

DYNASCOPE 1000 Series Central Monitor

DS-1800 System

Ver. 03

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-1800 System Version 03.



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 device.
- The information contained in this document is subject to change without notice due to improvement in the device.

© 2023 Fukuda Denshi Co., Ltd.

No part of this document may be reproduced or transmitted in any form without the prior written permission of Fukuda Denshi Co., Ltd.

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

Contents

Preface

Introduction.....	i
Important Notice	i
For Safe Operation of the Device.....	i
Intended Use of this Device	i
Copyright.....	ii
Maintenance, Repair, Replacement.....	ii
Contact.....	ii
About This Manual	iii
Expression Used in This Manual.....	iii
Composition of This Manual.....	v
System Construction and Installation	vi

Safety

About the Safety Precautions.....	i
The Meaning of Each Safety Precaution.....	i
Graphic Symbols.....	i
Precautions for Safe Operation	ii
Precautions for Safe Operation of Medical Device.....	ii
Maintenance.....	iii
Precautions about the Network System	iii
Medical Telemetry.....	iii
Precautions when Using with Other Device	iv
Pacemaker	iv
Non-Explosion Proof	v
Defibrillator	v
MRI (Magnetic Resonance Imaging).....	v
Precautions for Using the Device	v
This System.....	v
Wired Network System.....	x
Wireless Network System	xi
RTC and Data Backup	xi
Cables	xi
Precautions regarding Peripheral Devices and Accessories.....	xi
Connection to Peripheral Device.....	xi
Fuse	xii
Accessories	xii
Recording Paper	xii
Precautions about Disposing of the Device, Accessories, or Components.....	xiii
Precautions about Transportation	xiii
To Prepare for Emergency Use.....	xiii
Electromagnetic Compatibility	xiii
Precautions for Safe Operation under Electromagnetic Influence	xiii
EMC Guidance.....	xiv
Telemetry Precautions.....	xvi
Declaration of Conformity	xvii

Chapter 1 General Description

General Description	1-1
Composition of the System	1-1
Features	1-1
Various Display Configuration	1-2
Operation Flow	1-3

Chapter 2 Name of Parts and Their Functions

Chapter 3 Description of the Display

Home Display and Individual Bed Display	3-1
About the Home Display	3-1
Description of the Home Display	3-1
Individual Bed Display	3-4
Description of the Individual Bed Display	3-5
Alarm Occurrence	3-6
Menu Screen	3-7
To Display the Menu	3-7
Menu Configurations (Central Monitor Display)	3-7
Menu Configurations (Individual Bed Display)	3-8
Description of the Setup Window	3-9
Display on the Extended Display Unit and External Monitor	3-10

Chapter 4 Basic Operation

Operation Procedure	4-1
Touch Key	4-1
Mouse/Keyboard	4-1
Remote Control	4-2
Operation on the Home Display/Individual Bed Display	4-2
Adjusting the Size/Scale/Baseline Position	4-2
To Change the Quantity of Displayed Numeric Data	4-3
To Enlarge/Reduce the Numeric Data Box Size	4-3
Optimizing the Displayed Beds on the Home Display	4-4
Short Cut Keys Display	4-4
Operation on the Window	4-5
Moving the Floating Window	4-5
Switching the Page/Screen	4-5
Subwindow Display	4-6
Another Window Display	4-6

To Enter Characters.....	4-6
For Easier Use.....	4-7
User Key.....	4-7

Chapter 5 Preparation

Turning ON/OFF the Power.....	5-1
Installing the Recording Paper	5-2
Daily Check	5-4
Nurse Call Daily Check.....	5-5

Chapter 6 Admit/Discharge

What You Can Do on the Admit/Discharge Menu	6-1
Admit	6-1
Entering the Patient Information.....	6-2
To Enter the Patient Information from the Magnetic Card or Barcode	6-4
Entering Patient Information from the Patient Data Server	6-4
To Change the Admit Date.....	6-7
EMR Link Function	6-7
Restrictions of EMR Link Function	6-8
Admit/Discharge on the EMR	6-9
Data Transfer Function.....	6-9
When the Patient Temporarily Leaves the Bed.....	6-11
When the Patient is Transferring to Other Bed	6-11
When the Patient is Transferring to Other Bed (When EMR Link Function is Used)	6-12
Uploading the Data Manually	6-13
Suspend Monitoring	6-13
To Suspend Monitoring	6-14
To Resume Monitoring.....	6-16
To Resume Monitoring Automatically.....	6-16
Bed Transfer and Bed Exchange	6-17
Discharge	6-18
Discharging Procedure.....	6-19

Chapter 7 Alarm Function

General Description.....	7-1
Classification and Level of the Alarm	7-2
Alarm System	7-3
Alarm Message Display Area	7-3
Alarm Limit Setup	7-4

Alarm Limit Setup for Each Parameter	7-4
Arrhythmia Alarm Setup.....	7-6
List of Alarm Settings.....	7-9
All Beds Alarm Settings	7-10
Alarm Occurrence.....	7-12
Alarm Suspend	7-14
Alarm Silence and Alarm Sound Suspend.....	7-14
Alarm Silence.....	7-14
Alarm Sound Suspend.....	7-16
Too-Far Alarm.....	7-17
When the "SpO2 Check Sensor" Alarm Occurs	7-17
When the "SpO2 Disconnected" Alarm Occurs	7-17
ECG Alarm at Lead-Off Condition	7-18
All Beds Alarm Events	7-19
Event List.....	7-21
Alarm History	7-22
Displayed Items	7-22
Alarm History Setup and Printing.....	7-24
All Beds Nurse Call Setup	7-25

Chapter 8 Parameter Setup

To Display Each Parameter Setup Screen	8-1
ECG	8-3
Arrhythmia Relearn.....	8-3
ST Setup.....	8-3
Size / Lead.....	8-6
Detail Setup	8-8
RESP	8-12
Waveform Size	8-12
Common Setup / Impedance Setup.....	8-13
NIBP	8-14
NIBP Periodic Measurement	8-14
Detail Setup	8-15
BP.....	8-16
Scale.....	8-17
Label.....	8-17
Detail Setup	8-18
SpO2	8-19
Waveform Size	8-20
Label.....	8-20
Detail Setup	8-20
TEMP.....	8-21
CO2	8-21
Measurement Unit and Scale	8-22
GAS, SPIRO	8-22
Scale.....	8-23

Detail Setup.....	8-24
Ventilator Data.....	8-25
Scale	8-25
SI, RPP.....	8-26
Scoring Function	8-26
Description of the Scoring Display	8-27
Score Setup.....	8-29
SvO2/CCO Monitor Data	8-30
BIS Monitor Data	8-30
INVOS Monitor Data.....	8-31
Parameter ON/OFF	8-31

Chapter 9 Data Review

Common Operation	9-1
Graphic Trend	9-2
Displayed Items.....	9-2
Graphic Trend Setup and Printing.....	9-4
Description for Each Parameter	9-5
Tabular Trend.....	9-7
Displayed Items.....	9-7
Tabular Trend Setup and Printing	9-8
Parameter Selection for Tabular Trend	9-9
Recall	9-10
Displayed Items.....	9-11
Recall Condition Setup.....	9-12
Recall Setup and Printing.....	9-13
Divider Function	9-14
Caliper Function	9-16
Oxygen Desaturation Index (ODI)	9-17
Review Data Display for Discharged Patient.....	9-22
Review Data Display for Transferring Patient.....	9-23
Searching/Displaying the Discharged Data	9-24

Chapter 10 Waveform Review

ST Measurement.....	10-1
ST Measurement Display	10-1
Reference Waveform Setup.....	10-2
ST Alarm Setup	10-3
QT Measurement.....	10-3
QT Reference Waveform Setup	10-3
QT Alarm Setup.....	10-4
Full Disclosure Waveform.....	10-5

To Select the Waveform to Store.....	10-5
Displayed Items	10-7
Full Disclosure Waveform Setup	10-8
To Print the Full Disclosure Waveform	10-10
To Search by Time	10-12
12-Lead Analysis	10-12
Displayed Items	10-13
Operation on the 12-Lead Analysis Screen.....	10-14
Comparison of Analyzed Results.....	10-15

Chapter 11 Calculation

Hemodynamics	11-1
Calculation Data	11-1
To Display/Print the Hemodynamics Data.....	11-2
New Input of Hemodynamics Calculation.....	11-2
To Edit the Hemodynamics Input Data	11-4

Chapter 12 Printing

Types of Printing and Output Printer	12-1
Printing Condition/Output Destination Setup	12-2
Manual Printing Setup	12-2
Alarm Printing Setup.....	12-3
Periodic Printing Setup	12-5
12-Lead Printing Setup.....	12-6
Output Printer Setup for Review Data Printing	12-8
To Start/Stop the Printing	12-9
Manual Printing.....	12-9
Alarm Printing, Periodic Printing.....	12-11
Remote Printing.....	12-11
Review Data Printing	12-13
Measurement Status.....	12-13
Operation Procedure for HR-800.....	12-14
Paper Feed, Stop Printing	12-14
Status Message.....	12-14
Laser Printer Operation	12-15

Chapter 13 Menu Items

General Description of the Setup Menu.....	13-1
Display Configuration for Individual Bed.....	13-2
Layout.....	13-3

Numeric Data/Waveform	13-3
User Key Display on the Numeric Data Box.....	13-6
Detail Setup.....	13-6
To Set the Same Setting for All Beds.....	13-9
Bed Transfer/Bed Exchange	13-9
Network View.....	13-12
Night Mode	13-15
Discharged List.....	13-16
Color	13-17
Nurse Call Setup	13-18
Data Server Output Waveform Setup.....	13-21
Display Configuration of the Home Display	13-22
Setting/Registering the Layout	13-23
Selecting the Displaying Bed.....	13-25
Numeric Data Box Size	13-26
Numeric Data/Waveform	13-27
Detail Setup.....	13-29
Exiting the Display Configuration Setup	13-32
Tone/Volume	13-33
Brightness	13-34
Monitor Suspend Setup	13-35
Nurse Team Setup	13-36

Chapter 14 Troubleshooting

Message List	14-1
Messages Displayed inside the Numeric Data Box.....	14-7
Troubleshooting.....	14-11
Wired Network (DS-LANIII), TCP/IP Network	14-11
Telemetry	14-11
Bed Register.....	14-12
Alarm	14-12
Display.....	14-13
General.....	14-14
Recorder.....	14-15
Laser Printer.....	14-16
SD Card.....	14-17
USB Memory	14-17
Remote Control	14-18
Magnetic Card Reader/Barcode Reader	14-18
PHS Nurse Call System	14-18
EMR Link Function	14-19
Data Transfer	14-19
Mouse/Keyboard	14-20
Slave Monitor	14-20
Bed Transfer/Exchange.....	14-20
Extended Display Unit.....	14-21

Chapter 15 Setup Item/Default Value

Patient Admit/Discharge	15-1
Alarm Setup	15-1
Parameter Setup	15-2
Review Function	15-5
Basic Setup for Individual Bed Display	15-11
Menu (Central Monitor Display)	15-13
Functions	15-13
Each Bed Setup	15-14
Common Setup	15-18

Chapter 16 System Components

Medical Device	16-1
Accessories	16-1
The Other Products	16-2

Chapter 17 Specification

Specification/Performance	17-1
Specification	17-1
Performance	17-2
Measurement Unit for Each Parameter	17-6
External Connection	17-8
RS-232C Connector Output Signal (Serial Connector)	17-8
Technical Information	17-8
Settings for Each Alarm System	17-8
Alarm Limit Range for Each Parameter	17-9
Arrhythmia Type	17-12
Numeric Data Box Size Range	17-14

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 Device

- (1) Before using this device, read this operation manual.
- (2) Fukuda Denshi cannot predict all the dangers which may be caused by misuse of this product or environmental condition.
- (3) For using this device, 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 device, follow the respective regulation to minimize the probability of accidents.

Intended Use of this Device

This device is designed for the following intended use.

Intended Use

This device is a central monitor to monitor the conditions of the patients. It deals with the following vital sign parameters, which are measured and transmitted by the specified bedside monitors and /or the telemeters for use in combination.

The vital signs are electrocardiogram, heart rate, respiration rate, body temperature, arterial oxygen saturation (SpO₂), pulse rate, invasive blood pressure, non-invasive blood pressure, CO₂ concentration, O₂ concentration and anesthetic gas concentration (including N₂O, halothane, isoflurane, enflurane, sevoflurane and desflurane).

REFERENCE

- ♦ For the specifications and limit range details of this device, refer to "Chapter 17 Specification" of this Operation Manual.
-

WARNING

- ♦ This device is intended to be used by healthcare professionals. Users should have a thorough knowledge of the function and operation before using this device. The maintenance of this device should be performed by skilled personnel who received a training
-

of possible hazards and measures to avoid those hazards. Any local regulations that are applicable to operation and care of this device must also be followed. The following hazards may occur if this device is used for any purpose other than what is intended, or if the user does not follow proper safety protocols.

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

*A Problem Related to Medical Practice

*Damage to the Device

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 devices that can be connected.
- (3) The illustration in this manual may differ with the actual device.
- (4) If you lose or damage this manual, contact your nearest sales representative. Using the device without this manual may cause accidents.
- (5) When handing over this device, 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 device 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-1800 System is available from your local Fukuda Denshi sales representative.

Contact

If you need more detailed information or information about security risk, please contact following.

- (1) Fukuda Denshi Co., Ltd., Head Office

3-39-4 Hongo, Bunkyo-ku, Tokyo 113-8483 Japan

Tel: +81-3-5684-1455 Fax: +81-3-3814-1222

E-mail: info@fukuda.co.jp

Website: <https://fukuda.com/>

- (2) Fukuda Denshi USA, Inc.

17725-C NE 65th Street Redmond, WA 98052 USA

Toll Free: +1-800-365-6668

Local: +1-425-881-7737





Fax: +1-425-869-2018

- ♦ If a serious incident has occurred in relation to this device, please report it to the manufacturer and to the competent authority of the country where the user and/or the patient is established.
- ♦ In case you need the contact information for your national competent authority, please ask the manufacturer or the distributor from whom you purchased the device.

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 device.
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.: [Menu], [Home] etc.)

Other indications on the monitor screen are indicated by " ".
(Ex: "Patient Name", "Filter Mode", etc.)

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

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

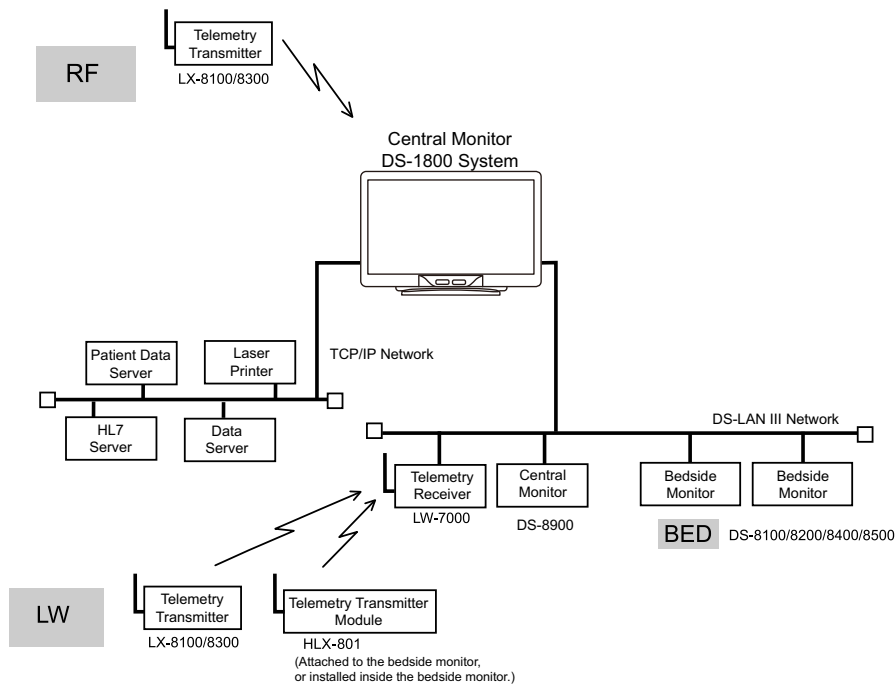
Restriction of the Function

Various network system such as wired and wireless network can be constructed with this device.

Some display and setups on this system are restricted depending on the system construction.

To explain these restrictions in a easy way to understand, the following expressions are used in this operation manual.

General Term	Expression	Description
Wireless Network Bed	RF Bed	The data is received by the built-in telemetry module in this device. Waveforms and numeric data can be displayed. Monitoring control from this device is not possible,
	LX+RF Bed	RF bed received from the LX series transmitter
	HLX+RF Bed	RF bed received from the HLX series transmitter
Wired Network Bed	DS-LAN Bed	Bedside monitor connected to the wired network (DS-LAN III). The monitoring data is received through the wired network (DS-LAN III). Monitoring control is not possible on this device.
	LW Bed	Network Telemetry Bed The monitoring data is received by the telemetry receiver which is then received by this device through the wired network (DS-LANIII). Monitoring control from this device is not possible.
	LX+LW Bed	LW bed receiving data from the LX series transmitter
	HLX+LW Bed	LW bed receiving data from the HLX series transmitter



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, EMC
1. General Description	Composition, features, operation flow
2. Name of Parts and Their Functions	Name and function of each part
3. Description of the Display	Information shown in the home display and individual bed display
4. Basic Operation	Basic operation procedure of home display and menu window, descriptions of menu functions
5. Preparation	Installing the paper, turning ON/OFF the power, time/date setting, maintenance check items
6. Admit/Discharge	Entering patient information (name, age, etc.) at admittance, discharging the patient, suspend monitoring, etc.
7. Alarm Function	General description of alarm function, alarm-related setups
8. Parameter Setup	Measurement condition setup of the monitoring parameters, size/scale setup, etc.
9. Data Review	Graphic trend, tabular trend, recall
10. Waveform Review	Full disclosure waveform
11. Calculation	Procedure of hemodynamics calculation
12. Printing	Printing functions on the printers
13. Menu Items	Settings of the display configuration, tone/volume, color, etc.
14. Troubleshooting	Maintenance and troubleshooting
15. Setup Item/Default Value	Setup item and default value
16. System Components	List of system components
17. Specification	Specification and performance of the device

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, EMC
1. Installation of the Unit	Starting up the system, keyboard/mouse setup, extended display unit connection
2. System Construction	Network restrictions, network connection and setup
3. Using the Storage Media	Procedure to use the storage media
4. Connection to the External Devices	Procedure to use the EMR, nurse call system, magnetic card reader, barcode reader
5. Initial Settings	Settings necessary before monitoring
6. Setup Item/Default Value	Default and backup of setup items
7. Replacing/Disposing the Parts	Precautions about the periodic replacement parts
8. Cleaning/Disinfecting/Storing	Procedure to handle, clean, store this device
9. Maintenance Check	Daily and periodic checks, maintenance, LAN information, software version, etc.

System Construction and Installation

⚠ WARNING

- The installation of this device should be performed by our service representative. The users should not attempt it.
 - The system construction and network setup of this device should be performed by our service representative or system administrator of your institution.
 - (☞ Maintenance Manual "Installation of the Unit" P1-1)
 - (☞ Maintenance Manual "System Construction" P2-1)
 - Verify that the initial settings are properly set before monitoring.
 - (☞ Maintenance Manual "Initial Settings" P5-1)
-




Safety

About the Safety Precautions

The Meaning of Each Safety Precaution













Read this manual thoroughly before use to ensure correct and safe use of the product.

Be sure to follow the precautions indicated below, as these are important messages related to safety.

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

Graphic Symbols

The following symbols are used for this device.

Graphic Symbols	Description
	Protective Earth Indicates the protective earth inside the device.
	Alternating Current (Power Supply LED)
	In Operation Indicates that the device is in normal operation status.
	Standby Mode Indicates that the device is in standby mode.
	Follow operating instructions (Warning). Indicated in blue. Failure to follow operating instructions could place the patient or operator at risk.
	Follow operating instructions (Information). Indicates the need to refer to the related accompanying documents before operation.
	TCP/IP Network Connector Connects to TCP/IP network.
	Video Output Connector Connects to external monitor.
	Battery Part Indicates the part to install the battery pack. LED Part Indicates the battery status LED.
	Antenna Terminal Indicates the terminal to connect the antenna.
	Signal Input/Output Indicates the connector which inputs/outputs the signals.
	USB Connector Indicates the USB connector.

Precautions for Safe Operation

Read this section thoroughly before use to ensure correct and safe use of the product.

Precautions for Safe Operation of Medical Device

CAUTION

- ♦ User should have a thorough knowledge of the operation before using the device.

Precautions about the Location of Installation and Storage of the Device

- ♦ 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 one (1) m from the user.
- ♦ Install or store in a place where the device will not be exposed to splashing water.
- ♦ Install or store in an area where environmental conditions such as atmospheric pressure, temperature, humidity, ventilation, sunlight, dust, sodium, and sulfur will not adversely affect the system.
- ♦ Place the device on a stable surface where there is no inclination, vibration, or shock (including during transportation).
- ♦ Do not install or store in an area where chemicals are stored or gases are evolved.
- ♦ Verify the power frequency, voltage and allowable current (or power consumption).
- ♦ Ensure the grounding is proper by connecting the accompanying power cable to the hospital grade outlet.

Precautions Before Using the Device

- ♦ Verify the power voltage. When operating the system with the battery pack, make sure that the battery pack is fully charged.
- ♦ Check the cable connection and polarity to ensure proper operation of the device.
- ♦ Make sure the power system has adequate earth ground.
- ♦ Ensure that all cables are firmly and safely connected.
- ♦ Pay special attention when the device is used in conjunction with other devices as it may cause erroneous judgment and dangerous situation.

Precautions during Operation of the Device

- ♦ Always observe the device and patient to ensure safe operation.
- ♦ If any abnormality is found on the device or with the patient, take appropriate measures under the safe conditions, such as ceasing operation of the device.
- ♦ Do not allow the patient to come in contact with the device.
- ♦ Do not assess the patient's condition only by the information from this device. A clinical judgment based on the information from this device should be made by a physician who fully understands functions of the device, in a comprehensive manner combined with clinical findings and other test results.

Precautions After Using the Device

- ♦ 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 device clean to ensure proper operation for the next use.

❑ Precaution when Device Failure Occurs

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

❑ Precaution about Disassembling/Remodeling the Device

- ◆ Do not disassemble or remodel the device.


❑ Precautions about Maintenance Check

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

Maintenance

 WARNING


- ◆ Never open the housing while the device 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 device, 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 device was subjected to extreme mechanical stress, e.g. after a heavy fall.
 - ◆ When the device was subjected to liquid spill.
 - ◆ When the monitoring function is interrupted or disturbed.
 - ◆ When parts of the device 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 device.
- ◆ When laying receiver antenna for each transmitter, the Institution has to examine the installation so that electronic interference does not occur.
- ◆ Based on the above examination result, the Institution should place each receiver antenna as required.

⚠ CAUTION Precautions about the Management

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

Precautions when Using with Other Device

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 device in the presence of flammable anesthetics, high concentration of oxygen, or inside hyperbaric chamber. Also, do not operate the device 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.

MRI (Magnetic Resonance Imaging)

 WARNING


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

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

Precautions for Using the Device

This System

 WARNING

- ◆ Do not connect any device or cable not authorized by Fukuda Denshi to any I/O connector. Also, do not connect any damaged device or cable. If done so by mistake, not only that the device cannot deliver its maximum performance, the device may be damaged and safety cannot be ensured.
 - ◆ For the connector with  mark, only the peripheral devices specified by Fukuda Denshi should be connected with the given procedure on the operation manual. Use of an unspecified device may cause electric shock to the patient and/or operator due to excessive leakage current.
 - ◆ If the device is used under an environment not fulfilling the specified condition, not only that the device cannot
-

deliver its maximum performance, the device may be damaged and safety cannot be ensured.

- ♦ When using multiple medical devices simultaneously, pay attention not to touch multiple devices at the same time. Even a small potential difference between the devices may result in electric shock to the patient and the operator.
Even a small potential difference may result in electric shock to the patient and the operator.
- ♦ 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 of 115 V AC. When connecting, do not use a multiple portable socket-outlet.
- ♦ The PHS nurse call system should be used as supplementary function of alarm notification. Make sure to monitor the alarm on this device as it may not be notified to the PHS depending on the nurse call system condition.
- ♦ When using the PHS nurse call system, make sure to set the "Bed Name" as it will be used for alarm notification to the PHS. If the "Bed Name" is not set, the patient cannot be specified on the nurse call system.
- ♦ The pacemaker usage setting influences the precision of the QRS detection and arrhythmia analysis. When a pacemaker is used, make sure to select [Used] for "Pacemaker" under "Admit/Discharge" menu.
- ♦ The patient classification selection influences the precision of the QRS detection and NIBP measurement range. Make sure that correct selection is made.
- ♦ The SpO₂ respiration measurement is not intended for use as an APNEA monitor.
- ♦ When [Suspend] is selected for "Setup at Discharge" (Initial Settings > User I/F), the suspend condition on this device will continue until the [Resume] key is pressed, even if the monitoring is performed on the bedside monitor.
- ♦ If a low battery condition occurs for the battery operating bedside monitor or telemetry transmitter, the waveforms and numeric data for the corresponding bed will not be displayed.
For the telemetry transmitter and wireless bedside monitor, "Check Battery" mark and a square waveform will be displayed to warn the low battery condition. But for the wired network bedside monitor, <Chk DS-LAN Comm> message will be displayed without prior warning. Therefore, the wired network bedside monitor should be operated by AC power source and not by battery. For the telemetry transmitter and wireless bedside monitor, make sure that "Check Battery" mark is not displayed.
- ♦ Objective and constant arrhythmia detection is possible through the fixed algorithm. However, excessive waveform morphology change, motion artifact, or the inability to determine the waveform pattern may cause an error, or fail to make adequate detection. Therefore, physicians should make final decisions using manual printing, alarm printing and recall waveform for evaluation.
- ♦ If the QRS pace mask function is set to [OFF], the pace pulse may be erroneously detected as a QRS complex, and even when the patient's HR is decreasing, HR or asystole alarms may not generate. Turn this function [OFF] only if you are sure that pacing failure will not occur, or when the patient can be constantly monitored.
- ♦ The operation cannot be guaranteed if connected to improper network. To change the network settings, refer to your nearest service representative. When connecting to an existing network, follow the instruction of the network administrator.
- ♦ Make sure not to duplicate the IP address for DS-1800 System, laser printer, and the server.
- ♦ As this system does not support DHCP (Dynamic Host Configuration Protocol) IP address, set the IP address excluded at DHCP if DHCP server is present.
- ♦ When a network setting is changed and [Regist] key is pressed, a warning message will be displayed. All the operation controls will not be possible until the system is restarted.

WARNING Warnings about the Alarm

- ♦ The ventilator alarm on this monitor should be used as supplementary function. Check the patient's condition, ventilator alarm sound and message occasionally.
- ♦ Depending on the bedside monitor type and software version, the ventilator alarm factor may not be transmitted

to the central monitor.

For details of the bedside monitor type and software version, refer to your nearest service representative.

- ♦ If the upper/lower alarm limit of the individual parameter is set to OFF, alarm will not generate even if the individual parameter alarm is set to ON. Pay attention when setting them OFF.
- ♦ During monitor suspend condition or alarm suspend condition, all the alarms will not generate even if the parameter alarm is set to ON. Also, the alarms will not be stored as recall events. Check the patient's condition frequently.
- ♦ If [Displayed Data] is selected for "Numeric Data External Output" on the bedside monitor, the alarm for the parameter which is not displayed on the bedside monitor will not generate on the central monitor. Make sure to display the parameter on the bedside monitor if alarm monitoring on the central monitor is required for that parameter.
- ♦ When a parameter monitored on a bedside monitor or telemetry transmitter is in a connector-off condition, the numeric data and waveform for that parameter will not be displayed on the central monitor. Also, alarms other than <SpO₂ Disconnected> will not be displayed. Make sure that all the connectors are firmly plugged in.
- ♦ If the parameter is not selected for the "HR/PR Alarm Source" (ECG/SpO₂/BP) on wired bedside monitor, the alarm for that parameter will be set to OFF on this device.
- ♦ When <Chk TLM Receive> or <Chk DS-LAN Comm> is displayed, alarm will not function.
- ♦ If "Alarm Judgment" under [Initial Settings > Alarm > During Lead OFF] is set to [OFF], HR alarm and arrhythmia alarm will not generate at lead-off condition. If this condition is left unresolved, a sudden change of the patient may not be noticed. Take prompt action when the lead-off condition is detected.
- ♦ Some delay may occur until the alarm generated on the bedside monitor is displayed on the central monitor.
- ♦ The alarm generation will differ depending on the communication specification (wired, wireless, etc.) between the bedside monitors, telemetry transmitters and the central monitors. Read the operation manual thoroughly before setting the alarm.
- ♦ Do not assess the patient's condition only by the alarm generated on this device. If the alarm is set to OFF or if low priority is set for the alarm, the alarm condition of the patient may not be noticed.
- ♦ If an alarm generates, check the patient's condition first and ensure the safety. Depending on the alarm, take appropriate measures to remove the problem. If the problem lies with the alarm setting, set the alarm properly.
- ♦ During monitoring, set the alarm volume according to the surrounding environment so that the alarm sound can be always recognized.

 **CAUTION**

- ♦ Use only the products specified for this device. If unspecified products are used, proper function cannot be executed.
- ♦ For quality improvement, specifications are subject to change without prior notice.
- ♦ The maintenance and internal switch setting will be performed by our service representative. Users should not perform this procedure as malfunction of the device may occur.
- ♦ Do not attach film or adhesive tape to the touch panel. This may result in malfunction or failure.
- ♦ As the touch panel is made of glass, a strong impact may cause damage. Pay attention not to hit or drop the touch panel.
- ♦ Always operate the touch panel with fingers. Do not touch with a pen-point or other hard-edged instruments. It may cause malfunction or damage the touch panel. Do not apply pressure for a prolonged time to any part of the panel.
- ♦ Do not press the touch panel with strength or twist your finger on the panel. This may result in malfunction or failure.
- ♦ The LCD of this device 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.
- ♦ Although the LCD utilizes highly accurate picture elements, occasionally, there may be few pixels which does

not light or constantly lights. This is not an device failure and will not affect monitoring operation.

- ◆ If a still image is displayed for a long time, a minor afterimage may occur. This is a normal operation of the LCD of this device. If the afterimage affects the visibility, contact your nearest service representative.
- ◆ The installation of this device should be performed by our service representative or a person who is well acquainted with this device.
- ◆ If not using the device for a long period, disconnect the power cable and battery.
- ◆ The battery can be charged only in the specified operational temperatures of the device. For details, refer to the operation manual of the battery (BTO-005).

CAUTION Precautions about the System

- ◆ The time will be synchronized with the following priority.
 - 1 Administrating monitor, if wired network is constructed.
 - 2 SNTP server, if used.
 - 3 Patient data server, if used, and if [Time Synchronization] is selected on Patient Data Server setup or "Time Synchronization" is set to [ON] for [Link with EMR] or [Search ID].
- ◆ Verify that the correct date and time is set before monitoring. If not correct, set the correct date and time under [Initial Settings>System>Other]. If the date/time is changed during monitoring, inconsistency of time may appear on the trend data or other patient data.
- ◆ Many of the initial settings items can be set only on the network-administrating monitor (Central ID: 001). Such initial settings items will not be displayed on other monitors.
- ◆ Canceling the bed registration will clear all data for that bed.
- ◆ The drift filter setting should be the same for all central monitors. Proper operation will not be performed if the setting is different among the central monitors.
- ◆ Unless the correct power frequency is set for "AC Filter" under [Initial Settings > System], the AC filter will not properly function.
- ◆ Do not use any slave monitors which does not satisfy the required display resolution. Do not use any monitors which has the function to display higher resolution than the actual resolution.

CAUTION Precautions about the Storage Media (SD Card, USB Memory), Data Transfer

- ◆ Use only the storage media specified by Fukuda Denshi.
- ◆ Use only the storage media formatted on this device.
- ◆ To avoid losing the data saved in the storage media, set to standby mode before turning OFF the power.
- ◆ The data transfer using the storage media is possible only between the DS-1800 System central monitors. The data cannot be transferred to other central monitors or to bedside monitors.
- ◆ If the software version of the DS-1800 System central monitors are different, the data transfer may not be possible, or part of the data may not be transferred. (The data transfer from the newer version monitor to the older version monitor is not possible.)

CAUTION Precautions about the Patient Admit/Discharge

- ◆ Make sure to discharge the previous patient before admitting a new patient. Otherwise, monitoring data of new patient will be added to that of the previous patient which will result in inaccurate monitoring. When a patient is discharged, make sure to perform the discharge procedure.
- ◆ Depending on the model type and software version of the bedside monitor, the monitor suspend operation will synchronize between the bedside monitor and the central monitor. If the bedside monitor is not compatible to synchronizing the monitor suspend operation, the data of the monitoring suspended patient on the central monitor will not be displayed. If the monitoring is resumed, the data on the central monitor will be displayed again.
- ◆ To display the pacemaker pulse, select [Used] under "Admit/Discharge" menu, and select [ON] or [Distinct

Color] under "ECG Setup" menu. It is also necessary to select [Used] for pacemaker on the bedside monitor in order to display pacemaker pulse on the DS-1800 System central monitor.

- ♦ When a patient ID is searched from the patient data server, admit operation should be performed with the patient information acquired from the patient data server. Also, Bed ID of the bedside monitor should not be changed during monitoring.
- ♦ When the monitoring is suspended, the trend data and full disclosure waveform data will not be acquired.
- ♦ Resuming monitoring will also resume the suspended alarm.
- ♦ When a bed transfer procedure is performed, all setup data for the new bed will be updated. The data for the wired network bed and the same data monitored on other central monitors will be initialized.
- ♦ Bed transfer/exchange of monitoring data is not possible among different central monitors.
- ♦ When the discharge process is performed on the bedside monitor or other central monitors, the monitoring on this device will not be suspended even if [Suspend] is selected for "Setup at Discharge" under [Initial Settings > User I/F > Display/Print].
- ♦ When EMR link function is used, the patient admitted on EMR will be also admitted on the central monitor. But it is also necessary to perform admit process for this patient on the central monitor as some items may not be transmitted.
Make sure that the pacemaker usage and patient classification are properly set as these will affect the monitoring accuracy.
- ♦ The discharge process on EMR will initialize only the patient information and monitoring data on the central monitor. It will not initialize the alarm settings. To initialize these data, it is necessary to perform discharge process on the central monitor.

CAUTION Precautions about the Parameter Monitoring

- ♦ The parameters that can be monitored on this device differs depending on the bedside monitor type and software version.

CAUTION Precautions about the Alarm Setup

- ♦ The adjustable alarm limit increments are different for the DS-7000 series, DS-8000 series, and DS-1000 series monitors. Therefore, the set alarm limit may change to the adjustable value depending on the monitor type constructing the network system.
- ♦ The alarm messages will be displayed in descending order of priority.
- ♦ For the same alarm level, the alarm message for the newer alarm will be displayed. However, arrhythmia alarm will be displayed according to their priority.
- ♦ The alarm message for the arrhythmia alarm (except Tachy, Brady, Ext Tachy, Ext Brady) will continue to be displayed for 30 seconds even after the alarm condition dissolves.
- ♦ Even during arrhythmia learning, alarms for HR, Asystole, VF, Tachy, Brady, Ext Tachy, Ext Brady, Pause will generate.
- ♦ Even when the <Cannot analyze> alarm is generated, alarms for HR, Asystole, VF, Tachy, Brady, Ext Tachy, Ext Brady will generate.
- ♦ If "Suspend Arrhy. Analysis during Noise Interference" is set to [ON] under [Initial Settings > Alarm Setup], the <Cannot analyze> alarm will generate when analysis is suspended for 30 seconds and longer.
- ♦ Depending on the bedside monitor type and software version, BP7, BP8, TEMP3-8, SpMet, SpCO, SpHb alarm will not be generated on the central monitor.
- ♦ If the same or similar devices with different alarm settings are used in the same facility or same department, pay attention not to misjudge the alarms.

