.

- 2** Select the category and displaying page.

► [Parameter]/[Vigilance]/[Vent.]/[Other]: The parameters for the corresponding category will be displayed.

► /: The displaying page for the parameters can be selected.

Parameters for each Category

Parameter	HR, VPC, ST, SpO ₂ , PR_SpO ₂ , NIBP, BP1 to 2, PR-IBP, PDP, PCWP, CPP, T1 to 4, Tb, CO, EtCO ₂ , InspCO ₂ , RR-GAS, RR-IMP, RR-VENT, APNEA, PI, PVI, SpCO, SpMet, SpHb
Vigilance	SvO ₂ , ScvO ₂ , SaO ₂ , O ₂ El, B-Temp, CCO, CCO-STAT, CCI, CCI-STAT, DO ₂ , RVEF, RVEF-STAT, VO ₂ , SV, SV-STAT, SVI, SVI-STAT, SVR, SVRI, SVV, EDV, EDV-STAT, EDVI, EDVI-STAT, MAP, ESV, ESVI
Ventilator	E-TV, I-TV, MV, P-PEAK, P-PAUSE, PEEP, P-MEAN, E-RES, I-RES, COMP, FiO ₂
Other	BIS, SQI, EMG, SR, SEF, TOTPOW, IMP, Lt-rSO ₂ , Rt-rSO ₂ , S1-rSO ₂ , S2-rSO ₂

NOTE

- The apnea duration will be stored when it exceeds the alarm threshold level. If lower than the alarm threshold level, it will be stored as "0 (zero)".

5

Select the parameter to be displayed for the selected location.

- The blue frame will move to one row below.

Recall

This section explains about the recall function and the setup procedure.

To Display the Recall Waveform

1 Time at Alarm Occurrence



2 Recall Factor

3 Recall Waveform (Compressed: 12 sec.)

4 Diamond Mark

When the alarm for the specified recall factor occurs, maximum of 2 waveforms (12 seconds) and numeric data for each recall factor will be stored for up to 200 data. The recall data to be displayed can be selected. 5 compressed recall waveforms will be displayed. The waveform can be enlarged by pressing the waveform display area.

If the recall data exceeds 200, 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.

A diamond mark indicates the alarm generated point.

1

Press the [Menu], [Recall] ("Data Review") keys.

Or, press the [Recall] key on the user key area.

- Recall screen will be displayed.

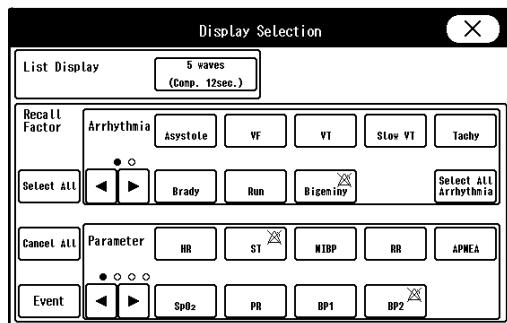
- 5 compressed waveforms (12 sec. per each waveform) will be displayed.

- The alarm occurrence time, the recall factor occurred at the same time, and the compressed waveform of recall waveform 1 will be displayed.

2 Select the recall factor to display on the recall screen.

1 Press the [Display Selection] key.

- The "Display Selection" window will be displayed.



2 Select the recall factor.

- The key will be displayed in blue to indicate that the alarm for the selected parameter will be displayed.
- [Select All]: All parameters including arrhythmia will be selected.
- [Select All Arrhythmia]: All arrhythmia will be selected.
- [Cancel All]: All selections will be cancelled.

3 Switch the displayed data on the recall screen.

1 Scroll the slider left and right.

- Right: Scrolls to the newer data.
- Left: Scrolls to the older data.

2 Press the **[◀]/[▶]** keys.

- The display will switch by page.

3 Press **[Latest]**.

- The latest data will be displayed.

4 Delete the recall waveform.

1 Press the [Delete Sel.] key.

2 Select the parameter to delete. For the selected parameter, "x" will be displayed.

To delete all displayed waveforms, press the [Select All] key.

If the parameter with "x" is selected, "x" will be erased and will be removed from the deleting parameters.

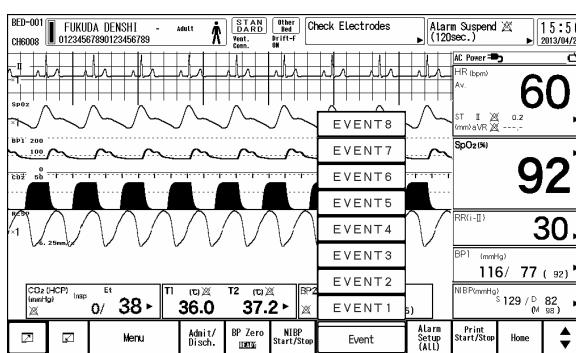
3 Press the [Delete] key, and then the [Delete OK] key to delete the parameters with "x" mark.

Recall Waveform Using Event Key

The recall display can provide not only the waveform for the specified recall factor, but also the waveform at the moment of pressing the "Event" key on the user key.

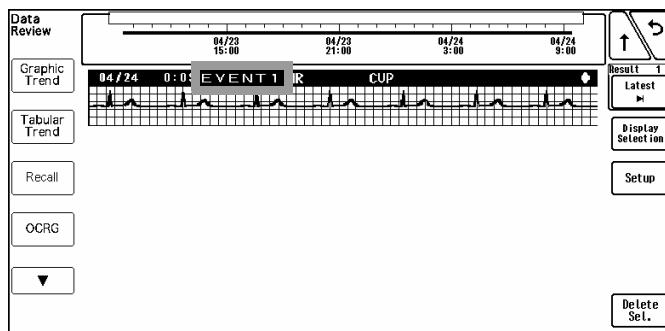
- 1 Press the [Menu], [Display Config.] ("Basic Setup") keys.

Press the [Change] key for "User Key" to set the "Event" key on the user key.



- 2 Press the "Event" key.

- ▶ The waveform at the moment will be stored as recall data.
- ▶ There are 8 event keys available titled [EVENT1] onwards until [EVENT8] to verify on the recall display. For example, if the [EVENT1] key is pressed, the display will be as follows:



REFERENCE

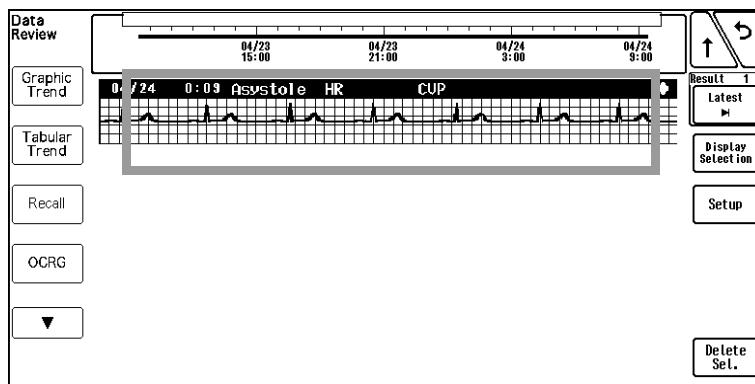
- When the Recorder Unit (HR-810/HR-811) is not connected, pressing [Print Start/Stop] of the user key without inserting the CF/SD card will store the waveform as recall data named "EVENT1".
If the CF/SD card is inserted, refer to the section below.
(☞ "CF/SD Card Printing" P9-7)

To Display/Print the Enlarged Recall Waveform

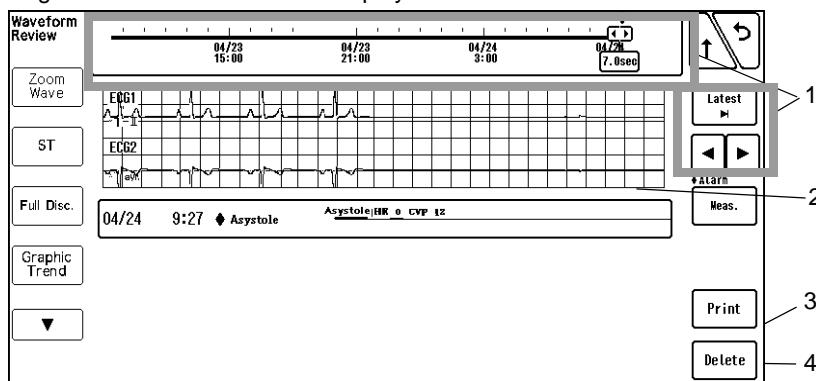
On the enlarged recall waveform display, the recall waveform will be displayed in 25mm/s and by using the cursor, the data before and after the alarm occurrence can be checked.

1

Press the waveform display area on the recall screen.



► The enlarged recall waveform will be displayed.



1 Shifts the recall waveform display.

2 Recall Waveform

The waveform can be dragged to left and right.

3 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)

4 Deletes the recall waveform.

The displayed recall waveform will be deleted.

NOTE

- ♦ When the Recorder Unit (HR-810/HR-811) is not connected, pressing the [Print] key with the CF (or SD) card inserted will store the bitmap data on the CF (or SD) card.
(If both the CF and SD cards are inserted, the data will be stored on the CF card.)
(☞ "CF/SD Card Printing" P9-7)

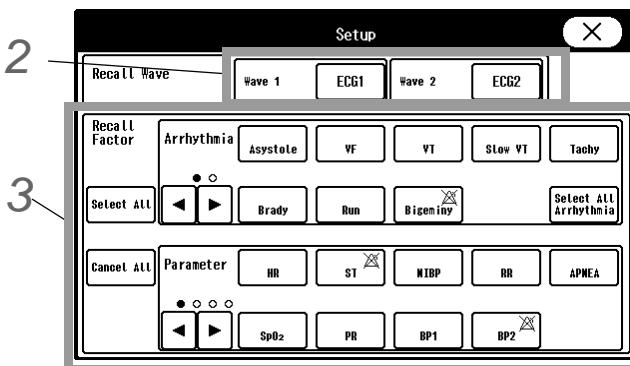
Recall Setup

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" P8-15)

► The "Setup" window will be displayed.



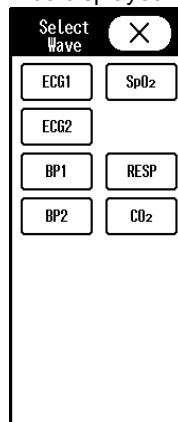
- 2 Select the recall waveform.

REFERENCE

- Up to 2 waveforms can be selected for the recall waveform.

- 1 Select from "Wave 1" or "Wave 2".

► The "Waveform Selection" window will be displayed.



- 2 Select the parameter for "Wave 1" and "Wave 2".

- 3 Select the recall factor.

(☞ "To Display the Recall Waveform" P8-15)

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

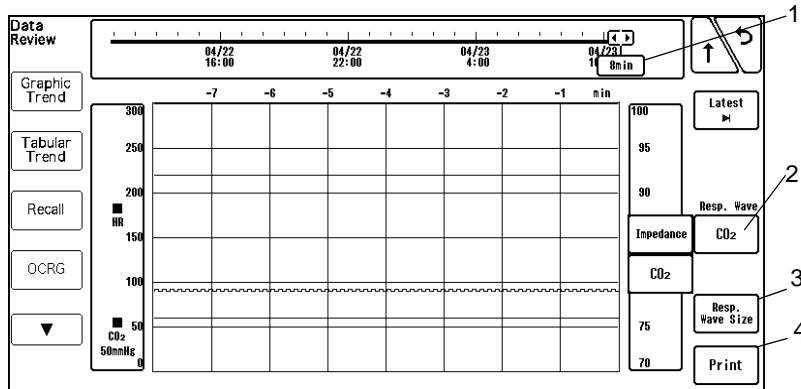
This section explains about the OCRG display.

On the OCRG display, compressed respiration waveform, HR trend and SpO₂ trend are displayed simultaneously. The trend scale is fixed as follows.

- ♦ HR: 0 to 300bpm
- ♦ SpO₂: 70 to 100%

1 Press the [Menu], [OCRG] ("Data Review") keys.

► OCRG screen will be displayed.



1 Display Time

Select from [8min]/[16min].

2 Respiration Waveform

Select from [Impedance]/[CO₂].

3 Respiration Waveform Size

Select the waveform size for the respiration compressed 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)

4 Printing

The currently displayed trend and compressed waveform on the OCRG screen will be printed.

NOTE

- When the Recorder Unit (HR-810/HR-811) is not connected, pressing the [Print] key with the CF (or SD) card inserted will store the bitmap data on the CF (or SD) card.
(If both the CF and SD cards are inserted, the data will be stored on the CF card.)
(☞ "CF/SD Card Printing" P9-7)

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], [Alarm History] ("Data Review") keys.

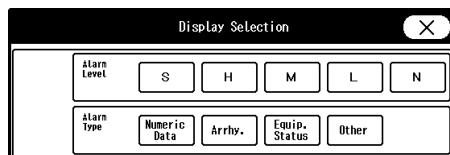
► The alarm history screen will be displayed.

Data Review		08/12 1:00		08/12 7:00		08/12 13:00		08/12 13:00	
Alarm History		Time	Code	Factor		sec.	M		
Zoom Wave	◆ 08/12 19:16:00	00E9	High PEAK	1 >	2	20	M		
ST	19:15:00	00E8	High MAC	0,1 >	0,2	20	M		
Full Disc.	19:14:00	00E7	High MzO-I	0 >	0	20	M		
	19:13:00	00E6	High MzO-E	0 >	0	20	M		
	19:12:00	00E5	High O2-I	0 >	0	20	M		
	19:11:00	00E4	High O2-E	0 >	0	20	M		
	19:10:00	00E3	High DES-I	0,1 >	0,2	20	M		
	19:09:00	00E2	High DES-E	0,1 >	0,2	20	M		
	19:08:00	00E1	High SEV-I	0,1 >	0,2	20	M		
	19:07:00	00EF	High SEV-E	0,1 >	0,2	20	M		
	19:06:00	00ED	High ENF-I	0,1 >	0,2	20	M		
	19:05:00	00DE	High ENF-E	0,1 >	0,2	20	M		

2 Select the items to be displayed on the alarm history.

1 Press the [Display Selection] key.

► The "Alarm Level", "Alarm Type" selection window will be displayed.



2 Select the alarm level to be displayed.

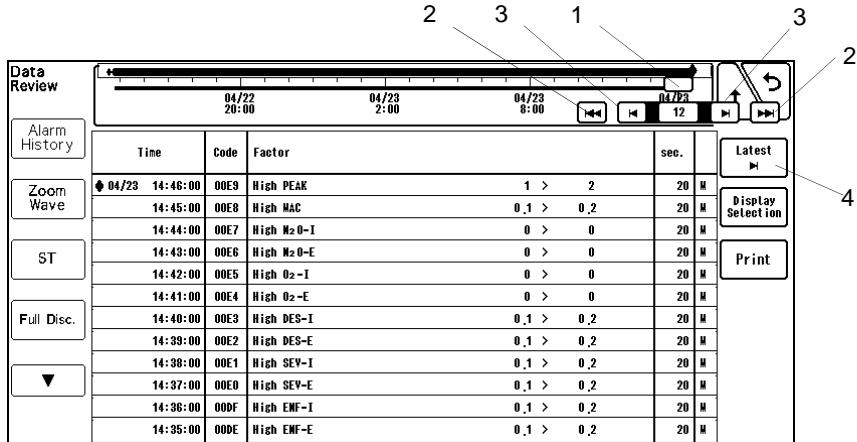
The selected item will be displayed in blue.

3 Select the alarm type to be displayed.

The selected item will be displayed in blue.

3

Switch the displayed data on the alarm history screen.

**1** Scroll the slider left and right.

- ▶ Right: Scrolls to the newer data.
- ▶ Left: Scrolls to the older data.

2 Press the [◀]/[▶] keys.

- ▶ The data will switch by page.

3 Press the [◀]/[▶] keys.

- ▶ The data will switch by half page.

4 Press [Latest].

- ▶ The latest data will be displayed.

4 Press the [Print] key.

- ▶ The currently displayed alarm history will be printed.

NOTE

- ◆ When the Recorder Unit (HR-810/HR-811) is not connected, pressing the [Print] key with the CF (or SD) card inserted will store the bitmap data on the CF (or SD) card.
(If both the CF and SD cards are inserted, the data will be stored on the CF card.)
(☞ "CF/SD Card Printing" P9-7)

Description for Each Item

The descriptions of each item are as follows.

Item	Details
Time	The alarm generated time or alarm setting changed time will be displayed.
Code	The code related to alarm generation or alarm setting change will be displayed in hexadecimal.
Factor	<p>The factor for alarm generation and alarm setting change will be displayed.</p> <p>In case of numeric data/arrhythmia alarm, the numeric data and alarm setting at alarm generation will be also displayed.</p> <p>In case of equipment status alarm, a detailed code may be also displayed.</p> <p>In case of alarm setting change, the changed value will be also displayed.</p>
Duration (sec.)	<p>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.</p> <p>It will not be displayed for the alarm setting change.</p>

Print Output Example

BED-013 2011/06/16 20:47 FUKUDA DENSHI ID:12841	SEX: AGE:39 ADULT	ALARM HISTORY 1/2
TIME CODE FACTOR		DURA.
11/06/16 20:46:49 2091 Printer Busy		5 N
11/06/16 20:46:43 2091 Printer Busy		5 N
11/06/16 20:46:05 4001 Alarm Suspend	119	
11/06/16 20:46:05 3A00 Tachy Setting Changed	120	
11/06/16 20:46:05 3203 RR (GAS) Lower Limit Changed	5	
11/06/16 20:46:05 3202 RR (VENT) Lower Limit Changed	5	
11/06/16 20:46:05 320E RR (IMP) Lower Limit Changed	5	
11/06/16 20:46:05 3003 RR (GAS) Upper Limit Changed	30	
11/06/16 20:46:05 3002 RR (VENT) Upper Limit Changed	30	
11/06/16 20:46:05 300F Apnea Upper Limit Changed	15	
11/06/16 20:46:05 300E RR (IMP) Upper Limit Changed	30	
11/06/16 20:46:05 3001 HR Upper Limit Changed	120	
SH11/06/16 20:46:04 4003 Discharge		
BED-013 2011/06/16 20:47 FUKUDA DENSHI ID:12841	SEX: AGE:39 ADULT	ALARM HISTORY 2/2
TIME CODE FACTOR		DURA.
11/06/16 20:45:15 3A00 Tachy Setting Changed	190	
11/06/16 20:45:15 3001 HR Upper Limit Changed	190	
11/06/16 20:45:12 0800 TACHY	60 > 50	3 H
11/06/16 20:45:12 0001 Upper HR	60 > 50	3 H
11/06/16 20:45:09 3A00 Tachy Setting Changed	50	

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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 8 hours of ST waveform will be displayed.

NOTE

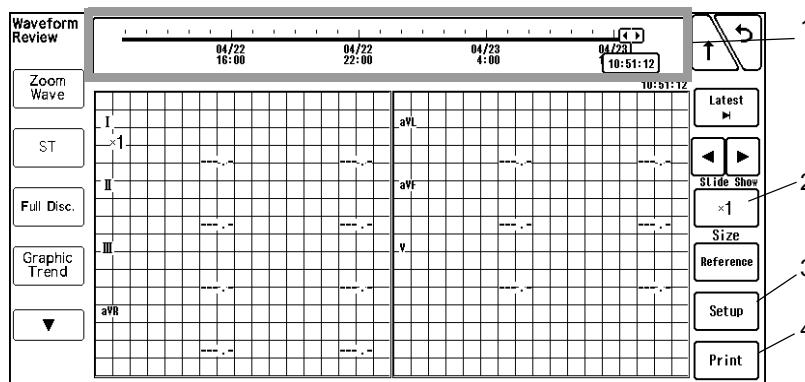
- If 3-lead cable is used, the measurement will be performed for only the displayed leads.
- For the following case, ST level will not be displayed.
 - ♦ When learning arrhythmia.
 - ♦ When the lead is off.
 - ♦ When the reference waveform is not set.
 - ♦ When "N" or "S" is not detected for QRS within 30 seconds.

1

Press the [Menu], [ST] ("Waveform Review") key.

Or, press the [ST] key on the user key area.

► ST screen will be displayed.



1 Select the displaying time.

◀/▶: The latest time of the ST waveform will be displayed by sliding it left/right and releasing it.

◀/▶: The display will change by one page.

Latest: The latest data will be displayed.

2 Select the waveform size for 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.

3 Change the time for the displayed block.

The "Setup" window will be displayed and "Slide Show" (1 sec./5 sec./10 sec./20 sec./30 sec.) can be selected.

REFERENCE

- When 3-lead cable is used, 36 blocks of ST waveform will be displayed. When 4, 5-electrode cable is used, 3 blocks of ST waveform for each lead will be displayed.

- 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 overlap waveform for the selected duration will be displayed.

4 Printing

The currently displayed ST waveform will be printed.

NOTE

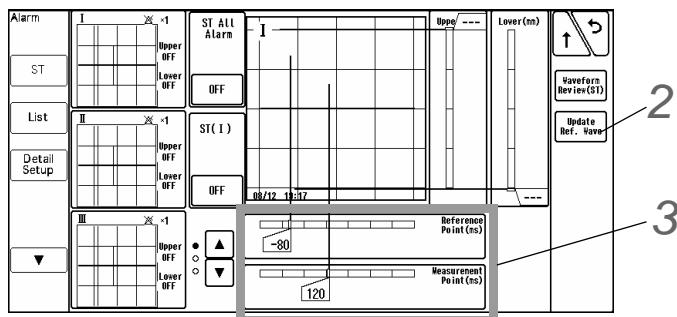
- When the Recorder Unit (HR-810/HR-811) is not connected, pressing the [Print] key with the CF (or SD) card inserted will store the bitmap data on the CF (or SD) card.
(If both the CF and SD cards are inserted, the data will be stored on the CF card.)
(["CF/SD Card Printing" P9-7](#))

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], [ST] ("Alarm") key.

► The ST alarm setup screen will be displayed.



2 Update the ST reference waveform.

CAUTION

- If the lead is off, the reference waveform cannot be set. Check if the electrode is properly attached, and perform the setup again.

1 Press the [Update Ref. Wave] key.

- 16 beats average of the ECG judged as normal QRS by arrhythmia analysis will be set as the reference waveform.
- While updating the reference waveform, the [Update Ref. Wave] key will be displayed in blue.
- 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 number of electrode 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.

- Slide the [xxx] for reference point left and right.
- Slide the [xxx] for measurement point left and right.

NOTE

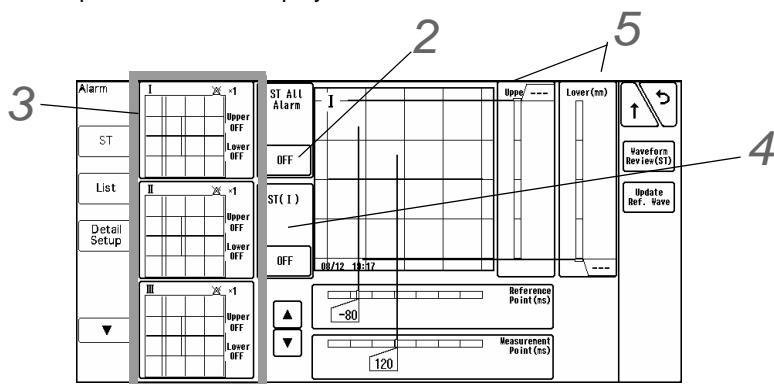
- Set the reference point in the range of -240 to 0ms in increments of 10ms from the peak of QRS to the P wave direction.
- Set the measurement point in the range of 0 to 560ms in increments of 10ms from the peak of QRS to the T wave direction.

ST Alarm Setup

Set the ST upper limit and lower limit for the reference waveform.

1 Press the [Menu], [ST] ("Alarm") key.

- 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 right.

4 Select [ON]/[OFF] of alarm for the selected lead.

5 Set the upper and lower alarm limit.

(☞ "Alarm Limit Setup for Each Parameter" P6-10)

NOTE

- Set the upper limit in the range from -18mm to +20mm/-1.8mV to +2.0mV. If a value above +20mm/+2.0mV is set, the upper alarm will turn OFF.
- Set the lower limit in the range from -20mm to +18mm/ -2.0mV to +1.8mV. 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 1mm / 0.1mV increment.

Full Disclosure Waveform (Optional Function)

By using the optional CF card (FCF-16GA:16GB), 48 hours of full disclosure waveform data can be stored. Maximum of 6 waveforms can be displayed. The alarm event and time will be also stored which allows to search the waveform by each factor.

⚠ CAUTION

- Use only the specified CF card.
- Turn OFF the power before removing the CF card.
- Check that the CF card indicator is not lit in red when turning OFF the power of the main unit.
- The CF card can be used only on the unit where it was formatted.
- It will take about 5 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 CF card formatted for the central monitor full disclosure waveform data cannot be used on the DS-8100 System.

NOTE

- When the full disclosure waveform data exceeds the capacity of the CF card, the data will be deleted from the old one.
- To delete the full disclosure waveform data, perform the discharge procedure.
(☞ "Discharge" P5-7)

To Format the CF Card

REFERENCE

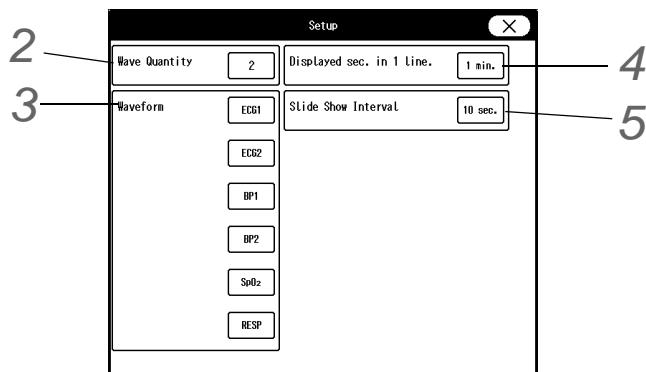
- To store the full disclosure waveform data, it is necessary to format the CF card for the full disclosure waveform.
(☞ Maintenance Manual "Using the CF card" P3-1)

Waveform Setup

The quantity and type of storing waveform, display duration (sec.) per line for the full disclosure waveform can be preprogrammed.

- 1** Press the [Menu], [Full Disc.] ("Waveform Review"), [Setup] key.

► The "Setup" window for full disclosure waveform will be displayed.



- 2** Set the quantity of waveforms to be displayed.

- 1** Press the key for "Wave Quantity".

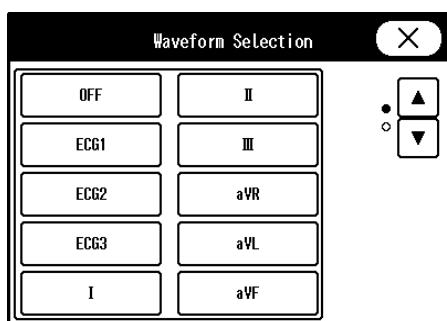
► The dropdown list will be displayed.

- 2** Select from [1]/[2]/[3]/[4]/[5]/[6].

- 3** Select the displaying waveform.

- 1** Press the key for "Waveform".

► The "Waveform Selection" window will be displayed.



- 2** Select the parameter.

- 4** Set the display duration (sec.) per line.

- 1** Press the key for "Time per Line".

► The dropdown list will be displayed.

- 2** Select from [10 sec.]/[30 sec.]/[1 min].

- 5** Set the time interval for slide show.

- 1** Press the key for "Slide Show Interval".

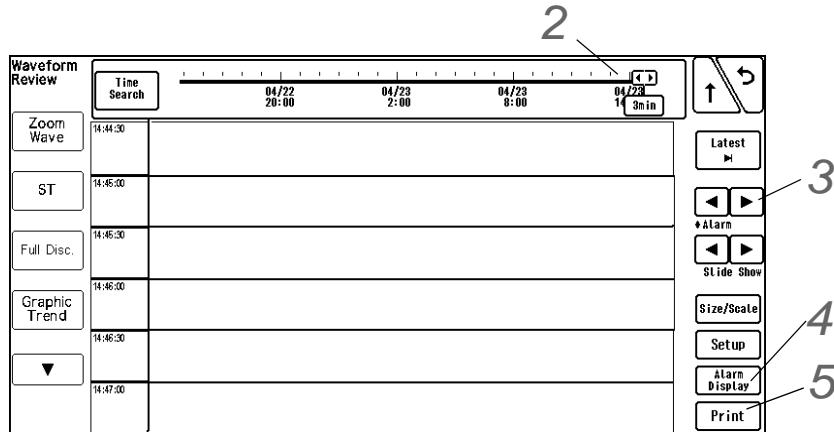
► The dropdown list will be displayed.