CAUTION Precautions about the PHS Nurse Call System

- ♦ When connecting multiple central monitors to one nurse call system, LAN adapter is required. When using the LAN adapter, contact your nearest service representative.
- ♦ Perform nurse call daily check and make sure that alarm is properly notified to the nurse call system.

⚠ CAUTION Precautions about the TCP/IP Network

- ♦ Make sure to power cycle the printer after setting the IP address, etc. for the laser printer.

⚠ CAUTION Precautions about the Maintenance

- ♦ When cleaning the touch panel, never use strong-acidic cleaning solution.
- ♦ To clean the touch panel, use an optional cleaning cloth, eyeglass cleaning cloth, soft cotton cloth, or non-woven cloth (pulp, rayon, polyethylene, etc.).
- ♦ Clean the device frequently so stains can be removed easily.
- ♦ To prevent injury, it is recommended to wear gloves when cleaning the device.
- ♦ Pay attention not to allow chemical solution to enter the device or connectors.
- ♦ Do not use organic solvents, thinner, toluene or benzene to avoid damaging the resin case.
- ♦ Do not polish the device with abrasive or chemical cleaner.
- ♦ When disinfecting the entire room using a spray solution, pay close attention not to get any solution into the device or connectors.
- ♦ Use only neutral detergent to clean the device. The surface resin coating may damage, resulting in discoloration, scratches, and malfunction.
Example:
chemical cloth, scrub brush, abrasive, polishing powder, hot water, volatile solvent and chemicals (cleanser, thinner, benzine, benzol, and synthetic detergent for house and furniture), or sharp-edged tools
- ♦ Do not open the housing.
- ♦ Do not allow alcohol or other liquids to enter the device.
- ♦ Replace the periodic replacement parts periodically as specified.

Wired Network System

⚠ WARNING

- ♦ Do not connect unspecified device to the wired network.
- ♦ This device cannot connect to the DS-LANII network.
- ♦ For the DS-LANIII network, use the specified HUB. If unspecified HUB is used, a communication error may occur.

⚠ CAUTION

- ♦ The DS-5000 series bedside monitors, LW-5500N Telemetry Receiver, and AU-5500N 8ch Recorder are not compatible with the DS-LANIII network.
- ♦ The central monitor with the Central ID, "001" will function as a network-administrating monitor, and controls the whole LAN system. One of the central monitors must have the Central ID, "001" in a network system. Also, make sure not to duplicate the Central ID with other monitors.
- ♦ The alarm generated on the bedside monitor will be transmitted to the central monitor with maximum of 5 seconds delay for the NIBP alarm and maximum of 2 seconds delay for other alarms.
- ♦ If the measurement unit for BP (mmHg/kPa) and temperature (°C/°F) is different between the bedside monitor and the central monitor, the corresponding waveform and numeric data will not be displayed on the central monitor.
- ♦ If the numeric data is displayed as "xxx" (out of measurement range) on the bedside monitor, maximum or minimum value of measurable range will be transmitted to the central monitor.

Wireless Network System

 DANGER

- ◆ When monitoring a patient with wireless telemetry, make sure the patient data is properly received at the central monitor. Pay special attention when channel ID at the bedside monitor is changed.

 WARNING

- ◆ Make sure to set the correct channel ID.
- ◆ Some combinations of channels may generate interference with other telemetry transmitters. 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.
- ◆ If the channel ID of the transmitter is changed, make sure to replace the channel label attached to the transmitter with a new one.
- ◆ If the channel ID is changed without notifying, it will result in monitoring an incorrect patient. To avoid incorrect diagnosis, make sure that the channel ID corresponds to the patient.

RTC and Data Backup

 CAUTION

- ◆ This device is equipped with a built-in clock. When the power of this device is turned OFF, this clock is backed up by a lithium battery. If incorrect time is displayed when turning ON the power, a low battery may be the cause. In such case, contact your nearest service representative for replacing the battery.
- ◆ During voltage dip, short interruptions and voltage variations on power supply input lines or during short duration of power turned OFF, the data will not be protected. The data that may not be protected are NIBP list data and alarm history. Maximum of 15 minutes of data before power-off may be lost for the trend data, recall data, full disclosure waveform data, ST data, hemodynamics data. To prepare for the possibility of voltage dip, short interruptions and voltage variations, it is recommended to equip battery pack (optional) on this device.
- ◆ The set alarm limits on this device will be retained even after the power is turned OFF.

Cables

 CAUTION

- ◆ When disconnecting the cables, pull on the connector and not on the cable itself. For cable with a lock tab, push the tab when disconnecting. Pull the connector straight so the connector pins do not bend. When attaching the cables to each other, both connectors should be directly facing each other.


Precautions regarding Peripheral Devices and Accessories

Connection to Peripheral Device

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

When connecting peripheral devices to this device, it is the user's responsibility to verify that the overall system complies with "ES60601-1 Clause 16 "ME SYSTEMS"".

⚠ WARNING

- ◆ For the connector with  mark, only the peripheral devices specified by Fukuda Denshi should be connected with the given procedure on the operation manual. Use of an unspecified device may cause electric shock to the patient and/or operator due to excessive leakage current.

⚠ CAUTION

- ◆ Adjust, clean, disinfect the connected devices according to the instructions in their respective manuals.
- ◆ Do not sterilize the connected devices.
- ◆ Do not touch the connected devices and the patients at the same time.
- ◆ For environmental conditions for using and storing the connected device and ME system, refer to the respective manuals of the device.

Fuse

⚠ DANGER

- ◆ If the fuse blows, contact Fukuda Denshi service representative. Do not continue using it as internal damage to the device may be considered.

Accessories

⚠ WARNING

- ◆ Use only the cables specified by Fukuda Denshi.
Use of other cables may result in increase in emission or decrease in immunity.

Recording Paper

⚠ CAUTION Precautions about the Recording Paper

- ◆ Use only the specified recording paper. The surface treatment and thickness of the recording paper affects the printing quality.

⚠ CAUTION Storing the Recording Paper

The recording paper is thermal type. Storage over an extended period of time at a high temperature may change the quality of the printed content, and make it illegible. When storing, follow the precautions below.

- ◆ Store in a place where light is shut off and avoid direct sunlight.
- ◆ Do not leave the paper in a high temperature (50 °C/122 °F and above).
- ◆ Do not store the paper in a polyvinyl chloride bag.
- ◆ Do not superpose the papers until the diazo copy is completely dried.
- ◆ Do not expose the paper to alcohol, hydrochloric acid, or ester ketone.
- ◆ Avoid using adhesive agents other than water based glue.

Precautions about Disposing of the Device, Accessories, or Components

⚠ CAUTION

- ♦ When disposing of this device, 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 the DS-1800 System, pack it with specified packing materials. Also, transport it under appropriate environment condition. (☞ "Specification" P17-1)

To Prepare for Emergency Use

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 will take approximately 5 hours during operation, and approximately 2.5 hours during standby mode with AC cable 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

This equipment complies with IEC 60601-1-2: 2014, safety standard regarding the electromagnetic disturbances of medical electrical equipment. To ensure maximum performance against the electromagnetic disturbances, make sure to follow the precautions for installation and usage described in this manual.

- ♦ This equipment is intended for use in the medical facility (except in the vicinity of MRI device), and satisfies the immunity level for professional healthcare facility environment stipulated in IEC 60601-1-2: 2014.
- ♦ When using this equipment, interference with other medical electrical equipments or non-medical electrical equipments may occur. Make sure that no interference is present before usage.
- ♦ This equipment is a ME equipment which intentionally receives RF energy of specific reception frequency. RF electromagnetic radiation from other equipment for the intended specific reception frequency band may cause radio interference. Make sure that the reception is properly made in the used environment.
- ♦ To ensure basic safety and essential performance related to electromagnetic disturbances during the expected service life of this equipment, "Daily Check" and "Periodic Check" must be performed. (Refer to "Chapter 9 Maintenance Check" of the Maintenance Manual.)

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 equipment.

Cellular phones and radio sets should be turned off in the room (building) where medical device is located.

⚠ WARNING Lightning

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

- ♦ Use the uninterruptible power supply system.

⚠ 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.

⚠ WARNING

- ♦ If this equipment is installed close to, or stacked with other equipment, malfunction may occur. Make sure to verify that the equipment operates properly in a used location.
- ♦ Use of accessories, probes, or cables other than specified may cause increase in electromagnetic emission or decrease in electromagnetic immunity resulting in malfunction of the equipment.
- ♦ The portable RF communications equipment (including antenna cable and peripheral equipment such as external antenna) with the specified cable should be used in a location at least 30 cm apart from any part of this equipment. Otherwise, it may result in performance degradation of this equipment.

EMC Guidance

This equipment complies with IEC 60601-1-2: 2014. However, if portable transmitter or wireless LAN equipment is used extremely nearby, the electromagnetic influence may largely exceed the compliance level and may cause unexpected phenomenon such as noise interference on the waveform, etc.

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

This equipment should be used in a location specified by each medical institution.

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

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

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

Compliance to the Electromagnetic Emissions

The DS-1800 System is intended for use in the electromagnetic environment specified below. The customer or the user of the DS-1800 System should assure that it is used in such an environment.

Emission Test	Compliance
Mains Terminal Disturbance Voltage CISPR 11	Group 1 Class A
Electromagnetic Radiation Disturbance CISPR 11	Group 1 Class A

 **CAUTION**

- ♦ The emission performance of this equipment is suitable for use in industrial environment and hospital environment (CISPR 11 Group 1 Class A). Do not use in home environment (generally, CISPR 11 Group 1 Class B is required).

Compliance to the Electromagnetic Immunity

The DS-1800 System is intended for use in the electromagnetic environment specified below. The customer or the user of the DS-1800 System should assure that it is used in such an environment.

Basic EMC Standard or Test Method	Immunity Test Levels
Electrostatic Discharge (ESD) IEC 61000-4-2	±8 kV contact ±2 kV, ±4 kV, ±8 kV, ±15 kV air
Radiated RF EM Fields IEC 61000-4-3	3 V/m 80 MHz to 2.7 GHz 1 kHz 80%AM
Proximity fields from RF wireless communications equipment IEC 61000-4-3	Refer to the following table.
Electrical fast transient/burst IEC 61000-4-4	±2 kV AC Mains ±1 kV Signal and Interconnecting Cables Repetition rate: 100 kHz
Surge IEC 61000-4-5	±0.5 kV, ±1 kV Normal mode (Phase 0°, 90°, 180°, 270°) ±0.5 kV, ±1 kV, ±2 kV Common mode (Phase 0°, 90°, 180°, 270°)
Conducted disturbances induced by RF fields IEC 61000-4-6	3 V 0.15 MHz to 80 MHz 1 kHz 80%AM 6 V 0.15 MHz to 80 MHz (ISM bands) 1 kHz 80%AM
Rated power frequency magnetic fields IEC 61000-4-8	30 A/m 50 Hz and 60 Hz
Voltage dips, short interruptions and voltage variations on power IEC 61000-4-11	0% UT; 0.5 cycles (Phase 0°, 45°, 90°, 135°, 180°, 225°, 270°, 315°) 0% UT; 1 cycle, 70% UT; 25 cycles (60 Hz) (Phase 0°) 0% UT; 250 cycles (60 Hz) with battery

Immunity test specifications for RF wireless communications equipment

Test Frequency (MHz)	Modulation	Immunity Test Level (V/m)
710, 745, 780	PM, 217 Hz	9
810, 870, 930	PM, 18 Hz	28
1720, 1845, 1970	PM, 217 Hz	28
2450	PM, 217 Hz	28
5240, 5500, 5785	PM, 217 Hz	9

- ♦ The assumed service TETRA 400 of the test frequency of 385 MHz is a service in Europe, and this product, which is intended for use in the United States, has not been tested as it will not be radiated in close proximity.
- ♦ The assumed service GMRS 460, FRS 4600 of the test frequency of 450 MHz is a wireless device for general and leisure use, and this product, which is intended for use in a professional healthcare facility environment, has not been tested as it will not be radiated in close proximity.

Telemetry Precautions

For proper management of the telemetry installation, consult your Fukuda Denshi representative concerning the following.

- ♦ Plan the installation of your telemetry system, taking into account your entire medical facility needs and plant requirements.
- ♦ Be sure the antenna system installed meets the facility and plant requirements.

⚠ WARNING

- ♦ The Radio Frequency device is susceptible to interference from other outside sources. Interference may prevent the monitoring of patients connected to this device. If problems exist, contact your local service representative.
 - ♦ Note: This device operates in the 600MHz UHF band. The exact frequency of operation depends on the destination, and has been preset for your facility, and may be identified by cross-referencing the channel designator on the device with the Telemetry Channel-Frequency Table in the transmitter operating manual.

⚠ CAUTION

- ♦ The manufacturers, installers and users of WMTS equipment are cautioned that operation of this equipment could result in harmful interference to other nearby medical devices.
- ♦ Users are advised to periodically contact the FCC or specified frequency coordinator and determine if your transmitter frequencies may cause interference.
- ♦ To assure safe and reliable operation, observe the following precautions:
 - ♦ Be sure that no other devices are using the frequency assigned to this transmitter.
 - ♦ This device is susceptible to interference from electrosurgical knives and other computerized equipment. If problems occur, contact your local Fukuda Denshi service representative.
 - ♦ Any obstruction such as reinforced concrete or large metallic surfaces between the receiver and the transmitter can affect reception. If problems occur, contact your local Fukuda Denshi service representative.
 - ♦ When a low battery alarm occurs, replace the battery in the transmitter.

Declaration of Conformity

Device: Central Monitor

Model Name: DS-1800

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- 1) This device may not cause harmful interference.
- 2) This device must accept any interference received, including interference that may cause undesired operation.

The responsible party for this device is:

Fukuda Denshi USA, Inc.

17725-C NE 65th Street

Redmond, WA 98052

Phone: (425) 881-7737, US Agent

 **WARNING**

- ♦ Changes or modification not approved by the responsible party for compliance of this device could void the user's authority to operate the equipment.

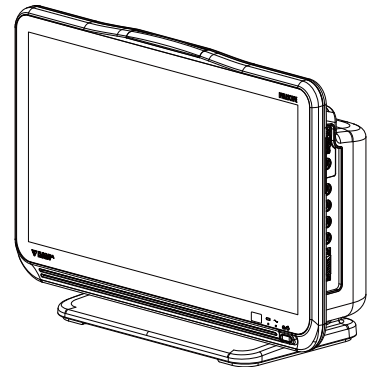
Chapter 1 General Description

General Description

Composition of the System

The DS-1800 System Central Monitor is a central monitor which supports various system construction of wired and wireless network in general ward, ICU, etc.

Vital signs are acquired from either the built-in wireless telemetry receiver or the LAN connected bedside monitor and are displayed with simultaneously generated visual and audible alarms. This device can monitor up to 32 beds at the same time with a freely modifiable screen layout containing patient information, dates, and review data viewable in many various formats.



The following model types are available.

Model	Number of Telemetry Receiving Beds	Printer	Extended Display
DS-1800LRE	0	Yes	Yes
DS-1812RE	12	Yes	Yes
DS-1800L	0	No	No
DS-1812	12	No	No
DS-1800LR	0	Yes	No
DS-1812R	12	Yes	No

Other device such as general-purpose display unit, mouse, keyboard can be also connected.

Features

- ♦ A 27 inch color LCD is used.
- ♦ By connecting wired bedside monitors and telemetry receivers by DS-LAN III network, maximum of 32 beds can be monitored.
- ♦ The patient data can be displayed in various configurations using the free layout function. The individual bed display and review display are just the same as those on the bedside monitor.
- ♦ The operation can be performed with the touch panel. By touching the displayed key, the display can be switched.
- ♦ Battery operation is possible in the event of power interruption. (Operation Time: 60 minutes)
- ♦ An alarm indicator is equipped, which notifies the alarm with different flash patterns according to the priority level.
- ♦ A mouse can be connected allowing touch key control using the mouse.
- ♦ This device can measure the heart rate and respiration rate from the received ECG and respiration waveforms.
- ♦ The alarm sound can be silenced using the remote control (optional).

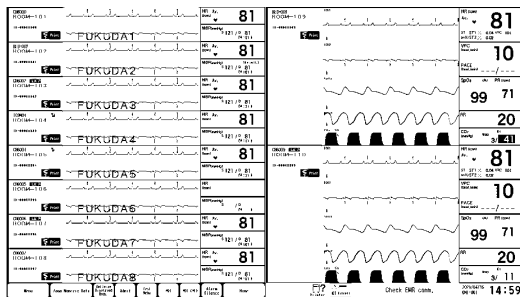
- ♦ By using the recorder, maximum of 3 channels of waveforms, graphic trend, etc. can be printed.
- ♦ By using the optional magnetic card reader, patient information (patient ID, patient name, birth date, etc.) can be read from the magnetic card.
- ♦ By using the optional barcode reader, patient information (patient ID, patient name, birth date, etc.) can be read from the barcode.
- ♦ By using the optional USB memory, patient data and setup data can be written/read.
- ♦ By using the optional SD card, maximum of 336 hours of full disclosure waveform can be saved.
- ♦ By using the optional SD card, SpO₂ drop detection can be performed based on the saved SpO₂ value.
- ♦ By using the nurse call system, the alarm information can be transmitted to the PHS.
- ♦ By using the TCP/IP network, laser printer (A4 size) can be used.

Also, by connecting to the network server, storing of patient data, time synchronization, admit/discharge process linked to the electronic medical record (EMR), and bed transfer/exchange between the other central monitors can be performed.

Various Display Configuration

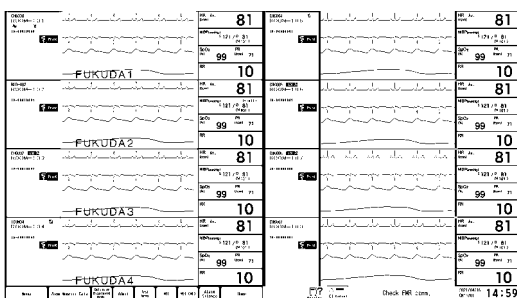
Free layout displays, individual bed displays which are similar to the bedside monitors, and various review displays are provided.

Customizable Home Display (Chapter 3)



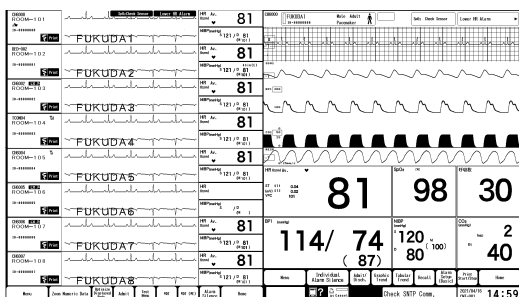
<<Free Layout Function>>

The beds, waveforms, and numeric data can be freely assigned to the left and right side of the screen. The example shown on the left is 10 beds configuration with 8 beds displayed on the left, and 2 beds displayed on the right. Depending on the degree of severity of the patient, the display can be freely customized.



Like the other central monitors of existing model, the display configuration of all beds in equal size is also possible.

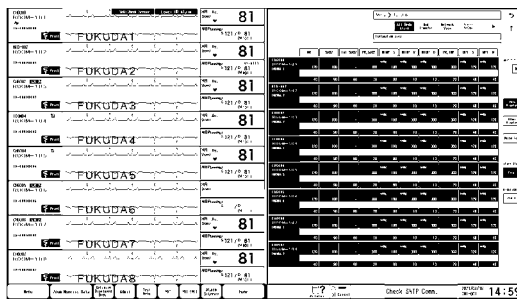
Individual Bed Display (Chapter 3)



<<Similar Display as the Bedside Monitor>>

The individual bed display is similar to the bedside monitor display. It can be operated as though operating the bedside monitor. Not just the display, but also various functions of the bedside monitor can be operated from the central monitor.

☐ List of Alarm Settings/Events for All Beds (Chapter 7)



<<All Beds Alarm Settings/All Beds Alarm Events>>

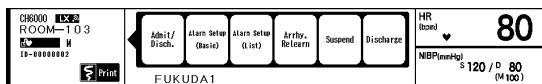
(☞ "All Beds Alarm Settings" P7-10)

(☞ "All Beds Alarm Events" P7-19)

By making use of the wide screen, alarm settings and alarm events for all beds can be listed for verification.

The risk of erroneously setting an alarm can be prevented by checking the alarm settings for all beds in a list format.

☐ Shortcut Keys (Chapter 4)



<<Shortcut Menu>>

By using the shortcut key, admit/discharge display, trend display, monitor suspend display, etc. can be directly accessed without opening the individual bed display.

Operation Flow

NOTE

- ◆ Before monitoring, system construction, power supply connection, initial settings are required.

This section explains the operation flow from patient admittance to discharge.

1 Admit the patient.

- 1 Enter the patient information.
- 2 Enter the admit date.

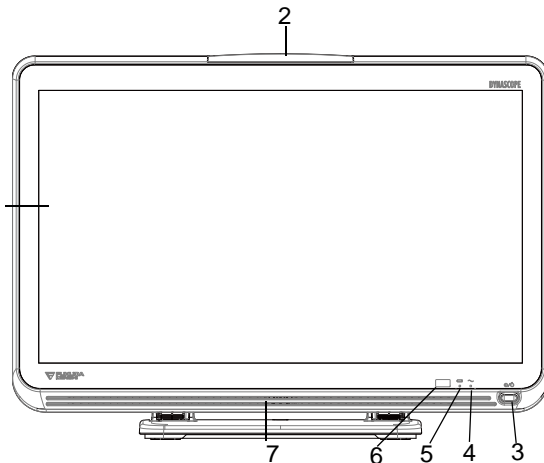
2 Start monitoring.

- 1 Monitor on the home display.
- 2 Select ON/OFF of monitoring for each parameter.
- 3 Configure the numeric data to be displayed on the home display.
- 4 Configure the numeric data to be displayed on the individual bed display.
- 5 Adjust the size/scale/baseline position of the waveform.
- 6 Parameter Setup

3 Discharge the patient.

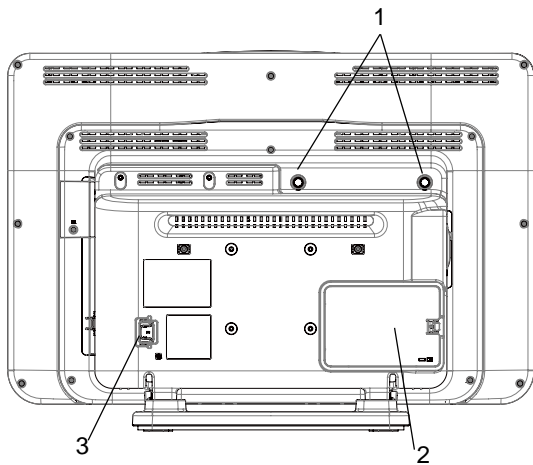
Chapter 2 Name of Parts and Their Functions

□ Front Side



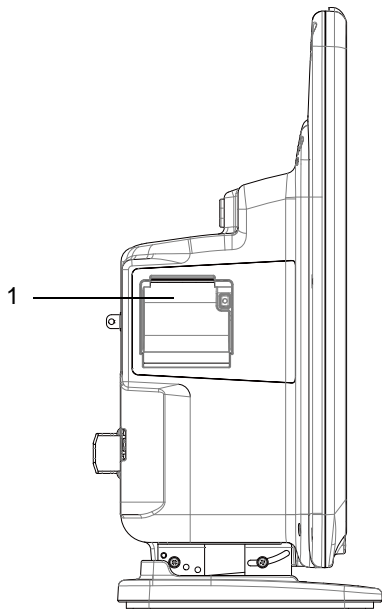
- 1 LCD with Touch Panel
Displays the waveforms and numeric data in various formats. The operation can be performed using the touch panel.
- 2 Alarm Indicator
Lights when the alarm generates. The flashing pattern can be changed.
- 3 Standby Switch
Sets ON/OFF of the standby condition.
- 4 Power Supply LED
Indicates the power supply status. Lights when the AC power is supplied.
Green: Power ON
Orange: Standby Mode
Light Off: During battery operation, or power OFF
- 5 Battery Status LED
Indicates the battery charging status. Lights when the battery is inserted.
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.)
- 6 Remote Control Sensor
Receives the infrared remote control signal.
- 7 Speaker
Generates the alarm sound and key sound.

☐ Rear Side



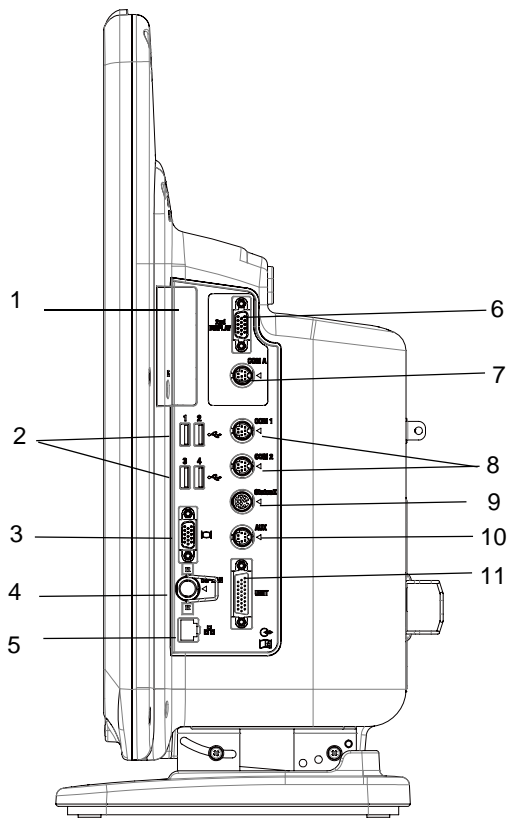
- 1 Antenna Connector 1, 2
Connects the specified antenna.
- 2 Battery Cover
Lithium-Ion Battery Pack (BTO-005) can be installed inside.
- 3 Power Supply Connector
Connects the power supply cable.

☐ Left Side



- 1 Recorder Slot
Recorder Unit is installed.

☐ Right Side



- 1 Maintenance Cover
For maintenance use.
- 2 USB Connector
Connects the USB
- 3 External Monitor Connector
Connects the specified device.
- 4 DS-LAN Connector
Connects the wired network (DS-LAN).
- 5 LAN Connector
Connects the specified network device.
- 6 Extended Display Unit Connector
Connects the extended display unit.
- 7 Serial Connector (COM A)
Connects the specified device.
- 8 Serial Connector (COM1 to 2)
Connects the specified device.
- 9 Status Input/Output Connector
Connects the specified device.
- 10 External Device Connector (AUX)
Connects the specified device.
- 11 U-LINK Connector
Connects the Recorder Unit (HR-800).

NOTE

- ◆ The DS-LAN connector cannot connect to the DS-LANII network.

Chapter 3 Description of the Display

This section explains about the items displayed on the home display, individual bed display, and menu display.

Home Display and Individual Bed Display

This section explains about the home display which can monitor multiple patients at the same time, and about the individual bed display which can monitor one patient specifically.

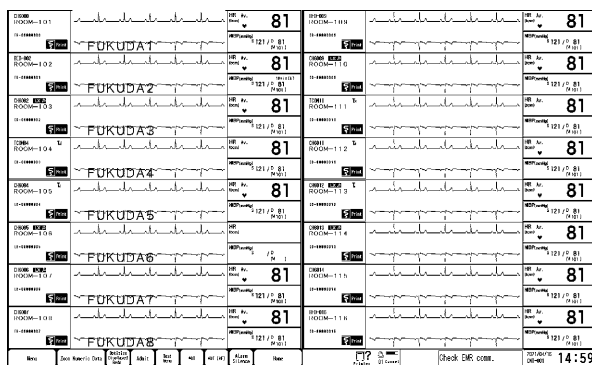
About the Home Display

The home display is the basic display to monitor the patient.

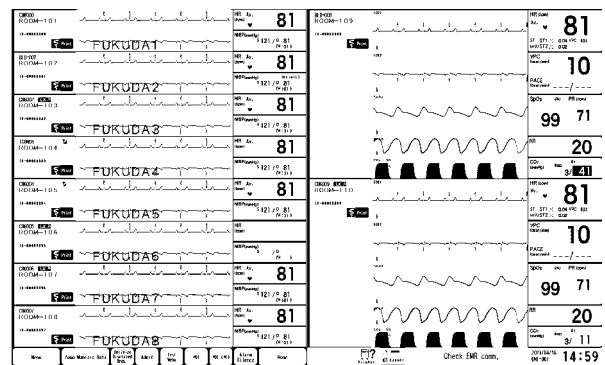
The display can be configured according to the monitoring purpose.

- ♦ The waveforms/numeric data of up to 32 beds can be displayed.
By using the extended display unit, dual display monitoring is also possible.
- ♦ A flexible display layout is possible which allows to set different display configuration (parameter, quantity of displaying waveform/numeric data, etc.) for each bed.

To return to the home display, press the [Home] key (user key).



Example of 16 Beds Display



Example of 8 Beds + 2 Beds Display

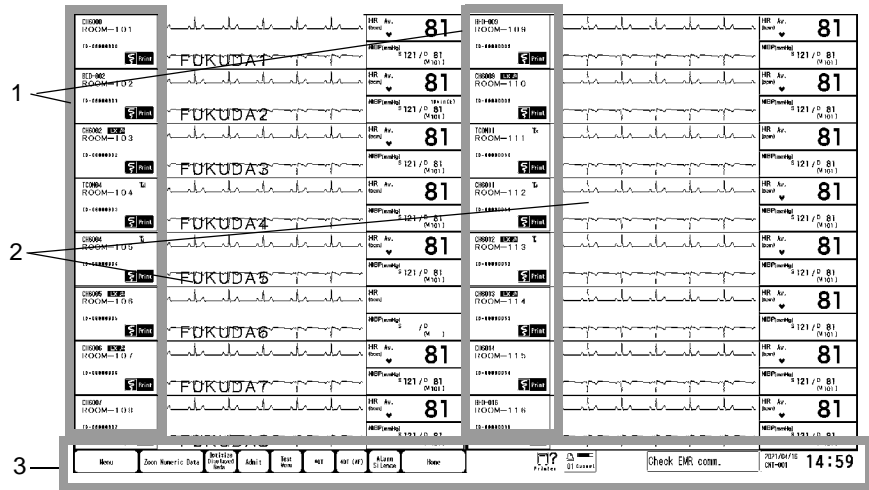
Description of the Home Display

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

The items displayed on each area are explained below.

□ Area on the Home Display

- 1 Information Display Area for Each Bed
- 2 Waveform/Numeric Data Area
- 3 Control Keys, Central Monitor Information Area

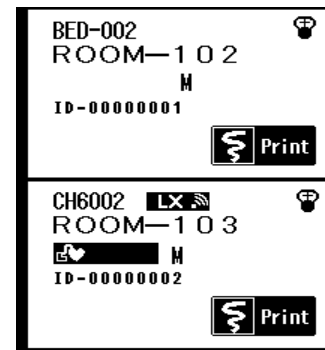


□ Information Display Area for Each Bed

The individual patient information will be displayed. By pressing this area, shortcut menu for the respective bed will be displayed.

[Standard Mode]

- ◆ Room/Bed ID, Telemetry Transmitter Channel ID
- ◆ Transmitter Type (LX/HLX)
- ◆ Nurse Call Mark
- ◆ Patient Name/Bed Name
- ◆ Pacemaker Mark
- ◆ Sex
- ◆ Patient Type (Adult / Child / Neonate) and Icon
- ◆ Patient ID (Max. 20 characters)
- ◆ Print Key (Displayed only when a recorder is used.)
- ◆ Nurse Team Color (Displayed only when nurse team is set.)



<<Example of Shortcut Menu>>

The example shown at right are the shortcut menu displayed when the information display area is pressed.

(☞ "Short Cut Keys Display" P4-4)



<<Displayed Icons on Information Display Area>>

Graphic Symbols	Description
	HLX Bed/LX Bed Indicates that the HLX-501/801 Telemetry Transmitter Module or LX series Transmitter is used on the bedside monitor.
	Nurse Call (☞ "Nurse Call Setup" P13-18) Indicates that the nurse call function is used.
	Pacemaker (☞ "Entering the Patient Information" P6-2) Indicates that the pacemaker is used.
	Print Start/Stop (☞ "To Start/Stop the Printing" P12-9) Starts/stops the printing.

□ Waveform/Numeric Data Area

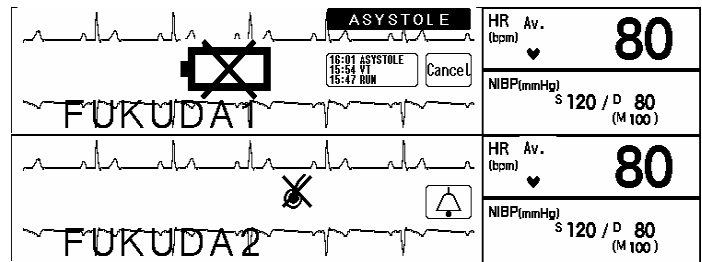
◆ Waveform

Other than the waveforms, patient name/bed name, parameter, waveform size/scale are displayed.

Depending on the situation, alarm messages and icons will be displayed.

The waveform display area will function as a bed selection key. During the individual

bed display, the displayed patient can be switched by pressing the waveform display area for the corresponding patient. The operation when the waveform area is pressed can be changed on the initial settings menu. (☞ Maintenance Manual "Operation" P5-21)



◆ Numeric Data

The numeric data of the monitoring parameters are displayed. The numeric data box will also function as individual bed display key. Pressing the numeric data box will display the individual bed display of the corresponded patient.

Depending on the situation, messages and icons (Alarm OFF, HR synchronization mark, etc.) may be displayed.

<<Displayed Icons on Waveform Area>>

Graphic Symbols	Description
	Lead OFF Indicates the lead-off condition.
	Check Battery Indicates the low battery condition of the telemetry transmitter.
	Event Key (☞ "Alarm Occurrence" P7-12) Indicates that the alarm has been generated.
	EMR Communication (☞ "EMR Link Function" P6-7) Indicates the communication with EMR.
	EMR Disconnected Indicates that the communication with the EMR is disconnected.
	Event List Key (☞ "Alarm Occurrence" P7-12) The latest 3 events will be displayed.

<<Displayed Icons on Numeric Data Box>>

Graphic Symbols	Description
	Alarm OFF Indicates that the alarm is OFF.
	Message Icon (☞ Maintenance Manual "Display/Print" P5-11) Indicates that an alarm message is present for that parameter. Whether or not to display this icon can be selected under "Initial Settings".
	HR/PR Synchronization Mark (☞ "Detail Setup" P8-8) Flashes synchronizing to the heartbeat or pulse wave.
	RR Synchronization Mark (☞ "Common Setup / Impedance Setup" P8-13) Flashes synchronizing to the respiration.

□ Control Keys, Central Monitor Information Area

	Description
1	Central Monitor User Key (☞ Maintenance Manual "User Key" P5-19) 10 function keys can be used. The [Menu] key (Central Monitor Display) at the left end cannot be changed.
2	Recorder Status Display Area (☞ "Message List" P14-1) The recorder status such as <Recorder Busy>, <Check Recorder> will be displayed.

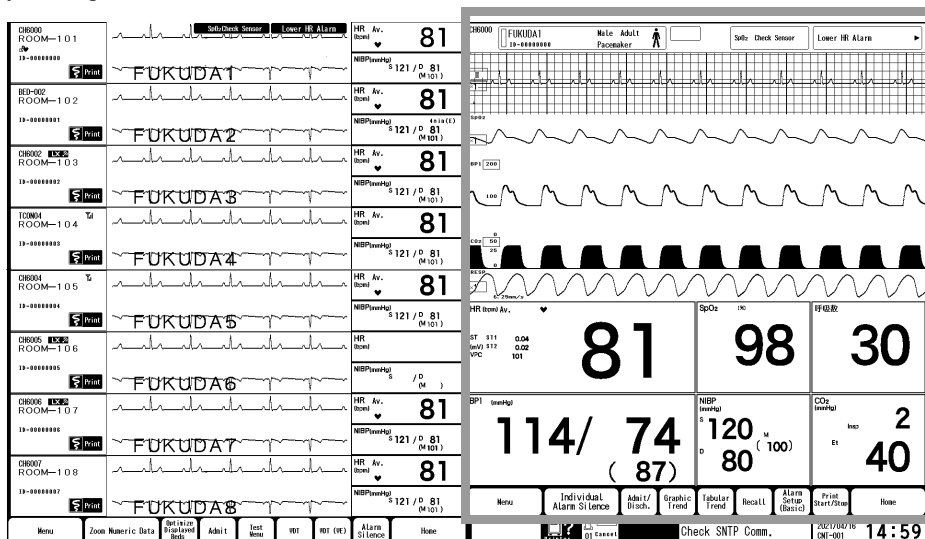
	Description
3	Laser Printer Status Display Area The quantity of stacked data, printing progress, status message will be displayed.
5	Battery Status Display Area Refer to the list below. (<<Displayed Icons on Battery Status Display Area>>)
6	System Status Area The system status message will be displayed. The displayed color will change depending on the status priority.
7	Time/Date (☞ Maintenance Manual "Time/Date" P5-29) The current date/time, central ID will be displayed. If the time is displayed in yellow, it indicates that the time synchronization with the server has failed.