- 2** Select from [1 sec.]/[5 sec.]/[10 sec.]/[20 sec.]/[30 sec.].

Description of the Full Disclosure Waveform Display

- 1** Press the [Menu], [Full Disc.] ("Waveform Review") key.

► Full disclosure waveform will be displayed.



- 2** Scroll the displayed data.

(☞ "Alarm History Setup" P8-21)

- 3** Press **[◀]**/**[▶]** for "Alarm Review".

► The full disclosure waveform at alarm-generated point can be searched.

- 4** Press the [Alarm Display] key.

► The background color of the alarm-generated waveform can be changed.

- 5** Press the [Print] key.

► The currently displayed waveform will be output on the printer.

NOTE

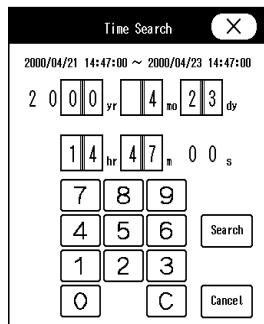
- When the Recorder Unit (HR-810/HR-811) is not connected, pressing the [Print] key with the CF (or SD) card inserted will store the bitmap data on the CF (or SD) card.
(If both the CF and SD cards are inserted, the data will be stored on the CF card.)
(☞ "CF/SD Card Printing" P9-7)

To Search by Time

The full disclosure waveform of the specified time can be displayed.

- 1** Press the [Search] key on the full disclosure waveform display.

▶ The "Time Search" window will be displayed.



- 2** Enter the search 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)	$h^{0.725} \times w^{0.425} \times 71.84 \times 10^{-4}$ (Dubois Formula)
CI	Cardiac Index (L/min/m ²)	$\frac{CO}{BSA}$
SV	Stroke Volume (mL/beat)	$\frac{CO \times 1000}{HR}$

Data	Item	Formula
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/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

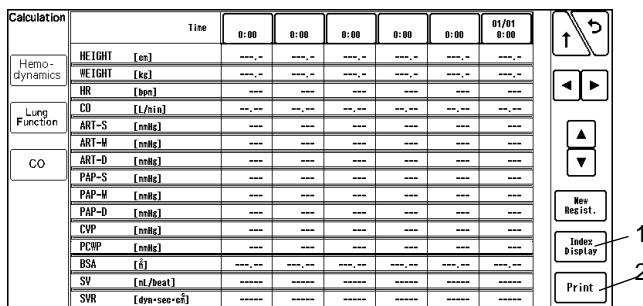
- The blood pressure unit for hemodynamics is "mmHg". If the unit is "kPa" or "cmH₂O", it will be converted to "mmHg" when calculating.

To Display/Print the Hemodynamics Data

10 hemodynamic data can be viewed in list format.

1 Press the [Menu], [Hemodynamics] ("Calculation") keys.

- The hemodynamics screen will be displayed.



1 [Index Disp] key

The display will alternately switch between "BSA, SV, SVR, PVR, LVW, LVSW, RVW, RVSW" and "CI, SVI, SVRI, PVRI, LVWI, LVSWI, RVWI, RVSWI".

2 [Print] key

The currently displayed hemodynamic data will be printed.

New Input of Hemodynamics Calculation

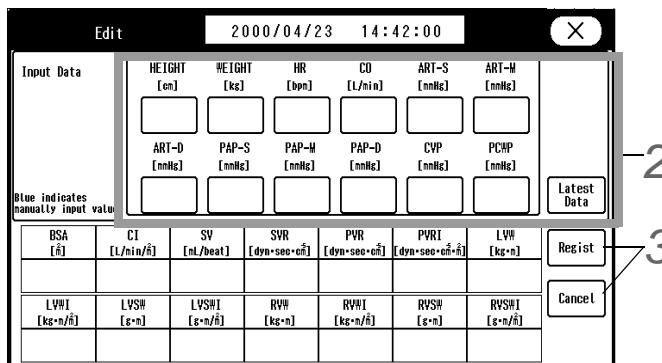
The hemodynamics calculation can be performed using the newly input data.

The data can be manually input using the numeric keys, or the current measurement data can be automatically input.

1

Press the [Menu], [Hemodynamics] ("Calculation"), [New Regist.] keys.

- The "Edit" window will be displayed.



REFERENCE

- 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] key.

- The measured data will be displayed.

To Edit the Data:

- 2 Select the data to edit.

- The numeric keys will be displayed.

- 3 Enter the value using the numeric keys.

- 4 Press the [Input] key.

- 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 (cm)	0 to 300cm
WEIGHT	Weight (kg)	0 to 350kg
BSA	Body Surface Area (m ²)	0 to 9.99m ²
CO	Cardiac Output (L/min)	0.00 to 20.00L/min
HR	Heart Rate (bpm)	0 to 350bpm

Input Data

Data	Item (Unit)	Editing Range
ART S	Systolic Arterial Pressure (mmHg / kPa)	0 to 350mmHg / 0 to 46.6kPa
ART M	Mean Arterial Pressure (mmHg / kPa)	0 to 350mmHg / 0 to 46.6kPa
ART D	Diastolic Arterial Pressure (mmHg / kPa)	0 to 350mmHg / 0 to 46.6kPa
PAP S	Systolic Pulmonary Artery Pressure (mmHg / kPa)	0 to 100mmHg / 0 to 13.3kPa
PAP M	Mean Pulmonary Artery Pressure (mmHg / kPa)	0 to 100mmHg / 0 to 13.3kPa
PAP D	Diastolic Pulmonary Artery Pressure (mmHg / kPa)	0 to 100mmHg / 0 to 13.3kPa
CVP	Central Venous Pressure (mmHg / kPa)	0 to 100mmHg / 0 to 13.3kPa
PCWP	Pulmonary Capillary Wedge Pressure (mmHg / kPa)	0 to 100mmHg / 0 to 13.3kPa

3 Press the [Regist.]/[Cancel] key.

- ▶ [Regist]: The calculation will be performed using the newly input data, and the input data and calculation result will be registered on the list.
- ▶ [Cancel]: The input data will be deleted.

REFERENCE

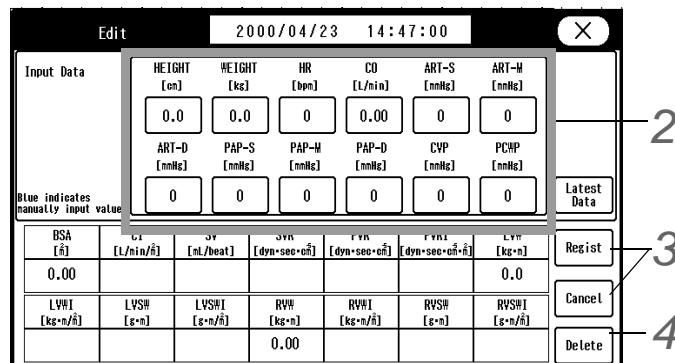
- ♦ The calculation result will not be displayed if sufficient data is not input.
- ♦ Maximum of 10 data can be registered. If exceeded, the oldest data will be deleted.
- ♦ The edited data will be also displayed in blue on the list.

To Edit the Hemodynamics Input Data

The input data which has been already calculated can be edited or deleted.

1 Press the [Menu], [Hemodynamics] ("Calculation"), 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" P8-32)

3 Register the edited data.

(☞ "New Input of Hemodynamics Calculation" P8-32)

4 Delete the data.

1 Press the [Delete] key.

► The "Delete" window will be displayed.

2 Press the [YES] key.

Lung Function

This section explains the procedure for lung function calculation and printing.

Calculation Data

Data	Item	Formula
BSA	Body Surface Area (m^2)	$h^{0.725} \times w^{0.425} \times 71.84 \times 10^{-4}$
CaO ₂	Arterial Oxygen Content (mL/dL)	$CaO_2 = 1.34 \times Hb \times SaO_2 + 0.003 \times PaO_2$
CvO ₂	Mixed Venous Oxygen Content (mL/dL)	$CvO_2 = 1.34 \times Hb \times SvO_2 + 0.003 \times PvO_2$
a-vDO ₂	Arteriovenous Oxygen Content Difference (vol %)	$a-vDO_2 = CaO_2 - CvO_2$
DO ₂	Oxygen Transport (mL/min)	$DO_2 = CaO_2 \times CO \times 10$
DO ₂ I	Oxygen Transport Index (mL/min/ m^2)	$DO_2I = CaO_2 \times Clx \times 10$
VO ₂	Oxygen Consumption (mL/min)	$VO_2 = a-vDO_2 \times CO \times 10$
VO ₂ I	Oxygen Consumption Index (mL/min/ m^2)	$VO_2I = a-vDO_2 \times Clx \times 10$
O ₂ ER	Oxygen Extraction Rate (%)	$O_2ER = (CaO_2 - CvO_2) / CaO_2 \times 100$
AaDO ₂	Alveolar-Arterial Oxygen Difference (Torr)	$AaDO_2 = PaO_2 - PaO_2$ $PaO_2 = P_iO_2 - (P_aCO_2 / R) \times (1 - F_iO_2 \times (1 - R))$ R: Respiration Quotient (0.8 for this equipment) $P_iO_2 = (P_B - 47) \times F_iO_2$
Q _s /Q _t	Shunt Rate (%)	$\dot{Q}_s / \dot{Q}_t = (CcO_2 - CaO_2) / (CcO_2 - CvO_2)$ $CcO_2 = 1.34 \times Hb + 0.003 \times PaO_2$

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], [Lung Function] ("Calculation") keys.

► The lung function list will be displayed.

- 1** [Index Disp] key

The display of BSA, CaO₂, CvO₂, a-vDO₂, DO₂, VO₂, O₂ER, AaDO₂, Qs/Qt will alternately switch with that of CI, DO₂I, VO₂I.

- 2** [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 manually input using the numeric keys, or the current measurement data can be automatically input.

- 1** Press the [Menu], [Lung Function] ("Calculation"), [New Regist.] keys.

► The "Edit" window will be displayed.

- 2** Enter the calculation data.

- 1** Press the [Latest] key.

► The input data for HEIGHT, WEIGHT, and measured data for CO will be displayed.

To Edit the Data:

- 2** Select the data to edit.

- ▶ The numeric keys will be displayed.

3 Enter the value using the numeric keys.

4 Press the [Input] key.

- ▶ 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 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(%)
PvO ₂	Partial Pressure of Mixed Venous Oxygen (mmHg)
SvO ₂	Mixed Venous Oxygen Saturation(%)

3 Press the [Regist.]/[Cancel] key.

- ▶ [Regist]: The calculation will be performed using the newly input data, and the input data and calculation result will be registered on the list.
- ▶ [Cancel]: The input data will be deleted.

REFERENCE

- ♦ The calculation result will not be displayed if sufficient data is not input.
- ♦ 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.

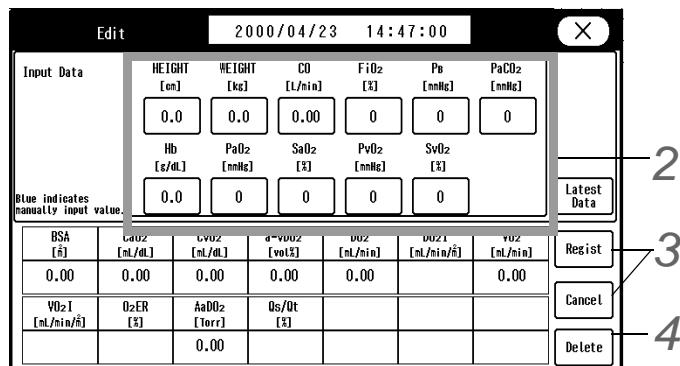
To Edit the Lung Function Input Data

The input data which has been already calculated can be edited or deleted.

1

Press the [Menu], [Lung Function] ("Calculation"), 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" P8-35)

3

Register the lung function list.

(☞ "New Input of Lung Function Calculation" P8-35)

4

Delete the data.

(☞ "New Input of Lung Function Calculation" P8-35)

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

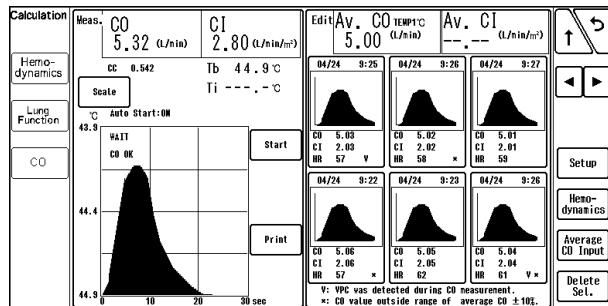
Press the [Menu], [CO] ("Calculation") keys.

Or, press the [Cardiac Output] key on the user key area.

- ▶ The CO measurement screen will be displayed.

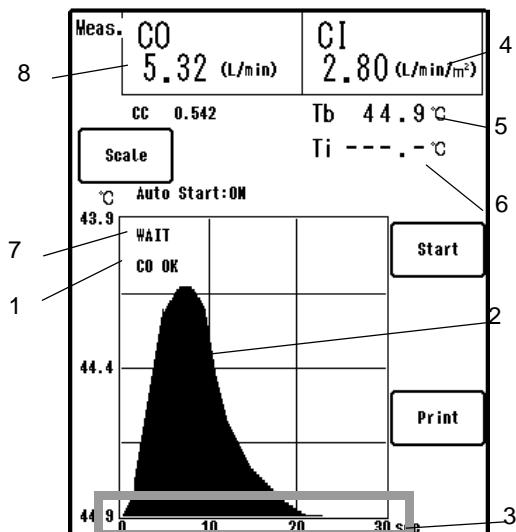
- ▶ The message according to the status will be displayed, and if "READY" is displayed, the measurement can be started.

(☞ "Cardiac Output Message" P11-16)



□ The Description of the CO Measurement Screen

- 1 Result Status
- 2 Thermodilution Curve
- 3 Time Scale
- 4 Cardiac Index (CI)
- 5 Blood Temperature
- 6 Injectate Temperature
- 7 Status Message
- 8 Cardiac Output (CO)

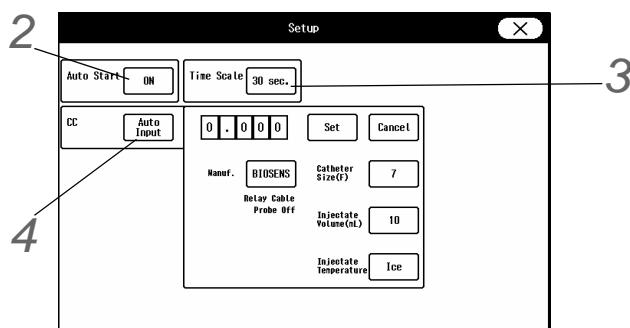


Cardiac Output Setup

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], [CO] ("Calculation"), [Setup] keys.

► The "Setup" window will be displayed.



- 2** Set ON/OFF of "Auto Start".

- 1** Press the key for "Auto Start".
 ▶ The dropdown list will be displayed.

- 2** Select from [ON] or [OFF].
 ▶ [ON]: The measurement will automatically start when the injectate is injected.
 ▶ [OFF]: The measurement will start by pressing the [Start] key.

REFERENCE

- Even when [ON] is selected, the measurement can be manually started by pressing the [Start] key.

- 3** Set the time scale.

- 1** Press the key for "Time Scale".
 ▶ The dropdown list will be displayed.

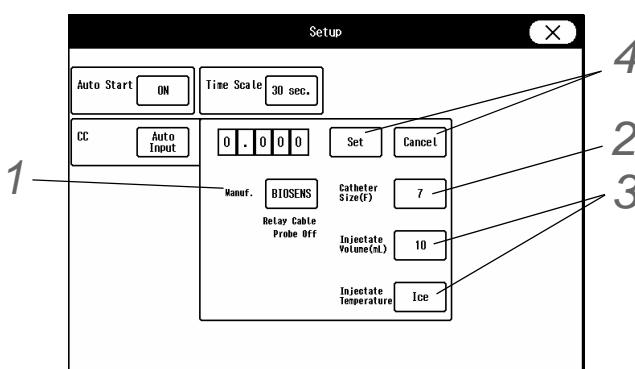
- 2** Select from [30 sec.]/[60 sec.].

- 4** Set the computation constant.

- 1** Press the key for "CC".
 ▶ The dropdown list will be displayed.

- 2** Select from [Auto Input]/[Manual Input].

- [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.

□ Auto Input of Computation Constant

- 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.

When the CJ0-P01C-C2.4 Catheter Relay Cable is used:

1 Select the "Injectate Temperature" from [Ice]/[Room].

- ▶ [Ice]: The measurement will be performed at 0°C.
- ▶ [Room]: The measurement will be performed at room temperature (24°C).

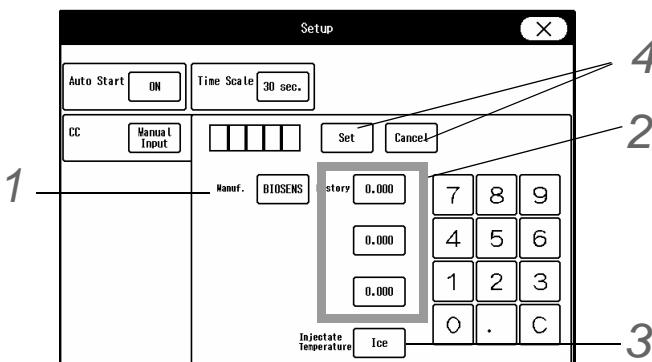
4 Press the [Input]/[Cancel] key.

- ▶ [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 be 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.

When the programmed history is present:

1 Press the key for "History".

When the programmed history is not present:

1 Use the numeric keys to enter the CC value.

3 Set the "Injectate Temperature".

(☞ "Auto Input of Computation Constant" P8-39)

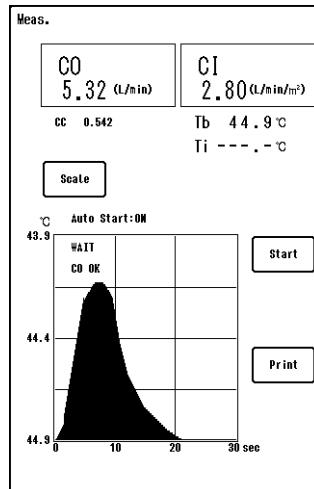
4 Press the [Input]/[Cancel] key.

- ▶ [Input]: The computation constant will be finalized.

CO Measurement

1 Press the [Menu], [CO] ("Calculation") 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 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 repeatedly performing the measurement, inject at intervals of 30–60 seconds
- ♦ The CI value will not be displayed unless height/weight or BSA value is input on the "Admit/Discharge" screen.
(☞ "Entering the Patient Name" 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.

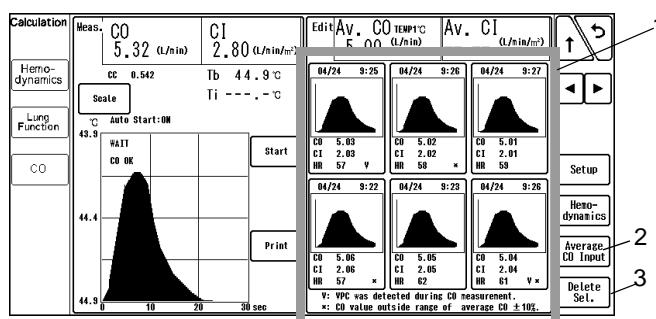
To Edit the CO Measurement Result

The average CO and average CI can be calculated by performing the CO measurement continuously and editing the measurement result.

1

Press the [Menu], [CO] ("Calculation") keys.

- ▶ The CO measurement screen will be displayed.
- ▶ The average CO and average CI value obtained from the measurement result will be displayed.



1 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 $\pm 10\%$.

2 [Average CO Input] key

The displayed average CO value will be input 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, store the average CI by hemodynamic calculation before changing the height, weight, and BSA.

3 [Delete Sel.] key ([Delete] key)

The [Delete Sel.] key will change to [Delete] key and allows to delete the data.

x mark will be displayed for the data to be deleted, and pressing the [Delete] key will delete the data.

Other Bed Display

This section explains about the function to display the waveform and 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-LANII or DS-LANIII) 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

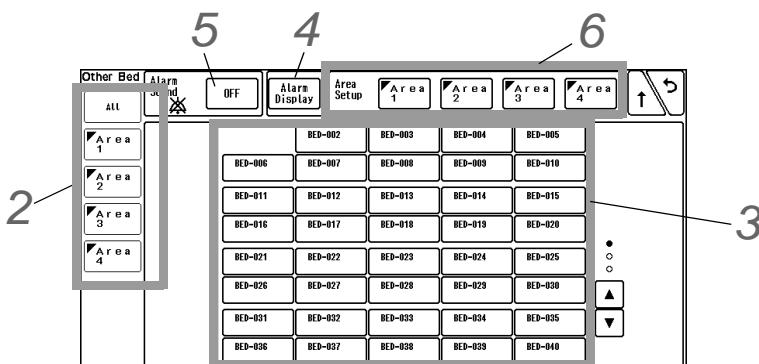
- This equipment cannot connect to a wired network of AU-5500N 8ch Recorder set as the administrator.
Even if connected, other bed display, printing and other function cannot be used.

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 [ON], [Other Bed Alarm] key will be displayed when other bedside monitor generates an alarm. By pressing this [Other Alarm] key, the display for the other bed can be accessed.



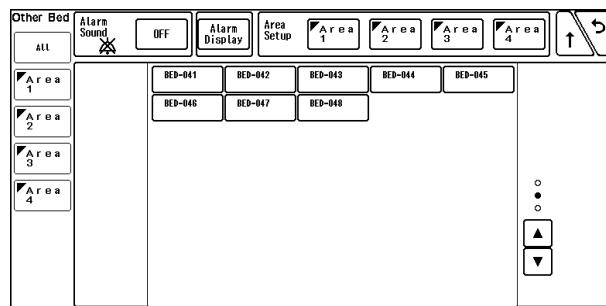
1 Press the [Menu], [Other Bed] keys.



- On the other bed selection screen, select the bed from the maximum of 100 beds (DS-LANIII) connected to the wired network. The bed ID/room ID for the alarm generated bed will be displayed in red. For the alarm generated bed, icon will be displayed.

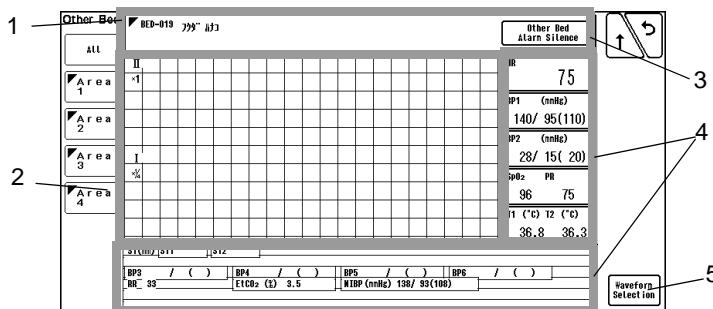
2 Select the area.

- ♦ 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.

The waveforms and numeric data for the selected bed will be displayed. If the alarm is generated for that bed, numeric data 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 6 waveforms for the DS-LANIII network, and maximum of 2 waveforms for the DS-LANII network can be displayed.

3 By pressing the [Other Bed Alarm Silence] key on the other bed display, the alarm sound for the displayed bed can be silenced.

4 Numeric Data Area

The numeric data will be displayed at the right and bottom (if not enough space at the right) of the screen.

5 Press the [Waveform Selection] key to select the waveforms.

- ▶ Waveform 1 is fixed as ECG, but other waveforms can be selected.

Maximum of 6 waveforms for the DS-LANIII network, and maximum of 2 waveforms for the DS-LANII 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.

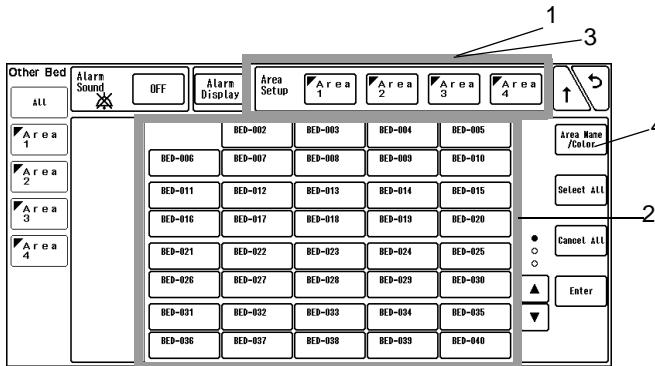
5 Turn ON the other bed alarm.

► [ON]: Other bed alarm will be generated.

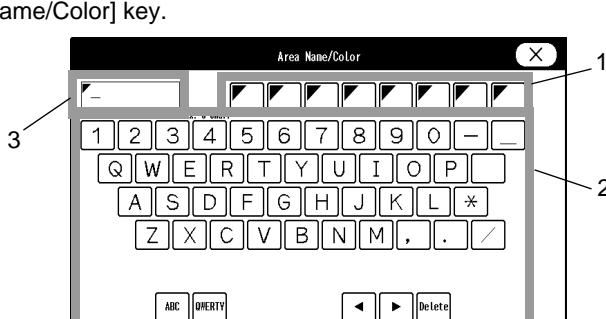
► [OFF]: Other bed alarm will not be generated.

6 Set the area.

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 "Area Setup" will be displayed in blue. To return to the original mode, press the key for "Area Setup" 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 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.

Chapter 9 Printing

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Chapter 9 Printing

Printing Setup

This section describes the procedure for printing.

For the DS-8100 System, the following can be performed.

- ♦ Manual Printing
- ♦ Automatic Printing (Periodic Printing)
- ♦ Automatic Printing (Alarm Printing)
- ♦ Freeze Printing
- ♦ Graphic Printing (Trend, Tabular Trend, Recall, etc.)

REFERENCE

- ♦ The printed HR/PR data depends on the ECG/SpO₂/BP selection for "Synchronized Mark/Tone" (Menu>Parameter>ECG, SpO₂, BP).
☞ "Synchronized Mark/Tone" 7-9)

1 Press the [Menu], [Manual Printing] or [Auto Printing] ("Basic Setup") keys.

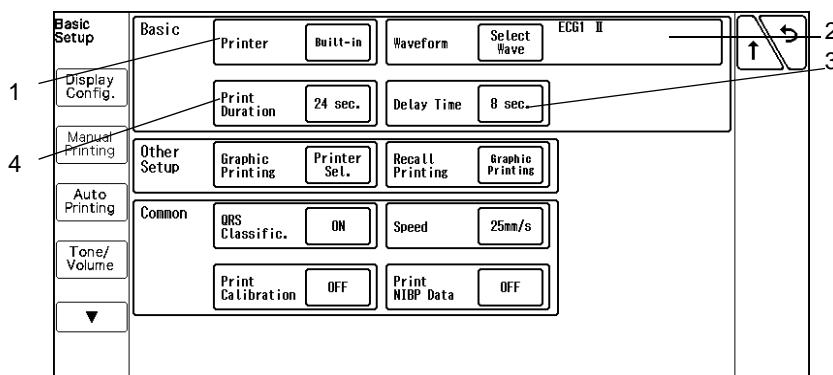
► The manual printing or automatic printing setup screen will be displayed.

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 built-in printer or central monitor printer.



1 Printer

[Built-in]: Data will be printed on the HR-810 or HR-811.

[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 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.].

4 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.

To Start/Stop the Printing

1

Press [Print Start/Stop] of the user 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	Details
None	Normal Operation
PAPER OUT	The recorder is out of paper.
CASSETTE	Check the cassette.
CHECK?	Other abnormality is found.

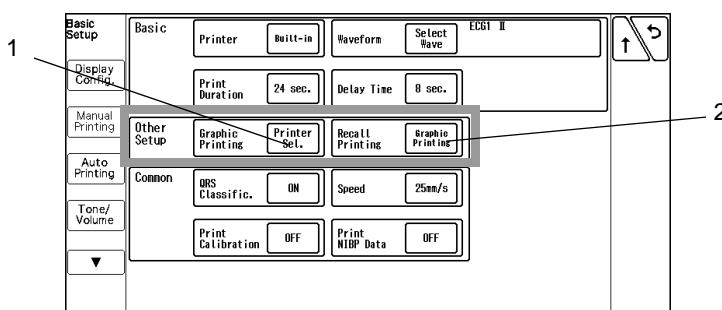
NOTE

- When the Recorder Unit (HR-810/HR-811) is not connected, pressing the [Print Start/Stop] key will store the waveform as recall data. However, if the CF (or SD) card is inserted, the waveform will not be stored as recall data, but stored on the CF (or SD) card. (If both the CF and SD cards are inserted, the data will be stored on the CF card.)

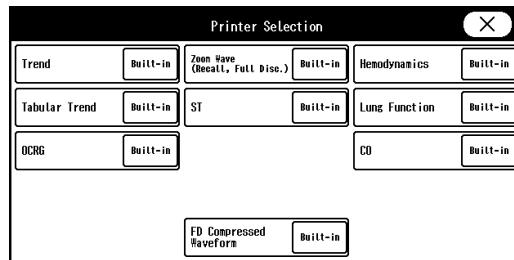
(☞ "CF/SD Card Printing" P9-7)

Manual Printing (Other Setup)

Select the printer for graphic printing and recall printing.



- 1 Press the key for "Graphic Printing" to display the "Printer Selection" window.



- ▶ [Built-in]: Data will be printed on the HR-810 or HR-811.
- ▶ [Central]: Data will be printed on the central monitor printer.
- ▶ [Laser]: Data will be printed on the laser printer.

REFERENCE

- ◆ Graphic printing is a printing performed from the data review screen such as graphic trend and tabular trend.
- ◆ To select laser printer, it is necessary to select [ON] for "Network Printer" under [Menu>Initial Settings>External Device>Network> in advance.
(Maintenance Manual "Laser Printer Setup" P4-15)

2 Recall Printing

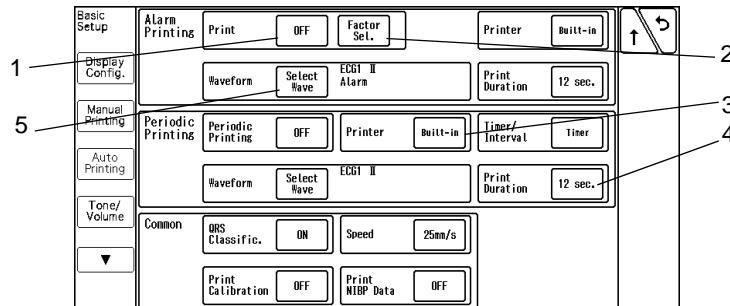
- ▶ [Graphic Printing]: Recall data will be output on the printer selected for "Graphic Printing".
- ▶ [Manual Printing]: Recall data will be output on the printer selected for "Printer" under "Basic".

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 > SLOW VT > TACHY > BRADY > RUN > HR(HR / PR_SpO₂ / PR_IBP) > APNEA > BP1 (or ART) > SpO₂ > NIBP > RR (RR_IMP / RR_GAS / RR_VENT) > EtCO₂ > PAUSE > COUPLET > BIGEMINY > TRIGEMINY > FREQUENT > BP2 > ST > TEMP > Tb > InspCO₂

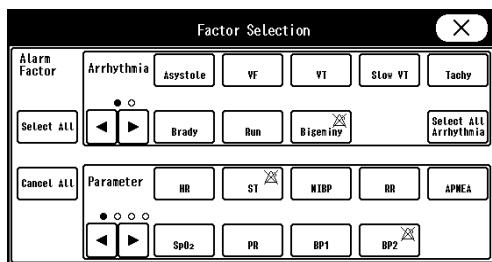


1 Alarm Printing

[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 will be selected as alarm factor.

[All ON]: All parameters will be selected as alarm factor.

[All OFF]: All selections for the alarm factor will be cancelled.

3 Printer

[Built-in]: Data will be printed on the HR-810 or HR-811.

[Central]: Data will be printed on the central monitor printer.

4 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.	

5 Waveform

(☞ "Manual Printing (Basic)" P9-1)

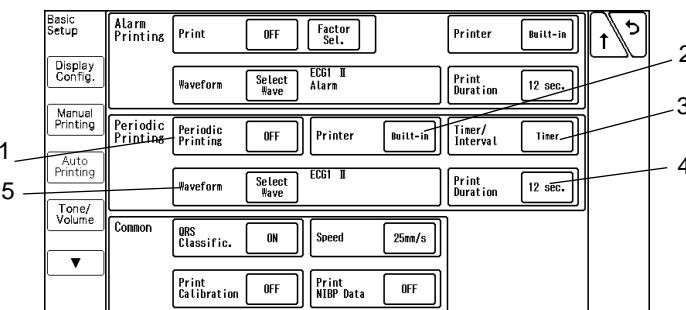
[Alarm]: Prints the waveform of the alarm factor.

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.



1 Periodic Printing

[ON]: Printing will automatically start at fixed interval.

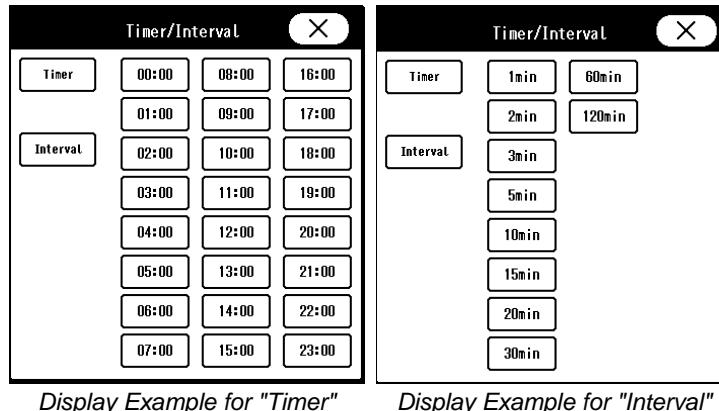
[OFF]: Turns OFF the periodic printing function.

2 Printer

[Built-in]: Data will be printed on the HR-810 or HR-811.

[Central]: Data will be printed on the central monitor printer.

3 Periodic 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], printing will start at 10:00, 10:05, ...10:25. If [60 min.] is selected, printing will start at 10:00, 11:00, 12:00,

4 Print Duration

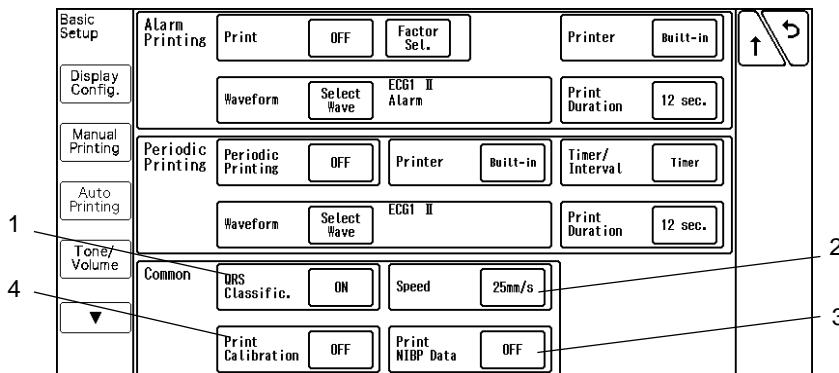
The printing will automatically stop after the selected duration.

5 Waveform

(☞ "Manual Printing (Basic)" P9-1)

Common Setup for Printing

The printing condition common for manual printing and automatic printing can be set.



Display Example for Automatic Printing

Display Example for Automatic Printing

1 QRS Classification

[ON]: QRS classification symbol will be printed with the ECG waveform.

Symbol	Details
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 delay time is "none" and for periodic printing. To print the QRS symbol, set the delay time to [8 sec.] or [16 sec.].
- The "S" (QRS symbol) will be printed as "N" on the central printer.

2 Printing Speed

[25mm/s]: The printing speed will be set to 25mm/s.

[50mm/s]: The printing speed will be set to 50mm/s.

3 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.

4 Print Calibration

[Top]: Calibration waveform will be printed at the beginning of the waveform.

[Each Page]: Calibration waveform will be printed in 18.75cm interval.

[OFF]: Calibration waveform 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" P10-5)

1 Press the [Freeze] key on the user key.

- ▶ The waveform trace will stop.

2 Press the [Print Start/Stop] key.

- ▶ The displayed waveform will be printed.
- ▶ Freeze printing will be output on the built-in printer. The waveforms selected for manual printing will be printed.

CF/SD Card Printing

When the Recorder Unit (HR-810/HR-811) is not connected, pressing the [Print Start/Stop] key will store the waveform on the CF (or SD) card.

(If both the CF and SD cards are inserted, the data will be stored on the CF card.)

NOTE

- ◆ When the CF/SD card is not inserted, pressing the [Print Start/Stop] key will store the waveform as recall data named "EVENT 1".

The [Print Start/Stop] key performs different functions in different situations as follows:

Recorder Unit connected (HR-810/HR-811)	Prints waveform on Recorder Unit.	
Recorder Unit not connected (HR-810/HR-811)	CF card inserted	Stores waveform on CF card.
	CF card not inserted	Stores waveform as recall data.

□ To store on the CF/SD card (Waveform)

1 Press [Print Start/Stop] of the user key.



- ▶ "Printer Busy" message will be displayed.

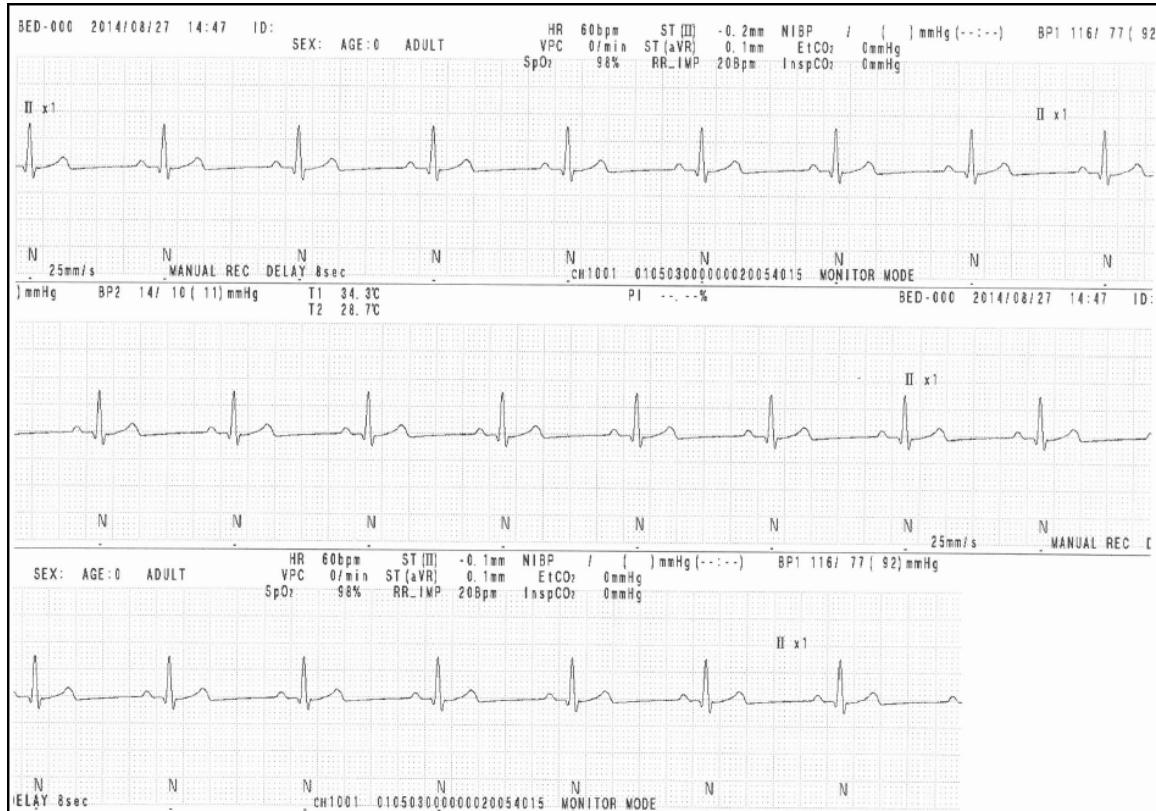


- ▶ When printing is completed, "Printer Busy" message will disappear.

NOTE

- The data stored on the CF/SD card can not be verified on this equipment, but can be verified and printed on a PC.

Waveform Output Example (The file name will be YYMMDD_HHMMSS_sequence number.bmp.)



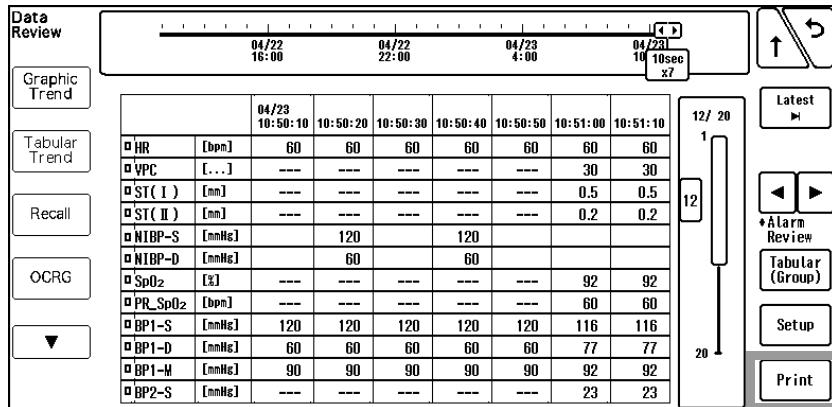
Other than waveform data, review data (Graphic Trend, Tabular Trend, Recall, Alarm History, etc.) can be stored on the CF (or SD) card as bitmap data.

Stored data on the CF card when the [Print] key on each Review display is pressed

Review Data	Stored Data
Graphic Trend	Trend data for the selected parameter
Tabular Trend	Currently displayed tabular trend data Pressing the [Print All] key will store all data for the 12 selected parameters.
Recall	Currently displayed enlarged waveform and numeric data
ST Measurement	Currently displayed ST waveform
OCRG	Currently displayed trend and compressed waveform
Cardiac Output (CO)	Currently displayed thermodilution curve, CO, CI
Hemodynamics	Currently displayed hemodynamic data
Lung Function	Currently displayed lung function data
Alarm History	Currently displayed alarm history

To store on the CF/SD card (Data Review)

- 1 Press the [Print] key on the Tabular Trend display.



► "Printer Busy" message will be displayed.



► When printing is completed, "Printer Busy" message will disappear.

BED-001 2014/08/27 14:48		ID:	SEX: ADULT	CH1001	LIST TREND 1/1
HR	[bpm]	60	60	60	60
VPC	[min]	0	0	0	0
ST (I)	[mm]	-0.2	-0.2	-0.2	-0.2
ST (II)	[mm]	-0.2	-0.2	-0.1	-0.1
NIBP_S	[mmHg]				
NIBP_D	[mmHg]				
Spo2	[%]	98	98	98	98
PR_SpO2	[bpm]	60	60	60	60
BP1_S	[mmHg]	116	116	116	116
BP1_D	[mmHg]	77	77	77	77
BP1_M	[mmHg]	92	92	92	92
BP2_S	[mmHg]	14	15	14	14

Chapter 10 System Configuration

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Tone/Volume	10-17
Color	10-20
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Chapter 10 System Configuration

Display Configuration

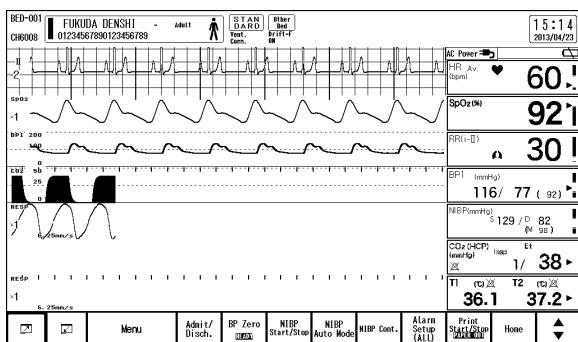
This section describes about the display configuration type and the procedure to configure the display.

The monitoring display can be configured according to the monitoring purpose. There are following types of basic display layout.

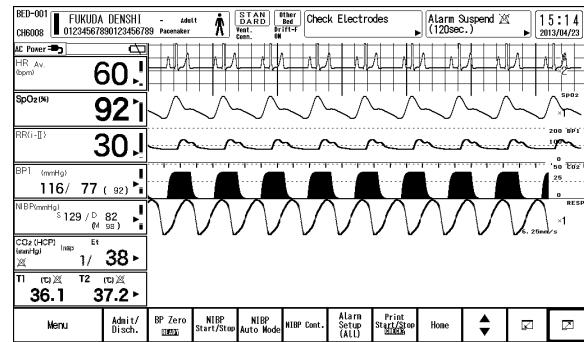
- ♦ Standard
- ♦ Standard&Bottom
- ♦ Numeric/Maximum Size

If ECG cascade or block cascade is selected, full disclosure waveform can be displayed. It is also possible to assign user keys to the numeric data area.

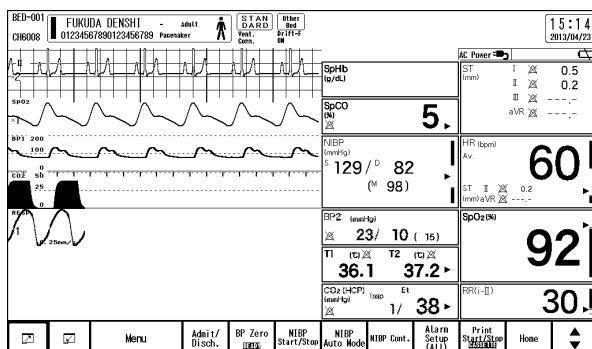
Example on DS-8100



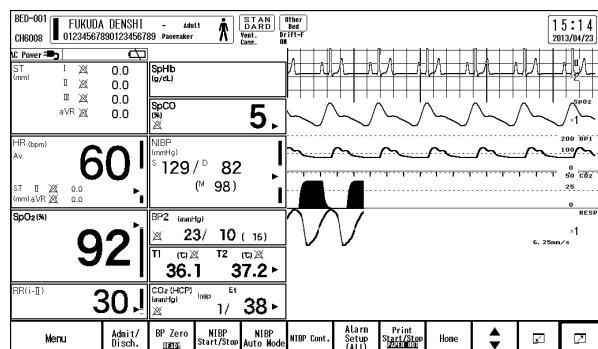
Numeric Data: Standard/Right



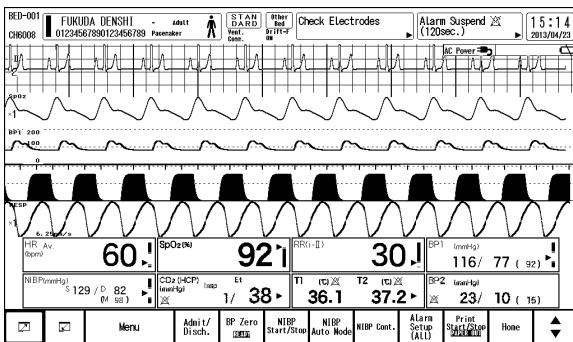
Numeric Data: Standard/Left



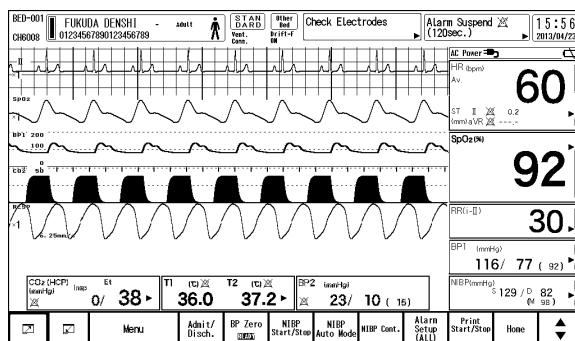
Numeric Data: Standard/Right (Large)



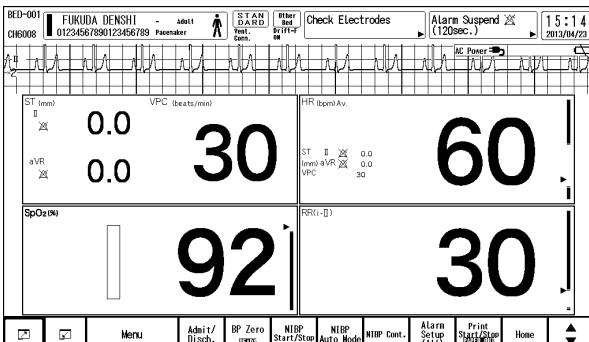
Numeric Data: Standard/Left (Large)



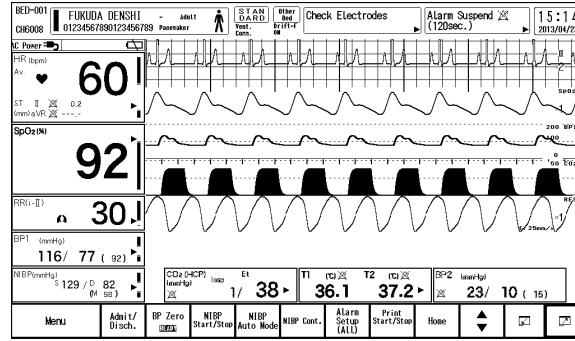
Numeric Data: Standard/Bottom



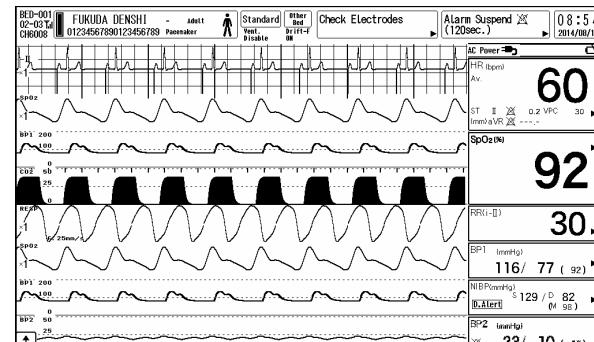
Numeric Data: Standard&Bottom/Left



Numeric Data: Maximum Size



Numeric Data: Standard&Bottom/Right



User Key Hidden

9 main modes can be preprogrammed according to the monitoring purpose.

By preprogramming the configuration to each mode, the display configuration setups at admittance of patient can be simplified by just selecting one of the modes.

(☞ "To Select the User Mode" P5-8)

(☞ Maintenance Manual "Operation Related Setup" P5-23)

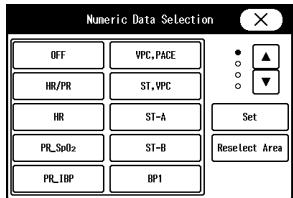
It is recommended to program the mode in rough classification such as patient's condition, monitoring purpose (ICU or surgery), and if necessary, perform unique setup for each patient.

Numeric Data Selection

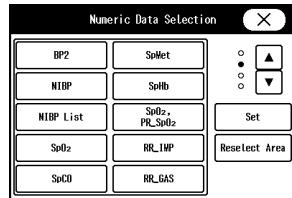
The numeric data to be displayed can be selected on the "Numeric Data Selection" window.

By selecting a parameter on the "Numeric Data Selection" window, it will be assigned to the numeric data box on the home display.

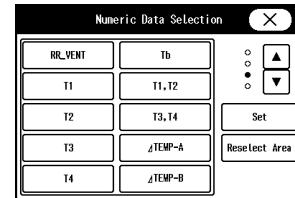
(☞ "Numeric Data Box Display (for each parameter)" P3-10)



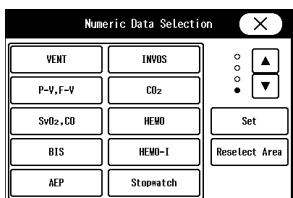
First Page



Second Page



Third Page



Fourth page

The Numeric Data Box Size for Each Parameter

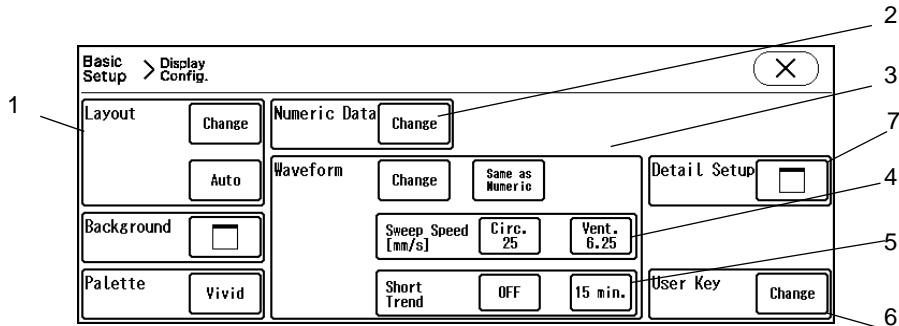
Numeric Data	Numeric Data Box Size							
	Width ^{*1}	W1/2	W1			W2 ^{*3}		
	Height ^{*2}	H1	H1	H2	H3	H1	H2	H3
HR/PR	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
HR	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
PR_SpO ₂	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
PR_IBP	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
VPC, PACE	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ST, VPC	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ST-A, ST-B	No	No	Yes	Yes	No	Yes	Yes	Yes
BP1 to BP2	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NIBP	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NIBP List	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SpO ₂	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SpO ₂ , PR_SpO ₂	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SpCO	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SpMet	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SpHb	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
RR_IMP, RR_GAS, RR_VENT	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T1 to T4, Tb	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T1/T2, T3/T4	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ΔTEMP-A, ΔTEMP-B	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
VENT	No	No	Yes	Yes	No	Yes	Yes	Yes
P-V, F-V	No	No	Yes	Yes	No	Yes	Yes	Yes
SvO ₂ , CO	No	No	Yes	Yes	No	Yes	Yes	Yes
BIS	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CO ₂	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
INVOS	No	No	Yes	Yes	No	Yes	Yes	Yes
HEMO	No	No	Yes	Yes	No	Yes	Yes	Yes
HEMO-I	No	No	Yes	Yes	No	Yes	Yes	Yes
Stopwatch	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*1: W1/2 is about 34mm, W1 is about 69mm, W2 is about 138mm
 *2: H1 is about 17mm, H2 is about 36mm, H3 is about 55mm (H1 is the same length as waveform area)
 *3: W2 size can be set only for "Bottom 1 row/2 rows" layout.

To Configure the Display

- 1** Press the [Menu], [Display Config.] ("Basic Setup") keys.

► The display configuration menu will be displayed.



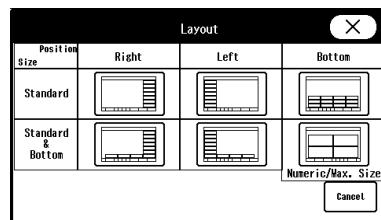
- 1 Layout
(☞ "Changing the Layout" P10-5)
- 2 Numeric Data
(☞ "To Change the Displayed Numeric Data" P10-6)
- 3 Waveform
(☞ "Changing the Displayed Waveform" P10-8)
- 4 Sweep Speed
(☞ "Sweep Speed" P10-10)
- 5 Short Trend
(☞ "To Display the Short Trend" P10-9)
- 6 User Key
(☞ "User Key Setup" P10-11)
- 7 Detail Setup
(☞ "Detail Setup" P10-12)

□ Changing the Layout

The layout can be changed with the following procedure.

- 1** Press [Change] for "Layout".

► The "Layout" window will be displayed.

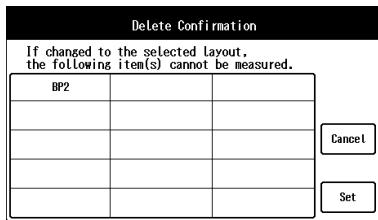


- 2** Select the layout to be displayed.

- 3** Check the home display to see if the selected layout is properly displayed.

If there are parameters that cannot be displayed:

- The "Delete Confirmation" window will be displayed.