<<Displayed Icons on Battery Status Display Area>>

Graphic Symbols	Description
	Indicates that AC power is connected.
	Indicates the remaining battery level. This icon (full green) indicates that the battery is fully charged. *While charging, the corresponding battery level icon flashes.
	This icon (2/3 green) indicates that the battery is less than full, but still usable.
	This icon (1/3 yellow) indicates that the battery level is low and needs to be charged. The battery needs to be charged.
	This icon (1/3 Red) indicates that the battery is less than full. This icon flashes to indicate that the battery needs to be charged. Needs to be charged immediately. Technical alarm will generate.
	This icon (Red frame) indicates that the battery is almost empty. This icon flashes to indicate that the battery needs to be charged. Make sure to charge the battery immediately when this icon appears. In this condition, the recorder cannot be used.
	Indicates that the battery is not installed.

Individual Bed Display

By pressing the bed selection area (numeric data box on the all beds display), the individual bed display will be shown on the right side.
The detailed information for the specific patient can be monitored on a display which is same as the bedside monitor.
The waveforms and numeric data to be displayed can be configured for each patient.
(☞ "Display Configuration for Individual Bed" P13-2)



Description of the Individual Bed Display

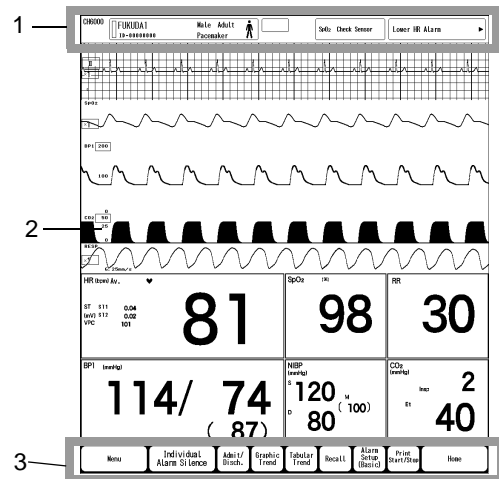
Other than waveforms and numeric data, alarm message, status message will be displayed on the individual bed display.

The keys to control the individual bed display will be also displayed.

The items displayed on each area are explained below.

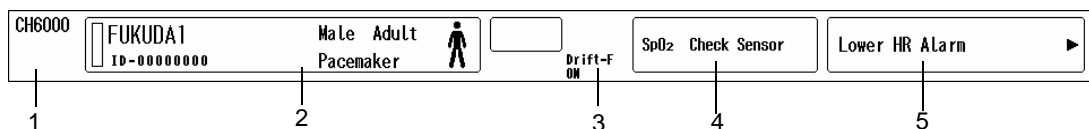
Area on the Individual Bed Display


- 1 Information Display Area
- 2 Waveform/Numeric Data Area
- 3 User Key Area



Information Display Area

The patient information will be displayed.



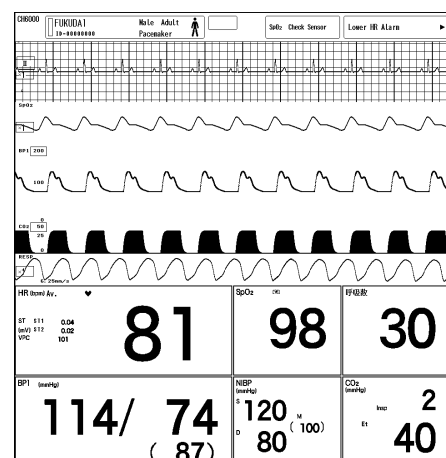
- 1 Room/Bed ID, Telemetry Transmitter Channel ID
- 2 Nurse team color, patient information (patient name, patient ID, sex, patient classification and icon , pacemaker usage) (☞ "Entering the Patient Information" P6-2)
- 3 ON/OFF of ECG drift filter (☞ "Detail Setup" P8-8)
- 4 Status Message (☞ "Message List" P14-1)
- 5 Alarm Message

Waveform/Numeric Data Area

The display configuration can be changed.

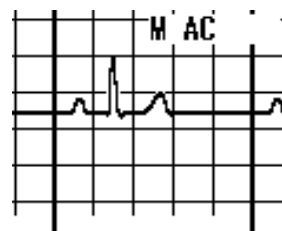
♦Waveform

Other than the waveforms, parameter, lead type, waveform size/scale are displayed.



In the ECG waveform area, ECG filter and filter mode will be displayed. However, filter mode will not be displayed for LW Bed and RF Bed.

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



♦ Numeric Data

The numeric data of the monitoring parameters are displayed. Depending on the situation, messages and icons (Alarm OFF, HR synchronization mark, etc.) may be displayed. The user keys can be assigned to the numeric data box.

□ User Key Area

The control keys are displayed.

(☞ "User Key" P4-7)



Alarm Occurrence

When an alarm occurs, alarm message will be displayed on various parts of the display.

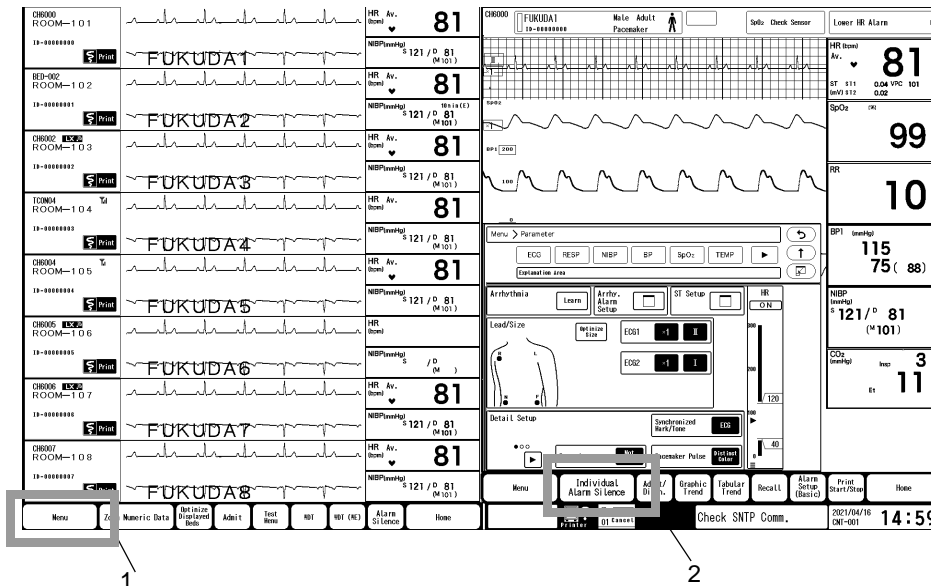
(☞ "Alarm Function" P7-1)

The screenshot shows a multi-bed monitoring interface. On the left, eight patient beds are listed, each with an ECG waveform and a heart rate of 81. The patient name 'FUKUDA' is repeated for each bed. On the right, a larger display shows vital signs: HR 81, SpO2 98, and BP 114/74 (87). A 'Check Sntp Comm.' alarm message is displayed at the bottom. The interface includes various control buttons and a status bar at the bottom right showing the time 14:59.

Menu Screen

To Display the Menu

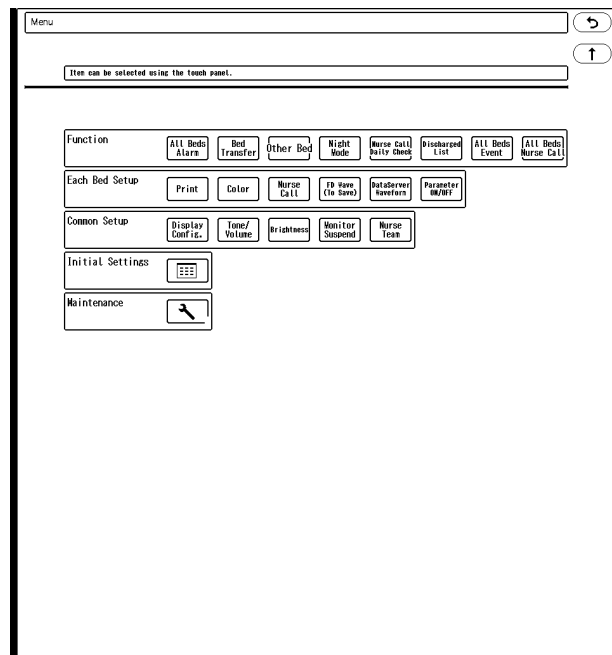
Each of the individual bed display and central monitor display has its own menu items. The [Menu] keys are provided on each display. Press [Menu] to display the "Menu" screen.



- 1 [Menu] key on the central monitor display
- 2 [Menu] key on the individual bed display

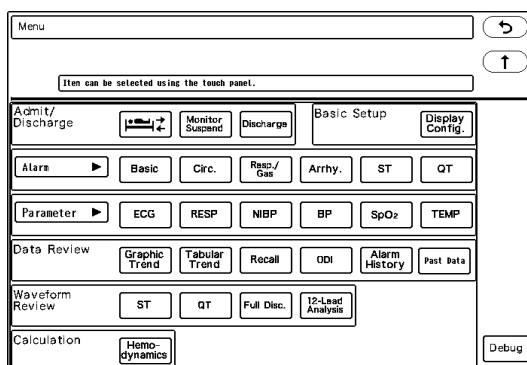
Menu Configurations (Central Monitor Display)

The menu for the central monitor display consists of the following 5 groups. The "Initial Settings" menu consists of another 6 groups.



Function Groups	Displayed Menu	
Function (☞ "Menu Items" P13-1)	All Beds Alarm Settings, Bed Transfer, Network View, Night Mode, Nurse Call Daily Check, Discharged List, All Beds Events, All Beds Nurse Call	
Each Bed (☞ "Menu Items" P13-1)	Print, Color, Nurse Call, Full Disclosure Waveform, Data Server Waveform, Parameter ON/OFF	
Common Setup (☞ Maintenance Manual "Initial Settings" P5-1)	Display Configuration, Tone/Volume, Brightness, Monitor Suspend, Nurse Team	
Initial Settings (☞ Maintenance Manual "Initial Settings" P5-1)	Alarm	Alarm, Nurse Call Custom
	Measurement	Unit, Other
	User I/F	Display/Print, Admit, User Key, Operation, Shortcut Key
	External Device	Serial Communication, Network, Extended Display, Slave Monitor, Remote Control, USB, Recorder
	System	Central ID, Bed Register, Channel Setup, Bed Name Regist, Time/Date, Other
	Administrator Setup	Key Lock, Password Setup
Maintenance (☞ Maintenance Manual "Maintenance Check" P9-1)	Program Version, LAN Information, Storage Media, Receiver Module S/N Registration, Test Menu	

Menu Configurations (Individual Bed Display)



The menu for the individual bed display consists of the following 7 groups.

Function Groups	Displayed Menu
Admit/Discharge (Chapter 6)	Admit, Monitor Suspend, Discharge
Alarm (Chapter 7)	Basic, Circ., Resp/Gas, Arrhy., ST, QT, Ventilator, List
Parameter (Chapter 8)	ECG, RESP, NIBP, BP, SpO ₂ , TEMP, GAS, External Device, CO ₂ , SpO ₂₋₂ , Sp*, SI, RPP, Scoring
Data Review (Chapter 9)	Graphic Trend, Tabular Trend, Recall, ODI, Alarm History, Past Data
Waveform Review (Chapter 10)	ST, QT, Full Disc. Wave, 12-Lead Analysis
Calculation (Chapter 11)	Hemodynamics
Basic Setup (Chapter 13)	Display Configuration

Description of the Setup Window

The setup windows will be displayed during the operation of home display or individual bed display.

The windows that appear by pressing the numeric data box are called floating windows as they can be moved to any desired position.

To open a window, select from the menu, or press the numeric data box or user key.

Window Display

The common items on the window are explained below.

1 Hierarchical Level Display

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

This area also functions as keys, making it possible to return from the lowermost to topmost window in a one-touch operation.

2 Tab Display Area

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

3 Operation Guide Message

4 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 "●".

5 Previous Display

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

6 Upper Level Key



Returns to the upper level display.

7 Key Lock Icon

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

To unlock the setup item, enter the password.

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

- ◆ : Locked
- ◆ : Unlocked

NOTE

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


8 Setup Item



Most of the setups can be performed by selecting from the dropdown list.

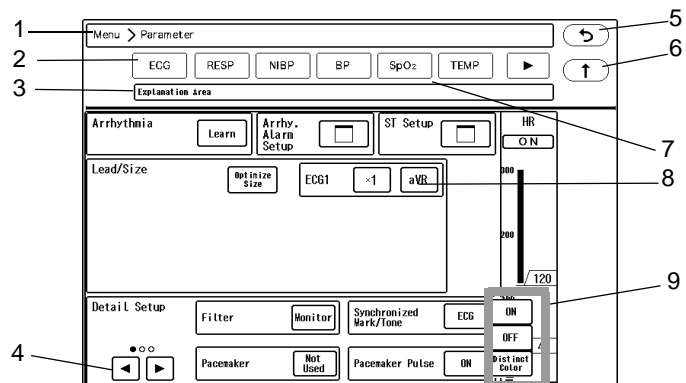
The dropdown list will close when a selection has been made.

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

Some menu may display a subwindow to perform the setup.

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

Pressing the key with the "" icon will display another window. To return to the original display, press the  key.



9 Dropdown List

Select one from the displayed selection list.

Floating Window


Pressing the numeric data box on the individual bed display will open the floating window for the corresponding parameter.

Minimum items are displayed on the floating window and they differ depending on the parameter, but there are some common items as follows.


1 Window Title

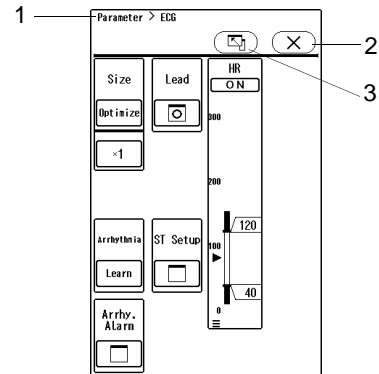
The windows can be moved to any desired position by dragging the window title.

2 Close Key

Pressing the  key will close the floating window.

3 Detail Key


To access the setup items which are not shown, press the  key to switch to the standard setup window.




Display on the Extended Display Unit and External Monitor

For the DS-1800 System, additional display unit can be used for extended display.


For the installation procedure, refer to the operation manual of the extended display unit.

( Maintenance Manual "Using the Extended Display Unit" P1-10)

( Maintenance Manual "Using the Slave Monitor" P1-11)

Connectable Display Unit	Connector	Displayable Screen (Yes: Can be displayed, No: Cannot be displayed)	
		Dual Display	Slave Display
Extended Display Unit	Extended Display Unit Connector	Yes	No
General-purpose LCD	External Monitor Connector	No	Yes

Dual Display

- ♦ The touch panel operation on the main display unit and the extended display unit can be performed independently.
- ♦ When one mouse is connected to the USB connector, both display units can be controlled by one mouse.
- ♦ When two mice are connected to the USB connector, each display unit can be operated separately with each mouse. ( Operation Manual "Mouse/Keyboard" P4-1)
- ♦ The alarm indicator is equipped on the main display unit only.

CAUTION

- ♦ For the 32 beds display configuration, dual display is not possible.
- ♦ On the extended display unit, speaker and alarm indicator are not equipped. The alarms for the patient monitored on the extended display unit will be output from the speaker and alarm indicator on the main unit.

❑ Slave Display

- ◆ The same display as the main display unit can be displayed on the extended display unit according to the slave monitor settings.
For the compatible slave monitor, refer to your nearest service representative.

Chapter 4 Basic Operation

Operation Procedure

Operation can be performed using the fixed keys, touch keys, or mouse and keyboard (both optional). CF-820 Remote Control Unit is also available which enables to remotely control the device.

Touch Key

Operation can be performed by pressing the displayed keys.

CAUTION

- ♦ Always operate the touch panel with fingers. Do not touch with a pen-point or other hard-edged instruments. It may cause malfunction or damage the touch panel.
 - ♦ Do not apply pressure for a prolonged time to any part of the panel.
 - ♦ Do not attach film to the touch panel. This may result in malfunction or failure.
 - ♦ When turning ON the power or recovering from standby mode, automatic adjustment of the touch panel will be performed. Do not touch or allow liquid or metal contact the screen during this period.
-

Mouse/Keyboard

WARNING

- ♦ Use the mouse, keyboard specified by Fukuda Denshi. Use of other products may cause malfunction or damage.
-

☐ Mouse

An optional mouse can be connected allowing touch key control using the mouse.

By moving the pointer on the displayed keys, and left-clicking the mouse, the operation can be performed just the same as by directly touching the displayed keys.

The pointer will be hidden if the mouse is not used for 30 seconds. (default operation)

The hidden mouse pointer will be displayed again by moving the mouse.

The mouse can be connected to USB connector on the right side of this device.

When two mice are connected, the controlling display unit can be set under [Initial settings>USB].

(☞ Maintenance Manual "Connecting the Mouse and Keyboard" P1-6)

☐ Keyboard

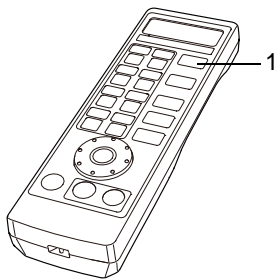
The keyboard can be used when entering patient information.

NOTE

- ♦ The keyboard can be used only when the touch panel keyboard is displayed (patient name, monitor suspend setup, etc.) The keyboard cannot be used for the display other than above (password input, etc.).
-

Remote Control

The alarm sound on the DS-1800 System can be silenced using the remote control unit, CF-820 (optional).



- 1. Alarm Silence
Silences the alarm sound for all the displayed beds.

CAUTION

- Pressing the [Alarm Silence] key on the remote control unit will silence all the alarms generated on the displayed beds. Pay attention not to miss any important alarms.

Operation on the Home Display/Individual Bed Display

Various operation can be performed using the touch panel.
This section describes the touch panel operation on the home display and individual bed display.

Adjusting the Size/Scale/Baseline Position

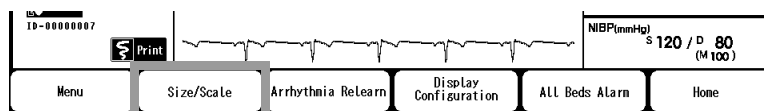
The procedures to set the waveform size and scale are as follows.
Other than the following, the settings can be also performed on each parameter setup screen.

Adjusting from the User Key

REFERENCE


- It is necessary to assign [Size/Scale] key as user key in advance.
(☞ Maintenance Manual "User Key" P5-19)

1 Press the [Size/Scale] key on the user key area.



▶ **Size** will be displayed in the waveform area.

2 Pressing **Size** will sequentially change the waveform size in the order of x1/4, x1/2, x1, x2, x4.
For BP, CO₂, anesthetic gas (CO₂, O₂, AGT), SPIRO (AWF, AWP, AWV) waveforms, scale can be adjusted.

3 To adjust the baseline position of the waveform, use the  key.

To Change the Quantity of Displayed Numeric Data

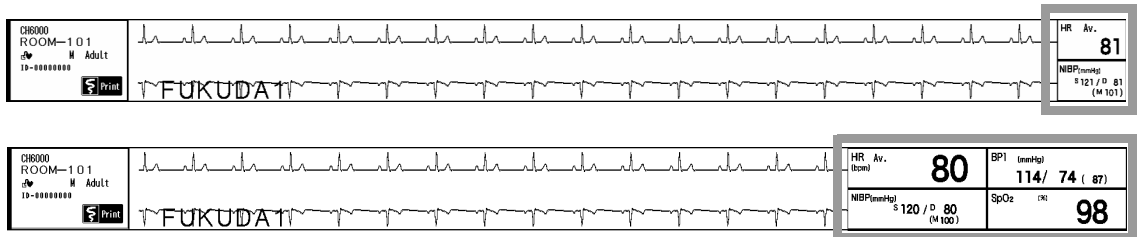
The numeric data display width can be changed.

REFERENCE

- It is necessary to assign [Meas Qty] key as user key in advance. (☞ Maintenance Manual "User Key" P5-19)
- The quantity of numeric data can be also changed on the "Display Config." menu. (☞ "Numeric Data/Waveform" P13-27)
- It will not function during individual bed display.

1 Press the [Meas Qty] key on the user key area.

- Pressing this key will sequentially change the quantity of displayed numeric data.



To Enlarge/Reduce the Numeric Data Box Size

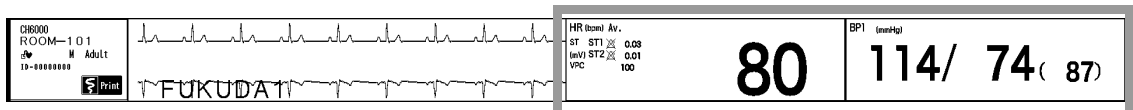
The numeric data box size can be enlarged/reduced without changing the area size of all numeric data.

REFERENCE

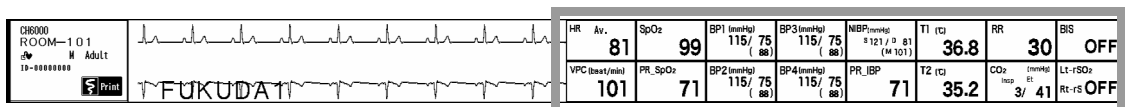
- It is necessary to assign [Zoom Numeric Data] key as user key in advance.
- Depending on the setting, enlarging/reducing the numeric data box size can be either applied to all beds or to individual bed. (☞ "Numeric Data Box Size" P13-26)
- It will not function during individual bed display.
- It will function only when the display height for all beds are equal.

1 Press the [Zoom Numeric Data] key preassigned as user key.

- The numeric data box size will enlarge/reduce. The size of the whole numeric data display area will not change.
- Pressing the [Zoom Numeric Data] key will sequentially enlarge/reduce the numeric data box size.
- If the numeric data box size is enlarged, the quantity of displayed numeric data will decrease.



- If the numeric data box size is reduced, the quantity of displayed numeric data will increase.



- When [Each Bed] is set for "Zoom Numeric Data", the numeric data box size for only the selected bed will

be enlarged/reduced.

HR (bpm) Av. 80	SpO ₂ (%) (ave/pt) 98	TI (°C) 36.7
NBP(mmHg) S 120 / D 80	SpO ₂ (%) 98	RR (breath/pt) 10
HR (bpm) Av. 80	SpO ₂ (%) (ave/pt) 98	TI (°C) 36.7
ST BTZ (sec) 0.03	RR (breath/pt) 10	CD ₂ (mmHg) 2/40
HR (bpm) Av. 80	SpO ₂ (%) (ave/pt) 98	TI (°C) 36.7
NBP(mmHg) S 120 / D 80 (M100)	SpO ₂ (%) 98	RR (breath/pt) 10
		CD ₂ (mmHg) 2/40

Enlarged Numeric Data Box

HR (bpm) Av. 80	SpO ₂ (%) (ave/pt) 98	TI (°C) 36.7
NBP(mmHg) S 120 / D 80	SpO ₂ (%) 98	RR (breath/pt) 10
HR (bpm) Av. 80	SpO ₂ (%) (ave/pt) 98	TI (°C) 36.7
ST BTZ (sec) 0.03	RR (breath/pt) 10	CD ₂ (mmHg) 2/40
HR (bpm) Av. 80	SpO ₂ (%) (ave/pt) 98	TI (°C) 36.7
NBP(mmHg) S 120 / D 80 (M100)	SpO ₂ (%) 98	RR (breath/pt) 10
		CD ₂ (mmHg) 2/40

Reduced Numeric Data Box

Optimizing the Displayed Beds on the Home Display

The displayed number of beds on the home display can be optimized.

REFERENCE

- It is necessary to assign [Optimize Display] key as user key in advance. (☞ Maintenance Manual "User Key" P5-19)
- It is necessary to set [ON] for "Optimize Displayed Beds" under [Initial Settings>User I / F>Display Print] in advance. (☞ Maintenance Manual "Display/Print" P5-11)

1 Press the [Optimize Display] key preassigned as user key.

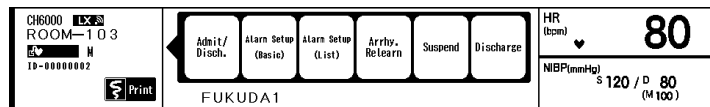
- The beds discharged when [Suspend] is set for "Setup at Discharge" will not be displayed, and the display area for the monitored beds will be enlarged to optimize the home display.

NOTE

- When [ON] is set for "Optimize Displayed Beds", PC communication function cannot be used.
- The beds which will not be displayed when optimizing the display are the discharged beds when [Suspend] is set for "Setup at Discharge" under [Initial Settings>User I/F>Display Print].

Short Cut Keys Display

Pressing the patient information area will display 3/6/12 short cut keys for each bed. Pressing one of the keys will display the corresponding menu.



The short cut key display will close for the following cases.

- When the short cut key is pressed.
- When the set duration (seconds) for "Auto Hide Window" has elapsed. (☞ Maintenance Manual "Operation" P5-21)
- When the patient information area was pressed again.
- When other key such as user key, other patient information area, etc. was pressed.

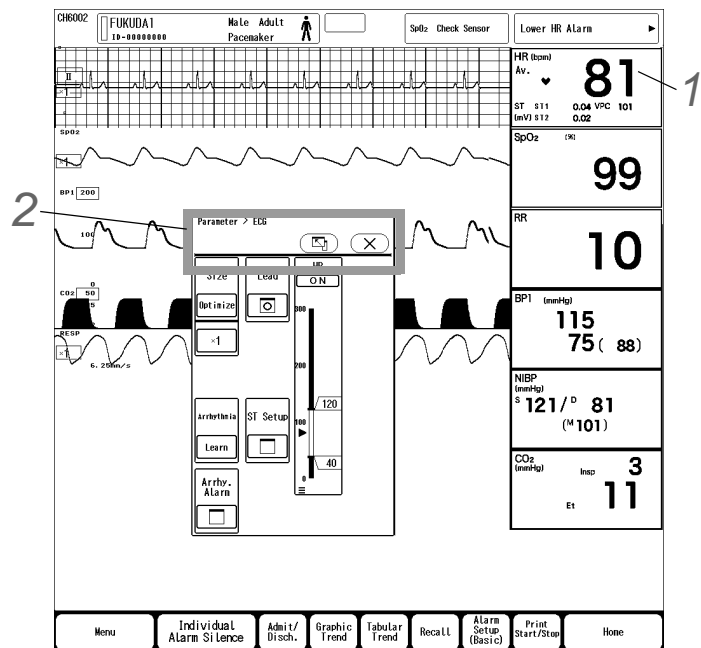
Operation on the Window

The operation procedure is not the same for all windows, but common operation procedure is explained below.

Moving the Floating Window

The floating window can be moved by dragging the window title bar. This operation is possible on the touch panel.

- 1 Press the numeric data box on the individual bed display to display the floating window.
- 2 Place the finger on the window title and drag to the desired position.



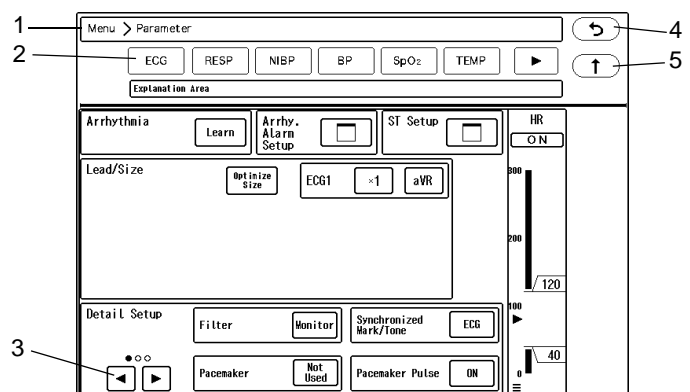
NOTE

- ♦ The floating window cannot be overlapped to the numeric data area or information display area.



Switching the Page/Screen

The keys used for displaying other page/screen is explained below.


- 1 Hierarchical Level Display
The hierarchical level of the current window is displayed. This area also functions as keys, making it possible to return from the lowermost to topmost window in a one-touch operation.
- 2 Tab
The menus belonging to the same hierarchy are displayed. It can be switched from each other in a one-touch operation without returning to the menu.




For example, pressing the [BP] while ECG setup menu is displayed will change the display to BP setup menu. For the review screens, the date/time of each review data are linked which allows to switch the display of the tabular trend, graphic trend, waveform of the same date/time in one-touch operation.

3 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 "●".


4 Pressing the  (Return) key will return to the previous window.

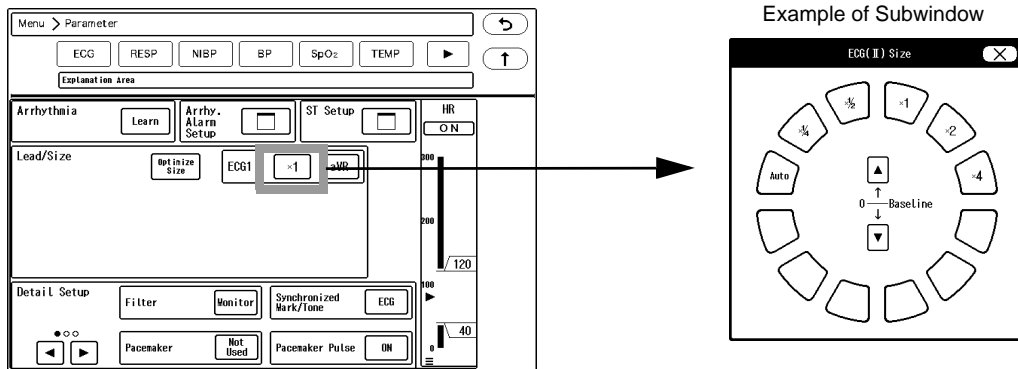
5 Pressing the  (Upper Level) key will return to the upper level display.

Subwindow Display


Some menu may display a subwindow to perform the setup.



The subwindow to set the waveform size is shown as an example.

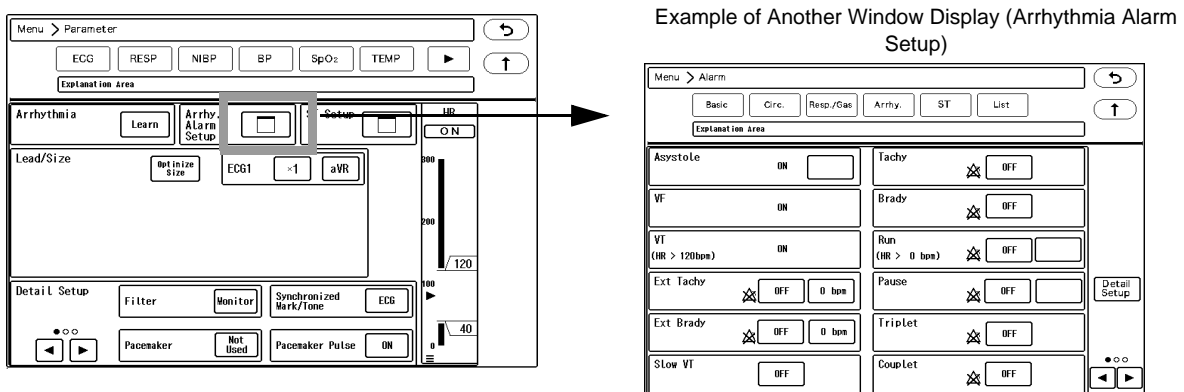
To close the subwindow, press either the  key, [Home] or [Prev. Disp.] key.



Another Window Display

Pressing the key with the "" icon will display another window or subwindow.

To return to the original display, press the  key. Or, press the  key to close the window.



To Enter Characters

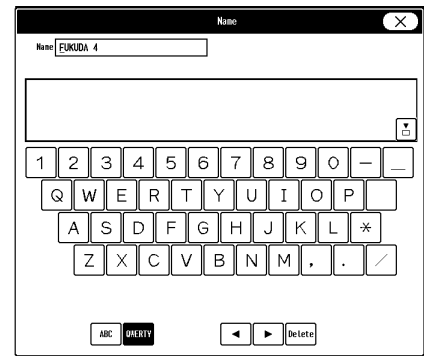
Alphanumeric characters and symbols can be entered using the displayed keyboard.

The procedure to enter characters is explained below using the example of patient admit menu.

□ Entering Alphanumeric Characters

Enter alphabets, numerics, or symbols.

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

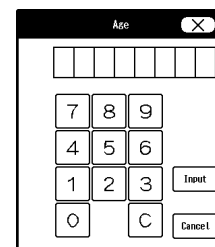


□ Entering Numerics

Setup windows for age, telemetry channel ID, etc. can enter only numerics.

In such case, only numeric keys will be displayed.

Enter the numerics.



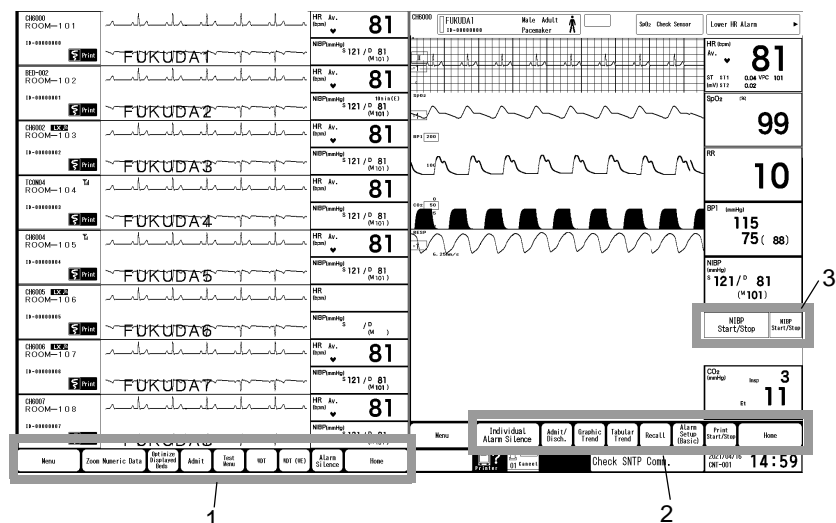
For Easier Use

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

User Key

The user keys can be customized according to the monitoring purpose. The user keys can be assigned for home display and for individual bed display. (Maintenance Manual "User Key" P5-19)

- 1 User Keys for Home Display
- 2 User Keys for Individual Bed Display
- 3 User Key on the Numeric Data Area



By assigning the [User Key] to the user key area, 2 pages of user keys can be registered, and pressing the [User Key] allows 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.

Chapter 5 Preparation

Turning ON/OFF the Power

❑ To Turn ON the Power

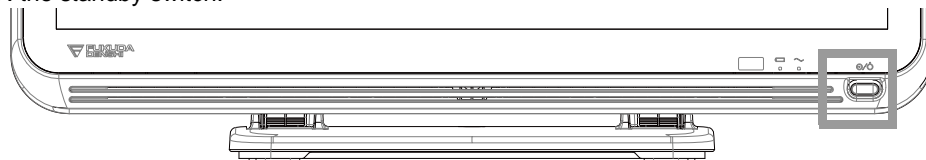
The procedure to turn ON the power of the DS-1800 System is explained below.

CAUTION

- ◆ The power cable must be connected to a hospital grade outlet.
- ◆ Do not connect a battery other than the lithium-ion battery (BTO-005).
- ◆ If not using the device for a long period, disconnect the power cable and lithium-ion battery.
- ◆ To avoid losing the data saved in the storage media, set to standby mode before turning OFF the power.