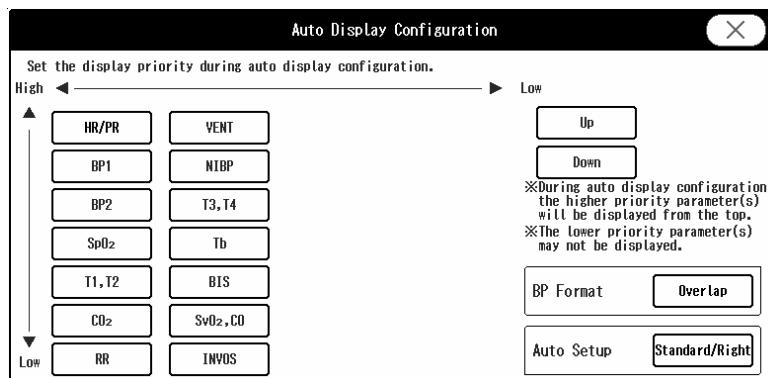
NOTE

- ♦ The displayed parameters will be automatically located with the selected layout.

4 If not changing the layout, press the [Cancel] key.

□ Adjusting the Layout Automatically

The display layout can be automatically adjusted.



- ♦ The measured parameters will be automatically located according to the priority. The display layout remains the same. (The layout will change if not enough space on the screen.) The order of display priority can be set on the "Auto Display Configuration" (Initial Settings>User I/F).

(☞ Maintenance Manual "Display/Print Setup" P5-13)

1 Select [Auto] for "Layout".

NOTE

- ♦ The waveform layout is equivalent to that when the [Same with Numeric] key is pressed.

□ To Change the Displayed Numeric Data

The displayed numeric data can be changed with the following procedure.

⚠ CAUTION

- ♦ When performing telemetry transmission or wired network communication, 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.

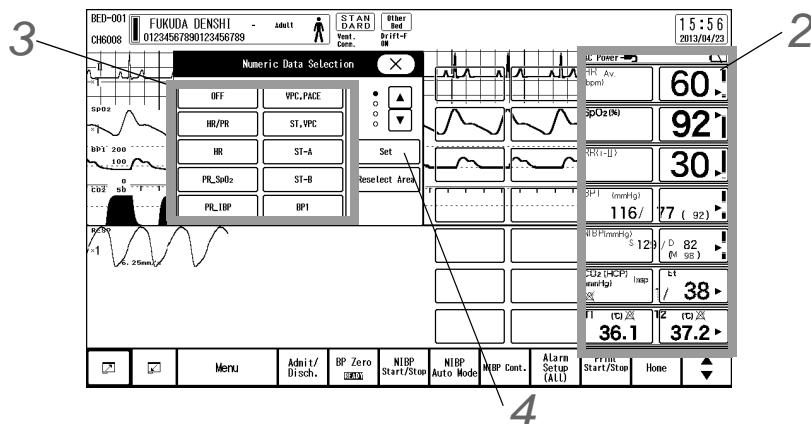
NOTE

- ♦ 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, SpO₂ parameter setup window/floating window or by pressing the [HR/PR] user key.

1 Press the [Change] key for "Numeric Data".

- ▶ The display will change to numeric data selection mode.
- ▶ If the layout is "Numeric/Max. Size", the "Numeric Data Selection" window will be different from that of other layouts.
- ▶ 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 cancelled.

NOTE

- To restart from the beginning, press the [Reselect Area] key.
- Adjust the size of the selected area which will be indicated in blue frame.

3 Select the parameter on the "Numeric Data Selection" window.

NOTE

- Press the **[▲]** / **[▼]** keys to switch the displayed parameters.
(☞ "Numeric Data Selection" P10-3)

4 Press the [Setup] key.

- ▶ The setup will be finalized.

NOTE

- The selected parameter may not be displayed depending on the size.
In such case, "Size Error" will be displayed in numeric data area. Adjust the size.
(☞ "Numeric Data Selection" P10-3)

□ Changing the Displayed Waveform

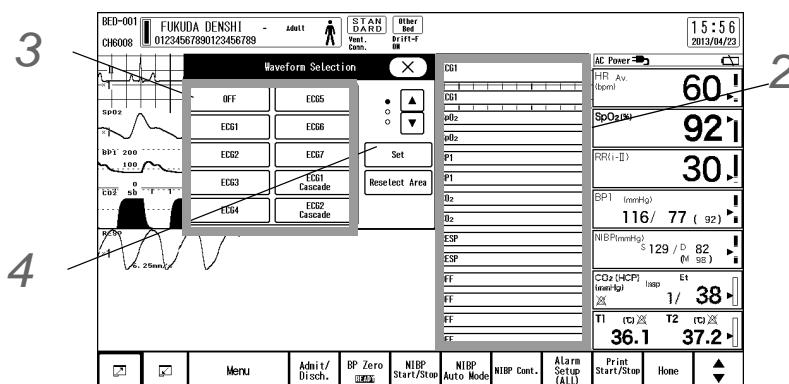
The displayed waveform can be changed with the following procedure.

CAUTION

- When performing telemetry transmission or wired network communication, 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.

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 cancelled.

NOTE

- To restart from the beginning, press the [Reselect Area] key.
- Adjust the size of the selected area which will be indicated in blue frame.

3 Select the parameter on the "Waveform Selection" window.

NOTE

- Press the **▲** / **▼** keys to switch the displayed parameters.
(↪ "Waveform Selection" P10-13)

4 Press the [Setup] key.

- The setup will be finalized.

□ To Display the Short Trend

The short trend display can be set with the following procedure.

REFERENCE

- 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 frame), the alarm data of up to 30 minutes can be verified on the home display.

NOTE

- The short trend cannot be displayed when the following numeric data layouts are used:
 - 1) Standard&Bottom
 - 2) Standard/Left (Large)
 - 3) Standard/Right (Large)
 - 4) Numeric Data/Maximum Size

1 Press the key for "Short Trend".

- ▶ The dropdown list will be displayed.

2 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.

When [ON] or [Overlap] is selected:

3 Press the [0 min.] key for "Short Trend".

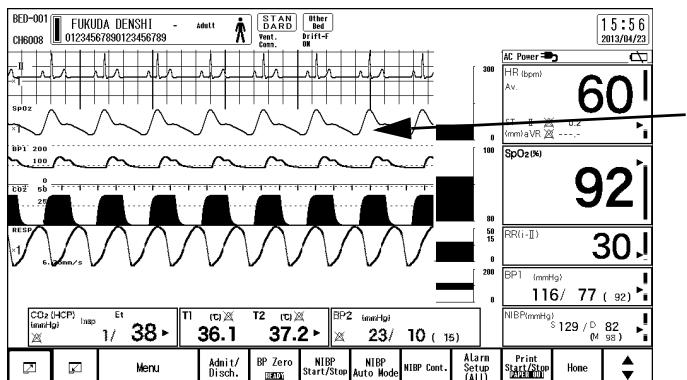
- ▶ The dropdown list will be displayed.

4 Select from [0 min.] to [30 min.].

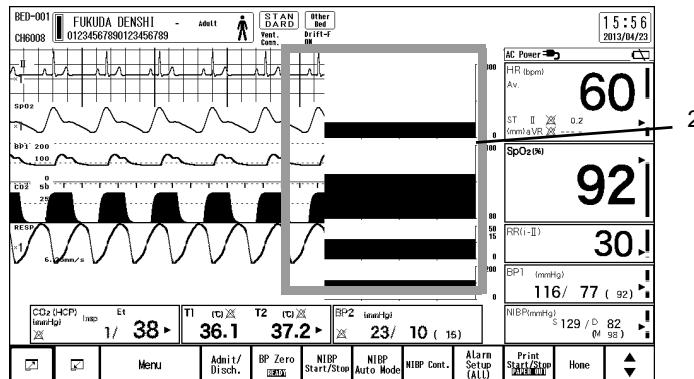
- ▶ The short trend can be displayed in 5 minutes increments from 0 minute to 30 minutes.

5 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 the alarm is generated for the recall alarm factor, recall screen can be displayed by pressing the short trend display area.

□ Sweep Speed

The sweep speed can be set with the following procedure.

REFERENCE

- The sweep speed can be set differently for the circulatory system waveform (ECG, BP) and respiratory system waveform.

1 Press [Circ.] for "Sweep Speed (mm/s)".

▶ The dropdown list will be displayed.

2 Select from [6.25]/[12.5]/[25]/[50].

3 Press the [Vent.] key.

▶ The dropdown list will be displayed.

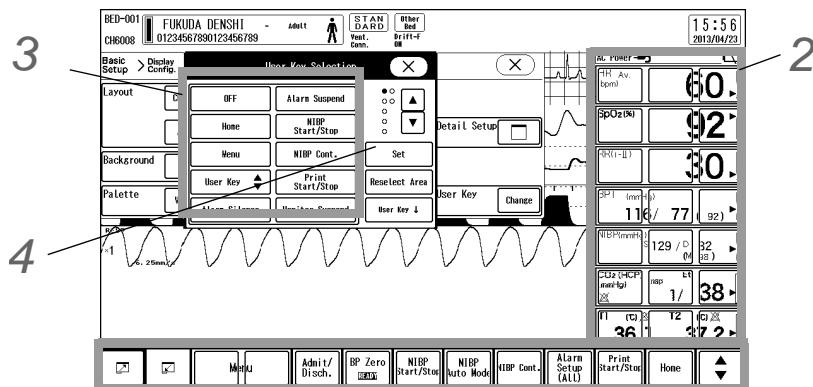
4 Select from [6.25]/[12.5]/[25].

>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 cancelled.

NOTE

- To restart from the beginning, press the [Reselect Area] key.
- Adjust the size of the selected area which will be indicated in blue frame.

3 Select the function to assign to the user key on the "User Key Selection" window.

NOTE

- The displayed user key can be switched between 2 displays using the [User Key Up] and [User Key Down] keys.
- Press the **[▲]** / **[▼]** keys to switch the user key selection.
(☞ "User Key Selection" P10-14)

4 Press the [Setup] key.

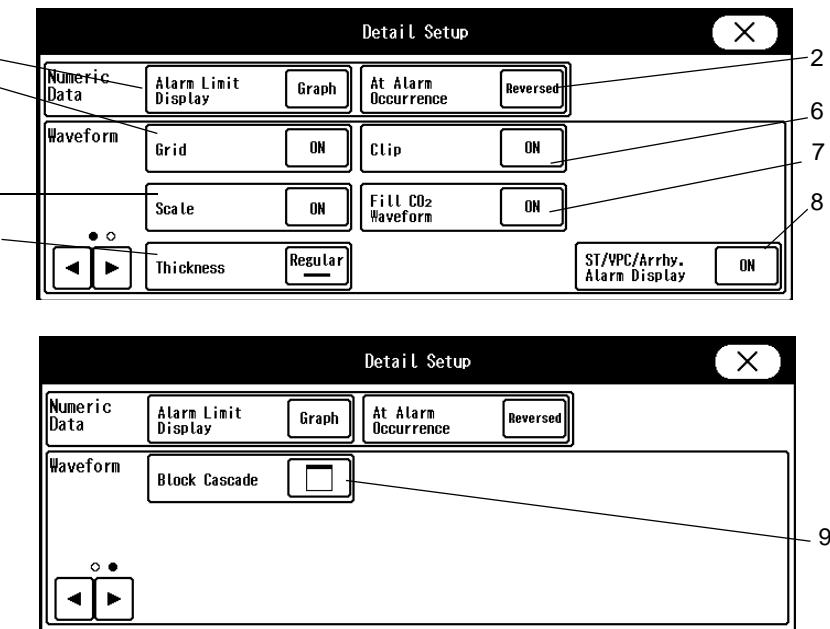
- ▶ The setup will be finalized.

Detail Setup

1

Press the key for "Detail Setup".

► The "Detail Setup" window will be displayed.



1 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.

2 At Alarm Occurrence

The numeric data display format at alarm occurrence can be selected.

[Reversed]: The numeric data will be displayed reversed (highlighted) at alarm occurrence.

[3D]: The numeric data will be displayed in 3D at alarm occurrence.

3 Grid

The ECG waveform can be displayed on the grid.

[ON]: Grid will be displayed.

[Bold]: Grid will be displayed in bold format.

[OFF]: Grid will not be displayed.

REFERENCE

- Short trend and grid cannot be displayed overlapped.

4 Scale

The scale can be selected from [ON]/[Bold1]/[Bold2].

5 Waveform Thickness

The thickness of the displayed waveforms can be selected from [Thin] / [Regular] / [Thick].

6 Waveform Clip

Whether or not to clip the overlapped waveforms of the neighboring display area can be selected.

7 Fill CO₂ Waveform

Whether or not to fill in the CO₂ waveform from the baseline can be selected.

8 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.

9 Block Cascade

The waveform combination for block cascade display can be set.

REFERENCE

- If multiple block cascades are selected for the waveform display areas, long duration waveform can be displayed.

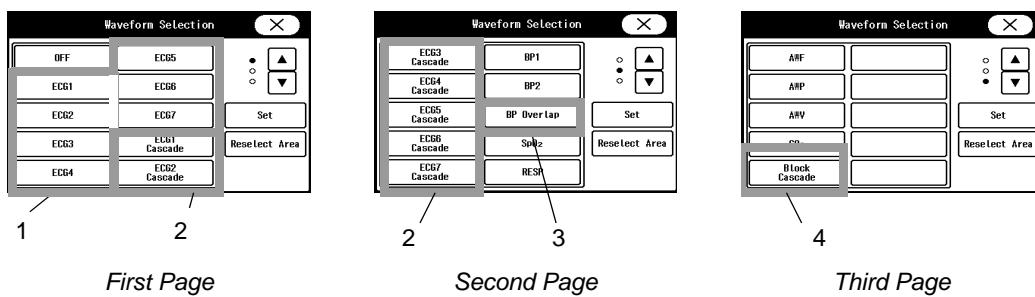
2 Press the [Home] key to check the configured display.

NOTE

- After configuring the display, press the [Home] key and verify the configured display.
- 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" P5-8)

Waveform Selection

The waveform to be displayed can be selected on the "Waveform Selection" window. In this section, the details of the displayed waveforms are explained.



1 ECG1 to ECG7

The ECG waveform of the specified channel will be displayed. Minimum of 2 blocks are required to display the ECG waveform.

2 ECG1 to ECG7 Cascade

The ECG waveform 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 BP2) 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.

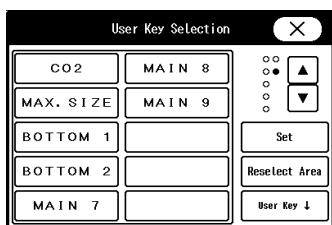
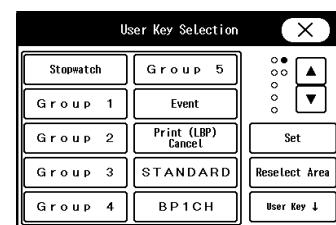
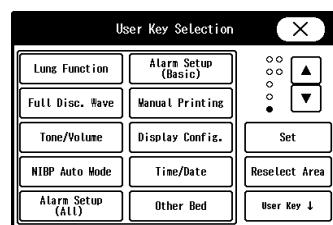
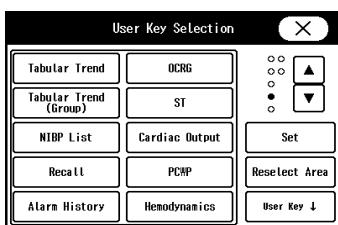
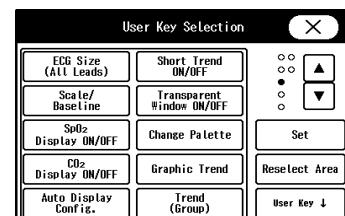
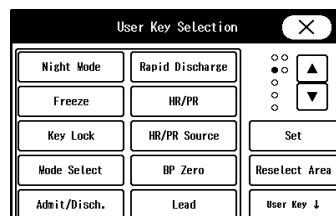
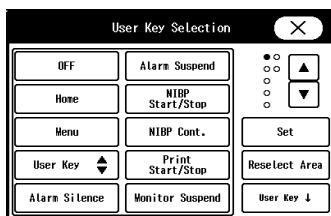
4 Block Cascade

The waveforms (2 to 6) set on the "Block Cascade Setup" will be displayed in one block.

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.
In this section, the user key function is explained.



OFF	Blank key will be displayed.
Home	The display will return to the home display. The [Home] key is also available as fixed key on the display unit housing.
Menu	"Menu" screen will be displayed. The [Menu] key is also available as fixed key on the display unit housing.
User Key 	The first and second page of the user key area will switch. This key will be located at the same position for both first and second page.
Alarm Silence	Alarm will be silenced for fixed amount of time. The [Alarm Silence] key is also available as fixed key on the display unit housing. 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.
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	Waveform trace will freeze for fixed amount of time. Pressing the [Print Start/Stop] key while in freeze condition will print the frozen waveform. Pressing the key again will start the waveform trace again.
Key Lock	Touch key operation will turn ON/OFF. It can be used when cleaning the display panel.
Mode Select	User mode selection screen will be displayed.
Admit/Discharge	Admit/Discharge screen will be displayed.
Rapid Discharge	Confirmation window to erase the data will appear.
HR/PR	The HR/PR numeric data box will be switched between HR and PR.
HR Source	The parameter for HR/PR Source will be automatically selected.
Zero Balance	Zero balance of BP1 to BP2 will be performed.
Lead	List of lead groups will be displayed, and selecting a lead group will display the lead selection window. 2 blocks of user key area are required to assign this key. It cannot be assigned to the numeric data area.
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.
Auto Display Config.	The display will be automatically configured with the currently measured parameters.
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.
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.
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 Disc. Wave	Full disclosure waveform will be displayed.
Tone/Volume	The tone/volume setup screen 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.
Display Configuration	The display configuration window will be displayed.
Time/Date	Time/Date setup screen will be displayed.
Other Bed	Other bed screen will be displayed.
Stopwatch	Stopwatch screen will be displayed.
Group 1 to 5	Selection list of key group 1 to 5 will be displayed.
Event	Event selection list will be displayed. The selected event will be stored as recall waveform.
Print (LBP) Cancel	Printing on the laser printer will be cancelled.
Main Mode 1 (Standard)	Main Mode 1 (Standard) will be set as the monitoring mode.
Main Mode 2 (BP1CH)	Main mode 2 (BP1CH) will be set as the monitoring mode.
Main Mode 3 (CO ₂)	Main mode 3 (CO ₂) will be set as the monitoring mode.
Main Mode 4 (Maximum)	Main mode 4 (Maximum) will be set as the monitoring mode.
Main Mode 5 (Bottom 1)	Main mode 5 (Bottom 1) will be set as the monitoring mode.
Main Mode 6 (Bottom 2)	Main mode 6 (Bottom 2) will be set as the monitoring mode.
Main Mode 7 (Standard)	Main mode 7 (Standard) will be set as the monitoring mode.
Main Mode 8 (Standard)	Main mode 8 (Standard) will be set as the monitoring mode.
Main Mode 9 (Standard)	Main mode 9 (Standard) will be set as the monitoring mode.

* Default user mode names are displayed inside the brackets. The mode names can be changed.

(☞ Maintenance Manual "To Program the User Mode" P5-27)

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.

Tone/Volume

In this section, tone/volume setup procedure for alarm sound, HR synchronized sound, key sound, boot/shutdown sound is explained. The tone/volume setup screen also allows to turn OFF the ventilator alarm sound. The volume of BP zero balance and NIBP measurement end sound can be changed on "Other" setting.

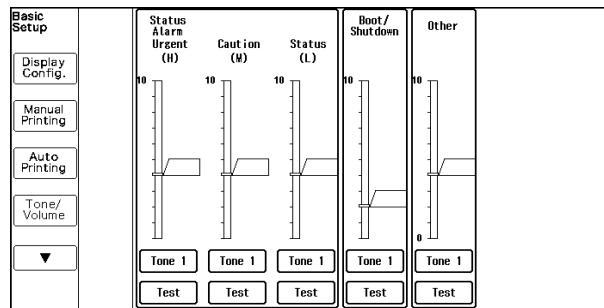
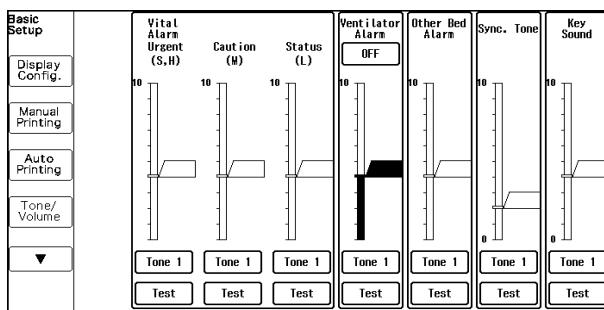
NOTE

- The tone setup for synchronized sound is effective only for HR and BP synchronized sound. The tone for SpO₂ synchronized sound will change according to the SpO₂ value. The tone will increase as the SpO₂ value increases, and vice versa.

1

Press the [Menu], [Sound] ("Basic Setup") keys.

- The tone/volume setup screen 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.



CAUTION

- If the alarm volume is set too low, alarm occurrence may not be recognized. Alarm sound for ECG, SpO₂, CO₂ 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.

REFERENCE

- The volume above the set minimum alarm volume can be set.
( Maintenance Manual "Alarm Related Setup" P5-5)

1 Slide the  up or down.

► When the slider is released, / will be displayed.

2 Press the / keys.

► The volume will be adjusted.

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.

3 Set the tone.

1 Press the [Tone] key.

► The dropdown list will be displayed.

2 Select the tone level.

NOTE

- The tone selection is different for synchronized sound, alarm sound, and key sound.

4 Press the [Test] key to check the set volume/tone.

5 Set ON/OFF for ventilator alarm sound.

1 Press the key for "Ventilator Alarm".

► The dropdown list will be displayed.

2 Select from [ON] or [OFF].

Alarm Behavior Setup

Alarm Operation	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	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.		
Level M				
Level L				
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

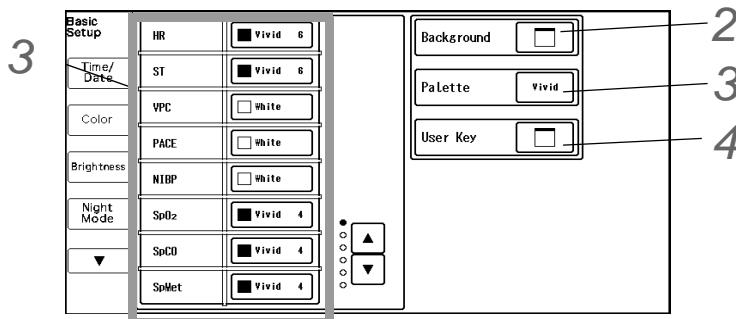
In this section, setup procedure for the color of background, numeric data, waveform is explained.

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], [Color] ("Basic Setup") keys.

► The "Color" selection window will be displayed.



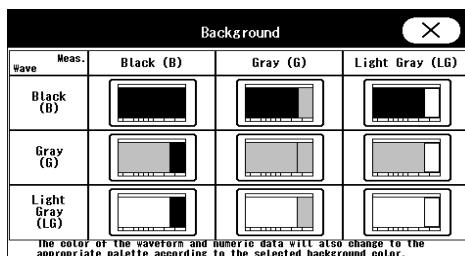
- 2** Set the background color.

REFERENCE

- ♦ The background color for the numeric data area and waveform area can be selected from three colors (black, gray, light gray).
- ♦ The background color can be also set by pressing the [Menu], [Display Config.]("Basic Setup"), "Background" keys.

- 1** Press the key for "Background".

► The "Background" color selection window will be displayed.



- 2** Select the background color.

► The selected background color will be immediately reflected.

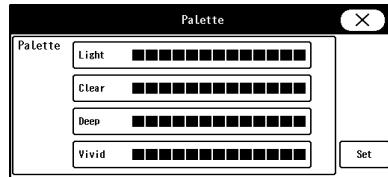
- 3** Set the color of numeric data and waveform.

REFERENCE

- ♦ The color can be set for each parameter. 12 colors (+white) for 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 [Set].

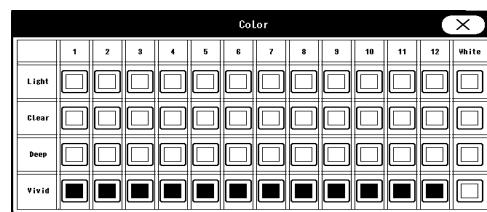
- The color of the numeric data and waveform will change to the selected palette color.

3 Press the keys.

- The page will switch.

4 Press the key for the parameter to change the color.

- The "Color" selection window will be displayed.



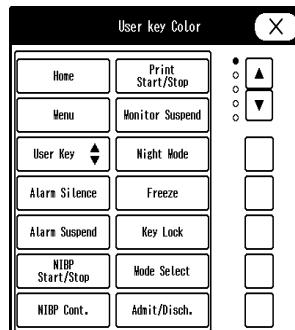
5 Select a color.

- The assigned color for the parameter will be also applied to the graphic trend and tabular trend data.

4 Set the color of the user key.

1 Press the key for "User Key".

- The "User Key Color" selection window will be displayed.



2 Press the keys.

- The page will switch.

3 Select the user key to change the color.

- Pressing the key again will cancel the selection.

4 Select the color displayed on the right.

- The color of the user key will change.

Brightness

In this section, brightness adjustment of the monitor display is explained.

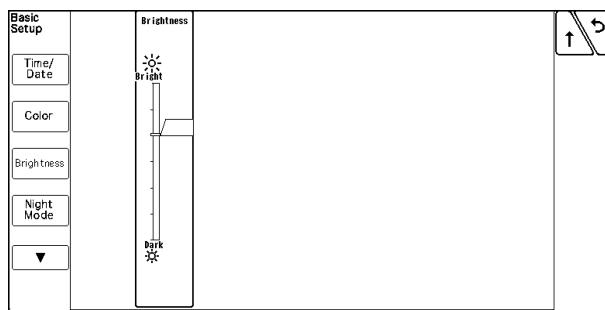
CAUTION

- The display panel 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], [Brightness] ("Basic Setup") keys.

- ▶ The brightness setup screen will be displayed.



2

Slide the  up or down.

- ▶ When the slider is released, / will be displayed.

3

Press the / keys.

- ▶ The brightness will be adjusted.

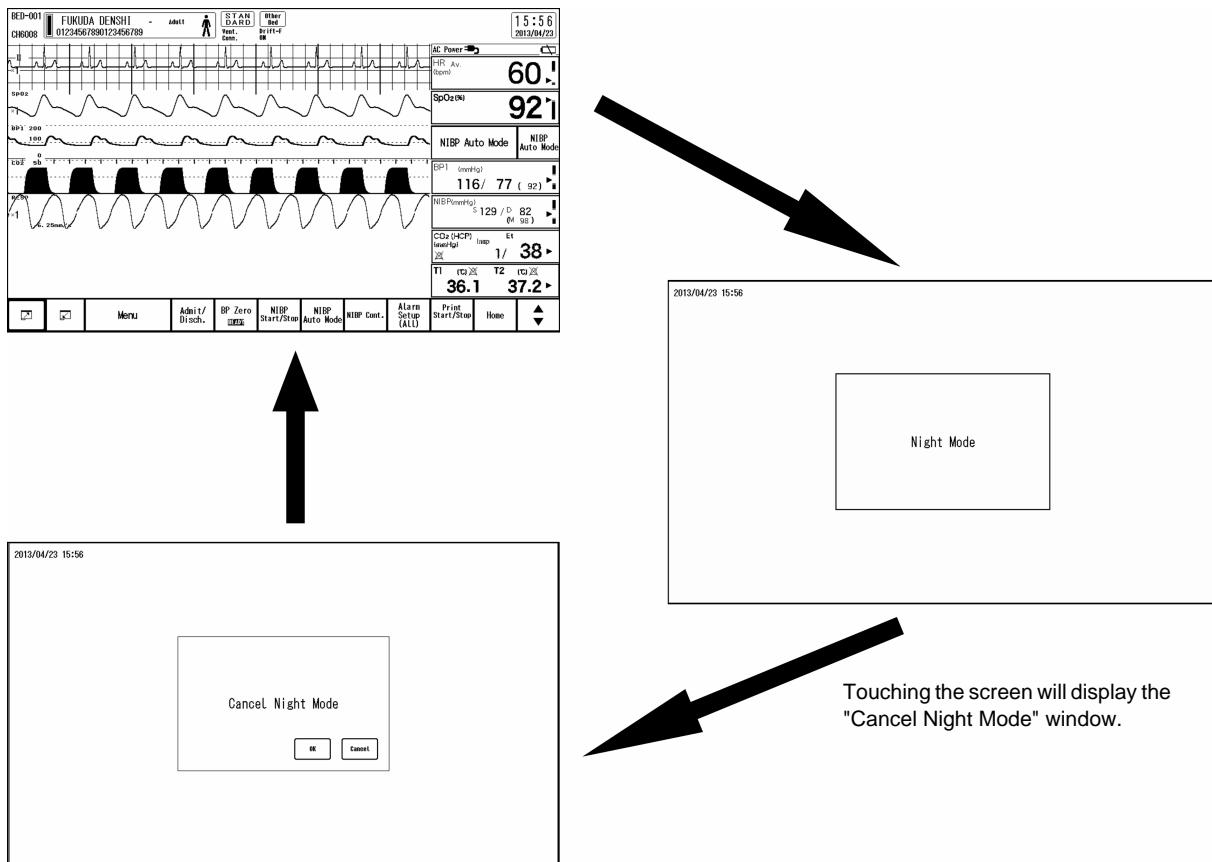
Night Mode

In this section, the procedure to set the night mode is explained.

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.

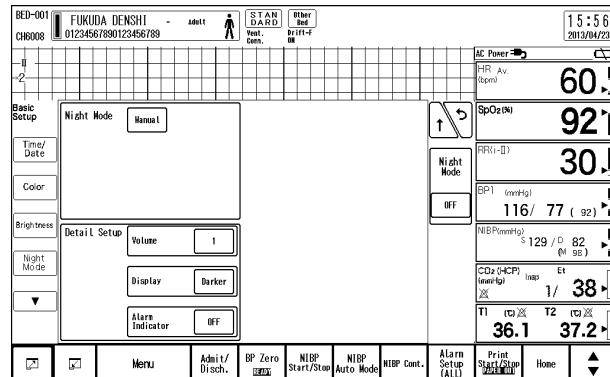
The night mode can be manually set to ON, or automatically set to ON by preprogramming the time to turn ON/OFF the night mode.

Operation flow when the night mode is set to "Timer"



Operation flow when the night mode is set to [Darker] or [Dark]

- To manually set the night mode, select [ON] for "Night Mode" or press [Night Mode] set as user key.



- 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.

▶ Press the key for "Night Mode Cancel" under Menu>Initial Settings>User I/F. The dropdown list will be displayed. Select from [Any Key]/[Night Mode Key].

• Night Mode Cancel

- [Any Key]: The night mode can be cancelled by pressing any key on the screen.
- [Night Mode Key]: The night mode can be cancelled by pressing the [Night Mode] key on the user key or on the menu screen.

▶  Maintenance Manual "Display/Print Setup" P5-13

NOTE

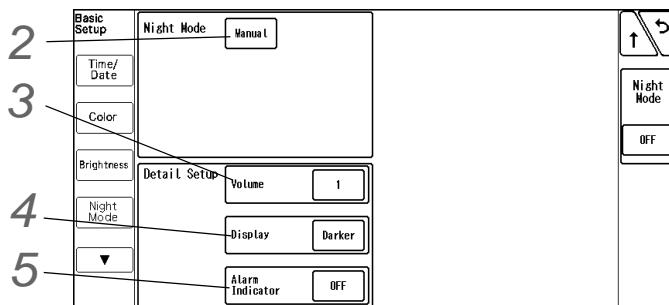
- The night mode can be manually turned ON from the menu, user key, or remote control even when the night mode is set to automatically turn ON. The night mode will automatically turn OFF at the set "End Time".
- The night mode cannot be set when the ventilator alarm is generated.

Night Mode

The time to start and end the night mode, and the night mode display can be set.

1 Press the [Menu], [Night Mode] ("Basic Setup") keys.

▶ The Night Mode setup screen will be displayed.

**2** Set the "Start Time" and "End Time" for the night mode.**1** Press the key for "Night Mode".

▶ The dropdown list will be displayed.

2 Select from [Manual]/[Timer].

▶ [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.

REFERENCE

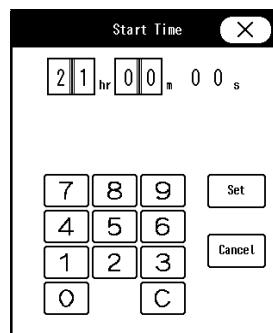
- The night mode can be manually turned ON from the user key or remote control even

when the [Timer] is set.

When [Timer] is selected:

3 Press the key for "Start Time".

► The "Start Time" window will be displayed.



4 Use the numeric keys to enter the time.

5 Press the [Set] key.

6 Set the "End Time" with the same procedure from Step 3 to 5.

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.
-

1 Press the key for "Volume".

► The dropdown list will be displayed.

2 Select from [No Change]/[3]/[1]/[0].

- [No Change]: Standard volume will be set.
- [3]: Third level from the minimum volume will be set.
- [1]: Minimum volume will be set.
- [0]: Sound will be silenced.

4 Set the brightness.

⚠ WARNING

- When selecting [Timer], pay attention not to miss any important alarm by simultaneously monitoring the patient on other monitors such as central monitor.
-

1 Press the key for "Display".

► The dropdown list will be displayed.

2 Select from [No Change]/[Dark]/[Darker]/[Timer].

- [No Change]: Brightness will not change
- [Dark]: 80% of the maximum brightness will be set.

- ▶ [Darker]: 50% of the maximum brightness will be set.
- ▶ [Timer]: Only the time will be displayed. The message will disappear after 1 minute from starting the night mode.

5 Set the alarm indicator operation.

- 1 Press the key for "Alarm Indicator".
 - ▶ The dropdown list will be displayed.
- 2 Select from [ON] or [OFF].
 - ▶ [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

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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
- Arrhythmia Alarm: Adult/Child/Neonate: none

Vital Alarm Message



CAUTION

- The alarm message for the arrhythmia alarm 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".
- When connected to DS-LANII, the alarm level will be fixed to DS-LANII alarm level and cannot be changed.

Top Priority Alarm (Alarm Level S)

This level can be selected for some parameters only when [Fukuda Tone] is selected for the "Alarm System" ("Initial Settings"). 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 , Ventilator)	Apnea
Arrhythmia	ASYSTOLE
	VF
	VT
	TACHY
	BRADY

Cautionary Alarm (Alarm Level M)

Parameter	Message
HR	Lower HR Alarm
	Upper HR Alarm
BP	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 , Ventilator)	Lower RR Alarm
	Upper RR Alarm
Gas	Lower CO ₂ -E Alarm
	Upper CO ₂ -E Alarm
	Upper CO ₂ -I Alarm
Arrhythmia	RUN

*: # indicates the label of BP, TEMP.

Treatment Needed Alarm (Alarm Level L)

Parameter	Message
ST1 to 7	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 4)	Lower TEMP# Alarm or Lower (label) Alarm*
	Upper TEMP# Alarm or Upper (label) Alarm*
Blood Temperature	Upper Tb Alarm
	Lower Tb Alarm
Arrhythmia	PAUSE
	COUPLET
	BIGEMINY
	TRIGEMINY
	FREQUENT

*: # indicates the channel number of BP, TEMP.

□ Notification Alarm

Parameter	Message
All Alarm	Alarm Suspend (xxx sec.)
Alarm Sound Suspend	Alarm Silence (xxx min.)
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 Asystole, VF, VT, Slow_VT, and HR alarm is OFF.

Vital Alarm Message (DS-LAN Standard Setup)

⚠ CAUTION

- The alarm message for the arrhythmia alarm 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".
- When connected to DS-LANII, the alarm level is fixed and cannot be changed.

□ Top Priority Alarm (Alarm Level S)

This level can be selected for some parameters only when [Fukuda Tone] is selected for the "Alarm System" ("Initial Settings"). 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
BP	Lower BP1 Alarm
	Upper BP1 Alarm
	Lower ART Alarm
	Upper ART Alarm
Non-Invasive Blood Pressure	Lower NIBP Alarm
	Upper NIBP Alarm
(Impedance, CO ₂ , Ventilator)	Lower RR Alarm
	Upper RR Alarm
	Apnea Alarm
Gas	Lower CO ₂ -E Alarm
	Upper CO ₂ -E Alarm
	Upper CO ₂ -I Alarm
Arrhythmia	ASYSTOLE
	VF
	VT
	TACHY
	BRADY
	RUN

Cautionary Alarm (Alarm Level M)

Parameter	Message
BP	Lower BP2 Alarm or Lower (label) Alarm*
	Upper BP2 Alarm or Upper (label) Alarm*
ST1 to 7	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 4)	Upper TEMP# Alarm or Upper (label) Alarm*
	Lower TEMP# Alarm or Lower (label) Alarm*
Blood Temperature	Upper Tb Alarm
	Lower Tb Alarm
Arrhythmia	PAUSE
	COUPLET
	BIGEMINY
	TRIGEMINY
	FREQUENT

*: # indicates the channel number of BP, TEMP.

Notification Alarm

Parameter	Message
All Alarm	Alarm Suspend (xxx sec.)
Alarm Sound Suspend	Alarm Silence (xxx min.)
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 Asystole, VF, VT, Slow_VT, 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-8100 Failure"	10
	"DS-8100 Speaker Failure"	10
	"ECG Unit Error"	5
	"DS-8100 Multiamp. Failure"	3
	"NIBP Meas. Error (###-##)"*	10 or 3
	"GAS Unit I/F Failure"	3
	"DS-8100 SpO ₂ Failure"	5 or 1
	"Charging error"	10
	"Fan Failure"	3
	"Charge the battery."	10

*: # indicates an error code.

Cautionary Alarm (Alarm Level M)

Item	Message	Delay Time (sec.)
NIBP	"NIBP meas. failed. (###-##)"* ¹	1
CO ₂ (HCP-800/HCP-810)	"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 (Gas Unit I/F and Mainstream Module)	"CO ₂ Sensor Failure"	1
Main Unit	"DS-8100 Check Long-Term Battery"	10
	"DS-8100 Out of Operating Temp. Range"	3
	"DS-8100 Analog Unadjusted"	3
Full Disclosure Waveform	"Failed to write full disclosure to the CF card."	1

*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
	"ECG Artifact"	3
	"ECG Only 5 electrodes are used."	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 Check Sensor Conn."	3
	"SpO ₂ only mode"	1
SpO ₂ (Nellcor Unit)	"SpO ₂ Check Sensor Attach."	3
	"SpO ₂ Replace Sensor"	1
	"SpO ₂ No Pulse Detected"	1
BP	"BP # Transducer OFF" *3	5
TEMP	"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 (Gas Unit I/F and Mainstream Module)	"CO ₂ Check airway adapter."	1
Connector Off	"ECG Disconnected"	3
	"BP # Disconnected" *3	3
	"SpO ₂ Disconnected"	3
	"T ## Disconnected" *4	3
	"CO Disconnected"	3
	"CO ₂ Disconnected"	3
Main Unit	"DS-8100 Check Unit"	10
	"DS-8100 Out of Operating Temp. Range"	10
	"DS-8100 Check Conn."	3
	"DS-8100 Check SD Card"	3
	"DS-8100 TEMP Unit Failure"	3
	"Check charging board."	10
	"Check Option Unit"	10

Item	Message	Delay Time (sec.)
	"Check Option Unit Connection"	3
	"Charge the battery."	10
	"Check Battery"	3
Check Connection, Check Reception, Interference	"Check Oximeter Conn."	1
	"Check BIS Conn."	1
	"Check INVOS Connection"	1
	"Check Printer Conn."	3
	"Chk DS-LAN Comm"	3
	"Check TCON Comm."	1
	"Chk TCON Reception"	1
	"TCON Interference"	1
	"Check HLX Conn."	3
	"Check System Conn."	3
	"Check Printer Comm"	1
Full Disclosure Waveform	"Wrong CF card for full disclosure."	1
	"Failed to read full disclosure from the CF card."	1
	"Check CF card for full disclosure."	1

*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).

NOTE

- ◆ "NIBP meas. failed", "Check NIBP cuff, hose", "Connector Off", "ECG Only 5 electrodes are used.", "Check xx Conn.", "Check xx Comm." alarms will be cancelled when [Alarm Silence] key is pressed. Pay attention not to cancel the important alarm.

Notification Alarm

Item	Message	Delay Time (sec.)
Operation	"Waveform Frozen (xx sec.)" ^{*1}	1
	"Key Locked (xx sec.)" ^{*1}	1
	"Night Mode Active"	1
ECG	"ECG Low Amplitude"	3
	"ECG Artifact"	3
	"ECG EMG Interference"	3
	"Check Electrodes" ^{*5}	3
BP	"BP # Zeroing Required" ^{*2}	1
TEMP	"T # Unknown Sensor" ^{*3}	1
SpO ₂ (Masimo Unit)	"SpO ₂ Demo Mode"	1
	"SpO ₂ Initializing"	1
	"SpO ₂ Check Sensor Attach." ^{*5}	3
SpO ₂ (Nellcor Unit)	"SpO ₂ Motion Artifact"	1
	"SpO ₂ Check Sensor Attach." ^{*5}	1
Capnostat 5 CO ₂ (Gas Unit I/F and Mainstream Module)	"CO ₂ Warming Up"	1
	"Zero the CO ₂ Adapter"	1
	"Unknown CO ₂ Sensor"	1
CO ₂ (HCP-800/HCP-810)	"CO ₂ Suspended"	1
	"CO ₂ Zeroing"	1
Non-Invasive Blood Pressure	"Initializing NIBP"	3
Recorder Unit	"Check Printer" ^{*4}	3
	"Check Paper" ^{*4}	3
	"Printer Busy" ^{*4}	1
	"Check Cassette" ^{*4}	3
Central Printer	"Check Paper (Central)" ^{*4}	3
	"Check Cassette" ^{*4}	3
	"Printer Busy (Central)" ^{*4}	1
	"Check Central Printer" ^{*4}	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-8100 Check Rotary SW"	1
	"DS-8100 Check DIP SW"	1
System Configuration	"Check Equip. Config."	1

*1: xx indicates the remaining time.

*2: # indicates the channel number of BP.

*3: # indicates the channel number of TEMP.

*4: The alarm generation can be inhibited depending on the setting.

*5: Displayed when lead-off or sensor-off condition remains after the power is turned ON, monitoring is resumed, or a patient is discharged.

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 2

Level H for BP1 and ART, Level M for other label

Message
Lower BP Alarm
Upper BP Alarm
Zero Required
Out of Range

Pulse Rate (BP Source)

Message
Upper PR Alarm (BP)
Lower PR Alarm (BP)
Out of Range

 NIBP

If "NIBP Meas. Error" is displayed, the message can be cancelled by pressing [Cancel Error] on the NIBP setup screen, or [NIBP Start/Stop] key (user key).

If the same message is repeatedly displayed, a failure of the equipment can be considered. Cease the measurement and contact our service representative.

(☞ "NIBP Meas. Error (Exx-xx)" is displayed." P11-33)

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

 SpO₂ (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

SpO₂/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
Check Cable
Check Sensor Conn.
Zeroing Sensor
SpO ₂ only mode
Low Signal IQ
Low Confidence

PR-SpO₂

Message
Upper PR alarm (SpO ₂)
Lower PR alarm (SpO ₂)
Out of Range

TEMP1 to 4

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 (Ventilator)

Message
Apnea Alarm
Upper RR Alarm
Lower RR Alarm

 RR (Gas)

Message
Apnea Alarm
Upper RR Alarm
Lower RR Alarm
Out of Range

 CO₂ (Gas Unit I/F and Mainstream Module)

Message
Upper CO ₂ -E Alarm
Lower CO ₂ -E Alarm
Upper CO ₂ -I Alarm
Check airway adapter.
Zero Calibration is being performed.
Warming Up
Zero CO ₂ Adapter
Unknown Sensor
Out of Range

□CO₂(When HCP-800/HCP-810 is used)

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)

Parameter	Message
Ventilator	Vent. Alarm
Ventilator	VENT_COMM

WARNING

- The ventilator alarm sound is set to OFF at factory default setting.
- The alarm sound can be turned ON on the "Sound" ("Basic Setup") menu.
(☞ "Tone/Volume" P10-17)

Ventilator Alarm Factor

CAUTION

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

Displayed Alarm Message	Note
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 <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • The thermistor connector and relay cable are not securely connected. • The sensor or relay cable is defective.
OVER RANGE	Measurement error <ul style="list-style-type: none"> • The CO value is out of the calculation range.

Troubleshooting

This section explains the troubleshooting for each case.

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 the electrode attachment.

Replace the electrodes.

Check if the lead cable or relay cable is 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 RL, RA, LL are connected.

Solution

Set the "3-lead Override" to [OFF].

Or, detach the electrodes other than RL, RA, LL.

<ECG Low Amplitude> is displayed.

Cause 1

The ECG amplitude is 0.25mV or below for the waveform size of x1, x1/2, x1/4, and 0.150mV 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, locate it away from the patient as much as possible.

Cause 3

Even though the "3-lead Override" (ECG Parameter Setup) is set to [ON], electrodes other than RL, RA, LL are

connected.

Solution

Set the "3-lead Override" to [OFF]. Or, detach the electrodes other than RL, 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, locate it away from the patient as much 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 a 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 RL, RA, LL are connected.

Solution

Set the "3-lead Override" to [OFF]. Or, detach the electrodes other than RL, RA, LL.

The ECG waveform is displayed in baseline.

The lead-off condition may have occurred by the following causes.

Cause 1

Electrode is detached.

Solution

Reattach the electrode. 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 may be considered. Contact our 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 electrodes of the same type.

(☞ "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 RL, RA, LL are connected.

Solution

Set the "3-lead Override" to [OFF]. Or, detach the electrodes other than RL, RA, LL.

□ <ECG Unit Error> is displayed.

Cause

A communication error has occurred between the ECG measuring unit.

Solution

A wire break or failure of the ECG unit can be considered. Contact our service representative.

□ The measurement data is displayed as "xxx".

Cause

The heart rate is outside the measurement range.

Solution

- ♦ Check the electrode attachment.
(☞ "Before Attaching the Electrodes" P7-1)
(☞ "Electrode Placement" P7-2)
- ♦ Replace the electrode, or check the lead cable and relay cable.

□ The heart rate is not counted. The heart rate is low.

Cause

The ECG waveform amplitude is below the QRS detection level (0.3mV).

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 to 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 the electrode attachment.
(☞ "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 RL, RA, LL are connected.

Solution

Set the "3-lead Override" to [OFF]. Or, detach the electrodes other than RL, RA, LL.

❑ Artificial pacemaker pulse is not displayed.

Cause 1

[Not Used] is selected for "Pacemaker" on the "Admit/Discharge" screen.

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 1

The pacemaker pulse is detected 16 pulses or more per second.

Solution 1

- ♦ Check the electrode attachment.
(☞ "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 wearing 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. This will clear the message and silence the alarm.

<Cannot Analyze> is displayed.

Cause

A noise is interfering on the ECG and arrhythmia analysis is suspended for more than 30 seconds.

"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.

Respiration

<CVA detected> message is displayed.

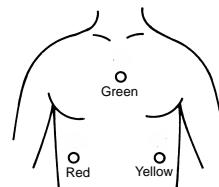
Cause

Heartbeat is interfering and superimposed on the respiration waveform.

Solution

Place the electrode as shown below where the heartbeat will be less likely to interfere.

Or, select a lead where the heartbeat will be less likely to interfere.



<RR meas. range is exceeded.> message is displayed.

Cause 1

Electrode is detached.

Solution

Reattach the electrode. 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

Reattach the electrode. 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**

The impedance respiration measurement is ceased.

Solution

Select [ON] for "Impedance Measurement" on "Admit/Discharge" or "RESP" setup screen.

 CAUTION

- ♦ If the pacemaker with the minute ventilation measuring function is used, turn OFF the impedance respiration measurement. Otherwise, both the pacemaker and this 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**

HLX or TCON is used.

Solution

- ♦ If HLX or TCON is set, the lead will be fixed to [II].
- ♦ If the respiration amplitude for lead II is small, check the electrode attachment.

(☞ "Before Attaching the Electrodes" P7-1)
(☞ "Electrode Placement" P7-2)

Invasive Blood Pressure

<BP# Transducer OFF> is displayed.

Cause

The BP (1 to 2) transducer is not connected.

Solution 1

To cease monitoring, press the [Alarm Silence] key. This will clear the message and silence the alarm.

Solution 2

Connect the 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 or no 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. This will clear the message and silence the alarm.

Solution 2

To continue monitoring, plug in the BP interface cable or 2ch BP conversion cable. This will clear the message and silence the alarm.

❑ The 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.

SpO₂ Measurement (DS-8100N)

❑ <SpO₂ 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.

❑ <SpO₂ 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.

❑ <SpO₂ 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.

<SpO₂ 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: The "SpO₂ Check Sensor Attach." message 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

SpO₂ sensor is not firmly connected to the connector.

Solution

Make sure the SpO₂ 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.

SpO₂ 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.

□<DS-8100 SpO₂ Failure> is displayed.Cause 1

The sensor is defective.

Solution

Replace the sensor.

Cause 2

Communication error has occurred with the SpO₂ unit.

Solution

A defective cable or SpO₂ unit failure can be considered.

Contact our service representative.

□<SpO₂ 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 the available sensors, refer to our service representative.

□<SpO₂ Disconnected> is displayed.Cause

The SpO₂ relay cable is disconnected during SpO₂ monitoring.

Solution 1

To cease monitoring, press the [Alarm Silence] key. This will clear the message and silence the alarm.

Solution 2

To continue monitoring, plug in the SpO₂ relay cable. This will clear the message and silence the alarm.

SpO₂ Measurement (DS-8100M)

□<SpO₂ 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 (Masimo)" P13-4)

 <SpO₂ 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.

 <SpO₂ 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.

 <SpO₂ 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.

 <SpO₂ Noise Interference> is displayed.**Cause**

External signal or energy is interfering with the measurement.

Solution

Remove the external interference.

 <SpO₂ Check Sensor>, <SpO₂ Replace Cable>, or <SpO₂ Check Cable> is displayed.**Cause**

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 SpO₂ sensor and patient cable.

Replace with a Fukuda Denshi specified patient cable and sensor.

(☞ "Pulse Oximetry Measurement (Masimo)" P13-4)

 <DS-8100 SpO₂ Failure> is displayed.**Cause**

Communication error has occurred with the SpO₂ unit.

Solution

A broken wire or failure of the SpO₂ unit can be considered. Contact our service representative.

 <SpO₂ Disconnected> is displayed.**Cause**

The SpO₂ relay cable is disconnected during SpO₂ monitoring.

Solution 1

To cease monitoring, press the [Alarm Silence] key. This will clear the message and silence the alarm.

Solution 2

To continue monitoring, plug in the SpO₂ relay cable. This will clear the message and silence the alarm.

 <SpO₂ 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-8100, and then reconnect it to the SpO₂ 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, please refer to our 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, please refer to our 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 is properly attached to the patient, or cuff size is correct.

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 may be internally leaked.

Contact our 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 connection is loose or disconnected, securely connect it and perform the measurement again.

If the same message is displayed again, air may be internally leaked. Cease the measurement and contact our service representative.

Cause 2

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.

If the same message is displayed again, a blockage in the air system can be considered. Cease the measurement and contact our service representative.

<NIBP measurement failed (Cxx-xx)> is displayed.

Error code condition (phenomenon, or situation) and its cause are indicated below.

C02-00 When not performing quick measurement, the data could not be measured.

Cause 1

According to the patient condition, the blood pressure may not be correctly measured.

Solution

Check the patient condition, and measure again.

Cause 2

The cuff application is loose.

Solution

Check that the cuff size is appropriate for the patient, and then measure again after wrapping the cuff properly.

C02-01 When performing quick measurement, the data could not be measured.**Cause 1**

According to the patient condition, the blood pressure may not be correctly measured.

Solution

Check the patient condition, set the quick measurement to OFF, and measure again.

Cause 2

The cuff application is loose.

Solution

Check that the cuff size is appropriate for the patient, and then measure again after wrapping 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, the 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 our service representative and notify the error code.

C04-xx The inflation was insufficient for the patient 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 frequently, correct measurement cannot be performed. Measure when arrhythmia is not frequently occurring.

C07-00 The measurement time has exceeded the allowed time.Cause

Measurement is automatically repeated because the body motion is detected or inflation is insufficient.

Solution

Check the cuff application or size, measure by keeping the patient still without body motion.

C08-00 Measured 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 allowed maximum value.Cause

The cuff was subjected to compression.

Solution

Check that the cuff is not subjected to compression, and measure with the patient arms extended as much as possible.

C10-xx Measured pulse amplitude was abnormal.Cause

The cuff size does not match the patient.

Solution

Check if the cuff size is appropriate for the patient and that the cuff is properly wrapped before the measurement.

- The time of measurement disappears and the numeric data is displayed as " - - - ".

Cause

The preprogrammed time to clear the NIBP data has elapsed.

Solution

Select the appropriate time for "NIBP Erase Time" from [60min], [120min] which best fits the monitoring purpose.

- Although the [NIBP Start/Stop] key is not pressed, Standby mode is cancelled 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. Stop using the TCON network, or discharge the patient on the central monitor.

- The NIBP periodic measurement is ceased.

Cause

The "NIBP Meas. Error (Exx-xx)" occurred during the measurement.

Solution

When "NIBP Meas. Error (Exx-xx)" occurs, the NIBP periodic measurement will be cancelled. To resume the measurement, press the [NIBP Start/Stop] key and check that the measurement is properly performed.

- <NIBP Meas. Error (Exx-xx)> is displayed.

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: Zeroing 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 started before zeroing
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

The error message can be cancelled by pressing [Cancel Error] on the NIBP parameter setup screen 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 our service representative.

Temperature

<T* Unknown Sensor> is displayed.

Cause 1

The 700 series 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 sensor 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 sensor. This will clear the message and silence the alarm.

<DS-8100 TEMP Unit Failure> is displayed.

Cause

An error was detected on the temperature unit.

Solution

A failure of the equipment can be considered. Cease the measurement and contact our service representative.

Cardiac Output (CO)

- When measured consecutively, the measurement value varies. ($\pm 10\%$ 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 (T_b), injectate temperature (T_i) 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.

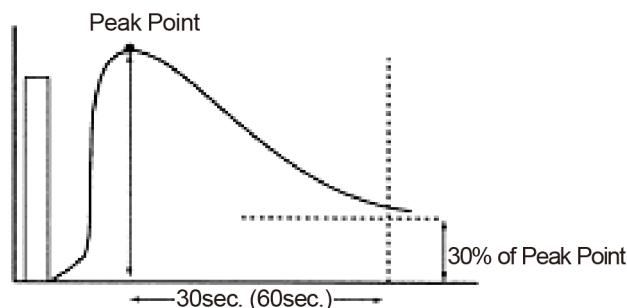
Solution

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).

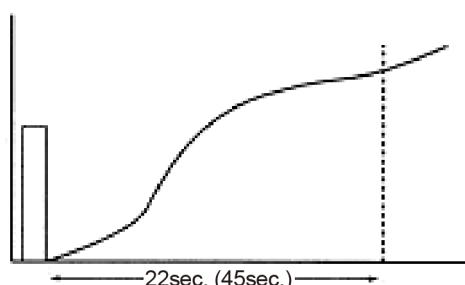
Solution

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").

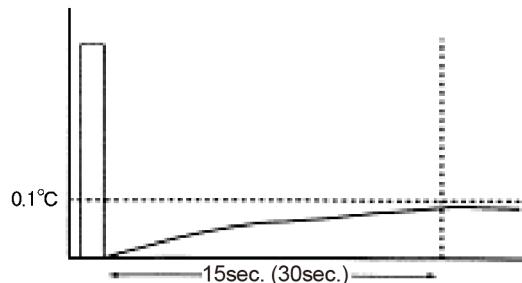
Solution

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 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.

CO₂ Measurement (HPD-800/HPD-810)

□<CO₂ Sensor Failure> is displayed.