- 1 Before turning ON the power, connect the cable, external device, etc. required for system construction.
 - Power Cable (CS-34) (If operating with AC power supply)
 - Lithium-Ion Battery Pack (BTO-005) (If operating with battery)
 - Recorder Unit (HR-800)
 - Extended Display Unit, Slave Monitor
 - Network System, etc. (☞ Maintenance Manual "Installation of the Unit" P1-1, ☞ Maintenance Manual "System Construction" P2-1)
 - ▶ When connected to the AC power source with battery installed, charging will automatically start.
 - Rapid Charge (when the device is not in operation): 2.5 hours
 - Normal Charge (when the device is operating): 5 hours

- 2 Turn ON the standby switch.



- ▶ The power supply LED on the front side will light.
 - 1 Power Supply LED
 - ◆Green: Power ON
 - ◆Orange: Standby Mode
 - ◆Light Off: During battery operation, or power OFF
 - 2 Battery Status 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.)

- 3 Adjust the brightness and color of the display, and perform initial settings, etc. (☞ Maintenance Manual "Initial Settings" P5-1)

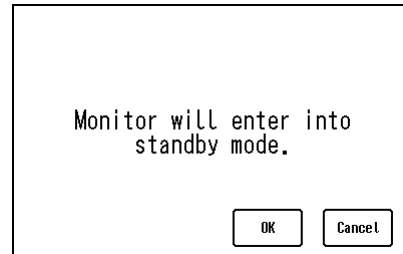
❑ To Turn OFF the Power

The procedure to cease the monitoring is explained below.

1 Press the standby switch.

2 A standby confirmation message will appear on the right side of the display.

- ▶ [OK]: Enters into standby mode, and power supply LED will change to orange.
- ▶ [Cancel]: Standby confirmation message will disappear, and returns to normal operation mode.



CAUTION

- After using the device, turn OFF the standby switch. If not using the device for a long period, disconnect the power cable.
- To avoid losing the data saved in the storage media, set to standby mode before turning OFF the power.
- If not using the device for a long period, disconnect the power cable and lithium-ion battery.
- When unplugging the cables, make sure to pull from the connector part of the cable and avoid applying excessive force. Otherwise, it may result in wire break or contact failure.
- Keep the unit clean to ensure proper operation for the next usage.
- Clean the accessories and cables, and organize them for storage.

Installing the Recording Paper

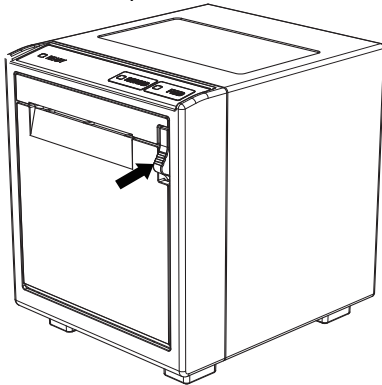
CAUTION

- Recording paper
 - Use only "OP050-02TDR" for the recording paper.
If the surface treatment and thickness of the recording paper are different, it may result in poor print quality.
- Storing the Recording Paper
Since the recording paper is thermal type, inappropriate storage may change the quality of the printed content, and make it illegible.
When storing the recording paper, follow the precautions below.
 - Store in a place where light is shut off and avoid direct sunlight.
 - Do not leave the paper in a high temperature (50 °C/122°F and above).
 - Do not store the paper in a polyvinyl chloride bag.
 - Do not superpose the papers until the diazo copy is completely dried.
 - Do not expose the paper to alcohol, hydrochloric acid, or ester ketone.
 - Avoid using adhesive agents other than water based glue.
- Installing the Recording Paper
 - When installing the recording paper, pay attention not to touch the thermal head or sensor. The temperature of those parts rises immediately after printing and may cause burn injury. Also, it may cause failure to the thermal head and sensor.

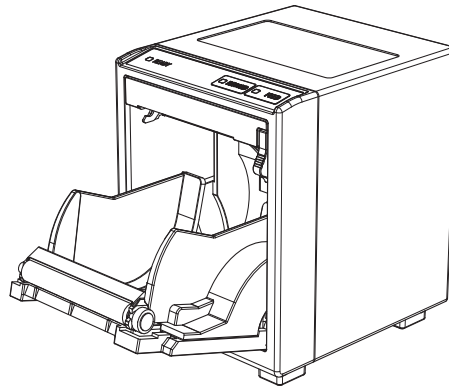
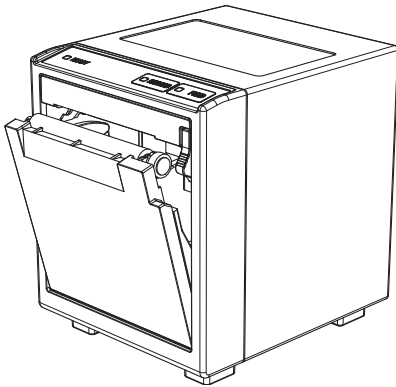
- ♦ Do not operate the device with wet hands. Doing so may short the thermal head.
-

Install the recording paper with the following procedure.

- 1** Press the open/close lever.

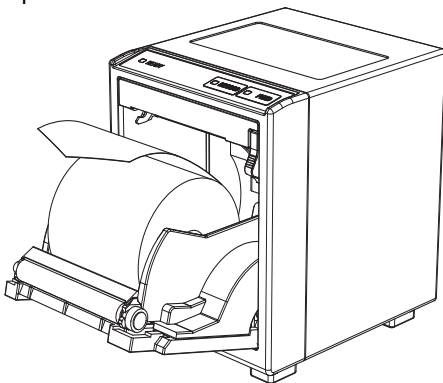


- ▶ The paper holder will open.



- 2** Set the paper.

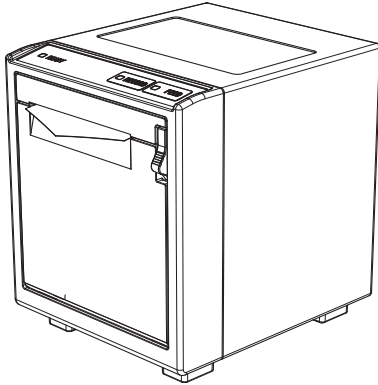
The outside surface of the paper is heat-sensitive. Make sure to place the outside surface of the paper facing up.



NOTE

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

3 Close the paper holder.



NOTE

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

NOTE

- ♦ For the built-in type recorder, use the same procedure to install the recording paper.

Daily Check

Perform the daily check using the "Daily Check List".

(☞ Maintenance Manual "Daily Check List")

Take necessary measures for the items with the "NG" judgment, and use the device only if the judgments for all the items are "OK".

Nurse Call Daily Check

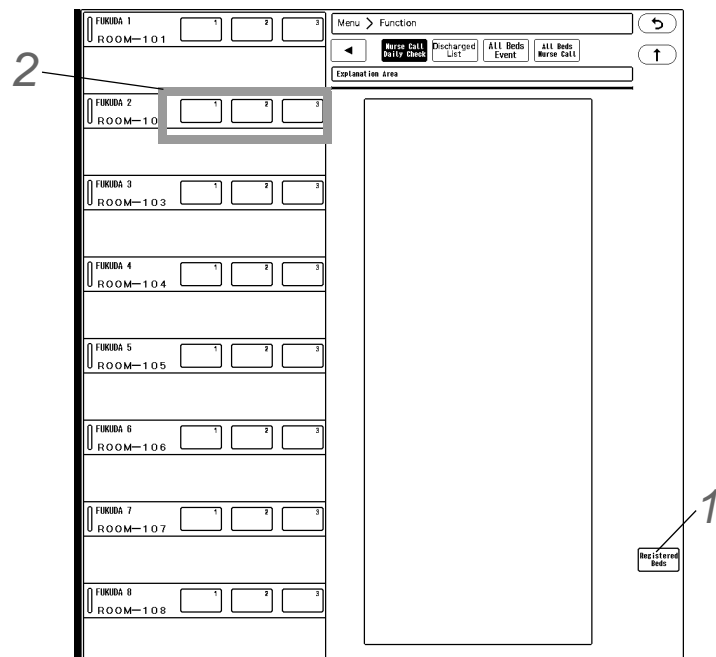
Before monitoring, perform nurse call daily check to make sure that the nurse call is properly functioning.

1 Press the [Menu], [Nurse Call Daily Check] ("Function") keys.

- ▶ The "Nurse Call Daily Check" screen will be displayed.
- ▶ The nurse call setup status for all the patients monitored on the DS-1800 System central monitor will be displayed.
- ▶ The display can be switched between [Displayed Bed] and [Registered Bed].

2 Check the nurse call connection status of each bed. Press the check key [1] / [2] / [3].
The displayed number (1 to 3) inside the check key indicates the urgency level.

- ▶ The key will turn blue when pressed.
- ▶ Nurse call will start.
- ▶ The key will remain blue until the nurse call connection is verified at the call target (base station, PHS, etc.). When the connection is verified, "Connected" will be displayed.
- ▶ On the nurse call system (base station, PHS, etc.), "TEST1/2/3" will be displayed.



NOTE


- ◆ If "Failed" is displayed, the connection may not be proper.
(☞ "Troubleshooting" P14-1)

Chapter 6 Admit/Discharge

What You Can Do on the Admit/Discharge Menu

Before starting monitoring, patient information can be entered.

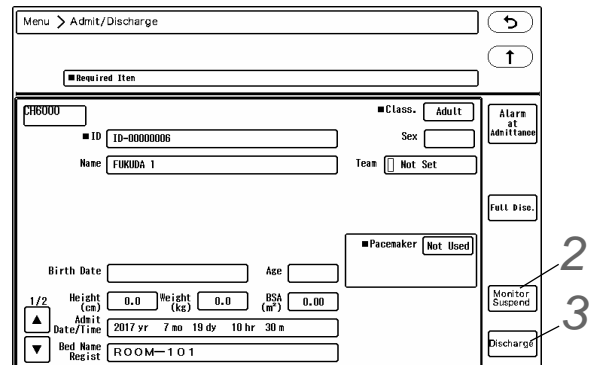
When the patient leaves the bed for a long period of time, monitoring can be suspended to temporarily cease the measurement and alarm generation.

1 On the Individual Bed Display, press the [Menu], [] (Admit/Discharge) keys.

- ▶ The "Admit/Discharge" screen will be displayed.
Enter the patient information.

2 Monitoring can be suspended by pressing the [Monitor Suspend] key.

3 Monitoring data of the patient can be deleted by pressing the [Discharge] key.



CAUTION

- ♦ When a patient is discharged, delete the patient's monitoring data by performing the discharging procedure. 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.
- ♦ If monitoring is suspended on the bedside monitor, the data for that patient will not be transmitted to the central monitor. When monitoring is resumed on the bedside monitor, the data transmission to the central monitor will also resume.
- ♦ Before monitoring, make sure the current alarm setting is suitable for the patient's condition.

NOTE

- ♦ When the extended display unit is used, "Admit/Discharge" screen can be displayed only on either of the display units and not both.

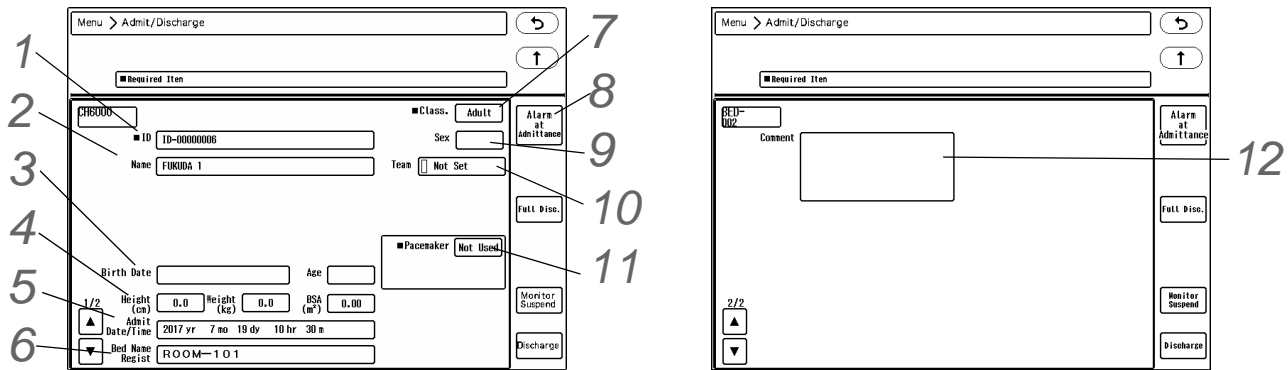
Admit

Enter the following patient information before starting monitoring. This is called "Admit" process.

Patient ID	Patient Information (Sex, Birth Date, Age, Height, Weight, BSA)
Name	Patient Classification (Adult / Child / Neonate)
Nurse Team	Pacemaker (Used / Not Used)
Bed Name	
Comment	

Entering the Patient Information

Enter the patient's information.



1 Patient ID

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

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

(☞ "To Enter Characters" P4-6)

2 Name

Up to 16 characters of alphabets, numbers, or symbols can be used.

The entered name will be displayed on the home display. (☞ "To Enter Characters" P4-6)

3 Birth Date/Age

There are two ways to enter the patient's age. One is to enter the birth date which will automatically calculate the age, and the other is to directly enter the age using the numeric keypad. If [Neonate] is selected for patient classification, age will be displayed in days.

4 Height/Weight/BSA

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

5 Admit Date/Time

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

The admit date/time can be changed when a data server is used through the TCP/IP network.

(For data server setup, ☞ Maintenance Manual "Data Server" P2-18)

6 Bed Name

Select the bed name from the displayed list.

The bed name displayed in gray indicates that it is already used by other bed.

The bed name displayed in blue indicates that it is selected for that bed. The bed name need to be registered in advance under the "Initial Settings" menu.

(☞ Maintenance Manual "Bed Name Registration" P5-27)

⚠ WARNING

- When using the PHS nurse call system, make sure to set the "Bed Name" as it will be used for alarm notification to the PHS. If the "Bed Name" is not set, the patient cannot be specified on the nurse call system.

7 Patient Classification (Adult / Child / Neonate)

The patient classification affects the accuracy of NIBP measurement, HR measurement, and RR measurement. It also affects the delay time to generate the measurement data alarm.



- ▶ The selected patient classification and icon will be displayed on the individual bed display.



WARNING

- ♦ The patient classification selection influences the precision of the QRS detection and NIBP measurement. Make sure the correct selection is made.

NOTE

- ♦ Under [Initial Settings > User I/F > Admit > Alarm], alarm settings at admittance can be set to link to patient classification.

8 Alarm at Admittance

By selecting the preprogrammed alarm mode, the current alarm settings can be changed.

9 Select [Male] or [Female].

10 Nurse Team

To easily recognize the patients for each nurse team, the displayed colors on the home display and individual bed display can be changed according to the nurse team.

The nurse teams need to be registered in advance under the "Initial Settings" menu.

(☞ "Nurse Team Setup" P13-36)

11 Pacemaker

Select from [Used] / [Not Used].

WARNING

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

- ▶ When [Used] is selected, the monitor will identify the pacemaker pulse and insert an artificial pulse onto the ECG waveform for easy identification. When pacing waveform does not appear (pacing failure), erroneously detecting the pacemaker pulse as QRS will be prevented.

- ▶ The arrhythmia analysis will detect pacing beat as P (Pacemaker Beat) or F (Fusion Beat) to prevent erroneous judgment of VPC.

12 Comment

A comment can be entered.

- ▶ The entered comment can be displayed on the patient information area by selecting [Comment] for "Disp. Item for Patient Info. Area" under [Common Setup > Display Config. > Detail Setup > Other].

- ▶ Pressing the [Fixed Form] key on the "Comment" window will display the comments preprogrammed on "Register Fixed Comment" under [Initial Settings > User I/F > Display/Print]. (☞ Maintenance Manual "Display/Print" P5-11)

Pressing the key next to "Sort" will sort the fixed comments by colors preprogrammed on "Register Fixed

Comment".

REFERENCE

- Maximum of 30 characters can be entered for comment.
- The comment can be entered using the displayed keys and keyboard.

To Enter the Patient Information from the Magnetic Card or Barcode

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

NOTE

- To automatically enter the patient information from the magnetic card or barcode, it is necessary to perform the setup in advance.
(☞ Maintenance Manual "Using the Magnetic Card Reader" P4-16) (☞ Maintenance Manual "Using the Barcode Reader" P4-18)

1 Display the "Admit/Discharge" menu for the patient to perform the admit process.

2 Read the data from the magnetic card or barcode.

- ▶ The acquired patient data will be displayed.

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

- ▶ [Change only patient info.] : Replaces the current patient information with the newly acquired information.
- ▶ [Discharge and admit as new patient.] : Initializes the current patient data/monitoring condition and admits the searched patient as new patient.
- ▶ [Cancel] : Cancels the acquired information.

NOTE

- The item which the information was not acquired from the magnetic card or barcode will be left blank. For the blank item, manually enter the information.
(☞ "Entering the Patient Information" P6-2)

Entering Patient Information from the Patient Data Server

By searching the information on the patient data server, the patient admit/discharge process linked to the electronic medical record (EMR) can be performed.

When a patient data server and magnetic card reader (or barcode reader) are used simultaneously, the information on the patient data server can be searched using the information on the magnetic card (or barcode).

NOTE

- To use the patient data server, it is necessary to perform network setup in advance.
(☞ Maintenance Manual "Patient Data Server" P2-20)

CAUTION

- ♦ The item not acquired from the patient data server will be left blank.
For the blank item, manually input the information.
(☞ "Entering the Patient Information" P6-2)
- ♦ After the information for a new patient is acquired by searching the patient data server, make sure to perform the admit process by pressing the [Discharge and admit as new patient.] key.
- ♦ Do not change the Bed ID of the bedside monitor during monitoring.

REFERENCE

- ♦ The following messages will be displayed in the "New Information" area.
"Searching patient": In process of searching the patient data server.
"No relevant patient information was found for the entered ID.": No relevant patient has been found on the patient server.
"Failed to find patient information for the entered ID."
"Failed to find patient information for the entered ID (Time-out)": Patient information could not be found.

□ When Using the Patient Data Server and Magnetic Card Reader (or Barcode Reader)

1 Display the "Admit/Discharge" menu.

2 Acquire the patient information.

The procedure differs depending on the ON/OFF setting of "Search Patient ID Linked to Magnetic Card Reader (Barcode Reader)" for the patient data server setup.

When [ON] is selected for "Search Patient ID Linked to Magnetic Card Reader (Barcode Reader)"

1 Read the data from the magnetic card or barcode.

- ▶ The searched patient data will be displayed in the "New Information" area.

The screenshot shows a screen titled "Menu > Admit/Discharge > Patient Data Confirmation". It features an "Explanation area" at the top. Below this, there are two main sections: "New Info." and "Current Info.". The "New Info." section displays the following data:

ID:	ID1234567
Name:	FUKUDA
Class.:	Adult
Sex:	
DOB:	1980/03/01
Age:	26
Height (cm):	175.0
Weight (kg):	60.0
BSA(m²):	0.00
Pacemaker:	Not Used

The "Current Info." section displays:

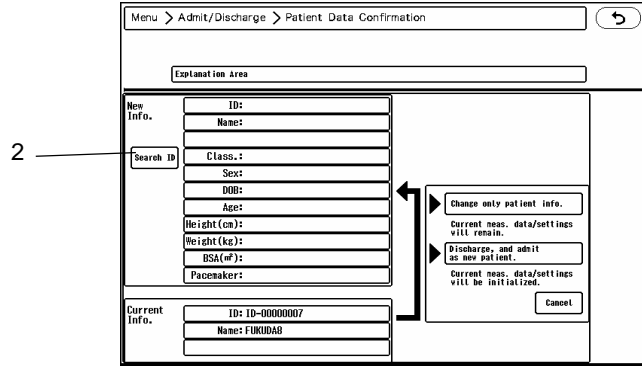
ID:	ID-00000007
Name:	FUKUDAB

To the right of the "New Info." section, there are two buttons: "Change only patient info." and "Discharge, and admit as new patient.". Below these buttons is a "Cancel" button. A message box indicates that current measurement data/settings will remain or be initialized depending on the selected option.

When [OFF] is selected for "Search Patient ID Linked to Magnetic Card Reader (Barcode Reader)"

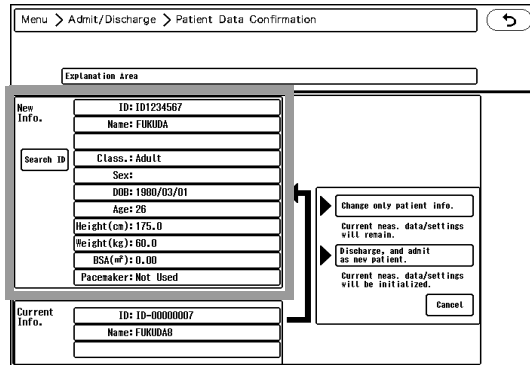
1 Read the data from the magnetic card or barcode.

▶ The read patient data will be displayed.



2 Press the [Search ID] key.

▶ The searched patient data will be displayed in the "New Information" area.



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

- ▶ [Change only patient info.] : Replaces the current patient information with the newly acquired information.
- ▶ [Discharge and admit as new patient.] : Initializes the current patient data/monitoring condition and admits the searched patient as new patient.
- ▶ [Cancel] : Cancels the acquired information.

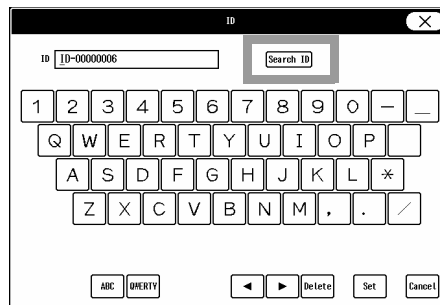
❑ When Using Only the Patient Data Server

1 On the "Admit/Discharge" menu, press the key for "ID".

▶ The "ID" window will be displayed.

2 Use the touch keys or keyboard to enter the ID.

3 Press the [Search ID] key.



- ▶ The searched patient data will be displayed in the "New Information" area.

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

- ▶ [Change only patient info.] : Replaces the current patient information with the newly acquired information.
- ▶ [Discharge and admit as new patient.] : Initializes the current patient data/monitoring condition and admit the searched patient as new patient.
- ▶ [Cancel] : Cancels the acquired information.

To Change the Admit Date

The admit date/time can be changed when a data server is used through the TCP/IP network or when EMR link function is used with the patient data server.

NOTE

- ♦ To change the admit date/time, it is necessary to perform network setup for the data server and the patient data server in advance. (☞ Maintenance Manual "TCP/IP Network" P2-15)

1 Press the key for "Admit Date/Time" on the "Admit/Discharge" menu.

- ▶ The "Admit Date/Time" window will be displayed.

2 Enter the year, month, day, hour, and minute. The future date/time cannot be set.

- 1 Enter the numeric where blue cursor is displayed.
Enter the year, month, day, hour, and minute using the numeric keys.

2 Press the [Set] key.

- ▶ The entered numbers will be finalized.

EMR Link Function

Using the EMR link function through the patient data server allows to perform the following operation.

- ♦ When a patient is admitted on EMR, the same patient will be admitted on the DS-1800 System.
- ♦ When a patient is discharged on EMR, this patient's information on the DS-1800 System will be initialized.
- ♦ When a patient information is changed on the EMR, the patient information on the DS-1800 System will also change.

CAUTION

- If there are items not transmitted from the EMR, change those manually on the "Admit/Discharge" menu. Make sure that the pacemaker usage and patient classification are properly set as these will affect the monitoring accuracy.
- The discharge process on EMR will initialize only the patient information and monitoring data on the central monitor. It will not initialize the alarm settings. To initialize these data, it is necessary to perform discharge process on the central monitor.

NOTE

- To use the EMR link function, it is necessary to select [Link with EMR] on the "Network Configuration (Patient Data Server)".
(☞ Maintenance Manual "Patient Data Server" P2-20)

Restrictions of EMR Link Function

These are the following restrictions when using the EMR link function.

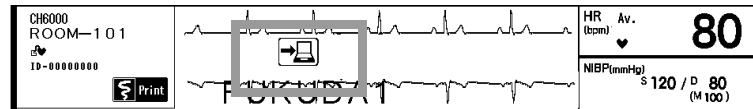
Function	Item	EMR Link Function		
		EMR Admitted	EMR Discharged	EMR Offline
"Admit/Discharge"	ID	No	No	Yes
	Search ID	No	No	No
	Name	No	No	Yes
	Discharge	No	Yes	Yes
	Monitor Suspend	Yes	Yes	Yes
	Admit Date/Time	No	No	Yes
	Bed Name	Yes	Yes	Yes
	Other patient information	Yes	Yes	Yes
	Confirmation window display during reading data from the magnetic card	No	No	Yes
"Menu"	Discharge	No	Yes	Yes
"Menu" (Central)	Bed Transfer	No	No	Yes
DS-LAN Network (Operation on the bedside monitor)	Change of patient ID	No	No	Yes
	Change of patient name	No	No	Yes
	Change of admit date	No	No	Yes
	Other patient information	Yes	Yes	Yes
	Discharge process	No	Yes	Yes

"Yes": Can display, edit, and change settings. "No": Cannot display, edit, and change settings.

Admit/Discharge on the EMR

Connection

When a patient is admitted on the EMR, EMR notice icon will be displayed on the home display.

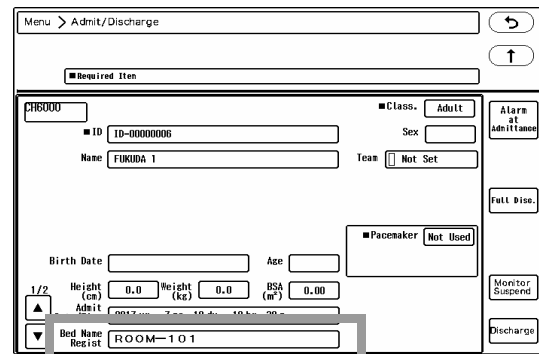


1 Press the EMR notice icon.

- ▶ The "Admit/Discharge" screen will be displayed.
- ▶ The patient's admit date/time on the EMR will be displayed for "Admit Date/Time".

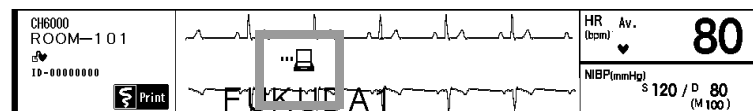
2 The patient information will be acquired from the EMR.

- ▶ The monitoring for the patient will start. When EMR link function is used, patient ID, patient name, and admit date from the EMR cannot be changed on the central monitor, but other patient information can be manually changed.



When a Patient is Discharged from the EMR

When a patient is discharged from the EMR, EMR disconnected icon will be displayed on the home display. On the "Admit/Discharge" screen, the [Discharge] key will become effective to allow discharging the patient.



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

Data Transfer Function

By using the data transfer function, the patient information and settings can be transferred to other monitor with the transport monitor (DS-8007).

While transferring, the review data of up to 24 hours (max. 5 waveforms) can be uploaded to the central monitor and transmitted to the data server.

NOTE

- To use the data transfer function, select [ON] for "Data Transfer" under [Initial Settings>System>Other]. (☞ Maintenance Manual "Data Server" P2-18)
- The uploading process is performed one at a time within one DS-LAN network. If multiple uploading data exist, uploading will be performed one at a time from the earlier data.

CAUTION

- During transferring the patient, do not discharge the patient on the transport monitor.
- While uploading the review data, <Uploading> will be displayed on the central monitor, and <Uploading Data> will be displayed on the host monitor. While uploading, do not disconnect

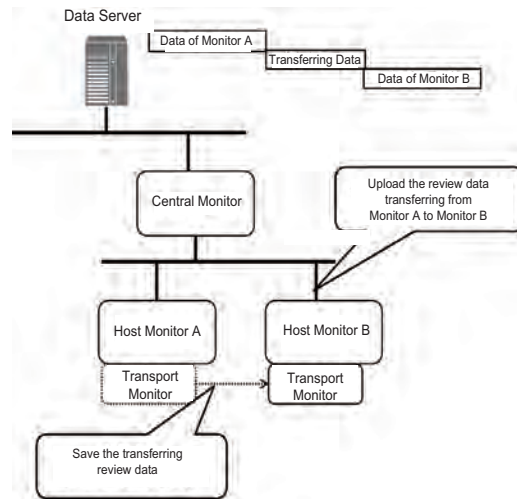
- the transport monitor, or turn OFF the power of the host monitor and central monitor.
- The review data can be transferred only on the DS-LAN III network. On the wireless network, the review data cannot be transferred.
- If the data of the past patient remains on the transport monitor, the review data of the unintended patient may be erroneously uploaded. When the monitoring patient is changed, make sure to discharge the previous patient. On the bedside monitor, it is recommended to set [ON] for "Check Discharge at Power ON" under [Initial Settings].

Example of System Configuration

By transferring the transport monitor, the data will be saved to the central monitor and data server as shown in the illustration.

Central Monitor: DS-8900 System, DS-1700 System, DS-1800 System
 Central Monitor: DS-8400 System, DS-8500 System
 Transport Monitor: DS-8007 System

- In Case of DS-8007, DS-1700, DS-1800
 To use the data transfer function, an optional SD card is required.



Transferable Data

The following data can be transferred.

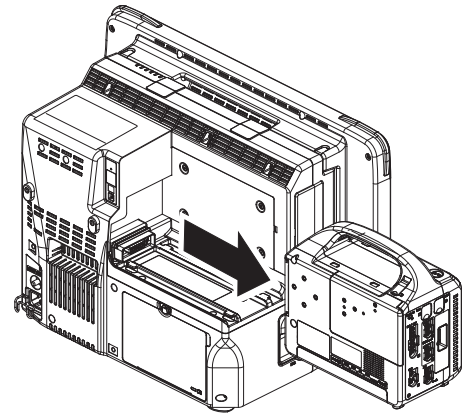
Item	
Graphic Trend	Maximum 24 hours
Tabular Trend	Maximum 24 hours
Recall	Maximum 300 data
Full Disclosure Waveform	Maximum 24 hours, 5 waveforms

When the Patient Temporarily Leaves the Bed

The case when the host monitor is DS-8400 and the transport monitor is DS-8007 is explained below.

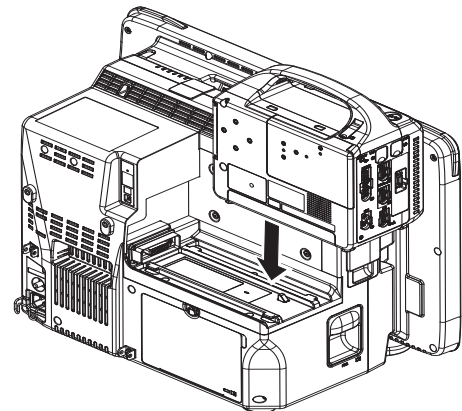
□ When Leaving the Bed

- 1** Disconnect the transport monitor from the host monitor.
- 2** The monitor suspend confirmation window will be displayed on the host monitor.
- 3** If the patient is temporarily leaving, select [Monitor Suspend].



□ When Returning to the Bed

- 1** Connect the transport monitor to the host monitor.
- 2** The review data while transferring will be automatically uploaded to the central monitor.
 - ▶ While uploading the data, <Uploading> will be displayed on the central monitor.
- 3** By selecting [ON] for "Data Transfer" under data server setup, the data will be transferred to the data server after the data is uploaded to the central monitor. While the data is transmitted to the data server, <Transmitting Data> will be displayed on the central monitor.



When the Patient is Transferring to Other Bed

□ When Leaving the Original Bed

- 1** Disconnect the transport monitor from the host monitor.
- 2** The monitor suspend confirmation window will be displayed on the host monitor.
- 3** Press the [Discharge] key.

□ When Transferred to the New Bed

- 1** Connect the transport monitor to the host monitor.
- 2** The "Patient Selection" window will be displayed on the host monitor.

3 Select the patient of the transport monitor.

REFERENCE

- ♦ When [Monitor Patient of This Device] is selected, the patient on the transport monitor will be discharged and the monitoring of the host monitor patient will start.
- ♦ When [Monitor New Patient] is selected, both patients on the host monitor and the transport monitor will be discharged and the monitoring of new patient will start.

4 The patient of the host monitor will be discharged, and the monitoring of the transport monitor will start.

5 The review data while transferring will be uploaded to the central monitor.

- ▶ While uploading the data, <Uploading> will be displayed on the central monitor.
- ▶ If the transport monitor is disconnected during uploading, <Failed to upload.> will be displayed. The message can be cleared by pressing the [Individual Alarm Silence] key on the individual bed display.

6 By selecting [ON] for "Data Transfer" under data server setup, the data will be transferred to the data server after the data is uploaded to the central monitor. While the data is transmitted to the data server, <Transmitting Data> will be displayed on the central monitor.

- ▶ If the transmission to the data server fails, <Chk Data Transfer> will be displayed. The message can be cleared by pressing the [Individual Alarm Silence] key on the individual bed display.

When the Patient is Transferring to Other Bed (When EMR Link Function is Used)

When the EMR link function is used, it is necessary to perform admit/discharge process through the EMR.

When Leaving the Original Bed

1 Disconnect the transport monitor from the host monitor.

2 The monitor suspend confirmation window will be displayed on the host monitor.

3 Select [Monitor Suspend].

4 Discharge the patient through the EMR.

 **CAUTION**

- ♦ Make sure to perform the discharge process after the transport monitor is disconnected. Otherwise, the patient information on the transport monitor will be cleared.

When Transferred to the New Bed

1 If the previous patient information remains on the host monitor, discharge the patient through the EMR.

2 Connect the transport monitor to the host monitor.

3 The review data while transferring will be uploaded to the central monitor.

4 Admit the patient through the EMR.

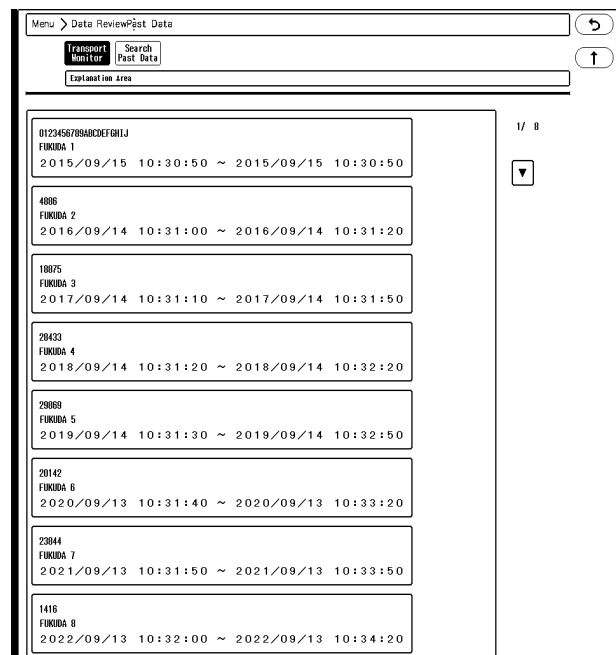
CAUTION

- ♦ Make sure to discharge the previous patient from the host monitor before connecting the transport monitor. Otherwise, the data of the previous and current patients may mix up.

Uploading the Data Manually

If the data cannot be uploaded during transferring, it can be uploaded manually by selecting the saved data on the transport monitor.

- 1 Connect the transport monitor to the host monitor.
- 2 Press [Menu > Past Data] on the individual bed display.
- 3 Select [Transport Monitor] tab.
 - ▶ The data list saved on the connected transport monitor will be displayed.
- 4 Select the data to upload from the list.
 - ▶ The upload confirmation window will be displayed.
 - ▶ If [Cancel] is pressed, the upload process will be canceled and the confirmation window will close.
- 5 Press [OK].
 - ▶ The upload process for the selected data will start.



CAUTION

- ♦ If other uploading is in process within the same DS-LAN network, manual uploading cannot be performed.

Suspend Monitoring

This section explains the procedure to suspend and resume monitoring when a patient temporarily leaves the bed. With this suspend monitoring function, data measurement, alarm generation, automatic measurement, and automatic printing can be suspended without erasing any data and setup condition.

By selecting ON for "Monitor Suspend's Message Selection" on the soft switch menu, different messages in different colors according to the patient's destination can be displayed during monitoring suspend condition.

To remind the user to resume monitoring, alarm will generate after the preprogrammed duration (15min./30min./1hr/1.5hr/2hr) for "Monitor Suspend Time".

By selecting [ON] for "Auto Resume Monitoring", the monitoring will automatically start under the specified condition. (☞ "Condition for Auto Resume Monitoring" P6-17)

CAUTION

- During the monitoring suspended condition, the trend data and full disclosure waveform data will not be acquired.
- Resuming monitoring will also resume the suspended alarm.
- Depending on the model type and software version of the bedside monitor, the moitor suspend/resume operation will not synchronize between the bedside monitor and the central monitor.
 - Suspending/resuming monitoring on the bedside monitor will not suspend/resume monitoring on the central monitor.
 - Similarly, suspending/resuming monitoring on the central monitor will not suspend/resume monitoring on the bedside monitor.
- If monitoring is suspended on the bedside monitor, the data for that patient will not be displayed on the central monitor. If monitoring is resumed on the bedside monitor, the data for that patient will be displayed again on the central monitor.
- The monitor suspend/resume operation on the bedside monitor can be synchronized to the central monitor, but the monitor suspend operation on the central monitor cannot be synchronized to the bedside monitor.
- For details of the bedside monitor which is compatible to synchronizing the monitor suspend operation, contact your nearest service representative.
- When the monitoring is resumed, make sure that the monitoring is also resumed on the central monitor.

REFERENCE

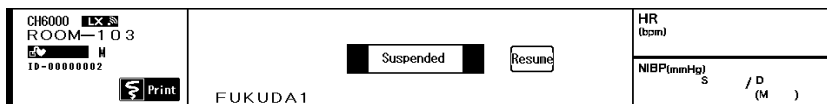
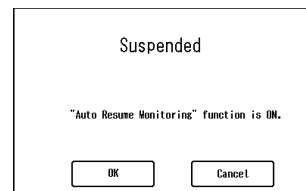
- To display the detailed message during monitoring suspended condition, select ON for "Monitor Suspend's Message Selection", and set the details under [Menu] > [Monitor Suspend] ("Common Setup"). (☞ "Monitor Suspend Setup" P13-35)

To Suspend Monitoring

1 On the "Admit/Discharge" menu, press the [Monitor Suspend] key.

If "Monitor Suspend's Message" is OFF:

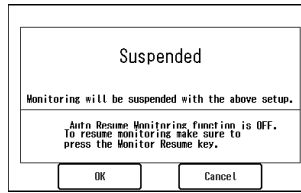
- ▶ The monitor suspend confirmation window will be displayed. (shown on right)
- ▶ To cancel the monitor suspend operation, press the [Cancel] key.
- ▶ Pressing the [Suspend] key will suspend the monitoring, and the [Resume] key will be displayed.



NOTE

- If the "Auto Resume Monitoring" function is set to OFF, pay attention not to forget to resume

monitoring.

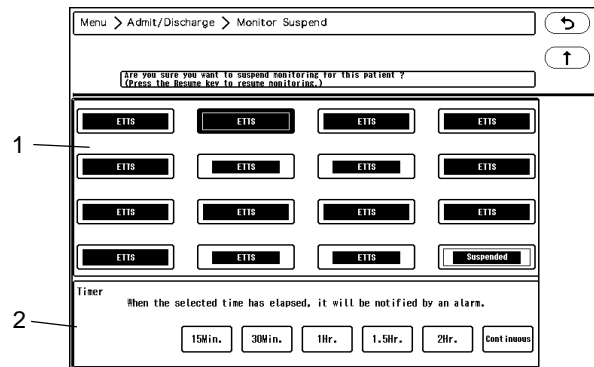
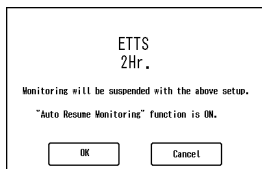


If both "Monitor Suspend's Message" and "Monitor Suspend Time" are ON:

- ▶ The "Suspend" screen will be displayed.

- 1 Select the label to be displayed during the monitoring suspended condition.
- 2 Select the monitoring suspend duration from [15Min.]/[30Min.]/[1Hr.]/[1.5Hr.]/[2Hr.]. [Continuous] will start to suspend monitoring without setting the duration.

- ▶ Confirmation window to suspend monitoring will be displayed.



- ▶ Pressing the [Suspend] key will suspend the monitoring.

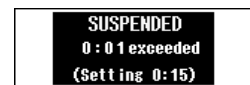
- 3 Verify that the monitoring is suspended on the home display. The selected label with the set color will be displayed on the home display.

- ▶ On the home display, the time will start counting for the set duration.



- ▶ When the preprogrammed duration completes, alarm will generate.

- ▶ When the preprogrammed duration completes, monitor suspended alarm generates, and the elapsed time from alarm generation will be highlighted in red and black. (shown on right)



- ▶ (Event) key will be displayed, alarm sound will generate (4 sec. interval), and alarm indicator will light.

REFERENCE

- ♦ To extend the monitoring suspended duration, press to display the timer selection.

NOTE

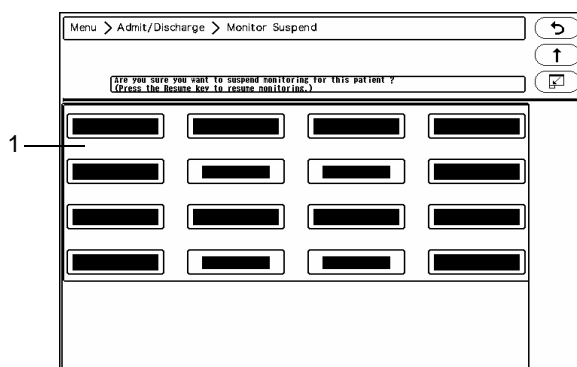
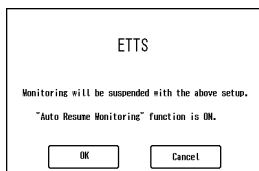
- ♦ If the "Auto Resume Monitoring" function is set to OFF, pay attention not to forget resume monitoring.
- ♦ The monitoring suspended elapsed time will be displayed as "hour: minute" and, the number of seconds will be rounded up. Ex.) When the elapsed time is 30 seconds, it will be displayed as "0:01".

If "Monitor Suspend's Message" is ON and "Monitor Suspend Time" is OFF:

- ▶ The "Suspend" screen will be displayed.

1 Select the monitor suspend's message.

- ▶ A confirmation message will be displayed.



- ▶ Pressing the [Suspend] key will suspend the monitoring.
- ▶ The selected monitor suspend's message with the set color will be displayed on the home display.

To Resume Monitoring

Resume the monitoring.

By selecting [ON] for "Auto Resume Monitoring", the monitoring will automatically start under the specified condition. (☞ "To Resume Monitoring Automatically" P6-16)

1 Press the [Resume] key on the home display.

- ▶ The monitoring will resume.



- ▶ The monitoring can be also resumed by pressing the [Monitor Resume] key displayed on the "Admit/Discharge" screen of the Individual Bed Display.

To Resume Monitoring Automatically

The auto resume monitoring function can be used when the patient temporarily leaves the bed.

When the specified condition for ECG, SpO₂, etc. is met, the monitoring will automatically resume after the preprogrammed duration.

The following initial settings are required in advance.

- ♦ Auto Resume ON/OFF
- ♦ Auto Resume Disable Duration (OFF/5 min./10 min./15 min.)
- ♦ Resume even during Lead-Off (Enable/Disable)
- ♦ Auto Resume Duration (10 sec./30 sec./1 min./2 min./3 min./4 min./5 min.)

REFERENCE

- ♦ Refer to ☞ Maintenance Manual "Other" P5-9 for procedure on initial settings.

□ Condition for Auto Resume Monitoring

The operation from suspend monitoring to automatically resume monitoring is explained below.

- ♦ The monitoring will not automatically resume until the set duration for "Auto Resume Disable Duration" (OFF/5 min./10 min./15 min.) is elapsed.
- ♦ The monitoring will resume after the set "Auto Resume Disable Duration" elapses, and when the following condition is met for the set "Auto Resume Duration" (10 sec./30 sec./1 min./2 min./3 min./4 min./5 min.).

Condition to Automatically Resume Monitoring

The monitoring will resume when the condition of telemetry reception/DS-LAN connection is good, and either one of ECG, RESP, SpO₂, SpO₂-2, NIBP, BP1, BP2, TEMP1, TEMP2, CO₂ meets the specified condition.

Measurement Status	Resume Condition
Telemetry Reception/DS-LAN Connection	Normal Condition
ECG	[Enable] is set for "Resume even during Lead-Off": Resumes monitoring even during the lead-off condition when the measurement is started. [Disable] is set for "Resume even during Lead-Off": Monitoring will not resume during the lead-off condition even if the measurement is started.
RESP	[Enable] is set for "Resume even during Lead-Off": Resumes monitoring even during the lead-off condition when the measurement is started. [Disable] is set for "Resume even during Lead-Off": Monitoring will not resume during the lead-off condition even if the measurement is started.
SpO ₂ , SpO ₂ -2	The measurement is started, and SpO ₂ disconnected condition is not detected.
NIBP	The measurement data is updated.
BP	The measurement is started.
TEMP1, TEMP2	The measurement is started.
CO ₂	The measurement is started.

NOTE

- ♦ When the [Resume] key is pressed, the [Resume] key operation will be prioritized.

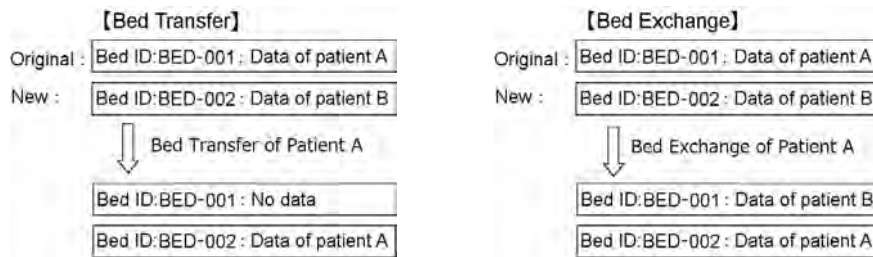
Bed Transfer and Bed Exchange

By using the bed transfer/exchange function, patient information and monitoring data can be transferred/exchanged between beds.

The bed transfer/exchange operation can be performed under the "Function" menu of the Central Monitor Display. (☞ "Bed Transfer/Bed Exchange" P13-9)

Bed Transfer: The setup data of the original bed will be overwritten to the setup data of the new bed. The original bed will be treated as discharged bed, monitoring data will be cleared and setup data will be initialized.

Bed Exchange: The setup data of the original bed and the new bed will be exchanged.



By performing central monitor communication setup, transfer/exchange of patient information and alarm settings among several central monitors can be performed through the TCP/IP network.

NOTE

- The review data cannot be transferred/exchanged among the different central monitors. The review data can be transferred/exchanged within the same central monitor.
- The review data saved on the original central monitor can be viewed via TCP/IP network. (☞ "Review Data Display for Transferring Patient" P9-23)
- The bed transfer is possible between the central monitors of the same model type. The bed transfer/exchange with other central monitor is not possible.

Discharge

The patient information, monitoring data, monitoring condition will be cleared to prepare for monitoring the next patient. The following data will be cleared after the discharge procedure.

- Patient information entered during the admit procedure (patient name, pacemaker used/not used, etc.)
- Patient monitoring data (trend data, recall waveform, etc.)
- Setup data changed during monitoring

CAUTION

- When a EMR link function is used, the discharge operation cannot be performed.

NOTE

- The alarm limit will be initialized to the value set under [Menu] > "Initial Settings" > [Admit] ("User I/F") > [Alarm]. (☞ Maintenance Manual "Admit" P5-14)
- When the discharge operation is performed on the bedside monitor, the settings will be initialized according to the "Power ON/Discharge" setting on the bedside monitor.

REFERENCE

- The monitoring condition after discharge can be selected from [Admit] or [Suspend] for "Setup at Discharge" under [Menu] > "Initial Settings" > [Display/Print] ("User I/F"). (☞ Maintenance Manual "Display/Print" P5-11)

Discharging Procedure

CAUTION

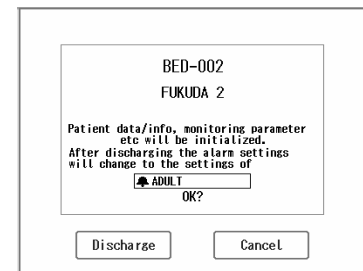
- ♦ If monitoring of new patient is started without discharging the previous patient, the measurement data of the previous and new patient will become mixed up on the recall and trend data.
 - ♦ When the discharge procedure is performed, patient data such as recall and trend will be initialized. The parameter and alarm will be reset according to the settings made under [Menu] > "Initial Settings" > [Admit] ("User I/F").
(☞ Maintenance Manual "Admit" P5-14)
-

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

- ▶ The discharge confirmation window will be displayed.
- ▶ If [Cancel] is pressed, the discharge process will be canceled and the confirmation window will close.

2 Press the [Discharge] key.

- ▶ The patient data, patient information will be initialized.
- ▶ The alarm settings will be initialized to the settings made under [Menu] > "Initial Settings" > [Admit] ("User I/F").



Chapter 7 Alarm Function

General Description

CAUTION

- For the wired network bed, alarm judgment and arrhythmia analysis are not performed on this central monitor. The judgment results displayed on this central monitor are received from the bedside monitor and telemetry receiver. However, the device status alarm of the central monitor is judged on this device.
- For the RF Bed, alarm judgment are performed on this central monitor based on the waveform and numeric data received from the telemeter.
- On a wired network (DS-LANIII), the alarm generated on the bedside monitor will be transmitted to this device with maximum of 5 seconds delay (at NIBP alarm generation).
- On a wireless network, the alarm generated on the bedside monitor will be transmitted to this device with maximum of 15 seconds delay.
- The adjustable alarm limit increments are different for the DS-1000 series, DS-8000 series, and DS-7000 series monitors. Therefore, the set alarm limit may change to the adjustable value depending on the monitor type constructing the network system.
- The alarm messages will be displayed in descending order of priority. For the same alarm level, the alarm message for the newer alarm will be displayed. However, arrhythmia alarm will be displayed according to their priority.
- For the SV-900, ventilator alarm factor will not be notified to the central monitor.
- Depending on the bedside monitor type and software version, the ventilator alarm factor may not be transmitted to the central monitor.
For details of the bedside monitor type and software version, refer to your nearest service representative.
- The alarm message for the arrhythmia alarm (except Tachy, Brady, Ext Tachy, Ext Brady) will continue to be displayed for 30 seconds even after the alarm condition dissolves.
- During arrhythmia learning, arrhythmia alarm other than Asystole, VF, Pause, Tachy, Brady, Ext Tachy, Ext Brady will not generate.
- If "Suspend Arrhy. Analysis during Noise Interference" is set to [ON] under [Initial Settings > Alarm Setup], the <Cannot analyze> alarm will generate when analysis is suspended for 30 seconds and longer.
- Even when the <Cannot analyze> alarm is generated, alarms for HR, Asystole, VF, Tachy, Brady, Ext Tachy, Ext Brady will generate.

NOTE

- On the full disclosure waveform display, the arrhythmia occurrence point will be displayed 7 seconds before the actual arrhythmia occurrence. (Excluding Asystole, Tachy, Brady, Ext Tachy, Ext Brady)
- The settings of the arrhythmia alarm and numeric data alarm which are not supported on the bedside monitor or telemetry receiver will not be displayed on the central monitor.

REFERENCE

- The alarm sound can be turned ON on the "Tone/Volume" menu.
(☞ "Tone/Volume" P13-33)
- On the "Alarm Setup" under the "Initial Settings" menu, detailed alarm setup can be performed.

This setup should be performed by our service representative or system administrator of your institution.

(🔗 Maintenance Manual "Alarm" P5-2)

Classification and Level of the Alarm

The classification and level of the alarms are explained below.

☐ Alarm Classification

The alarms displayed on this device are classified as follows.

Alarm Classification	Description
Physiological Alarm	Alarms generated based on physiological information Includes numeric data alarms and arrhythmia alarms.
Arrhythmia Alarm	Alarms based on arrhythmia analysis. (Ex.: Asystole, VF)
Numeric Data Alarm	Alarms based on numeric data. (ex.: Upper HR, Lower BP1)
Device Alarm	Alarms based on measurement status. Includes alarms of arrhythmia status, measurement status, external device.
Arrhythmia Status	Arrhythmia analysis condition such as noise, etc. (Ex.: ECG Low, ECG Artifact)
Measurement Status	Measurement status condition such as noise, etc. (Ex.: Lead-OFF, Check SpO ₂ Sensor)
External Device Alarm	Alarms output from external device. (Ex.: Ventilator Alarm)
System Status	Alarms related to the main unit and connected device. (Ex.: Check PHS comm., Check Data Server Comm.)
Printer Status	Alarms related to printer. (Ex.: Check Cassette)

☐ Alarm Level

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

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		Description	Color of Text/Background
Top Priority	S	Top Priority Alarm	Red, White/White, Red
High Priority	H	Life Threatening Alarm	White/Red
Medium Priority	M	Cautionary Alarm	White/Yellow
Low Priority	L	Status Alarm	White/Blue
Notification	N	Notification Alarm	White/Gray

CAUTION

- Level S alarm can be selected only when [Fukuda Tone] is selected for "Alarm System".
- When more than one alarms of the same alarm level are generated, the newer alarm message will be displayed. However, arrhythmia alarm will be displayed according to their priority. (🔗 "Arrhythmia Priority" P7-8)

Alarm System

The alarm system can be selected from Fukuda Tone/Melodic Tone/IEC Tone.

The default setting is IEC Tone mode.

The alarm sound differs for each alarm system.

(☞ "Settings for Each Alarm System" P17-8)

REFERENCE

- ◆ The alarm system can be set on the "Alarm Setup" under the "Initial Settings" menu.
(☞ Maintenance Manual "Alarm" P5-2)

IEC Tone

Alarm Priority, Level		Description	Burst Interval
High Priority	H	Life Threatening Alarm	About 2.5 sec.
Medium Priority	M	Cautionary Alarm	About 3.5 sec.
Low Priority	L	Status Alarm	About 17 sec.

IEC tone complies with the IEC 60601-1-8.

Melodic Tone

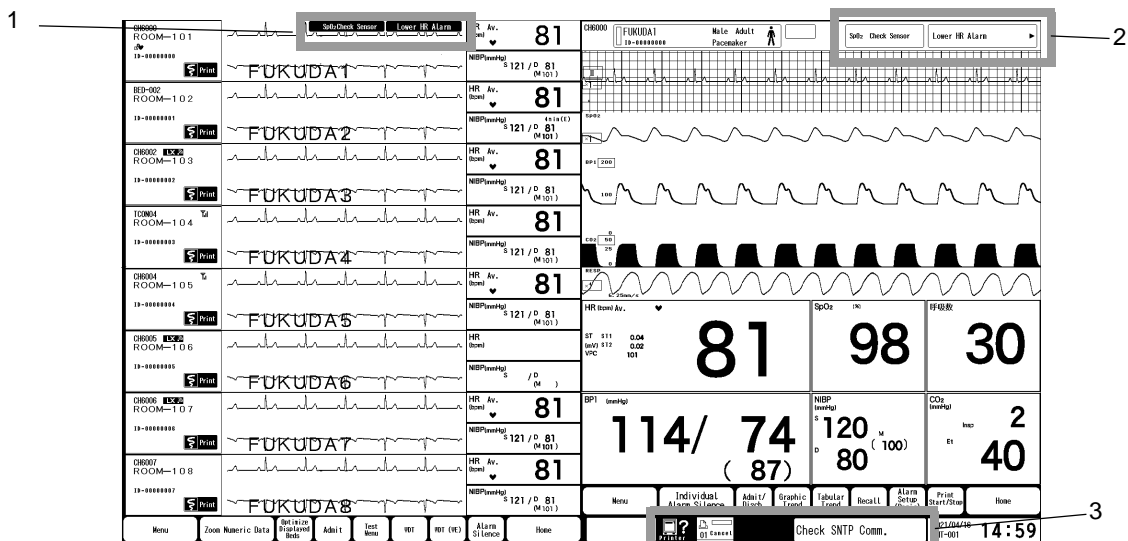
Alarm Priority, Level		Description	Burst Interval
High Priority	H	Life Threatening Alarm	About 2.5 sec.
Medium Priority	M	Cautionary Alarm	About 3.5 sec.
Low Priority	L	Status Alarm	About 17 sec.

Fukuda Tone

Alarm Priority, Level		Description	Burst Interval
Top Priority	S	Top Priority Alarm	Continuous
High Priority	H	Life Threatening Alarm	Continuous
Medium Priority	M	Cautionary Alarm	About 3.5 sec.
Low Priority	L	Status Alarm	About 17 sec.

Alarm Message Display Area

The alarm messages will be displayed in the area shown below.



1 All Beds Display Message Area

The messages such as device alarm, vital alarm, alarm silence, alarm suspend, etc. will be displayed. If more than one alarms generate at the same time, the alarm messages will be displayed alternately in 2-seconds intervals. In such case, ► mark will be displayed on the right side of the message.

2 Individual Bed Display Message Area

The messages such as device alarm, vital alarm, external device alarm, alarm silence, alarm suspend, etc. will be displayed.

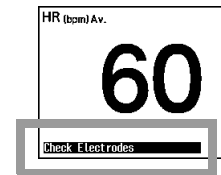
If more than one alarms generate at the same time, the alarm messages will be displayed alternately in 2-seconds intervals. In such case, ► mark will be displayed on the right side of the message.

3 System Status Area

The system status message, printer status message will be displayed.

4 Numeric Data Box Message Area

The vital alarm, device alarm of each parameter will be displayed inside the corresponding numeric data box. (shown on right)



Alarm Limit Setup

Alarm Limit Setup for Each Parameter

ON/OFF of alarm and upper/lower alarm limit for each parameter can be set. When the set limit is exceeded, an alarm will generate.

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.
- If the parameter is not selected for the "HR/PR Alarm Source" (ECG/SpO₂/BP) on a wired network bedside monitor, the alarm for that parameter will be set to OFF on this device. For applicable bedside monitors, contact your nearest representative.
Example:
If SpO₂ is set as the HR/PR alarm source on the bedside monitor, HR alarm will be OFF on this device.
Even if alarm ON/OFF setting or threshold is changed, it will automatically turn OFF after 3 seconds.

CAUTION

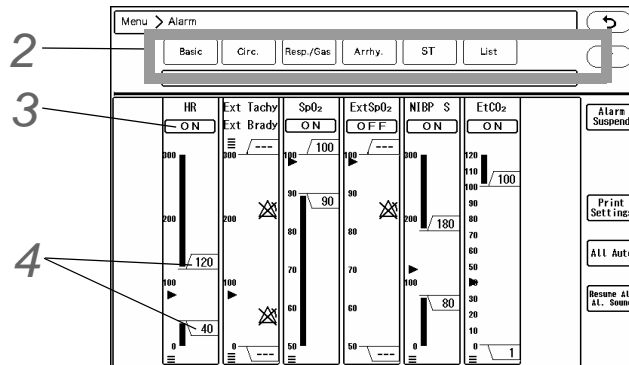
- On a wired network (DS-LANIII), the alarm generated on the bedside monitor will be transmitted to this device with maximum of 5 seconds delay (at NIBP alarm generation).
- On a wireless network, the alarm generated on the bedside monitor will be transmitted to this device with maximum of 15 seconds delay.

NOTE

- The adjustable alarm limit range for this device and the bedside monitor may differ.
Example:
Upper alarm limit of 300 bpm can be set for PR on this device, but there are some bedside monitors which can measure only up to 250 bpm. In such case, there is a possibility of setting the alarm limit exceeding the measurement range of the bedside monitor.
When setting the alarm limit on this device, make sure to set it within the measurement range of the bedside monitor.

1 Press the [Menu] > [Basic] ("Alarm") keys on the Individual Bed Display.

- The alarm setup menu will be displayed.



REFERENCE

- The standard parameters will be displayed on the Menu screen. The parameters to be displayed here are selectable.
(☞ Maintenance Manual "Alarm" P5-2)

2 Select the parameter group from the tab.

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.

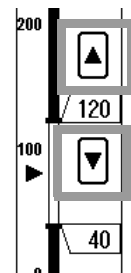
4 Set the upper/ lower limit. ▶ indicates the current measurement value.

1 Slide the $\overline{\text{xxx}}$ / ∇xxx keys on the right side of the bar.

- ▶ $\overline{\text{xxx}}$: Adjusts the upper limit.
- ▶ ∇xxx : Adjusts the lower limit.
- ▶ By releasing the finger from the key, fine-tune keys will appear for a fixed period of time. (shown on right)

2 The limits can be adjusted using the fine-tune keys.

3 Press the **Auto** key to set the limits automatically.



REFERENCE

- For the alarm limit range for each parameter, refer to ☞ "Alarm Limit Range for Each Parameter" P17-9.
- The set alarm limits on the DS-1800 System will be retained even after the power is turned OFF.
- When the discharge operation is performed on the central monitor, the alarm limits will be reset according to the settings made under [Initial Settings > User I/F > Admit > Alarm].

(☞ Maintenance Manual "Admit" P5-14)

When the discharge operation is performed on the bedside monitor, the alarm limits will be reset according to the settings made on the bedside monitor.

- For ST level alarm setup, refer to ☞ "ST Setup" P8-3.
- By setting the alarm threshold limit ("Initial Settings") in advance, the alarm threshold can be limited within the preprogrammed range. When the alarm threshold limit function is enabled, the limit range will be indicated on the bar. (☞ Maintenance Manual "Alarm" P5-2)
- "Alarm Auto Setup" function can be disabled. (☞ Maintenance Manual "Alarm" P5-2)

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.

When all arrhythmia alarm is set OFF, <ARRHY OFF> message will be displayed.

☐ Arrhythmia Alarm

NOTE

- For the alarms such as "Asystole", "Run", "Pause", "Frequent", threshold levels needs to be set. Other than ON/OFF of alarm, set also the threshold levels.

Arrhythmia Detection Level Setting

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

Item	Description
R on T	200 ms to 600 ms
SVT	2 beats to 10 beats
AFib	1% to 100%
Irregular RR	10, 15, 20%
S Frequent	1 bpm to 50 bpm
Pacer Not Capture	80 ms to 480 ms
Pacer Not Pacing	20 bpm to 200 bpm

1 Press the [Menu], [Arrhy.] ("Alarm") key on the Individual Bed Display.

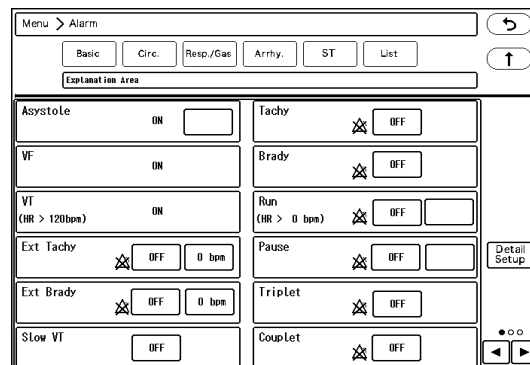
- ▶ The arrhythmia alarm setup screen will be displayed.

2 Set the detection level.

Set using the dropdown list, numeric keys, or displayed key selection.

3 Select ON/OFF for the alarm.

- ▶ [ON]: Alarm will generate.
- ▶ [OFF]: Alarm will not generate.



NOTE

- ♦ Asystole, VF, VT alarm cannot be turned OFF.

□ Arrhythmia Alarm Detail Setup

On the "Detail Setup" of arrhythmia alarm, HR Lower Limit for VT/RUN/SVT and AFib alarm clear time can be set.



⚠ CAUTION

- ♦ The settings for the "HR Lower Limit for VT", "HR Lower Limit for Run", "HR Lower Limit for SVT" will be compared with the average HR of continuous VPC. Therefore, the displayed HR value at alarm generation may be lower than the settings if it is just after the VT detection, or if RUN with few continuous VPC is detected.



1 Press the [Detail Setup] key on the arrhythmia alarm setup screen.

2 For "HR Lower Limit for VT", set the VT analyzing condition for the arrhythmia analysis.

- ▶ When the average HR of continuous VPC exceeds the set value, VT alarm will generate.
- ▶ If the HR is 100 bpm or above, and the average HR of continuous VPC is below the set value, Slow_VT will generate.


3 Set the "HR Lower Limit for Run". Set the detection level using  /  keys.


- ▶ When the average HR of continuous VPC exceeds the set value, Run alarm will generate.

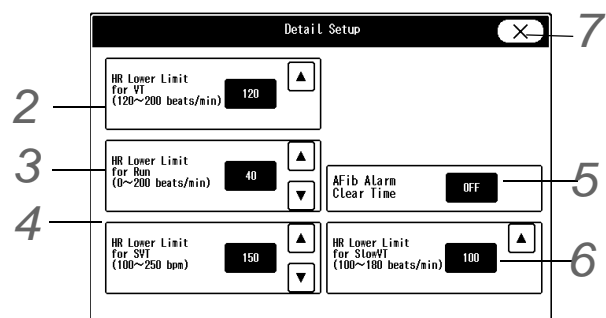
4 Set the "HR Lower Limit for SVT". Set the detection level using  /  keys.

- ▶ When the average HR of continuous VPC exceeds the set value, SVT alarm will generate.

5 Select "AFib Clear Time" from [OFF] / [30] / [60] seconds.

6 Set the "HR Lower Limit for SlowVT". Set the detection level using  key.

7 After the setting, press the  key and close the window.



□ To Perform Arrhythmia Learning

Learning the normal ECG largely affects the accuracy of arrhythmia analysis.

When arrhythmia or QRS is misjudged, using the arrhythmia learn function will recover the original accuracy. Arrhythmia learning will be performed for about 20 beats for the normal ECG, but it may take longer if the heartbeat is unstable.

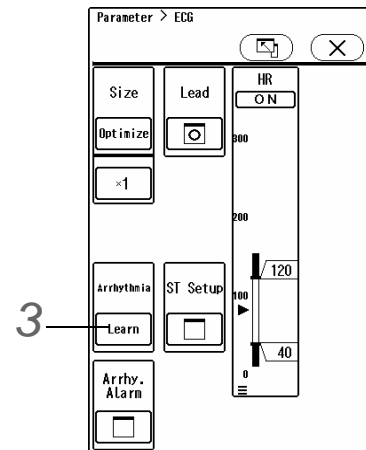
During the arrhythmia learning procedure, arrhythmia alarm other than Asystole, VF, Pause, Tachy, Brady, Ext Tachy, Ext Brady will not generate.

The arrhythmia learning can be performed from the "ECG" screen or from the [Arrhythmia Relearn] key preprogrammed as user key on the central monitor display.

(☞ "User Key Display on the Numeric Data Box" P13-6)

Procedure from the "ECG" Screen:

- 1 Select the patient to perform the arrhythmia learn process by pressing the bed selection area.
- 2 Press the HR numeric data box.
 - ▶ The ECG floating window will be displayed.
- 3 Press the [Learn] key for "Arrhythmia".
 - ▶ Arrhythmia learning will start.
 - ▶ During the arrhythmia learn process, the key will be displayed in blue. Pressing the key while learning arrhythmia will not stop the learning.
 - ▶ During arrhythmia learning, <LEARN> will be displayed.
 - ▶ When the learn process is completed, the message will disappear.



NOTE

- If [Used] is selected for "Pacemaker", the [Learn] key will not change to blue and <LEARN> will not be displayed, but the learning process will be performed.
- Pressing the key while arrhythmia learning is in process will not stop the process.

Procedure from the Central Monitor User Key:



- 1 Press the [Arrhythmia Relearn] key on the central monitor user key area.
 - ▶ [Arrhythmia Relearn] will be displayed on the all beds display area.
- 2 Press the [Arrhythmia Relearn] key on the all beds display area.
 - ▶ Arrhythmia learning for that bed will start.
 - ▶ During arrhythmia learning, a message will be displayed.
 - ▶ When the learn process is completed, the message will disappear.
- 3 To clear the [Arrhythmia Relearn] key for the bed which arrhythmia learning was not performed, press again the [Arrhythmia Relearn] key on the central monitor user key area.

Asystole, VF, VT Alarm, Ventilator Alarm

To not miss any life-threatening alarm, Asystole, VF, VT alarm, ventilator alarm can be set so that they cannot be turned OFF. (Default: Always ON)
 This setup should be performed by our service representative or system administrator of your institution.
 (☞ Maintenance Manual "Alarm" P5-2)

Arrhythmia Priority

- Arrhythmia alarms are displayed according to the predetermined priority of their classification (VPC, tachycardia, and bradycardia) to avoid missing any critical arrhythmias.
- The arrhythmia alarm will be displayed according to the alarm level and arrhythmia priority.

- ♦ If arrhythmia alarms of the same alarm level and same category generate at the same time, the alarm of the higher arrhythmia priority will be displayed.
- ♦ If arrhythmia alarms of the same alarm level and different category generate at the same time, the newer alarm will be displayed.

REFERENCE

- ♦ The alarm level can be changed. (Maintenance Manual "Alarm" P5-2)

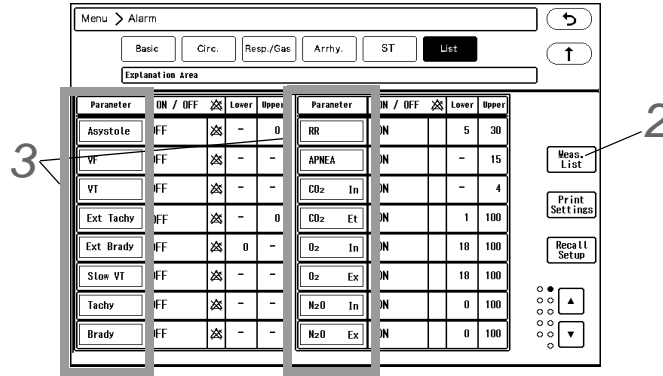
Alarm Level	VPC	Tachycardia	Bradycardia
S	None (Can be set only when the alarm system is "Fukuda Tone" .)		
H	Asystole		
	VF		
	VT		
	Ext Tachy		Ext Brady
M	SlowVT	Tachy	Brady
	Run	SVT	Pause
	-	AFib	
L	Triplet	S Couplet	Pacer Not Capture
	Couplet	S Frequent	Pacer Not Pacing
	R on T	S VPC	Prolonged RR
	Multiform	Irregular RR	
	Vent Rhythm		
	Bigeminy		
	Trigeminy		
	Frequent		
VPC			




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 on the individual bed display.

▶ The alarm settings list will be displayed.



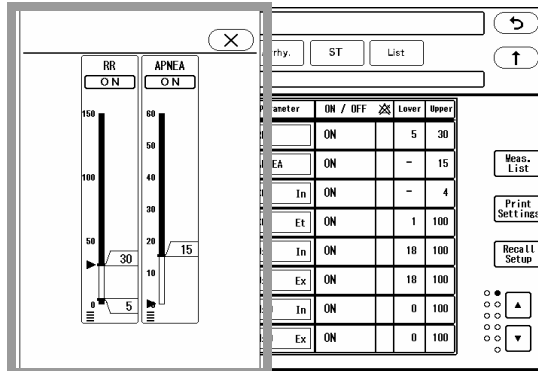
- : Indicates the alarm printing is set for the parameter.
- : Indicates the parameter is set as recall factor.
- : Indicates the alarm is OFF.

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 To change the alarm threshold, select the parameter.

▶ The alarm setup window will be displayed.



▶ Press $\overline{\text{xxx}}$ / $\overline{\text{xxx}}$ to set the threshold level.

All Beds Alarm Settings

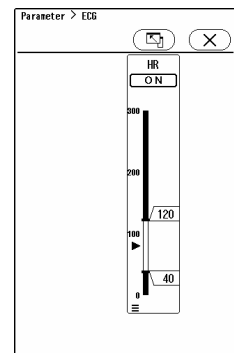
The alarm settings for all beds can be verified in a list format.
 Maximum of 8 beds, 10 parameters can be displayed on one display.

1 Press the [Menu], [All Beds Alarm] ("Function") keys.

- ▶ The alarm settings for all beds will be displayed.