Cause 1

The CO₂ sensor temperature has increased above 40°C.

Solution

Remove any heat generating source around the sensor.

Cause 2

The CO₂ sensor is malfunctioning.

Solution 1

Replace the CO₂ sensor.

Solution 2

If the error persists, the failure of HPD-800/HPD-810 can be considered. Stop using the unit and contact our service representative.

□<Zero the CO₂ Adapter> is displayed.

Cause

The CO₂ sensor is not zero balanced.

Solution

Perform the zero calibration of the sensor.

(☞ "CO₂ Concentration (Mainstream Method)" P7-69)

□<Check CO₂ 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 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 CO₂ Sensor> is displayed.

Cause

Unsupported CO₂ sensor is connected.

Solution

Connect the specified CO₂ sensor.

<CO₂ Disconnected> is displayed.

Cause

When the cable is disconnected during CO₂ 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 cable. This will clear the message and silence the alarm.

CO₂ Measurement (HCP-800/HCP-810)

<CO₂ Check Sample Line> is displayed.

Cause

The sampling tube is clogged.

Solution

Replace the sampling tube.

<Initializing> inside the numeric data box does not disappear.

Cause

An error has occurred during the initialization at power ON.

Solution

The CO₂ unit failure can be considered.

<CO₂ Unit Error> is displayed.

Cause

Communication error has occurred with the CO₂ unit.

Solution

A broken wire or failure of the CO₂ unit can be considered. Contact our service representative.

There is substantial measurement error.

Cause 1

20 minutes have not yet elapsed since the power is turned ON.

Solution

For 20 minutes from turning ON the power, there will be a substantial measurement error.

Cause 2

The CO₂ calibration value is not appropriate.

Solution

Perform the CO₂ calibration again.

❑<CO₂ Disconnected> is displayed.**Cause**

When the filter line is disconnected during CO₂ monitoring, this message will be displayed.

Solution 1

To cease monitoring, press the [Alarm Silence] key to clear the message and silence the alarm.

Solution 2

To continue monitoring, plug in the filter line. This will clear the message and silence the alarm.

Recorder Unit (HR-810/HR-811)

**❑<Check Paper> is displayed and printing cannot be performed.
<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.
<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.
<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.

Network Printer

- <Central Printer Check Connection> is displayed and printing cannot be performed.

Cause

The central monitor selected as the output destination is not connected to the printer.

Solution

Check the printer setting on the central monitor, and make sure the communication with the printer is established.

- <Central Printer Check Setting> is displayed and printing cannot be performed.

Cause

The central monitor selected as the output destination does not support the network printing function.
Or, the printer setting is set to [OFF] on the central monitor selected as the output destination.

Solution

Use the DS-7700/DS-7700W system with the software version of V06 and newer, and set the printer setting to [ON].

- <Check Central ID> is displayed and printing cannot be performed.

Cause

The central monitor selected as the output destination does not support the network printing function.

Solution

Select the central monitor which supports the network printing function.

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-LANII/DS-LANIII) for all bedside monitors and central monitors in the same network are the same. If the DS-LAN setting is changed, make sure to restart the system.

Cause 2

A central monitor which is not compatible is used.

Solution

The following central monitors can not be used on the DS-LANIII 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-LANII.

Cause 3

Inappropriate HUB is used.

Solution

For the DS-LANII network, use the repeater HUB.

For the DS-LANIII network, use the 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 our service representative.

- The CO₂ waveform is not displayed on the central monitor although the CO₂ numeric data is displayed.

Cause 1

[Impedance] is selected for "RR/APNEA Alarm Source" on the RESP setup screen.

Cause 2

[Ventilator] is selected for "RR/APNEA Alarm Source" on the RESP setup screen.

Solution

Select [CO₂] for "RR/APNEA Alarm Source" on the RESP setup screen.

In this case, RR and apnea alarm will be generated based on CO₂ measurement.

- The impedance respiration waveform is not displayed on the central monitor although the RR numeric data is displayed.

Cause 1

[CO₂] is selected for "RR/APNEA Alarm Source" on the RESP setup screen.

Cause 2

[Ventilator] is selected for "RR/APNEA Alarm Source" on the RESP setup screen.

Solution

Select [Impedance] for "RR/APNEA Alarm Source" on the RESP setup screen.

NOTE

- The impedance respiration waveform will not be displayed if [CO₂] is set for "RR/APNEA Alarm Source". AWF, AWP waveform will be displayed.

- The CO₂ waveform will not be displayed if [Impedance] is set for "RR/APNEA Alarm Source". AWF, AWP waveform will be displayed.
 - The CO₂ waveform and impedance waveform will not be displayed if [Vent.] is set for "RR/APNEA Alarm Source".
-

<Check DS-LAN Comm> is displayed.

Cause 1

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

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

[CO₂] is selected for "RR/APNEA Alarm Source" on the RESP setup screen.

Cause 2

[Ventilator] is selected for "RR/APNEA Alarm Source" on the RESP setup screen.

Solution

Select [Impedance] for "RR/APNEA Alarm Source" on the RESP setup screen.

The BP waveform of 100mmHg or above cannot be properly received.

Cause

The BP waveform and scale are not the same.

Solution

When the BP waveform is above 100mmHg, set the BP scale above 100mmHg.

<Check HLX Conn.> is displayed.

Cause

The connection with the HLX is interrupted.

Solution

Initial Settings>System>Telemeter

Check the setting for "Channel" and "Group ID" and verify that [ON] is set for "Telemeter".

If the "Check HLX Conn." message still persists, contact your nearest service representative.

<Check HLX Ver> is displayed.

Cause

Installation Failed

Solution

Check the software version of the HLX.

If "HLX-801 V99-99" is displayed, perform a re-installation.

Bidirectional Wireless Communications (TCON)

Communication with the central monitor is not possible. The <Chk TCON Reception> message 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 for the HTC-702 TCON unit is disconnected from the serial connector of the DS-8100 main unit. 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.

Remote Control

- The remote control does not function.

Cause 1

The remote control bed ID is not correct.

Solution

Set the correct remote control ID.

Cause 2

The section number is not correct.

Solution

Set the correct section number.

- The remote control does not properly function.

Cause

The remote control setting on the monitor does not correspond to the function key on the remote control unit.

Solution

Make sure the remote control setting on the monitor and the function key on the remote control unit is corresponded.

General

- The data is initialized each time the power is turned ON.

Cause 1

The internal switch setting is incorrect.

Solution

The internal switch setting needs to be changed. Contact our service representative.

Cause 2

The battery for the backup memory is depleted.

Solution

The battery needs to be replaced. Contact our 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 to the appropriate brightness on the Brightness setup screen under "Basic Setup".

Cause 3

The service life of the LCD backlight has expired.

Solution

The backlight needs to be replaced. Contact our service representative.

 CAUTION

- The display panel 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 our service representative.

 The system does not start although the standby switch is turned ON.**Cause 1**

The power cable is not connected.

Solution

Plug in the power cable.

Cause 2

Incorrect CF card is inserted.

Solution

Remove the CF card, turn OFF the power, and turn ON the power again.

Cause 3

The control board is in the disabled state.

Solution 1

When the battery is installed: Reconnect the power code and hold down the standby switch for 7 seconds.
After two to three seconds, turning ON the standby switch again and the system will restart.

Solution 2

When the battery is NOT installed: Reconnect the power code and hold down the standby switch for 7 seconds.
The system will restart by automatically.

 <Check Standby> is not displayed although the standby switch is turned ON.**Cause**

The control board is in the disabled state.

Solution 1

When the battery is installed: Reconnect the power code and hold down the standby switch for 7 seconds.
After two to three seconds, turning ON the standby switch again and the system will restart.

Solution 2

When the battery is NOT installed: Reconnect the power code and hold down the standby switch for 7 seconds.
The system will restart by automatically.

 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 our service representative.

There is an offset in the touch panel.

Cause

The detecting location is misaligned due to change over time.

Solution

Calibration needs to be performed. Contact our service representative.



- Calibration will be performed by our service representative. Users should not attempt it as incorrect calibration may cause malfunction to the equipment.

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 our service representative.

<DS-8100 Failure>, <DS-8100 Check Unit>, or <DS-8100 Out of Operating Temp. Range> is displayed.

Cause

The hardware failure has occurred.

Solution

Immediately turn OFF the power and cease the operation. Contact our service representative.

<DS-8100 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 our service representative.

<DS-8100 Check Long-Term Battery> is displayed.

Cause

The battery is depleted or malfunctioning.

Solution

The battery needs to be replaced. Contact our service representative.

Ventilator

<Vent. Alarm> is displayed.

Cause

The following alarm has generated on the ventilator.

- ♦ Parameter alarm such as AWP, MV, FiO₂
- ♦ 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-8100 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-900/SV-300/Servo-i/Servo-s]

- ♦ No network setting.

[PB-740/760/840]

- ♦ Baud Rate: 9600bps
- ♦ Parity Bit: None
- ♦ Stop Bit: 1
- ♦ Data Bit: 8

[Evita4/2dura/XL]

- ♦ Protocol : Medibus
- ♦ Baud Rate: 19200bps
- ♦ Parity Bit: Even
- ♦ Stop Bit: 1

SvO₂/CCO Monitor

- The numeric data is not displayed.

Cause 1

The cable is not properly connected.

Solution 1

Connect the following cable securely.

Oximeter, CCO Measurement Device	Connection Cable	
	For STATUS II Connector	For Serial Connector
Vigilance	CJ-406RI-70Vigi (x1)	CJO-04RS4
Vigilance CEDV	CJ-406RI-70Vigi (x1)	CJO-04RS4
Vigilancell	CJ-402RI-70SVi (x1)	CJ-502
Vigileo	CJ-402RI-70SVi (x1)	CJ-502

Cause 2

The "External Device" setting is not correct.

Solution

Select [Vigilance/Vigileo] for the port function on the "External Device" setup screen.

Cause 3

The measurement data is not displayed on the external device.

Solution

The measurement data of SvO₂, CO, etc. will not be displayed on the monitor unless the data is displayed on the used external device. Check if the data is displayed on the used external device.

Cause 4

The CCO is not measured.

Solution

The monitor will display CCO/CCI data only if CCO is measured on the external device.

Cause 5

The network setting of the monitor does not correspond with that of the external device.

Solution

The network setting of the monitor is fixed to the default setting of each external device and cannot be changed. Make sure that the network setting of the connecting oximeter is in default setting.

In Case of Vigilance/Vigileo:

Check if the network is set as follows.

For procedure to check the Vigilance/Vigileo network setting, refer to the operation manual for the Vigilance/Vigileo.

- ♦ Device: IFM Out
- ♦ Baud Rate: 19200bps
- ♦ Parity Bit: none
- ♦ Stop Bit: 1
- ♦ Data Bit: 8

- ♦ Flow Control: 2 sec.

Cause 6

The software version of Vigilance does not correspond.

Solution

If the Vigilance without the STAT function is connected, the STAT data will not be displayed. Check the software version of the Vigilance.

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 DS-8100 main unit, or Status II connector and BIS monitor connector .

INVOS

- The numeric data is not displayed. <Check INVOS Connection> is displayed.

Cause

The cable is disconnected or not properly connected.

Solution

Securely connect the connection cable to the serial connector of the DS-8100 main unit, or STATUS II connector and INVOS 5100C connector.

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.

CF/SD Card

- <There is no card in the slot.> is displayed.

Cause

CF/SD card is not inserted or not correctly set in the CF/SD card slot.

Solution

Set the CF/SD card into the CF/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 CF/SD card.

Solution 1

Check if the CF/SD card is readable. Or, check if the data is present on the CF/SD card. Pressing "Yes" will not start the reading process of compatible data. Error message will be displayed instead.

Cause 2

Error is detected during the read process.

Solution 2

The data may not be correctly written on the CF/SD card. Format the card again on the used equipment and try the write/read process again. Pressing "Yes" will not start the reading process of compatible data.

- <CF card access error.> is displayed.

Cause 1

There is not enough capacity on the CF/SD card to write the data.

Solution 1

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 2

Make sure that the CF/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 CF/SD card is used.

Solution 3

Use the specified CF/SD card.

- ❑ <Wrong CF card for full disclosure.>, <Failed to read full disclosure from the CF 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 our service representative.

- ❑ The SD card does not function when inserted to the card slot.

Cause 1

The SD card is not properly inserted.

Solution

Make sure that the SD card is properly inserted.

Cause 2

The SD card is write-protected.

Solution

Move the lock slide and release the write-protect.

Chapter 12 Setup Item/Default Value

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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	Details	Default	At Power ON	At Discharge
Mode Select	Main Mode 1 to 9	1	Backup	Backup
ID	Numeric, Alphabet, Symbol (20 characters)	Blank		Initialize
Patient Name	Numeric, Alphabet, Symbol (16 characters)	Blank		
Patient Classification	Adult, Child, Neonate	Adult	Depend on the "Power ON/Discharge" setup under [Initial Settings]>[User I/F].	
Sex	Male, Female	No selection	Backup	Initialize
Team	Red, Orange, Yellow, Yellow-green, Green, Light Blue, Blue, Purple	Red		Backup
Birth Date	Birth Date	Blank		Initialize
Year, Month, Day	Year, Month, Day	Blank		Backup
Age	0 to 150 years or 0 to 999 days	0 year		
Height	0.0 to 300.0cm / 0.0 to 118.1in	0.0cm / 0.0in		Initialize
Weight	0.0 to 350.0kg / 0.0 to 771.6lb	0.0kg / 0.0lb		
BSA	0.00 to 9.99m ²	0.00 m ²		
Blood Type	A, B, O, AB Rh +/-	Blank		
Pacemaker	Used, Not used	Not Used	Depend on the "Power ON/Discharge" setup under [Initial Settings]>[User I/F].	
Impedance Measurement	ON, OFF	ON		
Admit Date	Year, Month, Day	Blank	Backup	Initialize

Alarm

Item	Details	Default	At Power ON	At Discharge
System Alarm	Suspend, ON	Suspend	-	-
HR PR_SpO ₂ , PR_IBP	ON, OFF 20 to 300bpm	40 to 165bpm		
Asystole*1	ON, OFF 3 to 10 sec.	ON 5 sec.		
VF*1	ON, OFF	ON		
VT*1	ON, OFF	ON		
Slow_VT*1	ON, OFF	ON		
Run	ON, OFF 2 to 8 beats	ON 3 beats		
Couplet	ON, OFF	OFF		
Pause	ON, OFF 1.5 to 5 sec.	OFF 3.0 sec.		
Bigeminy	ON, OFF	OFF		
Trigeminy	ON, OFF	OFF		
Frequent	ON, OFF 1 to 50 beats/min.	OFF, 10 beats/min.		
Tachy	ON, OFF	ON		
Brady	ON, OFF	ON		
HR Lower Limit for VT	120, 140 bpm/min.	120		
HR Lower Limit for RUN	0 to 100 beats/min.	40		
ST1 to ST7(mm)*2	ST All Alarm ON, OFF Indiv. Alarm ON, OFF ±20mm	ST All Alarm OFF Indiv. Alarm OFF OFF to OFF	Depend on the "Power ON/ Discharge" setup under [Initial Settings]>[User I/F].	
ST1 to ST7(mV)*2	ST All Alarm ON, OFF Indiv. Alarm ON, OFF ±2.00mV	ST All Alarm OFF Indiv. Alarm OFF OFF to OFF	Depend on the "Power ON/ Discharge" setup under [Initial Settings]>[User I/F].	
BP1 (mmHg)	ON, OFF 0 to 300mmHg	ON SYS:80-180 DIA:OFF-OFF MEAN:OFF-OFF	Depend on the "Power ON/ Discharge" setup under [Initial Settings]>[User I/F].	
BP1 (kPa)	ON, OFF 0 to 40.0kPa	ON SYS:10.0-24.0 DIA:OFF-OFF MEAN:OFF-OFF	Depend on the "Power ON/ Discharge" setup under [Initial Settings]>[User I/F].	
BP2 (mmHg)	ON, OFF 0 to 300mmHg	OFF SYS:OFF-OFF DIA:OFF-OFF MEAN:OFF-OFF	Depend on the "Power ON/ Discharge" setup under [Initial Settings]>[User I/F].	
BP2 (kPa)	ON, OFF 0 to 40.0kPa	OFF SYS:OFF-OFF DIA:OFF-OFF MEAN:OFF-OFF	Depend on the "Power ON/ Discharge" setup under [Initial Settings]>[User I/F].	

*1: Select [ON/OFF] for "Asystole, VF, VT Alarm" (Menu<Initial Settings<Alarm) in advance.

*2: The same setting applies for "mm" and "mV".

Item	Details	Default	At Power ON	At Discharge
CVP(mmHg) (kPa)	ON, OFF 0 to 300mmHg 0 to 40kPa	OFF		
CVP(cmH ₂ O)	ON, OFF 0 to 40cmH ₂ O	OFF		
RR_IMP RR_VENT RR_GAS	ON, OFF 5 to 150Bpm	ON 5 to 30		
APNEA	ON, OFF 10 to 60 sec.	ON 15 sec.		
SpO ₂	ON, OFF 50 to 100%	ON 90 to OFF		
SpCO	ON, OFF 1 to 40%	OFF		
SpMet	ON, OFF 1 to 15%	OFF		
SpHb	ON, OFF 1.0 to 24.5g/dL	OFF		
NIBP (mmHg)	ON, OFF 10 to 300mmHg	ON SYS:80-180 DIA:OFF-OFF MAP:OFF-OFF	Depend on the "Power ON/Discharge" setup under [Initial Settings]>[User I/F].	
NIBP (kPa)	ON, OFF 1.5 to 40.0kPa	ON SYS:10.0-24.0 DIA:OFF-OFF MAP:OFF-OFF		
TEMP1 to TEMP4 (°C)	ON, OFF 30 to 45°C	OFF OFF-OFF		
Tb (°C)	ON, OFF 30 to 45°C	OFF OFF-OFF		
CO ₂ -Et (mmHg) (kPa) (%)	ON, OFF 1 to 100mmHg ON, OFF 0.1 to 13.3kPa ON, OFF 0.1 to 13.3%	OFF OFF OFF		
CO ₂ -Insp (mmHg) (kPa) (%)	ON, OFF 1 to 4mmHg ON, OFF 0.1 to 0.4kPa ON, OFF 0.1 to 0.4%	OFF OFF OFF		
Alarm Detail Setup	Alarm Suspend Time	1, 2 min.	2 min	Backup
	Alarm Silence Time	1, 2 min.	2 min	
	Alarm Sound Suspend	ON, OFF	ON	
	Alarm Sound Suspend Time	[1min.] / [2min.] / [5min.] / [10min.] / [30min.] / [60min.] / [90min.] / [120min.] / [240min.] / [360min.]	60 min	
	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	

NOTE

- Selecting [Backup] for "Power ON" and "Discharge" under [Initial Settings] > [User I/F] > [Power ON/Discharge] will retain the setting at "Power ON" and "Discharge" respectively. If [Initialize] is selected, the setting will be initialized with the selected mode at "Power ON" and "Discharge".

Parameter

ECG

Item	Details	Default	At Power ON	At Discharge
Lead	I, II, III, aVR, aVL, aVF, V	ECG1:II ECG2:aVR ECG3:I ECG4:III ECG5:aVL ECG6: avF ECG7:V		Depend on the "Power ON/Discharge" setup under [Initial Settings]>[User I/F].
Size	Auto, x1/4, x1/2, x1, x2, x4	ECG1 to ECG7 x1	Backup	Initialize
Filter	Monitor, Diagnosis, ESIS	Monitor	Backup	Backup
Synchronized Mark/Tone	ECG, SpO ₂ , BP, Auto, OFF	Auto	Backup	Backup
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	Instant, Average	Average	Backup	Backup
Drift Filter	ON, OFF	ON	Backup	Backup
AC Filter	ON, OFF	ON	Backup	Backup
Automatic Lead Switch	ON, OFF	OFF	Backup	Backup
3-lead Override	ON, OFF	OFF	Backup	Backup
ST, VPC/Arrhy. Alarm Display	ON, OFF	ON	Backup	Backup
ECG Analog Output	Disp. Lead, Selected Lead	Disp. Lead	Backup	Backup
ECG Waveform Display during Lead-OFF	ON, OFF	OFF	Backup	Backup
Noise Detection	ON, OFF	OFF	Backup	Backup
Chest Lead-OFF	Enable, Disable	Enable	Backup	Backup

RESP

Item	Details	Default	At Power ON	At Discharge
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, Ventilator, CO ₂	Auto	Backup	Backup
CVA Detect	ON, OFF	OFF	Depend on the "Power ON/Discharge" setup under [Initial Settings]>[User I/F].	
Impedance Measurement	*Same with "Patient Admit/Discharge" section.			
Impedance Detect. Lead	I, II	II	Depend on the "Power ON/Discharge" setup under [Initial Settings]>[User I/F].	

SpO₂ (General)

Item	Details	Default	At Power ON	At Discharge
Size	x1/4, x1/2, x1, x2, x4	x1	Backup	Initialize

SpO₂ (General)

Item	Details	Default	At Power ON	At Discharge
Synchronized Mark/Tone	*Same with selection for ECG Setup.			
Alarm during NIBP	ON, OFF	ON	Backup	Backup

SpO₂ (Nellcor™ Unit)

Item	Details	Default	At Power ON	At Discharge
Second Alarm	OFF, 10, 25, 50, 100	OFF	Backup	Backup

SpO₂ (Masimo Unit)

Item	Details	Default	At Power ON	At Discharge
SpO ₂ Averaging	2–4sec, 4–6sec, 8sec, 10sec, 12sec, 14sec, 16sec	8 sec.	Backup	Backup
Pulse Sensitivity	Normal, High	Standard	Backup	Backup
FAST SAT	ON, OFF	OFF	Backup	Backup
Perfusion Index	ON, OFF	ON	Backup	Backup
Signal IQ Wave	ON, OFF	OFF	Backup	Backup
PI/PVI/SpOC Display Selection	PI+PVI, PI+SpOC, PVI+SpOC	PI+PVI	Backup	Backup

NIBP

Item	Details	Default	At Power ON	At Discharge
Patient Classification	*Same with "Patient Admit/Discharge" section.			
Quick Meas.	ON, OFF	ON	Depend on the "Power ON/ Discharge" setup under [Initial Settings]>[User I/F].	
NIBP Auto Mode	Cont., 1min, 2min, 2.5min, 5min, 10min, 15 min, 20min, 30min, 60min, 120min, Lumbar Mode, OFF	OFF	Depend on the "Power ON/ Discharge" setup under [Initial Settings]>[User I/F].	
Dyna Alert (Nellcor™ only)	ON, OFF	ON	Backup	Backup
Sight Inflation	ON, OFF	OFF	Backup	Backup
Oscillograph	ON, OFF	OFF	Backup	Backup
MAP	ON, OFF	ON	Backup	Backup
PR	ON, OFF	OFF	Backup	Backup
End Tone	ON, OFF	ON	Backup	Backup
NIBP Erase Time	60min., 120min.	120 min	Backup	Backup
User Interval	Lumbar Mode	Lumbar Mode	Backup	Backup
Measure at Alarm	ON, OFF	OFF	Backup	Backup
	Asystole, VF, VT, Slow VT, Run, Bigeminy, Trigeminy, Pause, Couplet, Tachy, Brady, Frequent	No Selection	Backup	Backup
	HR, ST, RR, APNEA, SpO ₂ , BP1, BP2, T1, T2, T3, T4, Tb, CO ₂ , SpCO, SpMet, SpHb	No Selection	Backup	Backup
Auto Mode with Start/ Stop key	ON, OFF	ON	Backup	Backup
Time Display	Elapsed, Meas.	Elapsed	Backup	Backup

BP1 to 2

Item	Details	Default	At Power ON	At Discharge
Scale*	20, 50, 75, 100, 150, 200, 250, 300mmHg	200mmHg 50mmHg (BP2)	Depend on the "Power ON/Discharge" setup under [Initial Settings]>[User I/F].	
	4, 8, 12, 16, 20, 24, 32, 40kPa	24.0kPa 8kPa (BP2)		
Label	BP#, ART, PAP, CVP, ICP, IAP, LVP, US1 to US5	BP# indicates BP1 to BP2	Backup	Backup
Synchronized Mark/Tone	*Same with selection for ECG Setup.			
Display Type	S/M/D, S/D, M	S/M/D	Backup	Backup
Wave Filter	6, 8, 12, 40Hz	12Hz	Backup	Backup
Mean Wave	ON, OFF	OFF	Backup	Backup
Resp. Filter	ON, OFF	OFF	Backup	Backup
Alarm during NIBP	ON, OFF	ON	Backup	Backup

*:The scale selection will differ depending on the label.

TEMP1 to 4:

Item	Details	Default	At Power ON	At Discharge
Label	T#, Tsk, Tre, Tes, Tco, US1 to US7	T# (T1 to T4)	Backup	Backup

 ΔT Setting

Item	Details	Default	At Power ON	At Discharge
ΔT emp-A	(T1 to T4) -(T1 to T4)	T1-T2	Backup	Backup
ΔT emp-B	(T1 to T4) -(T1 to T4)	T3-T4	Backup	Backup

CO₂ (Capnostat 5/HPD-800/HPD-810)

Item	Details	Default	At Power ON	At Discharge
Scale	0-50, 0-100mmHg	0-50	Depend on the "Power ON/Discharge" setup under [Initial Settings]>[User I/F].	
	0-4, 0-8, 0-10kPa	0-4		
	0-4, 0-8, 0-10%	0-4		
EtCO ₂ Peak Duration	10, 20sec, OFF	10 sec.	Depend on the "Power ON/Discharge" setup under [Initial Settings]>[User I/F].	
O ₂ Comp.	0-100%	21%	Backup	Backup
N ₂ O Comp.	ON, OFF	OFF	Backup	Backup
Anesthetic Gas Comp.	0.0-20.0%	0.0%	Backup	Backup
Atmospheric Pressure	400 to 850mmHg 53.4 to 113.3kPa	760mmHg 101.3kPa	Backup	Backup

CO₂ (Oridion/HCP-800/HCP-810)

Item	Details	Default	At Power ON	At Discharge
Scale	0-50, 0-100mmHg	0-50	Depend on the "Power ON/Discharge" setup under [Initial Settings]>[User I/F].	
	0-4, 0-8, 0-10kPa	0-4		
	0-4, 0-8, 0-10%	0-4		
EtCO ₂ Peak Duration	10, 20sec, OFF	10 sec.	Depend on the "Power ON/Discharge" setup under [Initial Settings]>[User I/F].	

Ventilator

Item	Details	Default	At Power ON	At Discharge
AWP Scale	10, 20, 30, 50, 120cmH ₂ O	50cmH ₂ O	Depend on the "Power ON/Discharge" setup under [Initial Settings]>[User I/F].	
AWF Scale	5, 10, 20, 50, 180 L/min	50L/min	Depend on the "Power ON/Discharge" setup under [Initial Settings]>[User I/F].	
AWV Scale	50, 250, 500, 1000, 3000mL	500mL	Depend on the "Power ON/Discharge" setup under [Initial Settings]>[User I/F].	
P-V, F-V Scale	10, 20, 30, 50, 120cmH ₂ O 250, 500, 700, 1000mL ±20, ±50, ±180L/min	30cmH ₂ O 500mL ±50L/min	Depend on the "Power ON/Discharge" setup under [Initial Settings]>[User I/F].	