	Tachy	Brady	HR	SpO2	PR_SpO2	SpO2	SpO2-2	PR_SpO2-2	SpO2-2	NI/BP	S
CR8888 ROOM-101 FUKUDA1	-	-	120	100	120	40	100	120	40	180	112
CR8882 ROOM-103 FUKUDA3	-	-	120	100	120	40	100	120	40	180	112
CR8884 ROOM-105 FUKUDA5	-	-	120	100	120	40	100	120	40	180	112
CR8887 ROOM-108 FUKUDA8	-	-	120	100	120	40	100	120	40	180	112
CR8889 ROOM-109 FUKUDA9	-	-	120	100	120	40	100	120	40	180	112
CR8911 ROOM-111 FUKUDA11	-	-	120	100	120	40	100	120	40	180	112
CR8911 ROOM-112 FUKUDA12	-	-	120	100	120	40	100	120	40	180	112
CR8912 ROOM-113 FUKUDA13	-	-	120	100	120	40	100	120	40	180	112

- ▶ For each parameter, upper/lower alarm limit, current value, alarm OFF icon, nurse call mark will be displayed.
- ▶ Pressing the parameter area will display the floating window for the corresponding parameter. (shown on right)
The alarm settings (upper/lower limit, ON/OFF) can be changed.



- Use the ◀ / ▶ keys to change the displaying parameters.
- The beds to be displayed can be filtered.
 - ▶ [This Display]: The beds monitored on the display unit currently used will be displayed.
 - ▶ [Other Display]: The beds monitored on the other display unit will be displayed.
 - ▶ [Nurse Team]: The beds registered for the selected nurse team will be displayed.
- The parameters to be displayed can be filtered.
 - ▶ Select from [Basic]/[Circ.]/[Resp./Gas]/[Arrhy.]/[ST]/[ST/QTc]/[ΔST/QTc]/[List]/[Priority (Top)]/[Priority (High)]/[Priority (Med.)]/[Priority (Low)].
- The specific parameters can be highlighted.
 - ▶ [Alarm ON]/[Alarm OFF]: The parameter which the alarm is set to ON or OFF will be highlighted.
 - ▶ [Nurse Call ON]/[Nurse Call OFF]: The parameter which the nurse call is set to ON or OFF will be highlighted.
 - ▶ [OFF]: The highlight display will be canceled.
- The currently displayed data will be printed on the laser printer.

NOTE

- ♦ If a laser printer is not connected, [Print] key will not function.

- Use the ▲ / ▼ keys to change the displaying beds.

Alarm Occurrence





When the measurement data exceeds the alarm limit, or when arrhythmia is detected, or when connection failure of the devices occur, the alarm will be notified by message and sound.

- ◆ When an alarm occurs, the numeric data will be displayed in reversed color or in 3D depending on the setting. (Default: Reversed)
(☞ "Detail Setup" P13-6)
- ◆ The waveform background will light in the color corresponding to the alarm priority. (Default: Lighting)
(☞ Maintenance Manual "Alarm" P5-2)
- ◆ Alarm indicator will light. The flashing pattern can be changed.
(☞ Maintenance Manual "Alarm" P5-2)
- ◆ The event key will be displayed on the home display for the alarm generated bed. By pressing the event key, the alarm can be silenced for that bed.
- ◆ When more than one alarms are generated, the higher priority alarm will be displayed according to the alarm level.
- ◆ If the alarm level is same, the newer alarm will be displayed. However, arrhythmia alarm will be displayed according to their priority.

☐ Event Key Display

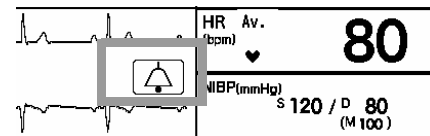
The event key will be displayed on the home display for the alarm generated bed.

The event key icon differs depending on the alarm status.

Status	Event Key Icon	Operation
During Alarm Generation (Alarm Sound ON)		Pressing this event key will silence the alarm sound and displays the event list.
During Alarm Generation (Alarm Sound Suspended)		Pressing this event key will display the event list.
End of Alarm Generation (Unchecked), During Monitor Suspend Timer/Too Far Alarm		When the monitoring is suspended, pressing this event key will extend the suspended duration. When the Too Far alarm is generated, pressing this event key will display the "Too Far Alarm Silence" window. (☞ "Too-Far Alarm" P7-17)
Alarm Suspend		This key is only for display and will not function.

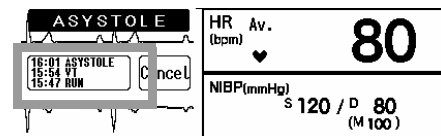
☐ Event Key Operation

1 When a parameter alarm is generated, the event key will be displayed on the home display.



2 By pressing the event key, the event list will be displayed and alarm will be silenced for the corresponding bed.

- ▶ On the event list, 3 latest alarm factor will be displayed.



3 Pressing the event list will display the recall screen.

- (☞ "Recall" P9-10)

□ Alarm Printing

At alarm generation, the waveform or numeric data of the alarm factor can be printed automatically. When the printer is in "Paper Out" or "Check Cassette" condition, the alarm printing will be in standby state. Also, if alarm generates simultaneously at more than one beds, the data that could not be printed will be in standby state.

1 data per bed can be in standby state for alarm printing. The alarm printing will not be performed for the alarm generated during the standby state.

REFERENCE

- ♦ The alarm printing setup can be performed on the "Print Settings". (☞ "Alarm Printing Setup" P12-3)

□ Storing the Alarm Factor as Recall Data

At alarm generation, the waveform or numeric data of the alarm factor can be stored as recall data and can be used for later review.

(☞ "Recall" P9-10)

□ Nurse Call System

By connecting the nurse call system to this device, the alarm generation can be notified to the nurse call system. PHS nurse call system can be connected to this device.

(☞ Maintenance Manual "Nurse Call System" P4-4)

The alarm factors to be notified to the nurse call system can be selected from the following.

- | | | | |
|----------------|-----------------------|-----------------------|--------------------|
| ♦ HR | ♦ ST1 | ♦ ST2 | ♦ BP1 to BP8 |
| ♦ NIBP | ♦ SpO ₂ | ♦ PR-1 | ♦ RR |
| ♦ Apnea | ♦ EtCO ₂ | ♦ InspCO ₂ | ♦ T1 to T8 |
| ♦ Asystole | ♦ VF | ♦ VT | ♦ Slow VT |
| ♦ Run | ♦ Couplet | ♦ Pause | ♦ Bigeminy |
| ♦ Trigeminy | ♦ Frequent | ♦ Tachy | ♦ Brady |
| ♦ Ext Tachy | ♦ Ext Brady | ♦ Triplet | ♦ R on T |
| ♦ Multiform | ♦ Vent Rhythm | ♦ SVT | ♦ AFib |
| ♦ Irregular RR | ♦ Prolonged RR | ♦ S Frequent | ♦ S Couplet |
| ♦ VPC | ♦ S VPC | ♦ Pacer Not Capture | ♦ Pacer Not Pacing |
| ♦ 12-Lead ST | ♦ SpO ₂ -2 | ♦ PR-2 | ♦ SpCO |
| ♦ SpMet | ♦ SpHb | ♦ SpCO-2 | ♦ SpMet-2 |
| ♦ SpHb-2 | ♦ MV | ♦ PEAK | ♦ PEEP |
| ♦ PR-IBP | ♦ Ventilator | ♦ Too Far | ♦ Check Electrode |
| ♦ SI, RPP | | | |

WARNING

- ♦ The PHS nurse call system should be used as supplementary function of alarm notification. Make sure to monitor the alarm on this device as it may not be notified to the PHS depending on the nurse call system condition.
- ♦ For ExtSpO₂, ExtSpO₂-2, the nurse call notification will be according to the nurse call settings made for "SpO₂", "SpO₂-2" respectively.

Alarm Suspend

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

WARNING

- When the alarm for individual bed is suspended, all the alarms will be suspended even if the parameter alarm is set to ON. In addition, 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.

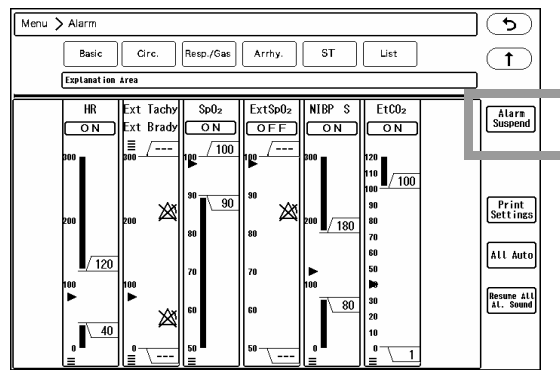
1 Press the [Menu], [Basic] or [Circ.] or [Resp./Gas] ("Alarm") keys on the individual bed display.

- ▶ The alarm setup screen will be displayed.

2 To Suspend the Alarm

1 Press the [Alarm Suspend] key.

- ▶ The key will turn blue, and the alarm will be suspended.
- ▶ <Alarm Susp: xxx sec.> message will be displayed. <xxx sec.> indicates the remaining time. The alarm will turn ON when the suspended time completes.



3 To Turn ON the Alarm

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

- ▶ The key will turn gray, and the alarm suspend condition will be cancelled.
- ▶ The set alarm limits for parameters and ON/OFF will be enabled.

Alarm Silence and Alarm Sound Suspend

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.).

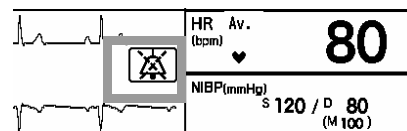
The "Alarm Sound Suspend" function suspends the alarm generation in advance at a time such as during operation when the alarm generation is expected. The alarm monitoring continues while in the "Alarm Sound Suspend" condition. The "Alarm Sound Suspend" cannot be controlled on this device but will synchronize with that of the bedside monitor.

Alarm Silence

To Silence the Alarm

1 To silence the alarm for all beds, press the [Alarm Silence] key (user key).

- ▶ The alarm silence icon will be displayed.
- ▶ If the alarm factor still remains at completion of silence time,

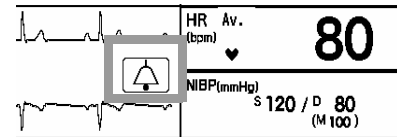


the alarm sound will generate again.

CAUTION

- ♦ Pressing the [Alarm Silence] key will silence all the alarms generated on the displayed beds. Pay attention not to miss any important alarms.

2 To silence the alarm for specific bed, press the event key displayed at alarm generation (shown on right), or [Individual Alarm Silence] key on the individual bed display.



3 When an alarm is silenced on the bedside monitor, the alarm for the corresponding bed will be also silenced on the central monitor.

Precautions about Silencing the Alarm

- ♦ If the alarm factor still remains at completion of silence time (1 min./2 min.), the alarm sound will generate again.
- ♦ If the alarm is silenced during NIBP alarm generation, the alarm will function as follows.
 - ♦ In Case of Wireless Network Beds
NIBP alarm will be canceled and alarm sound will not generate again even after the preprogrammed alarm silence duration.
 - ♦ In Case of Wired Network Beds
If [OK] is set for "Alarm Suspend/Alarm Silence from Central Monitor" :
NIBP alarm will be canceled and alarm sound will not generate again even after the preprogrammed alarm silence duration.
If [NG] is set for "Alarm Suspend/Alarm Silence from Central Monitor" :
NIBP alarm will not be canceled, and only the NIBP alarm of the operated central monitor will be silenced.
- ♦ If the [Alarm Silence] key is pressed for the alarm of another parameter which occurred during the alarm silence condition, the alarm silence duration for the first alarm will not be extended.
- ♦ If another alarm with the same or higher level occurs during the alarm silence condition, the alarm sound for the new alarm will occur.
- ♦ Depending on the "Alarm System" setting under "Initial Settings", the alarm operation will differ as follows.

If an alarm condition is resolved for a moment but is generated again during the alarm silence time:	
When [Fukuda Tone] is set	Alarm sound will not generate. In addition, recall and alarm printing will not be performed.
When [Melodic Tone] or [IEC Tone] is set	Alarm sound will generate. Recall and alarm printing will be performed.
If another alarm with lower priority occurs during the alarm silence time:	
When [Fukuda Tone] is set	Alarm sound will not generate. The recall and alarm printing will function.
When [Melodic Tone] or [IEC Tone] is set	Alarm sound will generate. Recall and alarm printing will be performed.
If numeric data alarm or arrhythmia alarm with lower priority occurs during the device status alarm silenced duration.	
When [Fukuda Tone], [Melodic Tone], [IEC Tone] is set	Alarm sound will generate.

To Cancel the Alarm Silence Condition

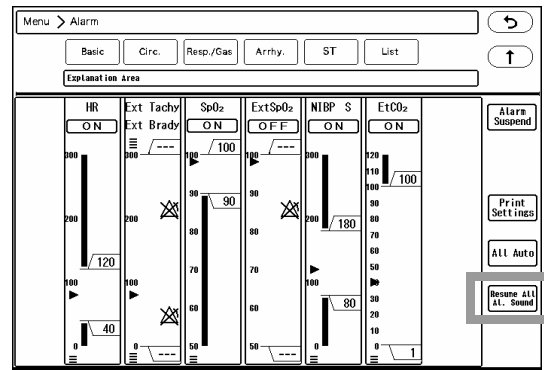
The alarm silence condition can be canceled.

Pressing the [Resume All Al. Sound] key will cancel the alarm silence condition and resumes the alarm sound if alarm factor exists.

The alarm silence condition will be canceled in the event of any of the following.

- ◆ The alarm silence condition for all parameters will be canceled for the following case.
 - ◆ When the power is turned ON.
 - ◆ When the system alarm status (ON/Suspend) is changed.
 - ◆ When the monitoring is suspended on the "Admit/Discharge" screen.
 - ◆ When the patient is discharged.
 - ◆ When Bed Transfer/Exchange is performed.
 - ◆ When [Resume All Al. Sound] key on the alarm setup screen is pressed.

- ◆ The alarm silence condition for each parameter will be canceled for the following case.
 - ◆ When the same alarm is generated again. (During IEC Tone, Melodic Tone mode)
 - ◆ 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.



Alarm Sound Suspend

The "Alarm Sound Suspend" function suspends the alarm generation for a preprogrammed duration (1/2/5/10/30/60/90/120/240/360 min.) at a time such as during operation when the alarm generation is expected.

When the alarm sound is suspended on the bedside monitor connected by DS-LAN III network, the alarm sound will be also suspended on this device, and <Alarm Sound Suspended> message will be displayed.

Even when the alarm sound is suspended, alarm judgment, message display, recall, and alarm printing will be performed as usual.

The alarm sound on this device will resume when the alarm sound on the bedside monitor resumes.

NOTE


- ◆ The "Alarm Sound Suspend" cannot be controlled on this device but will synchronize with that of the bedside monitor.
- ◆ During the alarm sound suspended duration, alarm sound will not generate for the preprogrammed duration. However, recall and alarm printing will function.
- ◆ The alarm will not be notified to PHS nurse call system during the alarm sound suspended duration.

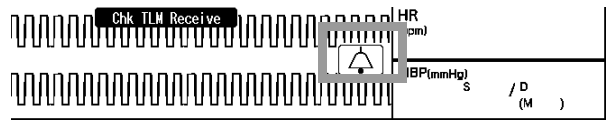
REFERENCE


- ◆ Whether or not to link the alarm sound suspend function with the bedside monitor can be set by selecting ON/OFF for "Link with Alarm Suspend" on the "Alarm Setup" under the "Initial Settings" menu.
(☞ Maintenance Manual "Alarm" P5-2)

Too-Far Alarm

If [ON] is selected for "Too Far Alarm" on the "Alarm Setup" ("Initial Settings"), and if telemetry transmitter is outside the transmission range for preprogrammed duration (5 sec. to 60 sec.), <Chk TLM Receive> message will be displayed and alarm sound will generate in 5 seconds interval.

At this time, event key  will be displayed regardless of the setting for "Event Key" on the "Alarm Setup" ("Initial Settings").



1 Press the displayed  key.

- ▶ The alarm sound will be silenced and [Too Far Alarm Silence] will be displayed.



2 Press the [Too Far Alarm Silence]/[Cancel] key.

- ▶ [Too Far Alarm Silence]: Too Far alarm will be silenced.
- ▶ [Cancel] : Too Far alarm will be suspended.
If the too-far condition still remains after the pre-programmed time (duration to generate the alarm: 5 sec. to 60 sec.), alarm will generate again.

When the "SpO₂ Check Sensor" Alarm Occurs

For the telemetry and wired network bed, <Check SpO₂ Sensor> will be displayed when the SpO₂ sensor is detached from the finger. The displayed color of the message and alarm sound will be according to the alarm level setting. (☞ Maintenance Manual "Alarm" P5-2)

1 To Silence the Alarm

Press the event key, or [Individual Alarm Silence] key on the individual bed display.

- ▶ The alarm will be silenced for the preprogrammed duration.

2 To Cancel the Alarm

Attach the SpO₂ probe to the finger, and perform the measurement properly.

When the "SpO₂ Disconnected" Alarm Occurs

For the telemetry and wired network bed, <Check SpO₂ Connector> will be displayed when the SpO₂ connector is disconnected from the measurement module of the telemeter or bedside monitor.

The displayed color of the message and alarm sound will be according to the alarm level setting.

(☞ Maintenance Manual "Alarm" P5-2)

1 To Silence the Alarm

Press the event key, or [Individual Alarm Silence] key on the individual bed display.

- ▶ Telemetry Bed: The alarm will be silenced for the preprogrammed duration.
- ▶ Wired Network Bed: The alarm will be canceled.

2 To Cancel the Alarm

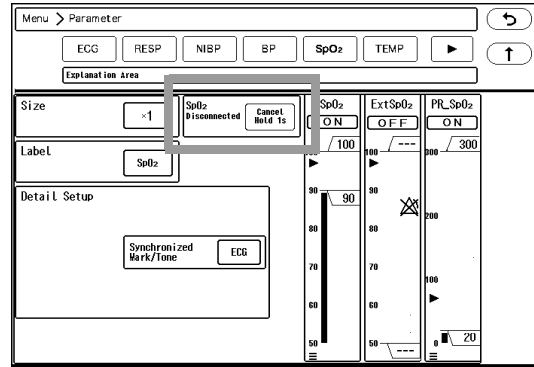
Open the SpO₂ setup menu.

(☞ "To Display Each Parameter Setup Screen" P8-1)
 For "SpO₂ Disconnected", press the [Cancel] key for 1 second.

- ▶ <SpO₂ Disconnected> message will disappear, and alarm sound will cease.

3 After the alarm is canceled, the alarm judgment will resume under the following condition.

- ▶ When the SpO₂ sensor is connected to the measurement module of the telemeter or bedside monitor, and measurement is properly performed.



ECG Alarm at Lead-Off Condition

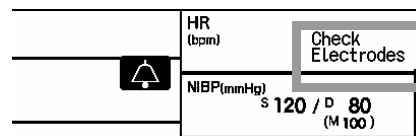
When ECG lead is detached, some waveforms may become immeasurable depending on the detached lead. In such case, ECG waveform or respiration waveform will be displayed as baseline, and ECG related alarm will generate. ECG related alarms during Lead-Off condition are as follows.

- ♦ HR Alarm
- ♦ Arrhythmia Alarm
- ♦ ST Alarm
- ♦ RR Alarm of Impedance Respiration
- ♦ Apnea Alarm of Impedance Respiration

If the alarm generated during lead-off condition is considered not reliable, selecting [OFF] for "Alarm Judgment" (Initial Settings > Alarm Setup > During Lead OFF) will not generate the ECG related alarm during lead-off condition.

For the alarm function during lead-off condition, the following setup can be performed on the "Alarm Setup".

- ♦ ON/OFF of Alarm Judgment
- ♦ ON/OFF of Lead OFF Message
- ♦ ON/OFF of Alarm Printing
- ♦ Lead OFF Alarm Interval (5/30/60 sec.)



WARNING

- ♦ If the "Alarm Judgment" for "During Lead OFF" is set to OFF, HR alarm and arrhythmia alarm will not be generated at lead-off condition. If this condition is left unresolved, a sudden change of the patient may not be noticed. Take prompt action when the lead-off condition is detected.
- ♦ The ON/OFF setting of "Alarm Judgment" for "During Lead OFF" is effective for telemetry beds only. For the wired network beds, HR alarm and arrhythmia alarm will not generate regardless of this setting.

NOTE

- ♦ These setups should be performed by our service representative or system administrator of your institution.
 (☞ Maintenance Manual "Alarm" P5-2)

- ♦ The settings will be synchronized with the administrating central monitor.

All Beds Alarm Events

The alarm events for all beds can be verified in a list format.

Maximum of 8 beds can be displayed on one display. For each bed, maximum of 16 events (4 events/line x 4 lines) can be displayed.

Also, maximum of 32 events for the selected bed can be displayed on one screen.

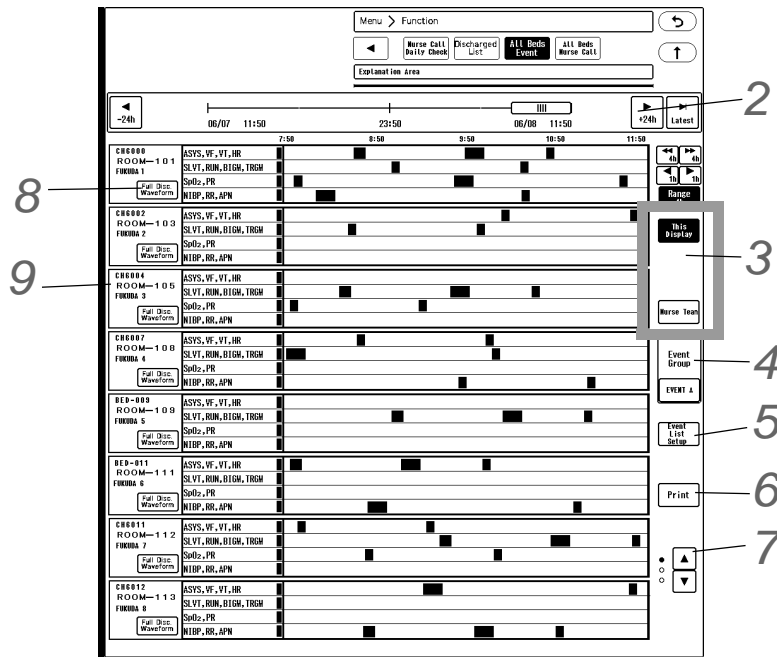
The full disclosure waveform of the cursor position can be displayed from the all beds alarm events or event list.

REFERENCE

- ♦ The all beds alarm events are based on alarm history data.

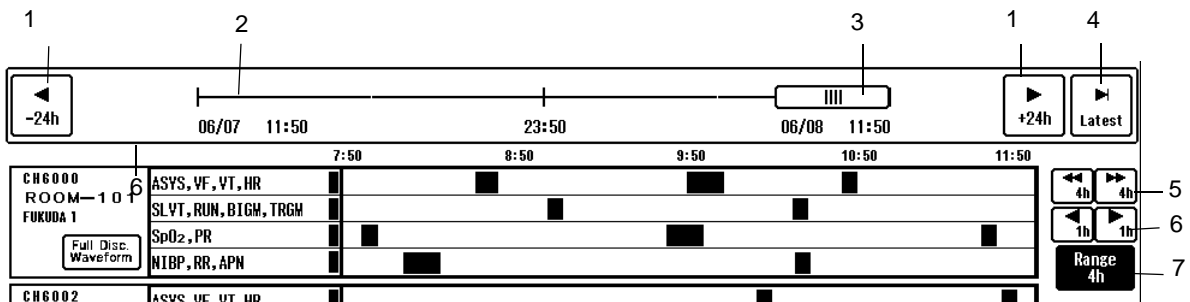
1 Press [Menu > Function > All Beds Event].

▶ The alarm events for all beds will be displayed.



▶ The alarm event will be displayed with the color set on procedure 4.

2 Changing the time span, scrolling the time, displaying the latest data can be performed.



1 The time zone range can be changed in 24 hours interval.

2 The time zone for the whole data is shown. Pressing the time bar will display the data at pressed time.

- 3 Indicates the displayed time range with the bar length.
Dragging the slider to the right will display newer data, and dragging it to the left will display older data.
- 4 The latest data will be displayed.
- 5 The display will switch by page.
- 6 The display will switch by 1/4 page.
- 7 The displayed time range can be selected.

3 The beds to be displayed can be filtered.

- ▶ [This Display]: The beds monitored on the display unit currently displaying the alarm events for all beds will be displayed.
- ▶ [Other Display]: The beds monitored on other display unit will be displayed.
- ▶ [Nurse Team]: The beds registered for the selected nurse team will be displayed.

4 Select the event group to display. The display color and group name can be changed.

1 Select the group to be changed.

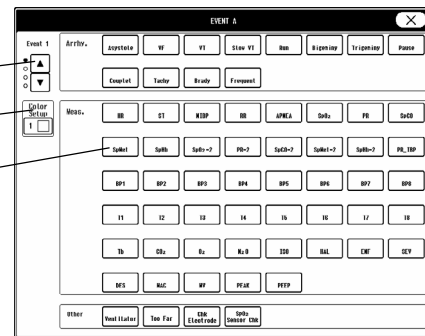
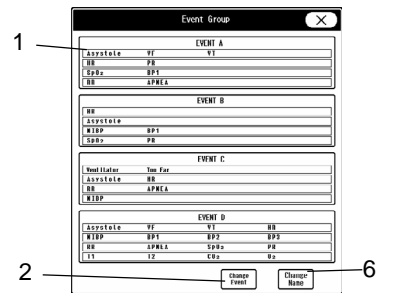
2 Press [Change Event] to display the event selection screen. (shown on right)

3 ▲ / ▼: Switches the page.
Select the events to be displayed for each line.

4 Maximum of 4 parameters per line can be selected.

5 Select the display color for the selected events from 12 colors.

6 Press the [Change Name] key to change the event group name.



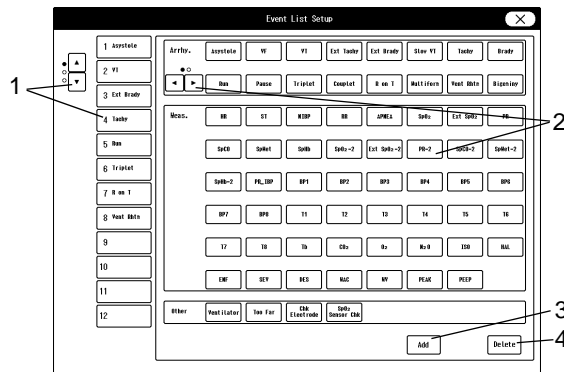
5 Select the event to be displayed on the event list.

1 Select the item to be displayed from 1 to 32.
Use the ▲ / ▼ keys to switch the display.

2 Select the alarm event to display. Use the ◀ / ▶ keys to switch the displayed arrhythmia alarm events.

3 Press [Add] to add the selected event to the selected position.
The event on No. 32 will be deleted.

4 Press [Delete] to delete the selected event.
The events will shift upwards.



6 The currently displayed data will be printed on the laser printer.

NOTE

- If a laser printer is not connected, [Print] key will not function..

7 ▲ / ▼: Switches the displaying beds

8 When optional SD card is used, full disclosure waveform will be displayed.

- ▶ Pressing [Full Disc. Wave] will display the full disclosure waveform at the cursor position.

9 Select a bed.

- ▶ The event list will be displayed. (☞ "Event List" P7-21)

Event List

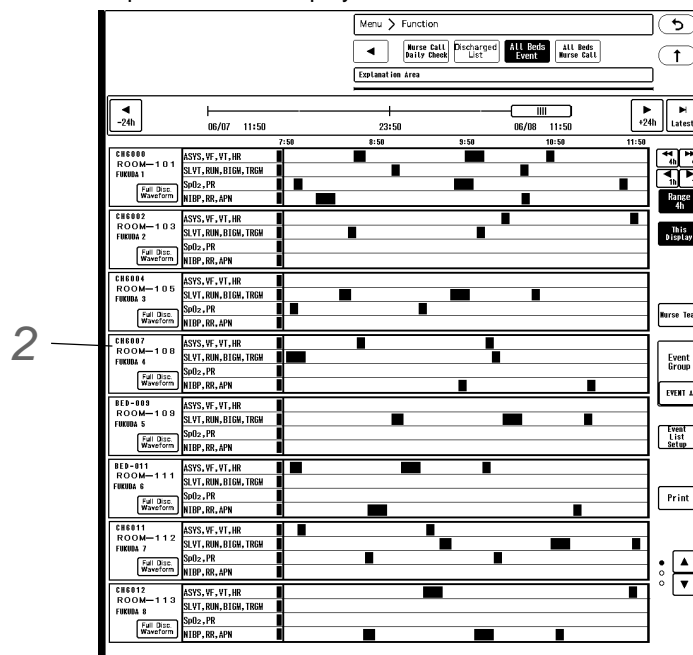
Maximum of 32 alarm events of the selected bed can be displayed on one screen.

REFERENCE

- ◆ The alarm lists are based on alarm history data.

1 Select the patient on the all beds alarm events screen.

- ▶ The event list will be displayed.
To return to all beds event screen, press the patient selection key again.
- ▶ The key for the selected patient will be displayed in blue.



- ▶ The generated alarm events are displayed in time bar format.
The displayed color is fixed.

2 Press the patient selection key for other patient.

- ▶ The event list screen will switch to the list for the next selected patient. The key for the selected patient will be displayed in blue.

Alarm History

This section explains the alarm history function and printing procedure.

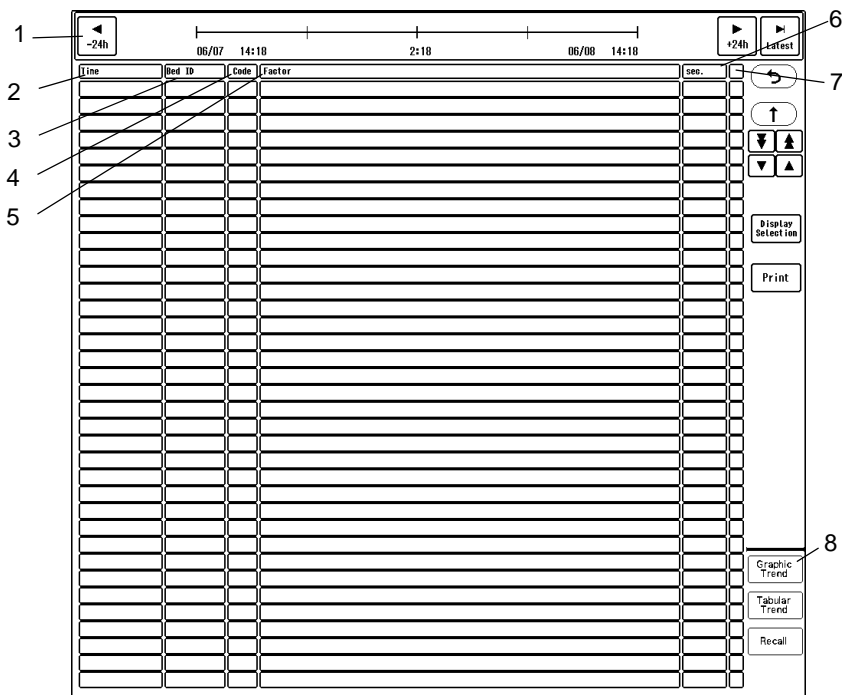
The alarm generation of numeric data, arrhythmia, device status and change in alarm settings can be stored as alarm history. Maximum of 5000 data per bed can be stored.

NOTE

- When the alarm history exceeds 5000 data, the data will be deleted from the oldest one.
- The alarm history data will be deleted when the AC power cable of this device is disconnected.

Displayed Items

Select a bed, and press the [Menu], [Alarm History] ("Data Review") on the individual bed display.



36 data per page can be displayed.

1	Time Bar	Changing the time span, scrolling the time, displaying the latest data can be performed. (☞ "Common Operation" P9-1)
2	Time	The time of alarm generation/alarm setting change will be displayed.
3	Bed ID	The bed ID for the alarm generated patient will be displayed. It will be left blank if the alarm factor applies for all beds.
4	Code	The hexadecimal code for the alarm factor will be displayed.

5	Factor	<p>The alarm factor 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 device 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> <p>The control source of discharging the patient, silencing the alarm, etc. will be displayed as follows.</p> <p>From this device: Manual Through the DS-LAN III network: DS-LAN</p> <p>From the magnetic card reader, barcode reader: ID CARD From the ID search function: ID SEARCH From the EMR link function: EMR</p>
6	Duration	<p>The alarm generated duration of numeric data, arrhythmia, device status alarm will be displayed in seconds. The maximum displayable value is 99999 seconds.</p> <p>The currently generated alarm factor will be displayed in red.</p> <p>It will not be displayed for the alarm setting change.</p>
7	Alarm Level	<p>The alarm level (S/H/M/L/N) will be displayed. It will be left blank if there is no corresponding alarm level.</p>
8	Other Review Data Display	<p>The display can be switched to other review data of the same time. (☞ "Common Operation" P9-1)</p>

☐ Stored Events for Alarm History

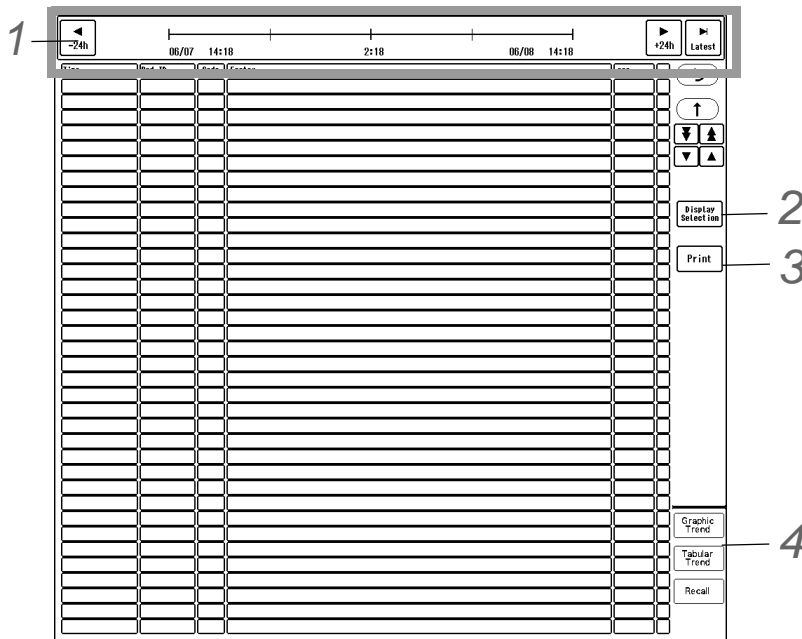
The following events will be stored for alarm history.

Classification	Item	Stored Event, Data
Each Bed	Numeric Data Alarm/Arrhythmia Alarm	Time, duration of alarm occurrence
		Numeric data, alarm setting at alarm occurrence
		Alarm Level
	Device Alarm	Time, duration of alarm occurrence
		Alarm Level
	Low Battery Symbol	Time, duration of low battery symbol display
	Check telemetry reception	Time, duration of "Too Far Alarm" occurrence
	Change of Alarm Settings	Change of alarm ON/OFF, upper/lower limit ON/OFF, upper/lower limit value, Control Source (Manual*, DS-LAN)
	Alarm Silence	Starting of Alarm Silence, Control Source (Manual*, DS-LAN)
	Alarm Suspend	Starting of Alarm Suspend, Control Source (Manual*, DS-LAN), Canceling of Alarm Suspend, Control Source (Manual*, DS-LAN)
	Alarm Sound Suspend	Starting/canceling of alarm sound suspend
	Discharge, Bed Transfer/Exchange	Control Source (Manual*, DS-LAN, EMR, etc.)
	Parameter ON/OFF	Parameter ON/OFF of ECG, RESP, SpO2
Monitor Suspend	Monitor Suspend, Monitor Resume	
All Beds	Change of Alarm Level	Change of alarm level setting
	Change of alarm silence time	Change of alarm silence time setting
	Change of alarm suspend time	Change of alarm suspend time setting
	Change of link alarm sound suspend setting	Change of alarm sound suspend setting

*: "Manual" for the control source indicates that the operation is performed on this device.

Alarm History Setup and Printing

The procedure for the alarm history setup and printing is explained below.