Cardiac Output (CO)

Item	Details	Default	At Power ON	At Discharge
Auto Start	ON, OFF	ON	Backup	Backup
Time Scale	30, 60 sec	30 sec.	Backup	Backup

Sp*

Item	Details	Default	At Power ON	At Discharge
SpCO	-	-	Backup	Backup
SpMet	-	-	Backup	Backup
SpHb	Medium, Short, Long	Medium	Backup	Backup

Vigilance/Vigileo

Item	Details	Default	At Power ON	At Discharge
STAT Mode	ON, OFF	OFF	Backup	Backup
Index Disp.	ON, OFF	OFF	Backup	Backup

INVOS

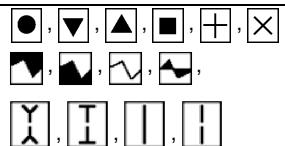
Item	Details	Default	At Power ON	At Discharge
Lt-rSO ₂	ch1, ch2, ch3, ch4	ch1	Backup	Backup
Rt-rSO ₂	ch1, ch2, ch3, ch4	ch2	Backup	Backup
S1-rSO ₂	ch1, ch2, ch3, ch4	ch3	Backup	Backup
S2-rSO ₂	ch1, ch2, ch3, ch4	ch4	Backup	Backup

Stopwatch

Item	Details	Default	At Power ON	At Discharge
Label 1	8 alphanumeric characters	TIMER1	Backup	Backup
Label 2		TIMER2	Backup	Backup

Data Review

Graphic Trend

Item	Details		Default	At Power ON	At Discharge
Trend A	HR, ST(I to V), SpO ₂ , PR_SpO ₂ , VPC, NIBP, BP1 to 2, PR_IBP, PDP, CPP, TEMP1 to 4, Tb, ΔTEMP-A to B, RR_IMP, APNEA, EtCO ₂ , InspCO ₂ , RR_GAS, BIS, SvO ₂ , ScvO ₂ , CCO, CCI, BT, RR_VENT, PI, PVI, SpCO, SpMet, SpHb, Lt-rSO ₂ , Rt-rSO ₂ S1-rSO ₂ , S2-rSO ₂		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			OFF, OFF, OFF, OFF	Backup	Backup
Time	10min, 1h, 2h, 4h, 8h, 12h, 16h, 24h		4 hours	Backup	Backup
Display Selection					
Scale, Display Selection	HR, PR_SpO ₂ , PR_IBP	100, 200, 300bpm	300bpm 	Backup	Backup
	ST(V)	±0.2, ±0.5, ±1.0, ±2.0mV ±2.0, ±5.0, ±10.0, ±20.0mm	±0.5mV ±5.0mm 	Backup	Backup
	VPC	20, 50, 100 beats	20 beats 	Backup	Backup
	BP1 to BP2	20, 50, 100, 150, 200, 300mmHg 4.0, 8.0, 16.0, 20.0, 24.0, 40.0kPa	200mmHg 24.0kPa 	Backup	Backup
	PDP, CPP	20, 50, 100, 150, 200, 300mmHg 4.0, 8.0, 16.0, 20.0, 24.0, 40.0kPa	200mmHg 24.0kPa 	Backup	Backup
	NIBP	100, 150, 200, 300mmHg 16.0, 20.0, 24.0, 40.0kPa	200mmHg 24.0kPa 	Backup	Backup
	TEMP1 to TEMP4	20.0-45.0, 30.0-40.0°C	30.0-40.0°C 	Backup	Backup
	Tb	20.0-45.0, 30.0-40.0°C	20.0-45.0°C 	Backup	Backup
	ΔT Setting	±10.0, ±25.0°C	±10.0°C 	Backup	Backup
	SpO ₂	0-100, 50-100, 80-100%	80-100% 	Backup	Backup
	SpCO	20, 40, 100%	20% 	Backup	Backup
	SpMet	10, 15, 100%	10% 	Backup	Backup
	SpHb	10-20, 0-25(g/dL)	10-20 	Backup	Backup
	RR_IMP, RR_VENT, RR_GAS	50, 100, 150Bpm	50Bpm 	Backup	Backup
	APNEA	15, 30 sec	15 sec. 	Backup	Backup
	CO ₂	50, 100mmHg 4.0, 8.0, 10.0kPa 4.0, 8.0, 10.0%	50mmHg 4.0kPa 4.0% 	Backup	Backup

Graphic Trend

Item	Details		Default	At Power ON	At Discharge
	PI	10,20%	10% 	Backup	Backup
	PVI	30,60, 100%	30% 	Backup	Backup
	SvO ₂ , ScvO ₂	0-100, 50-100, 80-100%	0-100% 	Backup	Backup
	CCO	6.0, 12.0, 20.0L/min	6.0L/min 	Backup	Backup
	CCI	6.0, 12.0, 20.0L/min/m ²	6.0L/min/m ² 	Backup	Backup
	BT	20.0-45.0, 30.0-40.0°C	20.0-45.0 °C 	Backup	Backup
	BIS	25, 50, 75, 100	100 	Backup	Backup
	Lt-rSO ₂	20-100(%)	20-100% 	Backup	Backup
	Rt-rSO ₂	20-100(%)	20-100% 	Backup	Backup
	S1-rSO ₂	20-100(%)	20-100% 	Backup	Backup
	S2-rSO ₂	20-100(%)	20-100% 	Backup	Backup

Tabular Trend

Item	Details	Default	At Power ON	At Discharge
Time	10sec., 30sec., 1min., 2min., 2.5min., 5min., 10min., 15min., 30min., 60min., NIBP	5 min	Backup	Backup
Group	A to F	A	Backup	Backup
Fixed Parameters	0 to 6 param.	0 param.	Backup	Backup
List Selection	<p>[Parameter] OFF, HR, VPC, ST (I to V), SpO₂, PR_SpO₂, NIBP-S/D/M, BP1 to 2-S/D/M, PR_IBP, PDP, PCWP, CPP, TEMP1 to 4, Tb, CO, EtCO₂, InspCO₂, RR_GAS, RR_IMP, RR_VENT, APNEA, PI, PVI, SpCO, SpMet, SpHb</p> <p>[Vigilance] SvO₂, ScvO₂, SaO₂, O₂El, B-Temp, CCO, CCO-STAT, CCI, CCI-STAT, DO₂, RVEF, RVEF-STAT, VO₂, SV, SV-STAT, SVI, SVI-STAT, SVR, SVRI, SVV, EDV, EDV-STAT, EDVI, EDVI-STAT, MAP, ESV, ESVI, OFF</p> <p>[Ventilator] E-TV, I-TV, MV, P-PEAK, P-PAUSE, PEEP, P-MEAN, E-RES, I-RES, COMP, FiO₂, OFF</p> <p>[Other] BIS, SQI, EMG, SR, Lt-rSO₂, Rt-rSO₂, S1-rSO₂, S2-rSO₂, OFF, TOTPOW, SEF, IMP</p>			
List A	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		Backup	Backup
List B	HR, VPC, ST(I) to ST(V)		Backup	Backup
List C	HR, RR_IMP, RR_GAS, RR_VENT, SpO ₂ , P-PEAK, P-PAUSE, P-MEAN, PEEP, E-TV, I-TV, MV, E-RES, I-RES, COMP, EtCO ₂ , APNEA		Backup	Backup
List D	SvO ₂ , CCO, EDV, B-Temp, RVEF, SV, CCI, EDVI, ESV, SVR, SaO ₂ , SVI, ESVI, SVRI, CCO_STAT, EDV_STAT		Backup	Backup
List E	BIS, SQI, EMG, SR		Backup	Backup
List F	HR, SpO ₂ , NIBP-S, NIBP-D, NIBP-M, BP1-S, BP1-D, BP1-M, RR_GAS, EtCO ₂		Backup	Backup
Filtering (Sampling Interval)	10sec., All	All	Initialize	Initialize

OCRG

Item	Details	Default	At Power ON	At Discharge
Display Time	8, 16 min	8 min	Backup	Backup
Waveform	Impedance, CO ₂	Impedance	Backup	Backup
Respiration Waveform Size	x 1/4, x1/2, x1, x2, x4	x1	Backup	Backup

Recall

Item	Details	Default	At Power ON	At Discharge
Waveform Selection	ECG1, ECG2, BP1 to 2, SpO ₂ , RESP, CO ₂ , RR_GAS	ECG1, ECG2	All ON	Backup
Recall Factor	Asystole, VF, VT, Slow VT, Run, Bigeminy, Trigeminy, Pause, Couplet, Tachy, Brady, Frequent HR, ST, NIBP, RR, APNEA, SpO ₂ , PR, BP1 to 2, TEMP1 to 4, Tb, CO ₂ , SpCO, SpMet, SpHb	All ON		
List Display	5 Waves (Compressed: 12 sec.)	5 Waves (Compressed: 12 sec.)		
Recall Display Selection	Asystole, VF, VT, Slow VT, Run, Bigeminy, Trigeminy, Pause, Couplet, Tachy, Brady, Frequent HR, ST, NIBP, RR, APNEA, SpO ₂ , PR, BP1 to 2, TEMP1 to 4, Tb, CO ₂ , EVENT1 to 8, SpCO, SpMet, SpHb	All ON		

ST Measurement

Item	Details	Default	At Power ON	At Discharge
Meas. Point	0 to 560ms	120ms	All ON	Backup
Ref. Point	0 to -240ms	-80ms		
ST Wave Size	x1/4, x1/2, x1, x2, x4	x1		
Slide Show Interval	1, 5, 10, 20, 30 sec.	5 sec.		
ST Waveform Interval	10 sec., 1 min., 5 min., 10 min.	10 sec.		

NOTE

- The graphic trend, tabular trend, alarm history will be stored even when the power is turned OFF.
- The ST data, OCRG data, Recall data will be stored for 5 minutes after the power is turned OFF.

Basic Setup

Tone/Volume

Item	Details		Default	At Power ON	At Discharge
Vital Alarm Sound	Urgent	Volume: 11 levels	4	Backup	
		Tone: 5 type*	1		
	Caution	Volume: 11 levels	4		
		Tone: 5 type*	1		
	Status	Volume: 11 levels	4		
		Tone: 4 type*	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		
Pulse Tone	Volume: 11 levels		2		
	Tone: 5 type		1		
	Sync. with SpO ₂ Value: Selected Tone, Sync. with SpO ₂ Value		Selected Tone		
Key Sound	Volume: 11 levels		4		
	Tone: 3 type		1		
Other Bed Alarm	Volume: 11 levels		4		
	Tone: 1 type		1		
Boot Sound Shutdown Sound	Volume: 11 levels		2		
	Tone: 3 type		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	Details	Default	At Power ON	At Discharge
Layout	Numeric Data: Standard/Right Numeric Data: Standard/Left Numeric Data: Standard/Bottom (1row, 2rows, 3 rows) Numeric Data: Standard&Bottom/Right Numeric Data: Standard&Bottom/Left Numeric Data: Standard/Right(Large) Numeric Data: Standard/Left(Large) Numeric Data: Maximum Size	Numeric Data: Standard/ Right	Depend on the "Power ON/ Discharge" setup under [Initial Settings]>[User I/F].	
Background Color	Refer to the Color Setup.			
Palette	Refer to the Color Setup.			

Display Configuration

Item	Details	Default	At Power ON	At Discharge
Numeric Data	OFF, HR/PR, HR, PR_IBP, VPC/PACE, ST/VPC, ST-A to B, BP1 to 2, NIBP, NIBP LIST, SpO ₂ , PR_SpO ₂ , RR_IMP, RR_GAS, RR_VENT, TEMP1 to 4, TEMP1/2, TEMP3/4, Tb, SpO ₂ /PR_SpO ₂ , ATEMP-A to B, VENT, P-V F-V, SvO ₂ /CO, BIS, CO ₂ , HEMO-I, Stopwatch, INVOS, HEMO, SpCO, SpMet, SpHb	HR/PR, SpO ₂ , NIBP, RR_IMP	Depend on the "Power ON/Discharge" setup under [Initial Settings]>[User I/F].	
Waveform	OFF, ECG1 to 7, ECG1 to 7 Cascade, BP1 to 2, BP Overlap, SpO ₂ , RESP, AWF, AWP, AWV, CO ₂ , Block Cascade	ECG1, SpO ₂ , RESP		
User Key	OFF, Home, Menu, User Key Up/Down, Alarm Silence, Alarm Suspend, NIBP Start/Stop, NIBP Cont., Print Start/Stop, Monitor Suspend, Night Mode, Freeze, Key Lock, Monitoring Mode Select, Admit/Disch., Rapid Discharge, HR/PR, HR Source, BP Zero, Lead, ECG Size (All Leads), Scale/ Baseline, SpO ₂ Display ON/OFF, CO ₂ Display ON/OFF, Alarm History, Other Bed, Auto Display Config., 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, Hemodynamics, Lung Function, Full Disc. Wave, Tone/Volume, NIBP Auto Mode, Alarm Setup (All), Manual Printing, Display Config., Time/Date, Stopwatch, Group 1, Group 2, Group 3, Group 4, Group 5, Event, Print (LBP) Cancel, Standard, BP1CH, CO2, Maximum, Bottom 1, Bottom 2, Main 7, Main 8, Main 9	User Key Down 1/2 Menu, Admit/Disch., BP Zero, NIBP Start/Stop, NIBP Auto Mode, NIBP Cont., Alarm Setup (All), Print Start/Stop, User Key Up/Down, Home, User Key Down 2/2 Menu, Alarm Silence, Trend Group, Tabular Trend Group, Night Mode, Key Lock, Print Start/Stop, User Key Up/Down, Home	Depend on the "Power ON/Discharge" setup under [Initial Settings]>[User I/F].	
Sweep Speed	Circ.: 6.25, 12.5, 25, 50 Vent.: 6.25, 12.5, 25	Circ.: 25 Vent.: 6.25	Depend on the "Power ON/Discharge" setup under [Initial Settings]>[User I/F].	
Short Graphic Trend	ON, OFF, Overlap Display Length: 0, 5, 10, 15, 20, 25, 30 min.	OFF 15 min.	Depend on the "Power ON/Discharge" setup under [Initial Settings]>[User I/F].	
Detail Setup (Meas.)	Alarm Limit Display	Graph, Numeric, OFF	Graph	Depend on the "Power ON/Discharge" setup under [Initial Settings]>[User I/F].
	At Alarm Occurrence	Reversed, 3D	Reversed	Depend on the "Power ON/Discharge" setup under [Initial Settings]>[User I/F].

Display Configuration

Item	Details		Default	At Power ON	At Discharge
Detail Setup (Wave)	ST, VPC/Arrhy. Alarm Display	ON, OFF	ON	Backup	Backup
	Grid	Standard, OFF, Bold	Standard	Depend on the "Power ON/ Discharge" setup under [Initial Settings]>[User I/F].	
	Scale	ON, Bold1, Bold2	Standard	Depend on the "Power ON/ Discharge" setup under [Initial Settings]>[User I/F].	
	Width	Thin, Regular, Thick	Standard	Depend on the "Power ON/ Discharge" setup under [Initial Settings]>[User I/F].	
	Clip	ON, OFF	ON	Depend on the "Power ON/ Discharge" setup under [Initial Settings]>[User I/F].	
	Fill CO ₂ Waveform	ON, OFF	ON	Depend on the "Power ON/ Discharge" setup under [Initial Settings]>[User I/F].	
	Block Cascade	Waveform Quantity: 2 to 6 Displayed Waveform: OFF, ECG1 to 7, BP1 to 2, SpO ₂ , RESP, AWF, AWP, AWV, CO ₂	Waveform Quantity: 2 Displayed Waveforms: ECG1, ECG2	Depend on the "Power ON/ Discharge" setup under [Initial Settings]>[User I/F].	

NOTE

- For "Display Config.", selecting [Backup] for "Power ON" and "Discharge" under [Initial Settings] > [User I/F] > [Power ON/Discharge] will retain the setting at "Power ON" and "Discharge" respectively. If [Initialize] is selected, the setting will be initialized with the selected mode at "Power ON" and "Discharge".

Manual Printing

Item		Details	Default	At Power ON	At Discharge
Basic	Printer	Built-in, Cent.	Built-in	Backup	Backup
	Waveform Selection	ECG1, ECG2, ECG3, BP1 to 2, SpO ₂ , RESP, CO ₂ , AWF, AWP, AWV	ECG1	Backup	Backup
	Print Duration	24 sec., Cont.	24 sec.	Backup	Backup
	Delay Time	None, 8sec., 16 sec.	8 sec.	Backup	Backup
Other Setup: Graphic Printing	Graphic Trend	Built-in, Central, Laser	Built-in	Backup	Backup
	Tabular Trend	Built-in, Central, Laser	Built-in	Backup	Backup
	OCRG	Built-in, Laser	Built-in	Backup	Backup
	Zoom Wave (Recall, Full Disc.)	Built-in, Central, Laser	Built-in	Backup	Backup
	ST	Built-in, Central, Laser	Built-in	Backup	Backup
	Full Disc. Compressed Wave	Built-in, Laser	Built-in	Backup	Backup
	Hemodynamics	Built-in, Central, Laser	Built-in	Backup	Backup
	Lung Function	Built-in, Central, Laser	Built-in	Backup	Backup
	CO	Built-in, Central, Laser	Built-in	Backup	Backup
Other Setup: Recall Printing		Graphic Printing, Manual Printing	Graphic Printing	Backup	Backup

Auto Printing

Item		Details	Default	At Power ON	At Discharge
Alarm Printing	Print	ON, OFF	OFF	Backup	Backup
	Factor	Alarm for each arrhythmia, parameter	All	Backup	Backup
	Printer	Built-in, Cent.	Built-in	Backup	Backup
	Waveform Selection	ECG1, ECG2, ECG3, BP1 to 2, SpO ₂ , RESP, CO ₂ , AWF, AWP, AWV , Alarm Factor	ECG1, Alarm Factor	Backup	Backup
	Print Duration	12, 24 sec	12 sec.	Backup	Backup
Periodic Printing	Periodic Printing	ON, OFF	OFF	Backup	Backup
	Printer	Built-in, Cent.	Built-in	Backup	Backup
	Waveform Selection	ECG1, ECG2, ECG3, BP1 to 2, SpO ₂ , RESP, CO ₂ , AWF, AWP, AWV	ECG1	Backup	Backup
	Periodic Interval	Inter., 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	Details	Default	At Power ON	At Discharge
QRS Classification	ON, OFF	ON	Backup	Backup
Speed	50mm/s, 25mm/s	25mm/s	Backup	Backup
Print Calibration	Top, Each Page, OFF	OFF	Backup	Backup
Print NIBP Data	ON, OFF	OFF	Backup	Backup

Other Setup

Item	Details	Default	At Power ON	At Discharge
Night Mode	Mode	Manual, Timer	Manual	Backup
	Start Time	00:00 to 23:59	Start Time: 21:00	Backup
	End Time	00:00 to 23:59	End Time: 07:00	Backup
	Volume	No Change, 3, 1, 0	1	Backup
	Display	No Change, Dark, Darker, Time Only	Darker	Backup
	Alarm Indicator	ON, OFF	OFF	Backup
Color	Background Color (Meas.)	Black, Gray, Light Gray	Meas: Black, Wave: Black	Backup
	Background Color (Wave)			Backup
	Palette	Light, Clear, Deep, Vivid	Vivid	Backup
	HR	12 colors + White	6	Backup
	ST		6	Backup
	VPC		White	Backup
	PACE		White	Backup
	NIBP		White	Backup
	SpO ₂		4	Backup
	SpCO		4	Backup
	SpMet		4	Backup
	SpHb		4	Backup
	CO ₂		8	Backup
	RESP		White	Backup
	BP1		1	Backup
	ART		1	Backup
	PAP		4	Backup
	CVP		8	Backup
	ICP		8	Backup
	IAP		12	Backup
	LVP		2	Backup
	US1(BP)		White	Backup
	US2(BP)		White	Backup
	US3(BP)		White	Backup
	US4(BP)		White	Backup
	US5(BP)		White	Backup
	BP2		8	Backup
	TEMP1 to 4, Tb		2	Backup
	Tsk, Tre, Tes, Tco, US1 to US7		2	Backup
	AWF		6	Backup
	AWP		4	Backup
	AWV		8	Backup
	BIS		White	Backup
	INVOS		White	Backup

Other Setup

Item		Details	Default	At Power ON	At Discharge
	SvO ₂ , CO		White	Backup	Backup
	Stopwatch		White	Backup	Backup
Brightness	Brightness	7 levels	3rd from top	Backup	Backup
Stopwatch Label	1	8 alphanumeric characters	TIMER1	Backup	Backup
	2		TIMER2	Backup	Backup

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Chapter 13 Accessories

Accessories

This section lists the accessories for the main unit (DS-8100).

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.

- DS-8100 System Operation Manual (This Manual)
- DS-8100 System Maintenance Manual
- Parts Replacement Label
- Color Panel (white, blue, red, yellow, green)

Optional Accessories

The following products are available as optional accessories for the DS-8100 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

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

Invasive Blood Pressure Measurement

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

Item	Model Type	Note
Adult Cuff (Large)	CUF-7101	Width 17cm, Reusable
Adult Cuff (Medium)	CUF-7102A	Width 14.5cm, Reusable
Adult Cuff (Small)	CUF-7103	Width 11cm, Reusable
Pediatric Cuff	CUF-7104	Width 10.5cm, Reusable
Infant Cuff	CUF-7105	Width 8.5cm, Reusable
Tempa-Kuff® Neonatal Cuff Infant #5	99750	Disposable, Latex-Free, 40/box
Tempa-Kuff® Neonatal Cuff Neonatal Extra Large #4	99848	Disposable, Latex-Free, 40/box
Tempa-Kuff® Neonatal Cuff Neonatal Large #3	99729	Disposable, Latex-Free, 40/box
Tempa-Kuff® Neonatal Cuff Neonatal Medium #2	99890	Disposable, Latex-Free, 40/box
Tempa-Kuff® Neonatal Cuff Neonatal Small #1	99801	Disposable, Latex-Free, 40/box
Air Hose (1.5m) General	OA-80APL1.5	For CUF-7101/7102A/7103/7104/7105
Air Hose (3.5m) General	OA-80APL3.5	For CUF-7101/7102A/7103/7104/7105
NIBP Extension Hose (1.5m)	OA-7110A	For CUF-7101/7102A/7103/7104/7105
NIBP Extension Hose (3.5m)	OA-7110B	For CUF-7101/7102A/7103/7104/7105

Item	Model Type	Note
Air Hose (1.5m) Neonate	OA-80NE1.5	For Tempa-Kuff® Neonatal Cuff
Air Hose (3.5m) Neonate	OA-80NE3.5	For Tempa-Kuff® Neonatal Cuff

*Tempa-Kuff® Neonatal Cuffs, manufactured by TRIMLINE Medical Products Corporation.

Temperature Measurement

Item	Model Type	Q'ty	Note
Rectal Temperature Probe (for adult)	401	1	
Rectal Temperature Probe (for pediatric)	402	1	
Body Surface Probe	409B	1	
2ch Temperature Relay Cable	CJO-P01T-DA0.5	1	0.5m
2ch Temperature Relay Cable	CJO-P01T-DA4.0	1	4m

* 400 series general purpose temperature probe, manufactured by Measurement Specialities, Inc.

Pulse Oximetry Measurement (Nellcor)

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.

Pulse Oximetry Measurement (Masimo)

SpO₂, PR, PI, and PVI Measurement

Item	Model Type	Note
Masimo SET Sensor	LNOP DCI (1269)	Reusable, Adult, Weight: > 30 kg
Masimo SET Sensor	LNOP Adt (1001)	Single Patient Use, Adult, Weight: > 30 kg
Masimo SET Sensor	LNOP Pdt (1025)	Single Patient Use, Pediatric, Weight: 10 kg - 50 kg
Masimo SET Sensor	LNOP Inf-L (1800)	Single Patient Use, Infant, Weight: 3 kg - 20 kg
Masimo SET Sensor	LNOP Neo-L (1798)	Single Patient Use, Neonatal/Adult, Weight: < 3 kg or > 40 kg
Masimo SET Sensor	LNOP NeoPt-L (1651)	Single Patient Use, Neonatal, Weight: < 1 kg
Masimo SET Sensor	LNOP Blue (1970)	Adhesive Sensors for Neonatal/Infant/Pediatrics, Weight 2.5-30 kg
Masimo SET Sensor	LNCS DCI (1863)	Reusable, Adult, Weight: > 30 kg
Masimo SET Sensor	LNCS Adtx (1859)	Single Patient Use, Adult, Weight: > 30 kg
Masimo SET Sensor	LNCS Pdt (1860)	Single Patient Use, Pediatric, Weight: 10 - 50 kg
Masimo SET Sensor	LNCS Inf-L (1861)	Single Patient Use, Infant, Weight: 3 kg - 20 kg
Masimo SET Sensor	LNCS Neo-L (1862)	Single Patient Use, Neonatal/Adult, Weight: < 3 kg or > 40 kg
Masimo SET Sensor	LNCS NeoPt-L (1901)	Single Patient Use, Neonatal, Weight: < 1 kg
LNOP Red Patient Cable	Red PC-04 (2058)	For LNOP sensor, 1.2m
LNOP Red Patient Cable	Red PC-08 (2059)	For LNOP sensor, 2.4m
LNOP Red Patient Cable	Red PC-12 (2060)	For LNOP sensor, 3.6m
LNCS Red Patient Cable	Red LNC-04 (2055)	For LNCS sensor, 1.2m
LNCS Red Patient Cable	Red LNC-10 (2056)	For LNCS sensor, 3.0m
LNCS Red Patient Cable	Red LNC-14 (2057)	For LNCS sensor, 4.2m

SpO₂, PR, PI, PVI, SpMet, SpOC, and SpCO Measurement

Item	Model Type	Note
Masimo Rainbow Sensor	Rainbow DCI-dc3 (2201)	Reusable, Adult, 0.9m, Weight: >30kg
Masimo Rainbow Sensor	Rainbow DCI-dc8 (2407)	Reusable, Adult, 2.4m, Weight: >30kg
Masimo Rainbow Sensor	Rainbow DCI-dc12 (2202)	Reusable, Adult, 3.6m, Weight: >30kg
Masimo Rainbow Sensor	Rainbow R25 (2221)	Single Patient Use, Adult, Weight: >30kg
Masimo Rainbow Sensor	Rainbow R25-L (2219)	Single Patient Use, Adult/Neonatal, Weight: <3kg or >30kg
Masimo Rainbow Sensor	Rainbow R20 (2222)	Single Patient Use, Pediatric, Weight: 10kg - 50kg
Masimo Rainbow Sensor	Rainbow R20-L (2220)	Single Patient Use, Infant, Weight: 3kg - 30kg
Masimo Rainbow Patient Cable	Rainbow RC-1 (2405)	For Rainbow Sensor, 0.3m
Masimo Rainbow Patient Cable	Rainbow RC-4 (2406)	For Rainbow Sensor, 1.2m
Masimo Rainbow Patient Cable	Rainbow RC-12 (2404)	For Rainbow Sensor, 3.6m

□ SpO₂, PR, PI, PVI, SpMet, SpOC, and SpHb Measurement

Item	Model Type	Note
Masimo Rainbow ReSposable Sensor	Rainbow ReSposable R2-25 Sensor System (3457)	Single Patient Use, Adult, Weight > 30 kg, R2-25a adhesive sensors & R2-25r reusable sensors 10-R2-25a /box, 2-R2-25r /box
Masimo Rainbow ReSposable Sensor	Rainbow ReSposable R2-20 Sensor System (3458)	Single Patient Use, Pediatric, Weight 10 kg - 50 kg, R2-20a adhesive sensors & R2-20r reusable sensors 10-R2-20a /box, 2-R2-20r /box
Masimo Rainbow ReSposable Sensor	Rainbow ReSposable R2-25a Sensors (2753)	Single Patient Use, Adult, Weight > 30 kg, R2-25a adhesive sensors For use with R2-25r, 25-R2-25a /box
Masimo Rainbow ReSposable Sensor	Rainbow ReSposable R2-20a Sensors (2755)	Single Patient Use, Pediatric/Slender Digit, Weight 10 - 50 kg R2-20a adhesive sensors For use with R2-20r, 25-R2-20a /box
Masimo Rainbow ReSposable Sensor	Rainbow ReSposable R2-25r Sensors (2754)	Single Patient Use, Adult, Weight > 30 kg, R2-25r reusable sensors For use with R2-25a, 5-R2-25r /box
Masimo Rainbow ReSposable Sensor	Rainbow ReSposable R2-20r Sensors (2756)	Single Patient Use, Pediatric/Slender Digit, Weight 10 - 50 kg R2-20r reusable sensors For use with R2-20a, 5-R2-20r /box
Masimo Rainbow Patient Cable	Rainbow RC-1 (2405)	For Rainbow Sensor, 0.3m
Masimo Rainbow Patient Cable	Rainbow RC-4 (2406)	For Rainbow Sensor, 1.2m
Masimo Rainbow Patient Cable	Rainbow RC-12 (2404)	For Rainbow Sensor, 3.6m

NOTE

- SpCO and SpHb cannot be measured at the same time for all the sensors.