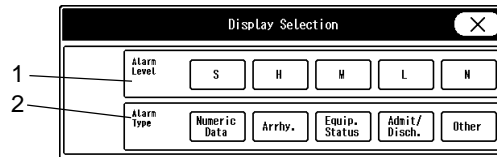
1 Changing the displayed time, scrolling the time, updating the data (☞ "Common Operation" P9-1)

2 Selecting the display items for alarm history

1 Select the alarm level to be displayed.
The selected item will be displayed in blue.

2 Select the alarm type to be displayed.
The selected item will be displayed in blue.

The displayed events for each alarm type are as follows.



Alarm Type	Events
[Numeric Data]	Numeric Data Alarm
[Arrhy.]	Arrhythmia Alarm
[Equip. Status]	Device Status, Low Battery, Chk TLM Receive
[Admit/Disch.]	Discharge, Bed Transfer/Exchange, Monitor Suspend
[Other]	Parameter ON/OFF, Change of Alarm Setting, Alarm Silence, Alarm Suspend, Alarm Sound Suspend, Alarm Volume, Alarm Level, Change of Alarm Silence Duration, Change of Alarm Suspend Duration, Change of Link Alarm Sound Suspend Setting

3 Printing the Alarm History

- ▶ The currently displayed alarm history will be printed.
- ▶ It can be output on the Recorder Unit (HR-800) or the laser printer.
(☞ "Output Printer Setup for Review Data Printing" P12-8)

4 Displays other review data of the same time. (☞ "Common Operation" P9-1)

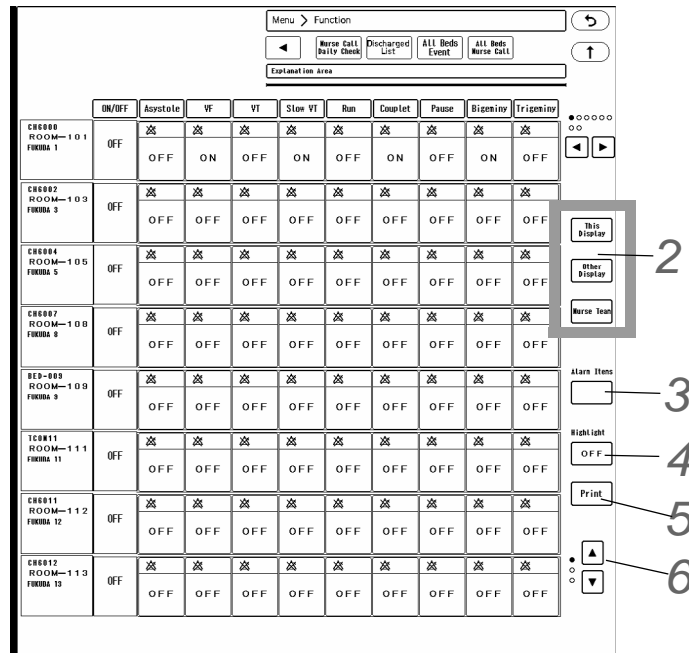
All Beds Nurse Call Setup

On the "All Beds Nurse Call" setup menu, the nurse call setup list for all monitoring beds will be displayed and the settings can be changed.

Maximum of 8 beds can be displayed on one display.

1 Press the [Menu], [All Beds Nurse Call] ("Function") keys.

▶ The "All Beds Nurse Call" setup menu will be displayed.



2 Displaying Patients

Select the displaying patients from [This Display]/[Other Display]/[Nurse Team].

3 Alarm Items

Select the displaying parameters from following.

[Basic]/ [Circ.]/ [Resp./Gas]/ [Arrhy.]/ [ST]/[ST/QTc]/[AST/QTc]/ [List]/ [Custom]/ [Other]/ [Alarm Level (S to L)]

4 Highlight

[Alarm ON]/[Alarm OFF]: The parameter which the alarm is set to ON or OFF will be highlighted.

[Nurse Call ON]/[Nurse Call OFF]: The parameter which the nurse call is set to ON or OFF will be highlighted.



[OFF]: The highlight display will be canceled.

5 Printing

The currently displayed data will be printed on the laser printer.

NOTE

- ♦ If a laser printer is not connected, [Print] key will not function.

6 Use the  /  keys to change the displaying beds.

Chapter 8 Parameter Setup

This chapter explains the procedure for measurement condition setup of each parameter received from the telemetry transmitter or bedside monitor.

To Display Each Parameter Setup Screen

There are following 2 procedures to display the parameter setup screen.

- ♦ To Display from the Parameter Key
- ♦ To Display from the "Menu" Screen
- ♦ To Display from the Shortcut Menu

□ To Display from the Parameter Key

On the individual bed display, numeric data are displayed. Each numeric data display area functions as a parameter key. Pressing the parameter key will display the setup menu for the corresponding parameter.

1 Select the patient to perform the parameter setup by pressing the bed selection area.

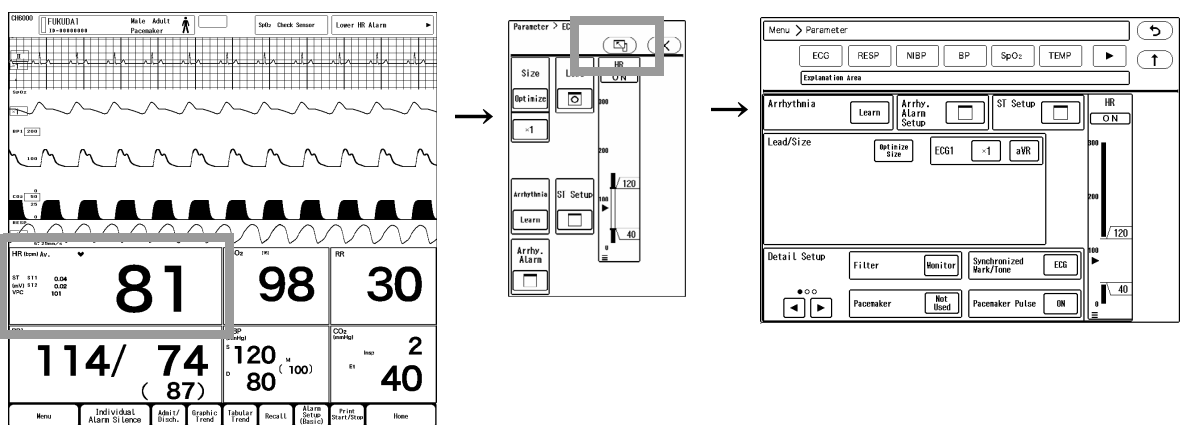
- ▶ The individual bed display for the selected patient will be displayed.

2 For example, press the ECG parameter key (area where HR data is displayed).

- ▶ The ECG floating window will be displayed.

3 Press the Detail () key.

- ▶ The "ECG" screen will be displayed.



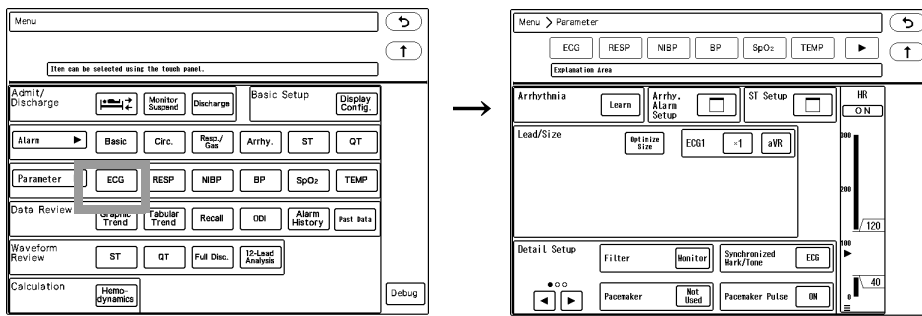
□ To Display from the Menu Display

1 Press the [Menu] key on the individual bed display.

- ▶ The "Menu" screen will be displayed.

2 Select the parameter to perform the setup.

- ▶ The parameter setup screen for the selected parameter will be displayed.

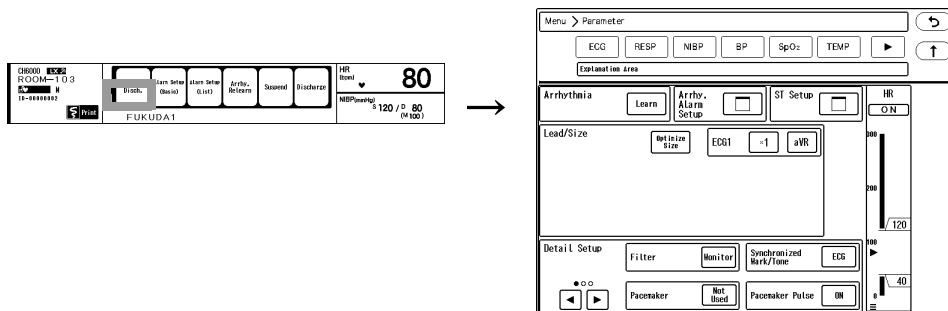


❑ To Display from the Shortcut Menu

- 1 Press the patient data area of each bed.
 - ▶ The shortcut keys will be displayed.
- 2 Select the parameter to perform the setup.
 - ▶ The selected parameter setup screen will be displayed.

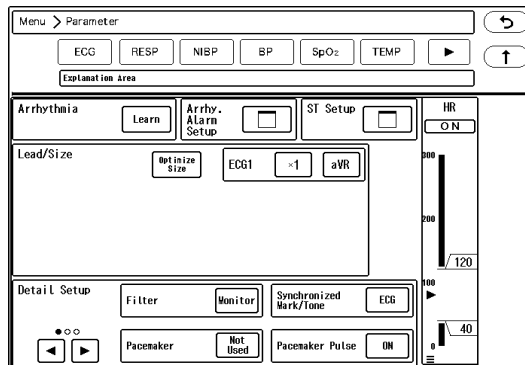
NOTE

- ♦ The functions needs to be assigned to the shortcut keys in advance. (Maintenance Manual "Shortcut Key" P5-22)



ECG

This section explains the procedure for ECG measurement condition setup.



Arrhythmia Learn	When arrhythmia or QRS is misjudged, performing arrhythmia learning will recover the original accuracy.
Arrhythmia Alarm	ON/OFF of each arrhythmia alarm, alarm limit (Asystole, Run, Pause, Frequent, Ext Tachy, Ext Brady, R on T, SVT, AFib, Irregular RR, S Frequent, Pacer Not Capture, Pacer Not Pacing)
ST Setup	ST reference waveform, reference point/measurement point, ON/OFF of ST level alarm, alarm limit
HR Alarm	ON/OFF of HR alarm, alarm limit
Lead, Size	Size and lead of ECG waveform
Detail Setup	Filter, Synchronized Mark/Tone, Pacemaker, Pacemaker Pulse, Pace Pulse Mask Time, QRS Detection, ECG Drift Filter, AC Filter, Auto Lead, ST/VPC/Arrhy. Alarm Display, HR Delay

For procedure to set the HR alarm and arrhythmia alarm, refer to "Chapter 7 Alarm Function".

Arrhythmia Relearn

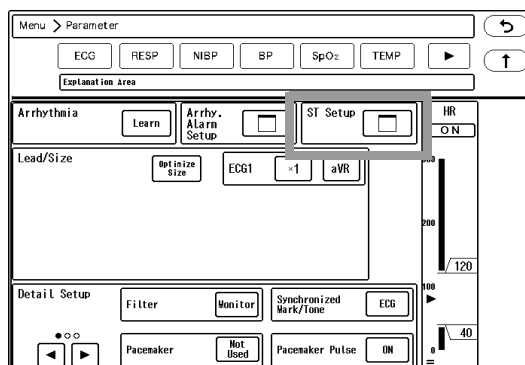
Learning the normal ECG largely affects the accuracy of arrhythmia analysis.

When arrhythmia or QRS is misjudged, performing arrhythmia learning will recover the original accuracy.

(☞ "To Perform Arrhythmia Learning" P7-7)

ST Setup

On the ST Setup screen, the reference point and measurement point to measure the ST level and ST level alarm can be set.

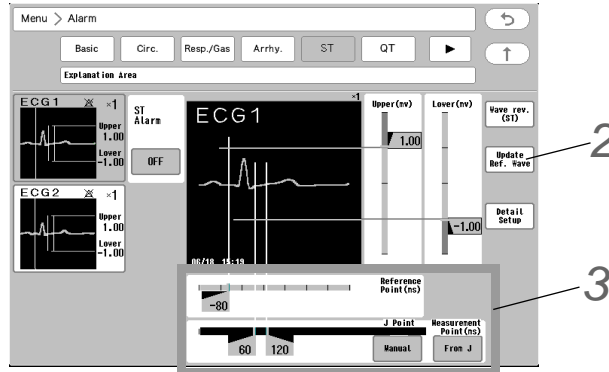


□ Setting the Reference Point/Measurement Point

Set the reference point and measurement point for the reference waveform.

1 Press the key for "ST Setup" on the ECG Setup screen.

▶ The ST alarm setup screen will be displayed.



2 Press [Update Ref. Wave] to update the ST reference waveform.

⚠ CAUTION

- ♦ For the lead which the electrode is detached, the reference waveform cannot be set. Check if the electrode is correctly attached, and perform the setup again.

- ▶ 16 beats average of the ECG judged as normal QRS by arrhythmia analysis will be set as the reference waveform.
- ▶ While updating the reference waveform, [Update Ref. Wave] 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.

3 Set the reference point and measurement point.

- 1** Select the measurement point. ([From R]/[From J])
When [From J] is selected, the cursor to set the J point will be displayed.
- 2** Select the procedure to set the J point.
[Auto]: J point will be automatically set based on the reference waveform. The set J point cannot be manually changed.
[Manual]: J point can be manually set by sliding the cursor to left and right.
- 3** Set the reference point by sliding the cursor to left and right.
- 4** Set the measurement point by sliding the cursor to left and right.

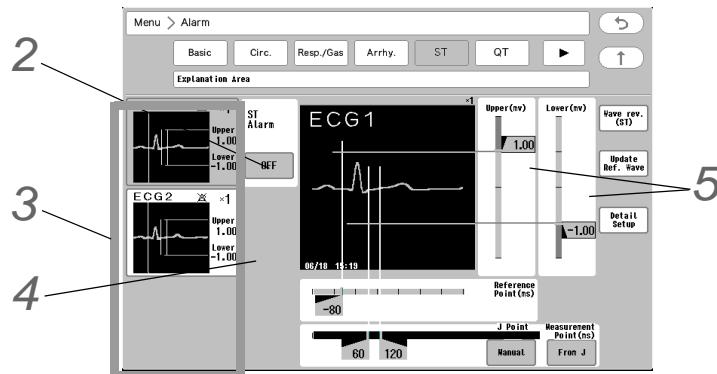
NOTE

- ♦ Set the reference point in the range of -240 ms to 0 ms in increments of 10 ms from the peak of QRS to the P wave direction.
- ♦ Set the measurement point in the range of 0 ms to 560 ms in increments of 10 ms from the peak of QRS to the T wave direction.

□ ST Level Alarm Setup

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

1 Display the ST setup screen.



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

3 Select the lead to set the alarm limit.

- ▶ The selected lead will be displayed large at the right.
- ▶ For the lead not selected on the screen, switch the page using / .

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

5 Slide / on the right of the bar to set the upper/lower limit.
The upper and lower limit can be set in 1 mm/0.1 mV increments.

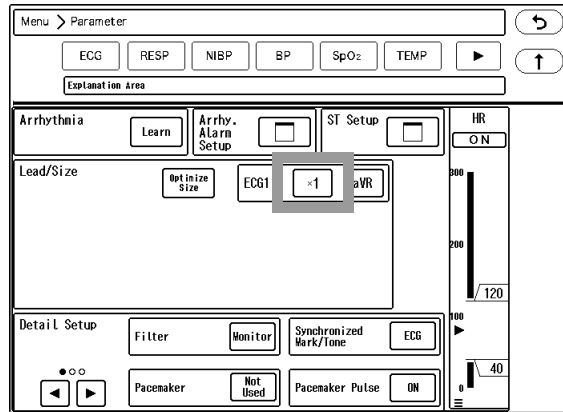
NOTE

- ◆ Set the upper limit in the range of -19 mm to +20 mm/-1.9 mV to +2.0 mV. The alarm will turn OFF if a value above +20 mm / +2.0 mV is set.
- ◆ Set the lower limit in the range of -20 mm to +19 mm/-2.0 mV to +1.9 mV. The alarm will turn OFF if a value above -20mm / -2.0mV is set.

Size / Lead

Adjustment of Waveform Size and Baseline Position

Adjust the waveform size and baseline position.



CAUTION

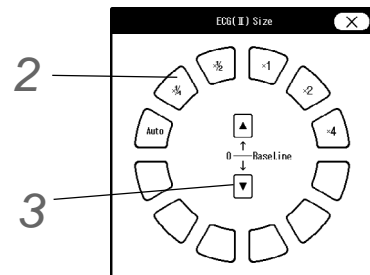
- Automatic size adjustment is effective only at the time the [Auto] key is pressed. This does not continually adjust the size.
- The setting is not possible if the waveform is not displayed. Change the display configuration as necessary.
(☞ "Numeric Data/Waveform" P13-3)

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

- ▶ The "Size" menu will be displayed.
- ▶ When the display layout is "12-Lead", the waveform size can be set differently for limb leads and chest leads.

2 Select the waveform size for displaying/printing.

- ▶ [Auto]: Automatically adjusts the ECG amplitude to 10 mm. The automatic adjustment is effective only when the [Auto] key is pressed.



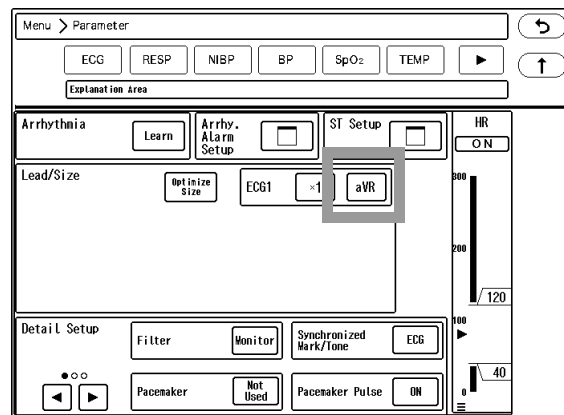
Waveform Size	x1/4	x1/2	x1	x2	x4
Voltage (10 mm)	4 mV	2 mV	1 mV	500 μV	250 μV

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

If the waveform is difficult to see due to ECG amplitude, set the baseline position to 0 mV. The baseline position for the waveform display and printing will be adjusted. When the display layout is set to "12-Lead", the baseline position cannot be changed.

Lead Selection

Set the monitoring lead.



CAUTION

- ECG1 and ECG2 are leads for arrhythmia detection and printing. Set the most appropriate leads with high QRS for ECG1 and ECG2, especially for arrhythmia detection.

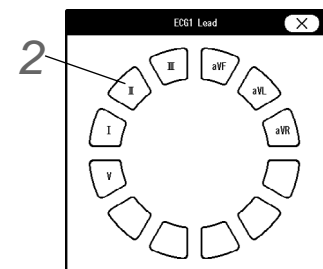
The selectable leads will depend on the lead cable type.


Selectable Lead

	Wired Network (BED)	Wired Network (LW) / Wireless Network (RF)	
		Transmitter Type	
		HLX Type	LX Type
3-electrode	I, II, III	(not selectable) Display: One from I, II, III	(not selectable) Display: Only ECG
4-electrode	I, II, III, aVR, aVL, aVF, V	(not selectable) Display: One from I, II, III, aVR, aVL, aVF, V, ECG1, ECG2	I, II, III, aVR, aVL, aVF
5-electrode			(not selectable) Display: One from ECG1, ECG2
10-electrode	I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5, V6		(not supported)

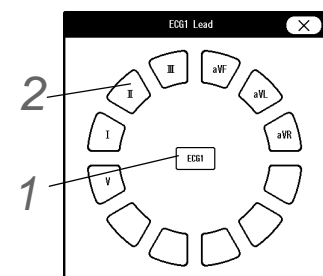
1 Press the key for "ECG1" to "ECG12".

- The "Lead" selection window will be displayed.

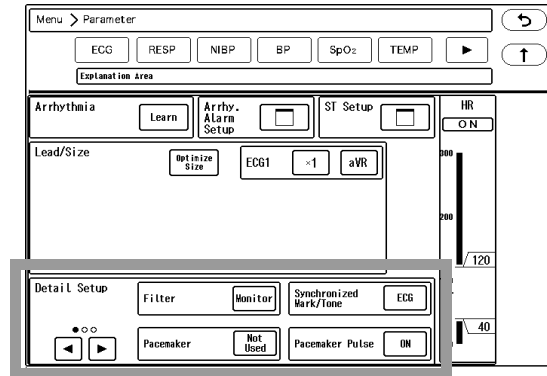


- When the display layout is set to "12-Lead", press  of "Arrhythmia" to switch [ECG1] and [ECG2].

2 Select the ECG monitoring lead.



Detail Setup



The following items can be set on the "ECG Detail Setup" screen.

Page 1	Filter, Synchronized Mark/Tone, Pacemaker, Pacemaker Pulse
Page 2	Pace Pulse Mask Time, QRS Detection, ECG Drift Filter, AC Filter
Page 3	Auto Lead, ST/VPC/Arrhy. Alarm Display, HR Delay

1 Filter Mode

On the bedside monitor, the waveform frequency characteristic can be selected from Monitor Mode, ESIS Mode, or Diagnosis Mode according to the monitoring purpose. The settings will be displayed on the central monitor.

On the waveform area, "M" (Monitor), "E" (ESIS), or "D" (Diagnosis) will be displayed.

CAUTION

- The ESIS mode cannot completely reduce the electrical noise, and may erroneously detect the pacemaker spike.
- The ESIS mode should be selected only when a high frequency noise largely affects the HR measurement.
- It will not be displayed for LW Bed and RF Bed.

2 Synchronized Mark/Tone

- ▶ [OFF]: Synchronized mark will not be displayed.
- ▶ [ECG]: HR synchronized mark will be displayed, and the synchronized tone will be set to ON.
- ▶ [SpO₂-1]/[SpO₂-2]: SpO₂ synchronized mark will be displayed, and the synchronized tone will be set to ON.
- ▶ [BP]: BP synchronized mark will be displayed, and the synchronized tone will be set to ON.



NOTE

- [OFF] is displayed only when [ECG/SpO₂ Menu] is selected for "Sync Tone Bed Selection" under [Menu > Initial Settings > System > Other].
- When [ECG/SpO₂ Menu] is selected for "Sync Tone Bed Selection" under [Menu > Initial Settings > System > Other], only the beds which "Synchronized Mark/Tone" selection is made on the ECG, BP, or SpO₂ menu will generate the synchronized tone and display the synchronized mark in reversed color.

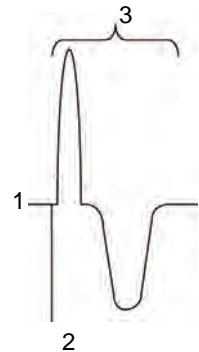
3 Pacemaker

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

4 Pacemaker Pulse

Pacemaker pulse detection algorithm is as follows.

- 1 ECG Signal Input
ECG signal will be input.
- 2 Pacemaker Pulse Detection and Suspension of QRS Detection
Detects the high frequency and large amplitude signal as pacemaker pulse. When pacemaker pulse is detected, QRS detection will be suspended for fixed amount of time to avoid erroneous detection of pacemaker pulse as QRS.
- 3 Canceling of Arrhythmia Detection
Arrhythmia detection of the waveform following the pacemaker pulse will be canceled.



CAUTION

- ♦ Precautions about Pacemaker Pulse Detection
 - ♦ There are some cases when the pacemaker pulse cannot be detected depending on the pacemaker type, pulse voltage, pulse width, electrode lead type (unipolar, bipolar), or electrode placement which causes the pacemaker pulse amplitude to decrease, and disables the pacemaker pulse detection.
 - ♦ If signals similar to a pacemaker pulse are present, such as electric blanket noise or excessive AC frequency noise, these may be erroneously detected and displayed as a pacemaker pulse.
 - ♦ When a spontaneous QRS and pacemaker pulse overlap (ex. fusion beat, etc.), QRS detection cannot be performed properly. In this case, the heart rate is degraded.
 - ♦ If a pacemaker pulse is continuously detected due to AC frequency interference, QRS detection will be suspended and the heart rate will be reduced. Also, arrhythmia will not be detected.

- ▶ [ON]/[Distinct Color]: Displays the artificial pace pulse in yellow.
- ▶ [OFF]: The pacemaker artificial pulse will not be displayed.
- ▶ When [Used] is set for "Pacemaker" , [Distinct Color] will be automatically set.

5 Pace Pulse Mask Time

WARNING

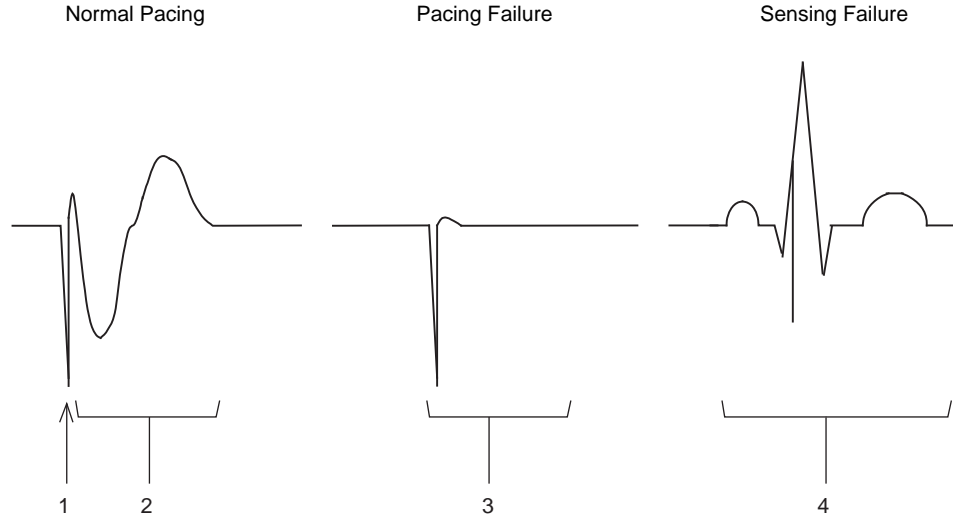
- ♦ When [OFF] is set for "Pace Pulse Mask Time" , the pace pulse may be erroneously detected as a QRS complex, and even when the patient's HR is decreasing, HR or asystole alarms may not generate. Set this function to [OFF] only if you are sure that pacing failure will not occur, or when the patient 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 mask the pace pulse 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] for correct measurement of the heart rate.



- 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

- ▶ Select the mask time depending on the pace spike amplitude or presence of fusion beat.
- ▶ [40ms]: Pace pulse mask time will be set to 40ms.
- ▶ [OFF]: Pace pulse mask time will be set to 0 ms.

NOTE

- ♦ For DS-LAN bed, the data set on the bedside monitor is displayed. The settings cannot be changed on the central monitor.

6 QRS Detection

The ECG channels to use for QRS detection can be selected. (Default: ECG1+2)

- ▶ [ECG1]: Detects the QRS only for ECG1.
- ▶ [ECG1+2]: Detects the QRS of either ECG1 or ECG2 with the larger amplitude.

NOTE

- ♦ This setting is available only for the telemetry beds. (LW, RF)
- ♦ QRS may not be detected for ECG waveform with amplitude 0.3 mV or below.
- ♦ When only one ECG waveform is measured, QRS detection will be performed only for ECG1, regardless of the setting.
- ♦ The QRS detection for the wired network bed (BED) will be according to the setting made on the bedside monitor.

REFERENCE

- ♦ If [ECG1+2] is selected and an artifact is detected on one of the waveforms, one of the

following can be set.

- ◆ Detect QRS by merging ECG1 and ECG2.
- ◆ Detect QRS only for the waveform without the artifact.
(☞ Maintenance Manual "Initial Settings" P5-1)

7 Drift Filter

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

The patient signal display will delay about 0.5 seconds.

On the individual bed display, "Drift-F ON" will be displayed in the information area, and "DF" will be displayed in the waveform area.



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

NOTE

- ◆ This setting is available only when [Each Bed] is set for "ECG Drift Filter" under [Menu > Initial Settings > Measurement > Other].
- ◆ This setting is available only for LX bed. For DS-LAN bed, the setting on the bedside monitor will be displayed. It will not be displayed for HLX bed.

8 AC Filter

- ▶ [ON]: AC filter will turn ON. If the ECG waveform is interfered with AC noise, the AC filter cuts off the frequency component (50Hz/60Hz). "AC" will be displayed in the waveform area.

- ▶ [OFF]: AC filter will not be set.

NOTE

- ◆ The "AC Filter" can be set only for the LX bed.
- ◆ The AC filter frequency can be set under [Menu > Initial Settings > System > Other].

9 Auto Lead

ON/OFF of auto lead can be set on the bedside monitor. This setting will be displayed on this device.

10 ST/VPC/Arrhy. Alarm Display

- ▶ [ON]: If the numeric data box size is W3xH2 or larger, 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 HR Delay

- ▶ [OFF]: Average HR of 6 seconds will be calculated based on QRS detection of each heartbeat.
- ▶ [ON]: HR will be calculated based on the arrhythmia analysis. 5 seconds delay will occur compared to when [OFF] is selected.
It may improve the HR detection when T wave or noise is interfering.
When two ECG waveforms (ECG1 and ECG2) are measured, HR will be calculated by merging ECG1 and ECG2. If artifact is present on one of the waveforms, HR will be calculated using only the stable ECG waveform.
If artifact is present on both of the waveforms, HR value will be displayed as "---".

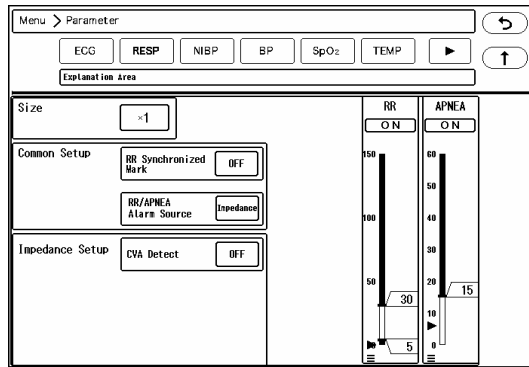
When ECG electrodes are detached, arrhythmia analysis cannot be performed, and <Lead OFF> message will be displayed. Alarm sound will be also generated.

NOTE

- ♦ The HR delay function is available for RF beds. For LW beds, this setting may not be possible depending on the telemetry receiver type and software version. For details of the corresponding telemetry receiver type and software version, refer to your nearest service representative.

RESP

This section explains the procedure for respiration measurement condition setup.

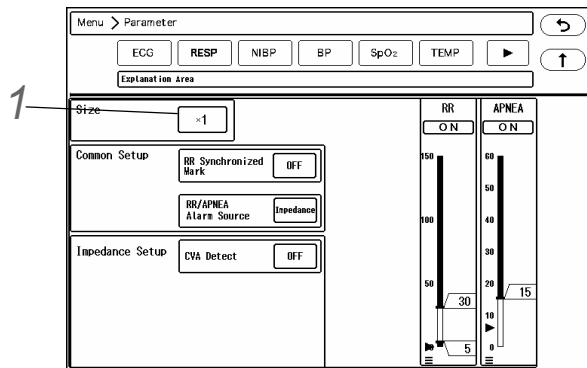


Waveform Size	Respiration waveform size
RESP Alarm	ON/OFF of RR alarm, alarm limit
APNEA Alarm	ON/OFF of APNEA alarm, alarm limit
Common Setup	RR Synchronized Mark, RR/APNEA Alarm Source
Impedance Setup	CVA Detect

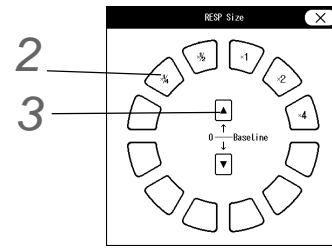
For procedure to set the RR Alarm and APNEA Alarm, refer to "Chapter 7 Alarm Function".

Waveform Size

Set the RESP waveform size.



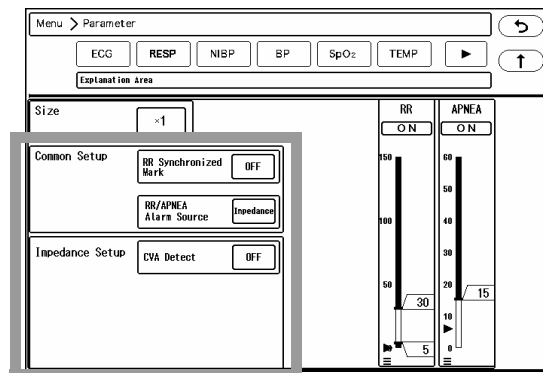
- 1 Press the key for "Size".
 - ▶ The "RESP Size" window will be displayed. (shown on right)
- 2 Select from [1/4]/ [x1/2]/ [x1]/ [x2]/ [x4].
- 3 Use the / keys to adjust the baseline position.



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.

Common Setup / Impedance Setup



RR can be measured from the following 4 sources.

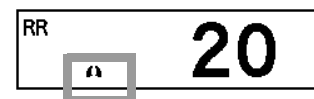
- ♦ Impedance Respiration Rate
- ♦ RR measured on the multigas unit
- ♦ RR measured on the ventilator
- ♦ RR measured on the SpO₂ module

There are setup items common to all sources and setup items specific to each source.

Common Setup

1 RR Synchronized Mark

- ▶ [ON]: RR synchronized mark will be displayed.
- ▶ [OFF]: RR synchronized mark will not be displayed.



2 RR/APNEA Alarm Source

RR/APNEA Alarm Source can be set only on the bedside monitor. The setting will be displayed on this device.

- ▶ [Impedance]: RR alarm will be generated based on the impedance respiration curve. The RR synchronized mark based on impedance respiration will be displayed.
- ▶ [CO₂/GAS]: RR alarm will be generated based on the RR measured by the CO₂ module or multigas unit. Also, RR synchronized mark based on CO₂ waveform will be displayed for only the DS-LAN beds.
- ▶ [Ventilator]: RR alarm will be generated based on the RR measured by the ventilator. Also, RR synchronized mark based on ventilator measurement will be displayed for only the DS-LAN beds.
- ▶ [SpO₂]: RR alarm will be generated based on the RR measured by the SpO₂ module. The RR synchronized

mark will not be displayed.

WARNING

- The SpO₂ respiration measurement is not intended for use as an APNEA monitor.

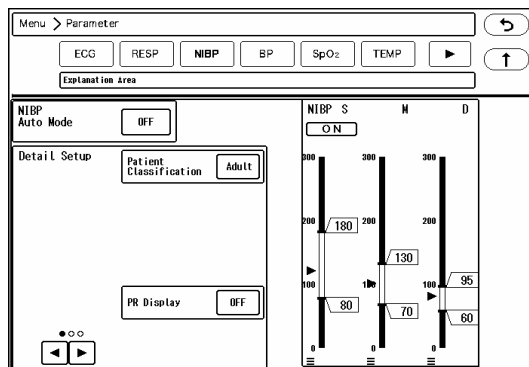
Impedance Setup

1 CVA Detect

- ▶ [ON]: When CVA is detected, alarm will generate and message will be displayed.
- ▶ [OFF]: CVA detection will not be performed.
- 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".
- If the ECG waveform is superimposed on to the respiration waveform with HR (RR) of 30 Bpm or above for more than 20 seconds (10 seconds for neonates) and if the "CVA Detect" is set to [ON], the <CVA detected> will be displayed, and an alarm sound will be generated.

NIBP

This section explains the procedure for NIBP measurement condition setup.



Auto Mode	NIBP measurement interval (only for DS-LAN bed)
NIBP Alarm	ON/OFF of NIBP alarm, alarm limit for systolic (S), diastolic (D), mean (M) blood pressure.
NIBP Detail Setup	Patient Classification, PR Display, MAP, Time Display

For procedure to set the NIBP alarm, refer to "Chapter 7 Alarm Function".

NIBP Periodic Measurement

NIBP measurement can be performed automatically at selected time interval or at selected time. This function is available only for the DS-LAN beds.