NOTE

- The number inside the brackets indicates Masimo PN.
- SpCO and SpHb cannot be measured at the same time for all the sensors.
- There are various types of sensors available. For details, refer to our service representative.

CO Measurement

Item	Model Type	Note
Catheter Relay Cable	CJO-P01C-C2.4	
Injectate Probe Relay Cable	CJO-P01C-T2.4	

CO₂ Concentration Measurement (Respironics)

For HPD-800/HPD-810 Gas Unit I/F with Resironics Novametrix, LLC. Capnostat 5 CO₂ 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)
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.

CO₂ Concentration Measurement (Covidien)

For HCP-800/HCP-810 CO₂ Gas Unit

Sampling Devices

Item	Model Type	Note
Intubated EtCO₂		
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 EtCO₂		
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.

Others

Item	Model Type	Note
Power Cable	CS-24	3.5m
Power Cable	CS-33	3.5m
Ground Cable	CE-11	
Ground Cable	CE-01A	
Remote Control Unit	CF-820	
Recording Paper	OP-050-01TDR	10 per box
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 20m (For DS-LAN)
RS-232C Cable	CJ-725	Cross cable with core
CF Card	FCF-16GA	16GB
CF Card	FCF-1000	1GB
CF Card	FCF-128	128MB
SD Card	SD-1G	1GB
SD Card	SD-8G	8GB
Telemetry Transmitter Module	HLX-801	
Bidirectional Wireless Communications Module	HTC-702	
Lithium-ion Battery	BTO-008	For battery operation
Module Connection Cable (1.5m)	CJO-13SS1.5	module-LAN Cable 1.5m
Module Connection Cable (3.5m)	CJO-13SS3.5	module-LAN Cable 3.5m
Module Connection Cable (5m)	CJO-13SS5	module-LAN Cable 5.0m
Network Cable (1.5m)	CJO-14SS1.5	module-LAN-RJ-45 Conversion Cable 1.5m
Network Cable (2.5m)	CJO-14SS2.5	module-LAN-RJ-45 Conversion Cable 2.5m
Network Cable (5m)	CJO-14SS5	module-LAN-RJ-45 Conversion Cable 5.0m
Network Cable (10m)	CJO-14SS10	module-LAN-RJ-45 Conversion Cable 10.0m
Network Cable (20m)	CJO-14SS20	module-LAN-RJ-45 Conversion Cable 20.0m
AUX Connection Cable (0.17m)	CJO-15RR0.17	Relay cable for HCP-810, HPD-810
AUX Connection Cable (0.65m)	CJO-15RR0.65	Relay cable for HCP-810, HPD-810
AUX Connection Cable (1.5m)	CJO-15RR1.5	Relay cable for HCP-810, HPD-810
AUX Connection Cable (3m)	CJO-15RR3	Relay cable for HCP-810, HPD-810
HTC Attachment Case for DS-8100	OAO-64A	For installing the HTC-702
HCP Attachment Case for DS-8100	OAO-65A	For installing the HCP-810, HPD-810
Stand for DS-8100	OAO-66A	For attaching to the shelf

Item	Model Type	Note
Rail/Pole Clamp for DS-8100 (VESA75mm)	OAO-84A	For attaching to the rail or pole
Bed Mount for DS-8100 (VESA75mm)	OAO-85A	For attaching to the bed pipe
HCP Fixing Bracket for DS-8100	OAO-86A	For fixing the HCP-810, HPD-810
Counter Bracket (for OAO-66A)	OAO-87A	For fixing on a shelf (OAO-66A is required.)
Clip Bracket for DS-8100	OAO-90A	For attaching the HCP-810, HPD-810 with a clip

External Equipment Connection Cable

External Device	Model Type	Note
SV-300	CJ-401RI-70SV3	For Status II Connector
Servo-i/Servo-s	CJ-402RI-70SVi	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
Vigilance, Vigilance CEDV	CJ-406RI-70Vigi	For Status II Connector
	CJO-04RS4	For Serial Connector
Vigilance II, Vigileo	CJ-402RI-70SVi	For Status II Connector
	CJ-502	For Serial Connector
BIS	CJ-407RI-70BIS	For Status II Connector
	CJO-03RS4	For Serial Connector
INVOS 5000C	CJ-406RI-70Vigi	For Status II Connector
	CJO-04RS4	For Serial Connector

Chapter 14 Specification

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Chapter 14 Specification

Specification

This section states the specification of this equipment.

Main Unit: DS-8100 System

Size

300(W) x 265 (H) x 75 (D) mm (not including the protrusion)

Weight

3.5kg (not including the accessory)

Environmental Conditions

Operating Temperature 10 to 40°C

Operating Humidity 30 to 85 % (non-condensing)

Operating Atmospheric Pressure 700 to 1060hPa

Transport / Storage Temperature -10 to 60°C

Transport / Storage Humidity 10 to 95%(40°C) (non-condensing)

Storage Atmospheric Pressure 700 to 1060hPa

Safety

General Standard IEC 60601-1: 1988+A1: 1991+A2: 1995
(Medical Electrical Equipment- Part 1: General Requirements for Safety)

IEC 60601-1-1: 2000
(Medical Electrical Equipment- Part 1-1: General Requirements for Safety- Collateral standard:
Safety Requirements for Medical Electrical Systems)

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 (During AC power operation)
Internally powered Equipment (During battery operation)

Degree of protection against electric shock ECG/RESP, SpO₂, SpCO*, SpMet*, SpHb*, TEMP, BP, CO: Type CF Applied Part
NIBP: Type BF Applied Part
*DS-8100M only

Operation Mode Continuous Operating Equipment

The degree of protection against ingress of water IPX0 (no protection)

Protection against Ignition of Flammable Gas Not provided

Power Supply

Voltage	AC 100-240V
Frequency	50/60 Hz
Power Consumption	During AC power operation: 60VA and below During battery operation: 40W and below
Battery Operation Time	3 hours (NIBP of 15 min. interval, without option unit operation)
Battery Charging Time	Rapid Charge (when the monitor is not operating): 4 hours Normal Charge (when the monitor is operating): 8 hours

Usable Life

6 year	According to self-certification. ( Maintenance Manual "Periodic Replacement" P7-1)
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Option Unit**Size**

Recorder	HR-810	100(W)x110(H)x178(D)mm
Expansion Port Unit	CU-810	50(W)x110(H)x178(D)mm
Recorder/Expansion Port Unit	HR-811	100(W)x110(H)x178(D)mm

Weight

Recorder	HR-810	0.70kg
Expansion Port Unit	CU-810	0.45kg
Recorder/Expansion Port Unit	HR-811	0.80kg

Environmental Conditions

Operating Temperature	10 to 40°C
Operating Humidity	30 to 85 % (non-condensing)
Operating Atmospheric Pressure	700 to 1060hPa
Transport / Storage Temperature	-10 to 60°C
Transport / Storage Humidity	10 to 95%(40°C) (non-condensing)
Storage Atmospheric Pressure	700 to 1060hPa

Safety

General Standard	IEC 60601-1: 1988+A1: 1991+A2: 1995 (Medical Electrical Equipment- Part 1: General Requirements for Safety) IEC 60601-1-1: 2000 (Medical Electrical Equipment- Part 1-1: General Requirements for Safety- Collateral standard: Safety Requirements for Medical Electrical Systems)
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-8100 System)/Internally Powered Equipment (DS-8100 System)
Protection against Ignition of Flammable Gas	Not provided

Voltage	DC18V
Usable Life	
6 year	According to self-certification.

Gas Unit I/F: HPD-800/HPD-810 and CO₂ Gas Unit: HCP-800/HCP-810

Size

36(W)x91(H)x87(D) mm (not including the protrusion)

Weight

HPD-800	0.3kg (not including the accessory)
HPD-810	0.18kg (not including the accessory)
HCP-800	0.4kg (not including the accessory)
HCP-810	0.22kg (not including the accessory)

Environmental Conditions

Operating Temperature	10 to 40°C
Operating Humidity	30 to 85 % (non-condensing)
Transport / Storage Temperature	-10 to 60°C
Transport / Storage Humidity	10 to 95%(40°C) (non-condensing)
Storage Atmospheric Pressure	700 to 1060hPa

Safety

General Standard	IEC 60601-1: 1988+A1: 1991+A2: 1995 (Medical Electrical Equipment- Part 1: General Requirements for Safety) IEC 60601-1-1: 2000 (Medical Electrical Equipment- Part 1-1: General Requirements for Safety- Collateral standard: Safety Requirements for Medical Electrical Systems)
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-8100 System)/Internally Powered Equipment (DS-8100 System)
Degree of protection against electric shock	CO ₂ : Type BF Applied Part
Protection against Ignition of Flammable Gas	Not provided

Power Supply

Voltage	HCP-800/HCP-810:DC12V HPD-800/HPD-810:DC5V/12V (Supplied from DS-8100 Main Unit)
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Usable Life

6 year	According to self-certification. ( Maintenance Manual "Periodic Replacement" P7-1)
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Performance

This section states the performance of this equipment.

Display

Device	10.2 inch color LCD
Resolution	1024 x 600 pixel
Function Control	Touch Screen Method
Waveform Trace	Stationary Trace
Sweep Speed	ECG / SpO ₂ / BP (6.25mm/s, 12.5mm/s, 25mm/s, 50mm/s) RESP/CO ₂ (6.25mm/s, 12.5mm/s, 25mm/s)

Operation

Touch Panel	Resistive Touchscreen
Jog Dial	With push switch
Fixed Keys	5 keys (NIBP Start/Stop, Home, Menu, Prev. Disp., Alarm Silence)

Sound Pressure

Alarm (Standard Tone)	Maximum 83.0dB, Minimum 52.0dB
HR Synchronized Tone	Maximum 85.0dB, Minimum 32.0dB
SpO ₂ Synchronized Tone	Maximum 77.0dB, Minimum 51.0dB

Clock Accuracy

±2 min. per year (25°C)

ECG

Lead Type	Wired 3, 4, 5-electrode
Frequency Characteristic	150Hz/40Hz/15Hz(4, 5-electrode) 100Hz/40Hz/15Hz(3-electrode)
Input Impedance	2.5MΩ and above
Maximum Input Voltage	10mVp-p
Polarization Voltage	± 825mV or above
Common Mode Rejection Ratio	90dB and above
HR Measurement Range	Adult: 0, 12 to 300bpm Neonate: 0, 30 to 300bpm
HR Measurement Accuracy	±3bpm
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	Provided

Heart rate meter accuracy and response to irregular rhythm

80bpm Ventricular Bigeminy : 80bpm



60bpm Ventricular Bigeminy : 60bpm



120bpm Ventricular Bigeminy : 120bpm



90bpm Bidirectional Systoles : 90bpm



Response time of heart rate meter to change in heart rate

HR change from 80bpm to 120bpm:
Range 6 to 8 sec., Average 7 sec.

HR change from 80bpm to 40bpm:
Range 6 to 8 sec., Average 7 sec.

Time to ALARM for tachycardia

Ventricular Tachycardia 1mVpp, 206bpm:
Range 8 to 10 sec., Average 9 sec.



Ventricular Tachycardia 2mVpp, 206bpm:
Range 7 to 10 sec., Average 9 sec.

Ventricular Tachycardia 0.5mVpp, 206bpm:
Range 8 to 13 sec., Average 10 sec.

Ventricular Tachycardia 2mVpp, 195bpm:
Range 7 to 10 sec., Average 9 sec.



Ventricular Tachycardia 4mVpp, 195bpm:
Range 8 to 10 sec., Average 9 sec.

Ventricular Tachycardia 1mVpp, 195bpm:
Range 8 to 12 sec., Average 10 sec.

Tall T-wave Rejection Capability

1.2mV T-wave can be removed when tested according to IEC60601-2-27.

Transient Characteristic

3.2 sec, 0.3 sec, 0.1 sec (time constant can be changed)

Rejection of Pacemaker Pulse

- a) Pacemaker Pulse without Over/Uncorrected
Capable to reject pulses of pulse width 0.1 to 2ms, amplitude ± 2 to ± 700 mV
- b) Pacemaker Pulse with Over/Uncorrected
Rejection is not possible.
- c) Pacer Pulse Detector Rejection of Fast ECG Signals
Slew Rate 3.2V/S

Respiration

Method

Impedance Method

Frequency Characteristic

1.5Hz (adult, child) / 2.5Hz (neonate)

Current

100 μ A and below (at 66.65kHz $\pm 5\%$)

Measurement Range

0, 4 to 150Bpm

Measurement Accuracy

± 3 Bpm

TEMP

Measurement Method	Thermistor Method
Probe	400 series only
Measurement Range	0 to 45°C
Measurement Accuracy	25 to 45°C $\pm 0.2^\circ\text{C}$ Outside above range $\pm 0.4^\circ\text{C}$
No. of Channels	Maximum 4 channels
Temperature Delay Time (From temperature probe to monitor display)	10sec. or less (Not including the time constant of temperature probe.)

SpO₂ (Arterial Oxygen Saturation)

Measurement Value Update 1 sec.
Rate

Nellcor Unit

Measurement Method	2 Wavelength Pulse Wave Method Wavelength: Approx. 660nm (red light), Approx. 890nm (infrared light) Output: 15mW and below
Measurement Range	1 to 100%
Resolution	1%
Measurement Accuracy	Adult: $\pm 3\%$ when 70 to 100% (DS-100A) Neonate: $\pm 2\%$ when 70 to 100%
PR Measurement Range	20 to 250bpm
PR Accuracy	$\pm 3\text{bpm}$
Measurement Response Time	6 to 7 sec. (averaging duration)

Masimo Unit

Measurement Method	2 Wavelength Pulse Wave Method Masimo LNOP/LNCS Sensor Wavelength: Approx. 660nm (red light), Approx. 905nm (infrared light) Output: 15mW and below Masimo Rainbow Sensor Wavelength: 8 different wavelengths are used within the range of 610nm to 905nm Output: 25mW and below
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SpO₂

Measurement Range	1 to 100%
Resolution	1%
Measurement Accuracy	Adult: $\pm 2\%$ when 70 to 100% Neonate: $\pm 3\%$ when 70 to 100%

SpCO	
Measurement Range	0 to 100%
Resolution	0.1%
Measurement Accuracy	±3% (SpCO: 1 to 40%)
SpMet	
Measurement Range	0 to 100%
Resolution	0.1%
Measurement Accuracy	±1% (SpMet: 1 to 15%)
SpHb	
Measurement Range	0 to 25.0g/dL
Resolution	0.1g/dL
Measurement Accuracy	±1g/dL (SpHb: 8 to 17g/dL)
PI	
Measurement Range	0.02 to 20.0% (disposable sensor), 0.05 to 20.0% (reusable sensor)
Resolution	0.01%
PVI	
Measurement Range	0 to 100%
Calculation Time	15 sec.
SpOC	
Measurement Range	0 to 35ml/dL
Resolution	0.1ml/dL
Pulse Rate	
Measurement Range	26 to 239bpm
Measurement Accuracy	± 3bpm when 26 to 239bpm (No motion) ± 5bpm when 26 to 239bpm (Motion / Low perfusion)
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 SpO₂ measurement accuracy is determined based on the values of the root-mean square (rms) difference between SpO₂ readings of the pulse oximeter equipment and values of SaO₂ 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 function.
- SpO₂, SpCO and SpMet accuracy was determined by testing on healthy adult volunteers in the range of 60-100% SpO₂, 0-40% SpCO, and 0-15% SpMet against a laboratory CO-Oximeter. SpO₂ and SpMet accuracy was determined on 16 neonatal NICU patients ranging in age from 7-135 days old and weighting between 0.5-4.25kg. Seventy-nine (79) data samples were collected over a range of 70-100% SaO₂ and 0.5-2.5% MetHb with a resultant accuracy of 2.9% SpO₂ and 0.9% SpMet.
- The Masimo sensors have been validated for no motion accuracy in human blood studies on healthy adult male and female volunteers with light to dark skin pigmentation in induced hypoxia studies in the range of 70-100% SpO₂ against a laboratory CO-Oximeter and ECG monitor. This variation equals plus or minus one standard deviation. Plus or minus one standard deviation encompasses 68% of the population.
- The Masimo sensors have been validated for motion accuracy in human blood studies on healthy adult male and female volunteers with light to dark skin pigmentation in induced

hypoxia studies in the range of 70-100% SpO₂ against a laboratory CO-Oximeter and ECG monitor. This variation equals plus or minus one standard deviation which encompasses 68% of the population.

- ♦ The Masimo SET Technology has been validated for low perfusion accuracy in bench top testing against a Bioteck Index2 simulator and Masimo's simulator with signal strengths of greater than 0.02% and transmission of greater than 5% for saturations ranging from 70 to 100%. This variation equals plus or minus one standard deviation which encompasses 68% of the population.
- ♦ The Masimo sensors have been validated for pulse rate accuracy for the range of 25-240 bpm in benchtop testing against a Bioteck Index2 simulator. This variation equals plus or minus one standard deviation which encompasses 68% of the population.
- ♦ SpHb accuracy has been validated on healthy adult male and female volunteers and on surgical patients with light to dark skin pigmentation in the range of 8-17g/dL SpHb against a laboratory CO-oximeter. This variation equals plus or minus one standard deviation which encompasses 68% of the population. The SpHb accuracy has not been validated with motion or low perfusion.
- ♦ The following substances may interfere with pulse CO-Oximetry measurements:
 - Elevated levels of Methemoglobin (MetHb) may lead to inaccurate SpO₂ and SpCO measurements
 - Elevated levels of Carboxyhemoglobin (COHb) may lead to inaccurate SpO₂ measurements.
 - Very low arterial Oxygen Saturation (SpO₂) levels may cause inaccurate SpCO and SpMet measurements
 - Severe anemia may cause erroneous SpO₂ readings.
 - Dyes, or any substance containing dyes, that change usual blood pigmentation may cause erroneous readings.
 - Elevated levels of total bilirubin may lead to inaccurate SpO₂, SpMet, SpCO and SpHb readings.

For more details, see the "Specifications" of the following operation manuals.

- ♦ Covidien (Nellcor) OxiMax N-600x Pulse Oximeter
- ♦ Masimo Radical-7 Pulse CO-Oximeter

BP

Transducer Sensitivity	5µV / V / mmHg
Measurement Range	-50 to 300mmHg
Frequency Characteristic	DC 6Hz / 8Hz / 12Hz / 40Hz
Measurement Accuracy	Within ±2% or ±1mmHg of full scale, whichever is greater
Zero Balance Range	Within ±150mmHg
PR Measurement Range	Adult: 12 to 300bpm Neonate: 30 to 300bpm
PR Accuracy	Within ± 3% or 1bpm, whichever is greater
No. of Channels	Maximum 2 channels

NIBP (Non-Invasive Blood Pressure) (AAMI SP10: 2002+A1:2003+A2:2006+(R) 2008 Manual, electronic or automated sphygmomanometers)

Measurement Method	Oscillometric Method
Measurement Range	Adult: 10 to 280mmHg/1.3 to 37.3kPa Child: 10 to 180mmHg/1.3 to 24.0kPa Neonate: 10 to 130mmHg/1.3 to 17.3kPa
Resolution	1mmHg
Static Pressure Accuracy	$\pm 3\text{mmHg}/0.4\text{kPa}$
BP Measurement Error according to the Clinical Performance Test	
Mean Error	Within $\pm 5\text{mmHg}$
Standard Deviation of Error	8mmHg or below
Error of Cuff Pressure Display	Within $\pm 3\text{mmHg}$
PR Measurement Range	40 to 240bpm
PR Accuracy	$\pm 2\%$ or $\pm 2\text{bpm}$ (whichever greater)
Deflation Speed	$5\pm 1\text{mmHg/sec.}$ (Quick Measurement OFF) $10\pm 2\text{mmHg/sec.}$ (Quick Measurement ON)
Safety Mechanism	Adult: 300mmHg or above Child: 210mmHg or above Neonate: 150mmHg or above

NOTE

- Blood pressure measurements determined with this device are equivalent to those obtained by a trained observer using the cuff/stethoscope auscultation method, within the limits prescribed by the American National Standard, Electronic or automated sphygmomanometers.

CO₂ (Carbon Dioxide Concentration)

RESPIRONICS® Capnostat 5 (Gas Unit I/F and Mainstream Module)

Measurement Method	Infra-Red Solid-State Method, Mainstream Method
Measurement Range	0 to 150mmHg
Measurement Accuracy	0 to 40mmHg: $\pm 2\text{mmHg}$ 41 to 70mmHg: $\pm 5\%$ 71 to 100mmHg: $\pm 8\%$ 101 to 150mmHg: $\pm 10\%$
RR Measurement Range	0 to 150Bpm
RR Measurement Accuracy	$\pm 1\text{Bpm}$
Response Time	60ms and below
Covidien® Unit	
Measurement Method	Infra-Red Solid-State Method, Microstream® Method
Measurement Range	0 to 99mmHg
Measurement Accuracy	0 to 38mmHg: $\pm 2\text{mmHg}$ 39 to 99mmHg: $\pm [5 + 0.08 \times (\text{displayed value}-39)]\%$: (RR: 80Bpm and below) : The larger of $\pm 4\text{mmHg}$ or $\pm 12\%$: (RR: over 80Bpm)
Variation of Measurement Accuracy	$\pm 2\text{mmHg}$ (Within 6 hours after power ON)
RR Measurement Range	0 to 150Bpm
RR Measurement Accuracy	0 to 70Bpm: $\pm 1\text{Bpm}$ 71 to 120Bpm: $\pm 2\text{Bpm}$ 121 to 150Bpm: $\pm 3\text{Bpm}$
Flow Rate	50mL/min +15, -7.5mL/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 to 20L/min
Measurement Range and Accuracy	
Blood Temperature	17 to 45°C $\pm 0.3^\circ\text{C}$
Injectate Temperature	-1 to 35°C $\pm 0.5^\circ\text{C}$

Recording (Recorder Unit)

Recording Speed	50mm/s, 25mm/s (Error: within $\pm 5\%$)
Resolution	Head Direction: 8 dots/mm Feed Direction: 40 lines/mm (at recording speed of 25mm/s)
Recording Waveforms	3 waveforms
Recording Type	Waveform Recording, List Recording, Graphic Recording
Detection	Paper out, printhead temperature
Protective Circuit	Provided

Analog Waveform Output

Output Voltage	ECG output 1V/mV (fixed), BP output 1V/100mmHg (fixed)
Output Voltage Accuracy	within $\pm 10\%$ (Both ECG and BP output)
Analog Output Frequency Range	ECG Output 0.5 to 20Hz BP Output DC to 40Hz
Delay Time	35ms and below (ECG waveform) 35ms and below (BP waveform: when 40Hz is set for waveform filter)
Output Impedance	$100\Omega \pm 10\%$
Load Impedance	$1k\Omega$ to ∞
Pacemaker Pulse	none

QRS Synchronization Output

Output Waveform	Square Wave (Positive/negative logic can be selected.)
Output Voltage	+4.3V to +5.0V (High Level) +0.3V and below (Low Level)
Synchronized Signal Width	100ms
Delay Time	50ms and below (when the "Filter" setting is [Monitor] or [Diag.])
Output Impedance	Open Collector Output (+5V 500 Ω 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 of the patient monitor. For detailed information of the delay time, refer to Fukuda Denshi service representative.
- The QRS synchronized signal is not intended to be used as synchronized signal for defibrillator. For details, refer to Fukuda Denshi service representative.

Measurement Unit for Each Parameter

The measurement units for this equipment are as follows.

Details	Parameter	Display	Unit	Default
Heart Rate / Pulse Rate	ECG	HR	bpm (beats per minute)	
	BP	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)	
	Ventilator	RR_VENT	Bpm	
	CO ₂	RR_CO ₂	Bpm	
	SpO ₂	RR_SpO ₂	Bpm	
Apnea	Impedance	APNEA	s (second)	
	CO ₂	APNEA	s (second)	
	Ventilator	APNEA	s (second)	
Blood Pressure	BP	BP	mmHg, kPa cmH ₂ O (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 Saturation	SpOC	SpOC	mL/dL	
Temperature	TEMP	TEMP	°C	
End Tidal CO ₂ Concentration	CO ₂	EtCO ₂	mmHg, kPa, %	mmHg
Inspiratory CO ₂ Concentration	CO ₂	InspCO ₂	mmHg, kPa, %	mmHg
Cardiac Output	CO	CO	L/minute	
Blood Temperature	Blood Temperature	Tb	°C	
Injectate Temperature	Injectate Temperature	Ti	°C	
Airway Flow	Airway Flow	AWF	L/minute	
Airway Pressure	Airway Pressure	AWP	cmH ₂ O	
Ventilatory Volume	Ventilatory Volume	AWV	mL	

Details	Parameter	Display	Unit	Default
Tidal Volume	Expiratory Tidal Volume	E-TV	mL	
	Inspiratory Tidal Volume	I-TV	mL	
	Ventilatory Volume per second	TV/1Sec	%	
Minute Ventilation Volume	Minute Ventilation Volume	MV	L/minute	
	Spontaneous Minute Volume	SMV	L/minute	
Compliance	Compliance	COMP	mL/cmH ₂ O	
Airway Resistance	Expiratory Resistance	E-RES	cmH ₂ O/L/sec	
	Inspiratory Resistance	I-RES	cmH ₂ O/L/sec	
Airway Pressure	Mean Airway Pressure	MEAN	cmH ₂ O	
	Peak Airway Pressure	PEAK	cmH ₂ O	
	Pause Airway Pressure	PAUSE	cmH ₂ O	
	Plateau Pressure	PLATEAU	cmH ₂ O	
Peak End Expiratory Pressure	Peak End Expiratory Pressure	PEEP	cmH ₂ O	

Details	Parameter	Display	Unit	Default
Vigilance Data Vigilance Vigilance CEDV Vigilance II Vigileo	Mixed Venous Oxygen Saturation	SvO ₂	%	
	Central Venous Oxygen Saturation	ScvO ₂	%	
	Arterial Oxygen Saturation	SaO ₂	%	
	Oxygen Uptake Index	O ₂ EI	%	
	Oxygen Transport	DO ₂	mL/minute	
	Oxygen Consumption	VO ₂	mL/minute	
	Stroke Volume	SV	mL/beat	
	Stroke Volume (STAT Mode)	SV_STAT	mL	
	Stroke Volume Index	SVI	mL/m ²	
	Stroke Volume Index (STAT Mode)	SVI_STAT	mL/m ²	
	HR	HR	bpm (beats per minute)	
	Mean Arterial Pressure	MAP	mmHg	
	Central Venous Pressure	CVP	mmHg	
	Continuous Cardiac Output	CCO	L/minute	
	Continuous Cardiac Output (STAT Mode)	CCO_STAT	L/minute	
	Continuous Cardiac Index	CCI	L/minute/m ²	
	Continuous Cardiac Index (STAT Mode)	CCI_STAT	L/minute/m ²	
	Systemic Vascular Resistance	SVR	dyn-sec-cm ⁻⁵	
	Systemic Vascular Resistance Index	SVRI	(dyn-sec-cm ⁻⁵ -m ²)	
	Blood Temperature	BT	°C	
	Ejection Fraction	RVEF	%	
	Ejection Fraction (STAT Mode)	RVEF_STAT	%	
	End-Diastolic Volume	EDV	mL	
	End-Diastolic Volume (STAT Mode)	EDV_STAT	mL	
	End-Diastolic Volume Index	EDVI	mL/m ²	
	End-Diastolic Volume Index (STAT Mode)	EDVI_STAT	mL/m ²	
	End-Systolic Volume	ESV	mL	
	End-Systolic Volume Index	ESVI	mL/m ²	
	Stroke Volume Variance	SVV	%	

Details	Parameter	Display	Unit	Default
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	
INVOS 5100C Monitor Data	Regional Cerebral Oxygen Saturation (Left)	Lt-rSO ₂	%	
	Regional Cerebral Oxygen Saturation (Right)	Rt-rSO ₂	%	

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FUKUDA DENSHI CO., LTD.

3-39-4 Hongo, Bunkyo-ku, Tokyo, Japan
Tel: +81-3-5684-1455 Fax: +81-3-3814-1222
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