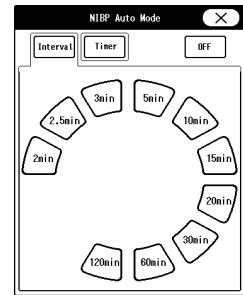
- 1 Press the key for "NIBP Auto Mode". ([Interval]/[Timer]/[OFF])

2 When [Interval] is selected, select the interval from [2min.] to [120min.].

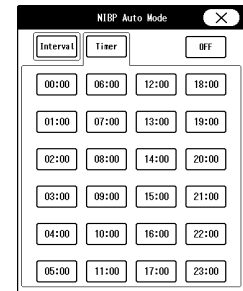
- ▶ The measurement time will be integral multiple of the selected interval starting from 0 minute.

Ex.) If the current time is 13:14, the measurement time will be as follows for each interval time.

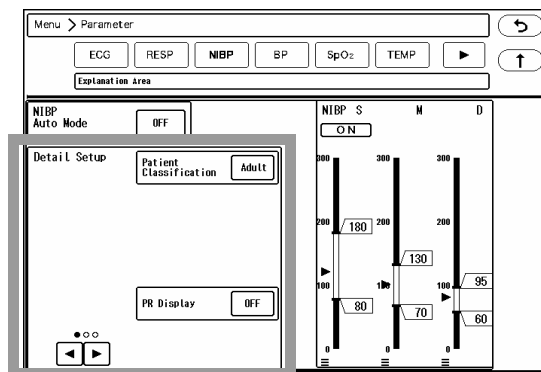
- 2 min.: 13:16, 13:18, 13:20, ...
- 2.5 min.: 13:15, 13:17:30, 13:20, ...
- 3 min.: 13:15, 13:18, 13:21, ...



3 When [Timer] is selected, select the measurement starting time. (More than one selection is possible.)



Detail Setup



The following items can be set on the "NIBP Detail Setup" screen.

Page 1	Patient Classification, PR Display
Page 2	MAP
Page 3	Time Display

1 Patient Classification

The patient classification is linked with the setting on the "Admit/Discharge" screen. The inflation value and measurement duration will differ according to the patient classification setting.

(☞ "Entering the Patient Information" P6-2)

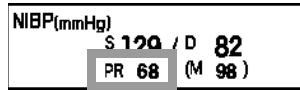
WARNING

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

hose for adult can be used.

2 PR Display

[ON]: PR will be displayed.

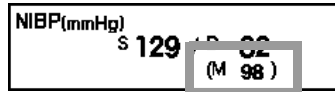


NOTE

- If the bedside monitor is DS-7000 series, PR will not be displayed.
- PR will not generate alarm, or be displayed for the tabular trend.

3 Mean BP (MAP) Display

ON/OFF of the MAP display can be set only on the bedside monitor. The setting will be displayed on this device.



CAUTION

- If the mean BP (MAP) value is not displayed, the mean BP (MAP) alarm will not be generated.

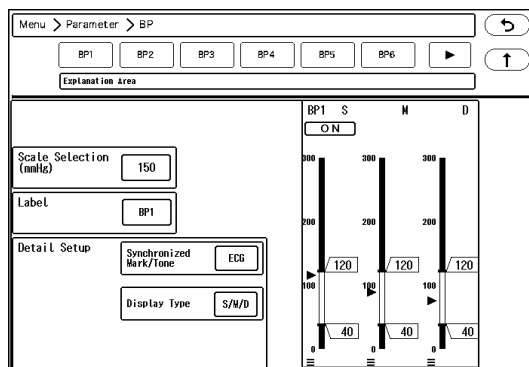
4 Time Display

The time for the NIBP measurement will be displayed.

- ▶ [Elapsed]: The elapsed time from the previous NIBP measurement will be displayed.
- ▶ [Meas.]: The NIBP measured time will be displayed.

BP

This section explains the procedure for BP measurement condition setup.



Scale	BP waveform scale
Label	BP Label
BP Alarm	ON/OFF of BP alarm Alarm limit for systolic (S), diastolic (D), mean (M) blood pressure
BP Detail Setup	Synchronized Mark/Tone, Display Type

For procedure to set the BP alarm, refer to "Chapter 7 Alarm Function".

Scale

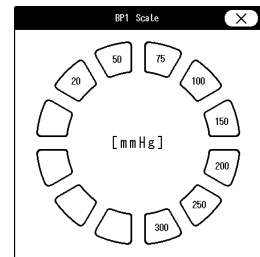
Select the full scale for displaying and printing. The scale selection will differ depending on the label as shown below.

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		
														20	40	cmH ₂ O
BP1 to BP8, RAP, RVP, UAP, LAP, User Label				Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes			
ART, IAP, LVP							Yes	Yes	Yes	Yes	Yes	Yes	Yes			
PAP				Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes			
CVP		Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
ICP	Yes	Yes	Yes	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes			

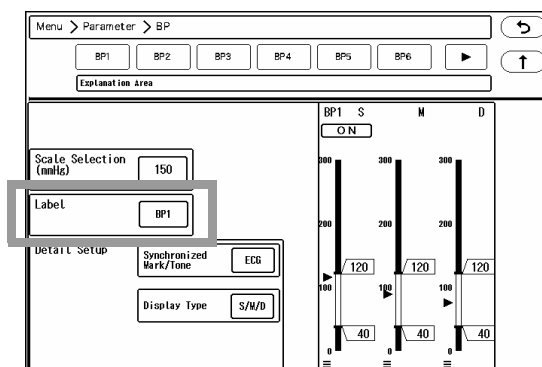
1 Press the key for "Scale Selection".

▶ The scale selection window will be displayed.

2 Select the scale from the displayed selection.



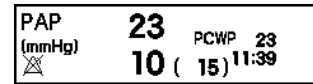
Label



BP label cannot be changed on this device. The label set on the bedside monitor will be displayed on the key for "Label".

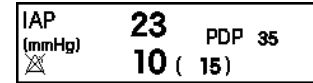
When the BP Label is PAP

PAWP (Pulmonary Artery Wedge Pressure) and measurement time will be displayed.



When the BP Label is IAP

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

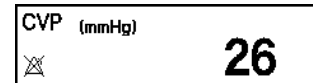


CAUTION

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

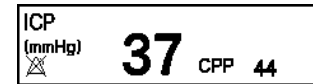
When the BP Label is CVP

The measurement unit can be selected from "mmHg", "kPa", "cmH₂O". (Initial Settings > Measurement > Unit) The selected measurement unit will be displayed on the BP numeric data box. (Maintenance Manual "Unit" P5-8)

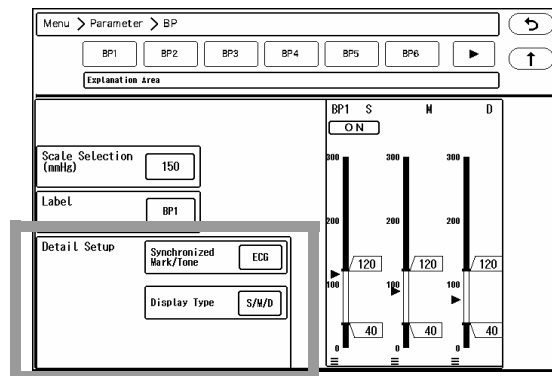


When the BP Label is ICP

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



Detail Setup



The following items can be set on the "BP Detail Setup" screen.

First Page	Synchronized Mark/Tone, Display Type
------------	--------------------------------------

1 Synchronized Mark/Tone (BP1/ART)

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

- ▶ [ECG]: HR synchronized mark will be displayed.
- ▶ [SpO₂] / [SpO₂-2]: SpO₂ synchronized mark will be displayed.

- ▶ [BP]: BP synchronized mark will be displayed.
- ▶ [OFF]: Synchronized mark will not be displayed.

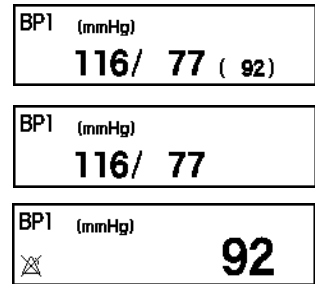
NOTE

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

2 Display Type

The display type of BP numeric data ([S/M/D]/[S/D]/[M]) can be set only on the bedside monitor. The setting will be displayed on the central monitor.

- ▶ [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.

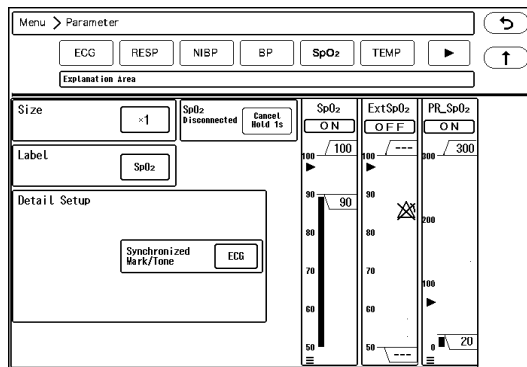


CAUTION

- ♦ The BP data which is not displayed in the numeric data box will not generate a BP alarm.

SpO₂

This section explains the procedure for SpO₂ measurement condition setup.



Waveform Size	Pulse waveform size
Label	SpO ₂ Label
SpO ₂ Alarm	ON/OFF of SpO ₂ alarm, Ext SpO ₂ alarm, PR alarm, SpCO alarm, SpMet alarm, SpHb alarm, alarm limit
SpO ₂ Detail Setup	Synchronized Mark/Tone, Perfusion Index (PI)
"Check SpO ₂ Connector" [Cancel (Hold 1s)]	Cancels the "Check SpO ₂ Connector" alarm. (Only at alarm occurrence)

For procedure to set the SpO₂ alarm, refer to "Chapter 7 Alarm Function".

WARNING

- ♦ The SpO₂ respiration measurement is not intended for use as an APNEA monitor.

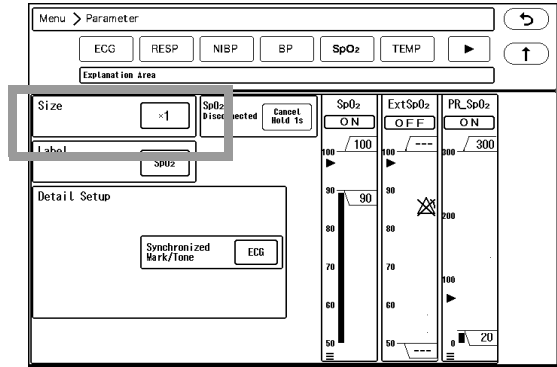
NOTE

- The alarm for SpCO, SpMet, SpHb can be set under [Menu>Parameter>Sp*] on the individual bed display.

Waveform Size

Pulse waveform size can be set.

- 1 Press the key for "Size".
 - ▶ The "Size" screen will be displayed.
- 2 Select from [x1/4]/ [x1/2]/ [x1]/ [x2]/ [x4].

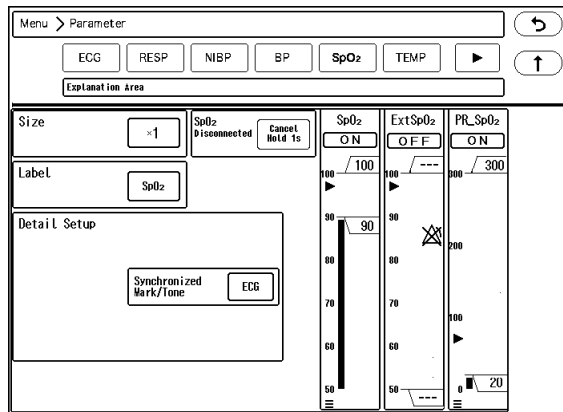


Label

SpO₂ label cannot be changed on this device. The label set on the bedside monitor will be displayed on the key for "Label".

Detail Setup

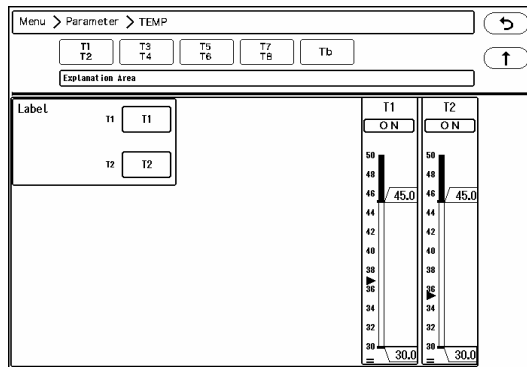
SpO₂ detail setup is explained below.



- 1 Synchronized Mark/Tone
ECG (☞ "Detail Setup" P8-8)
- 2 Perfusion Index
Whether or not to display the PI (Perfusion Index) data can be selected.

TEMP

This section explains the procedure for TEMP measurement condition setup.



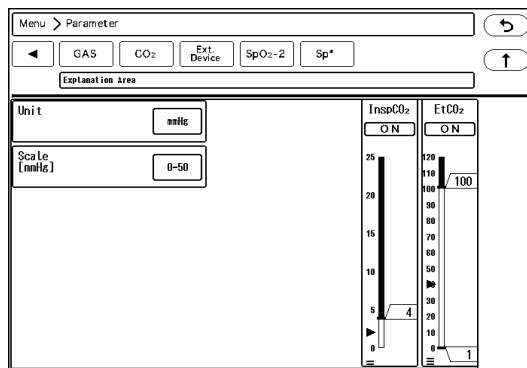
Label	TEMP Label
Alarm	ON/OFF of TEMP alarm, Tb alarm, alarm limit

For procedure to set the TEMP alarm, refer to "Chapter 7 Alarm Function".

TEMP label cannot be changed on this device. The label set on the bedside monitor will be displayed on the key for "Label".

CO₂

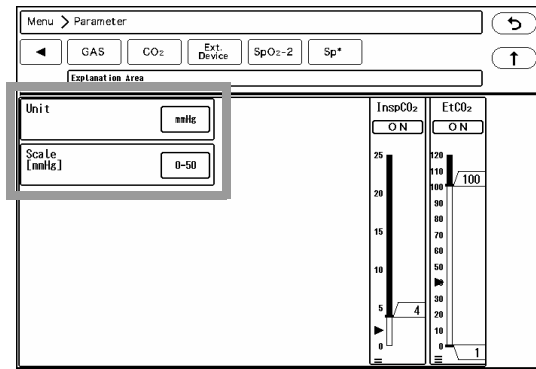
This section explains the procedure for EtCO₂ and InspCO₂ measurement condition setup.



Unit	CO ₂ measurement unit
Scale	CO ₂ waveform scale
Alarm	ON/OFF of EtCO ₂ alarm, InspCO ₂ alarm, alarm limit

For procedure to set the CO₂ alarm, refer to "Chapter 7 Alarm Function".

Measurement Unit and Scale

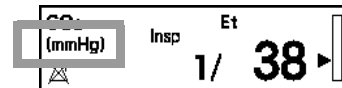


NOTE

- When a measurement unit is changed, make sure to set the alarm condition for that unit.

1 Select the measurement unit from [mmHg] / [kPa] / [%].

- The data will be displayed on the graphic/tabular trend with the selected measurement unit.

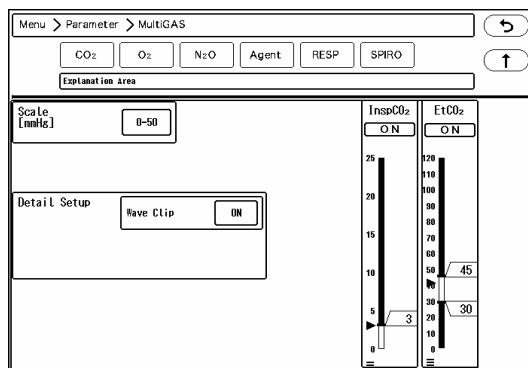


2 Select the scale.

- mmHg: [0-50]/[0-100]
- kPa/%: [0-4]/[0-8]/[0-10]

GAS, SPIRO

This section explains the procedure for multigas and SPIRO measurement condition setup.



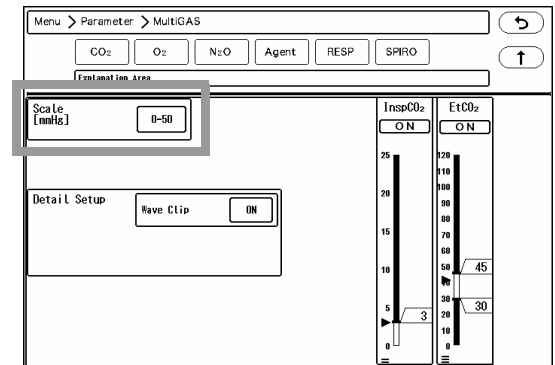
CO ₂	Scale, EtCO ₂ / InspCO ₂ Alarm, Detail Setup (Wave Clip)
O ₂	Scale, InspO ₂ / ExpO ₂ Alarm, Detail Setup (Wave Clip)
N ₂ O	InspN ₂ O / ExpN ₂ O Alarm, Detail Setup (Wave Clip)
Agent	Agent Selection, InspAgent / ExpAgent Alarm (ISO/HAL/ENF/DES/SEV), Scale, Wave Clip
RESP	RR Alarm, APNEA Alarm, Common Setup (RR Synchronized Mark, RR/APNEA Alarm Source)
SPIRO	AWP Scale, AWF Scale, AWV Scale, ExpMV Alarm, PEAK Alarm, PEEP Alarm

"Agent Selection" is not selectable on this device. The selected agent on the bedside monitor will be displayed. For procedure to set the alarm, refer to "Chapter 7 Alarm Function".

Scale

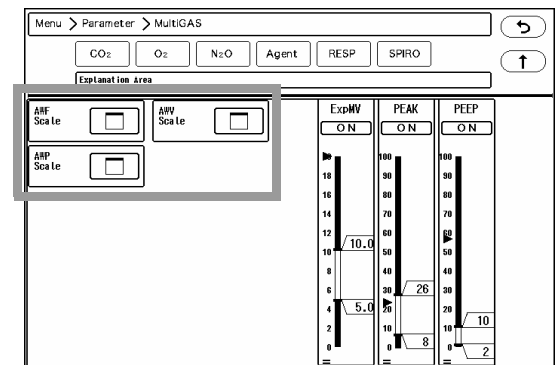
The waveform scale for CO₂, O₂, Agent can be set.

- ♦ CO₂: Select from [0-50]/ [0-100] (mmHg) or [0-4]/ [0-8]/ [0-10] (kPa, %).
- ♦ O₂: Select from [18-30]/ [18-60]/ [18-100]/ [0-30]/ [0-60]/ [0-100] (%).
- ♦ Agent: Select from [0-4]/ [0-8]/ [0-16] (%).

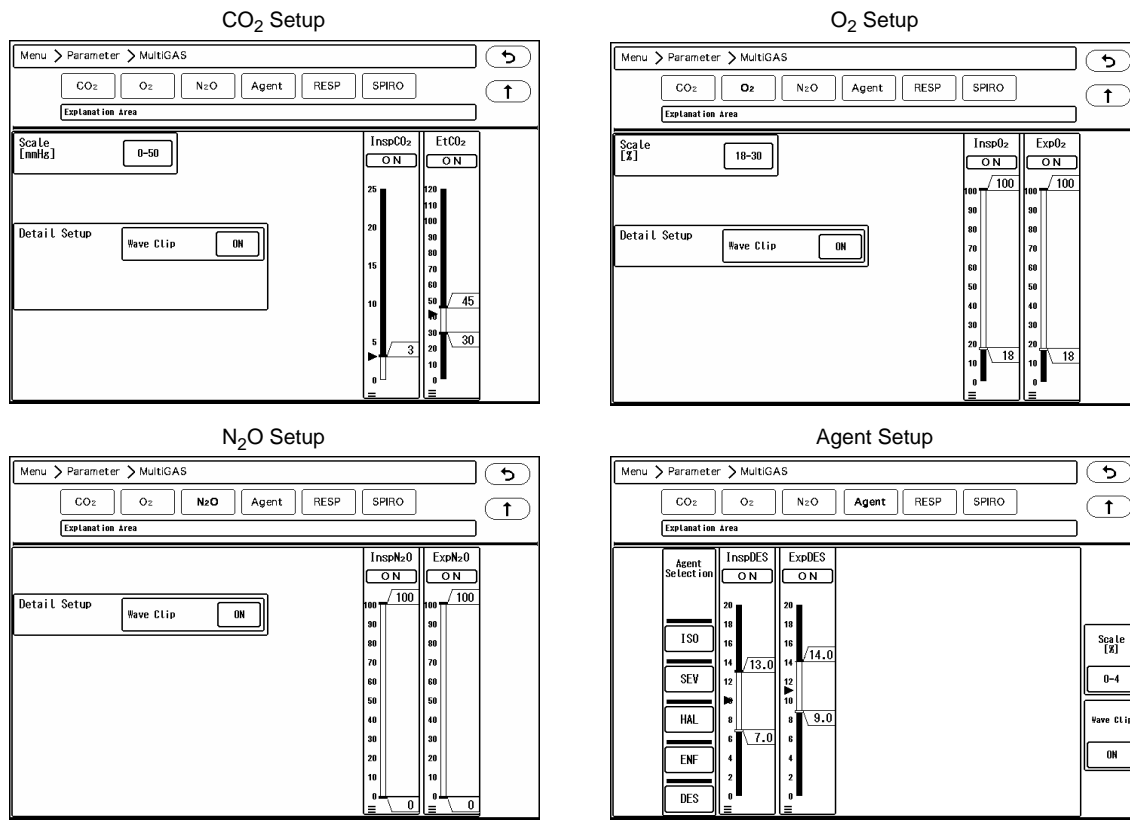


For SPIRO, the following scale can be set.

- ♦ AWF Scale: Select from [±5]/ [±10]/ [±20]/ [±50]/ [±180] (L/min).
- ♦ AWP Scale: Select from [10]/ [20]/ [30]/ [50]/ [120] (cmH₂O).
- ♦ AWW Scale: Select from [50]/ [250]/ [500]/ [1000]/ [3000] (mL).



Detail Setup



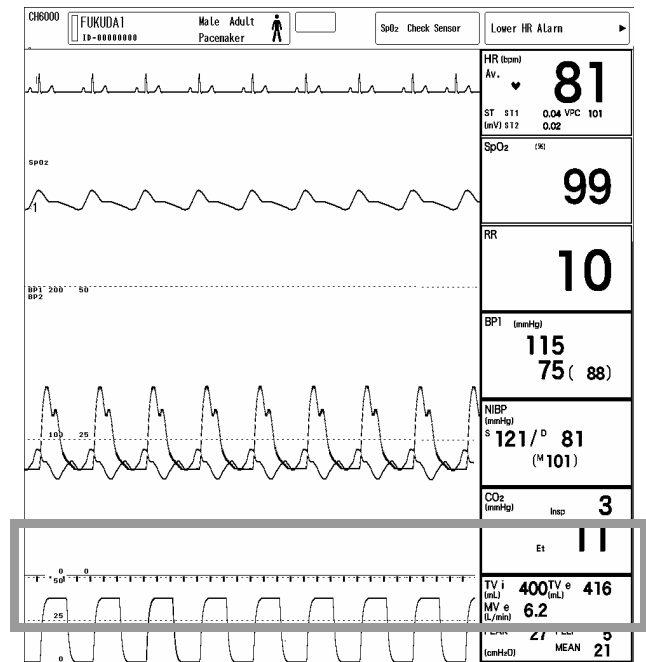
Set the "Wave Clip".

- ♦ [ON]: The exceeded part of the waveform will be displayed in straight line at the upper or lower scale limit.
- ♦ [OFF]: The whole part of the waveform will be displayed even if it exceeds the scale. However, the exceeded part may not be displayed depending on the sweep speed of the waveform displayed above or below the gas waveform.

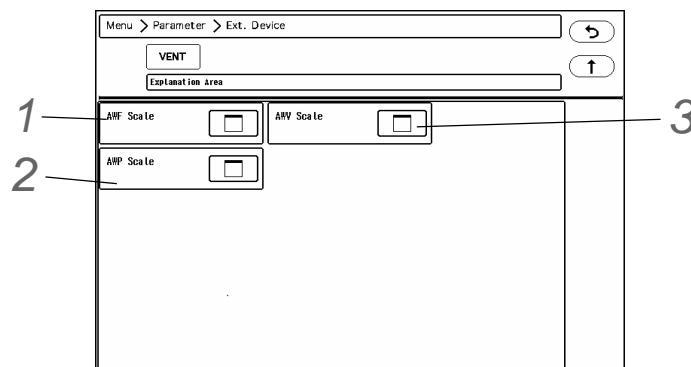
Ventilator Data

Numeric data and waveform measured by the ventilator connected to the bedside monitor can be displayed on the DS-1800 System.

This section explains the setup procedure of AWP/AWF/AVV scale.

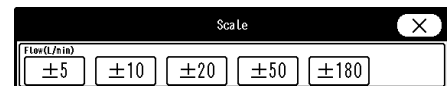


Scale



1 AWF Scale

- ▶ Select the AWF (Airway Flow) scale from [±5]/[±10]/[±20]/[±50]/[±180] (L/min).



2 AWP Scale

- ▶ Select the AWP (Airway Pressure) scale from [10]/[20]/[30]/[50]/[120] (cmH₂O).



3 AWW Scale

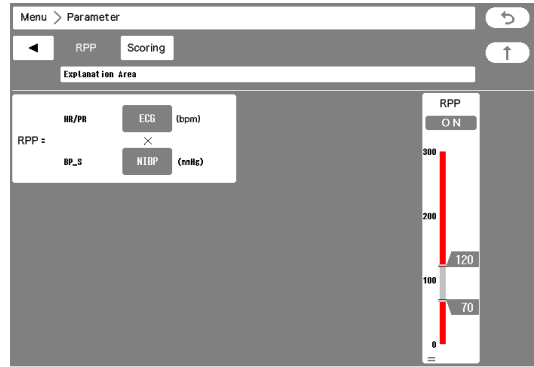
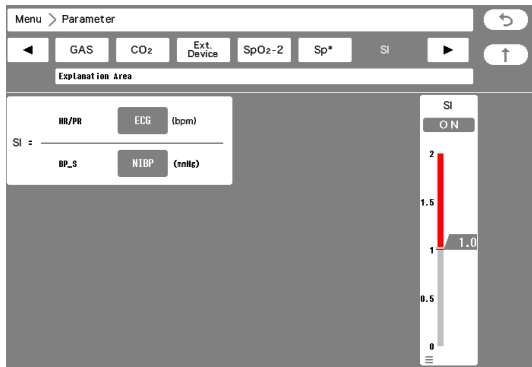
- ▶ Select the AWW (Airway Volume) scale from [50]/[250]/[500]/[1000]/[3000] (mL).



SI, RPP

This device can calculate the SI (Shock Index) and the RPP (Rate Pressure Product). The SI is an index that serves as a guide for bleeding. Its value is obtained by dividing the pulse rate or heart rate by the systolic blood pressure value (SYS). The RPP is an index for evaluating the state of cardiac function. Its value is obtained by multiplying the pulse rate or heart rate by the systolic blood pressure value (SYS). The systolic blood pressure value (SYS) can be measured by either invasive or non-invasive methods.

The settings for SI (Shock Index) and RPP (Rate Pressure Product) are explained below.



Set the HR/PR source and BP_S source to calculate the SI and RPP.

- ♦ HR/PR Source: Select from ECG / SpO₂ / SpO₂-2 / BP.
- ♦ BP_S Source: Select from NIBP/BP.

Scoring Function

As an index to assist predicting possible sudden health changes for a patient, a score can be calculated based on the patient's medical history, biometric measurements, and the observations performed by the medical professional.

The following score modes can be used. The score mode can be customized by changing the parameters and score thresholds.

- ♦ NEWS2
Improved scoring system of NEWS (National Early Warning Score) which is a scoring system released by NHS (National Health Service) on 2012.
- ♦ qSOFA (quick-Sequential Organ Failure Assessment)
Scoring system to predict organ failure caused by sepsis, etc.

CAUTION

- ♦ A diagnosis should not be made based solely on a patient's score. A comprehensive diagnosis should be performed taking into consideration all of the patient's clinical signs and symptoms.
- ♦ NEWS2 cannot be used for patients under the age of 16.

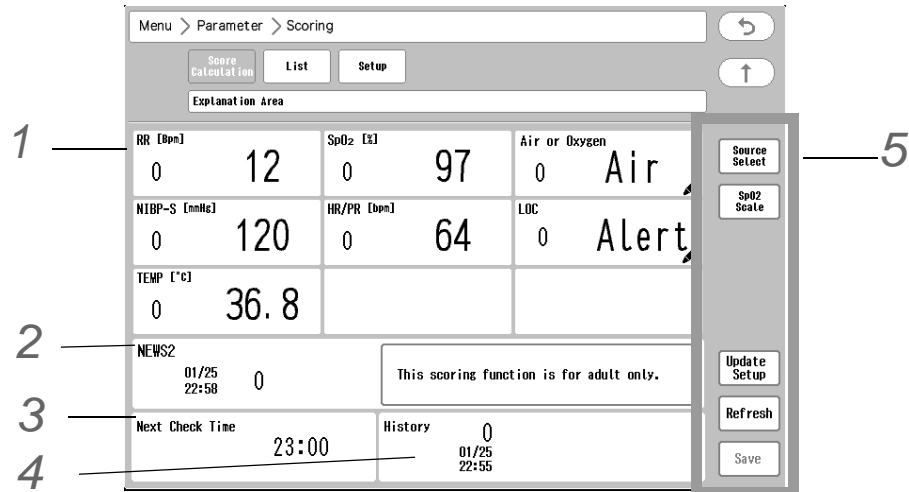
NOTE

- ♦ When the extended display unit is used, the "Scoring" screen (Score Calculation, Score List, Score Setup) can only be shown on one of the display units, not both.

Description of the Scoring Display

On the individual bed display, press [Menu > Parameter > Scoring], or press the Scoring numeric data box.

Score Calculation Display



1 Maximum of 9 parameters and scores (0 to 3) will be displayed.

- ▶ Pressing the parameter display area with the mark will allow the values to be entered manually.

2 The aggregate score (0 to 27) and calculated date/time will be displayed.

It will be displayed only if the measurement data for all the parameters are entered.

REFERENCE

- ♦ The background color of the score will differ depending on its value.
 - ♦ An arrow to the right of the score value displays the comparison of the current value with that of the previous recorded score.
 - ↑: Increased from the previous score.
 - : Same with the previous score.
 - ↓: Decreased from the previous score.
- An arrow will not be displayed if there is no score history.

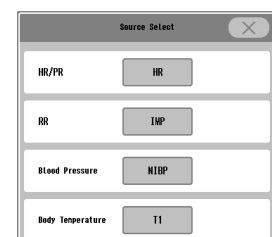
3 The recommended date for recalculating this score will also be displayed. (☞ P8-29)

4 The history of the previous three scores calculated (aggregate score and date/time) are displayed as well.

- ▶ Select the measurement source for HR/PR, BP, RESP, TEMP.

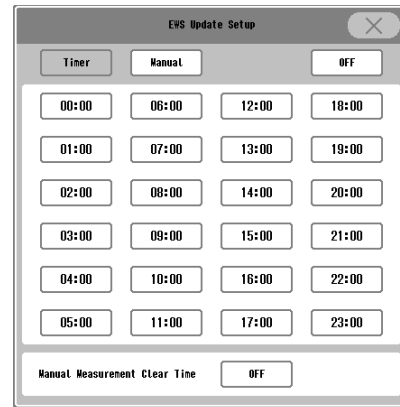
5 Description of Each Key

- 1 Press [Source Select] to display the setup window.



- 2 Note: The [SpO2 Scale] will be displayed only when the score mode is set to NEWS2.

- ▶ Select the SpO₂ scale (Scale 1/Scale 2) from the dropdown list.
- 3 [Update Setup]: The score update timing can be set. (Timer/Manual/OFF)
- ▶ [Timer]: Select the time to automatically update. (More than one selection is possible.)
In addition, select "Manual Measurement Clear Time" . The manually entered data will be deleted after the set time.
 - ▶ [Manual]: The data will be updated according to the setting of "Time Interval until Next Check" . (☞ P8-29)



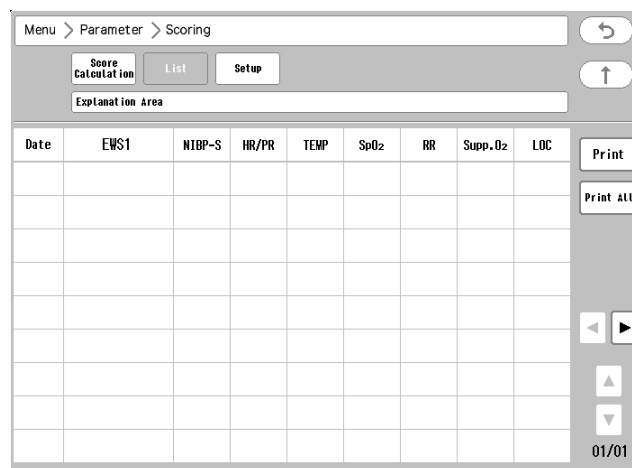
- 4 [Refresh]: The Aggregate score, individual parameter score, and manually entered data will all be displayed blank.
- 5 [Save]: The Numeric data box and score list will be updated. It will not be displayed when the [Update Setup] is set to [OFF].

NOTE

- ◆ When the aggregate score has not been calculated, the [Save] key is grayed out and cannot be used.
- ◆ For the DS-LAN beds which supports this scoring function, the following operations can be performed at the bedside monitor.
 - *Manual input of the score
 - *Saving the score
 - *Selecting the source, changing the SpO₂ scale

Score List Display

On the individual bed display, press [Menu > Parameter > Scoring > List] to display the score list.



Score Setup

Press [Menu > Parameter > Scoring > Setup] to display the Score Setup Display. Score mode, parameters, score range can be set.

NOTE

- When the score mode is NEWS2, parameters and score thresholds cannot be changed.

1 Press the score mode display area to display the setup window.

- Set the thresholds for score level (1-4) and the time interval for the next re-evaluation.

2 Press the parameter display area to display the parameter selection window.

- Select the parameters to be used.

3 Press the score range display area to display the threshold setup window.

- The selection will differ depending on the [Choice]/[Numeric]/[Yes/No] selection for "Scoring". The example shown on the right is when [Choice] is selected.

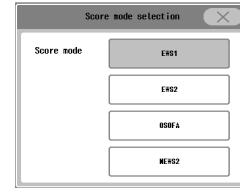
[Choice]: Select the level from the dropdown list.

[Numeric]: Select Enable/Disable and threshold for each level.

[Yes/No]: Select Yes/No from the dropdown list.

4 [Score Mode]: Select the score mode to be used.

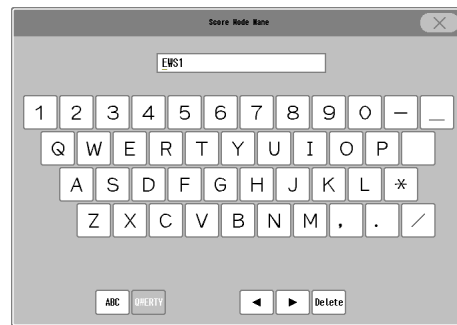
- ▶ The name of the score mode can be changed. (☞ P8-30)
EWS1, EWS2, QSOFA, NEWS2 will be displayed by default.



CAUTION

- When the score mode is changed, pay attention to the patient's condition as the scoring will be calculated with a different method.
- The following operation can be performed on the DS-LAN-administrating central monitor.
 - *Selecting the score mode, parameters, changing the score range
 - *Changing the score mode name
 - *Initializing the score setting

5 Press [Change Name] to change the score mode name.



6 Press [Initialize] to initialize the setting.

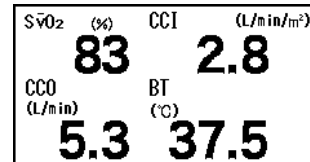
SvO₂/CCO Monitor Data

The DS-1800 System can display the measurement data (SvO₂, CCO, CCI, BT) of SvO₂/CCO monitor (Vigilance, VigilanceCEDV, Vigilance II, Vigileo) connected to the bedside monitor.

(Display Configuration on the Individual Bed Display: ☞ "Numeric Data/Waveform" P13-3)

(Display Configuration on the Home Display: ☞ "Numeric Data/Waveform" P13-27)

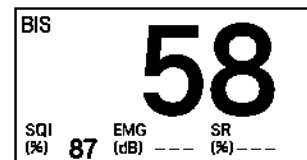
There are no setup items for SvO₂/CCO monitoring.



BIS Monitor Data

The DS-1800 System can display the BIS monitor measurement data (BIS, SQI, EMG, SR).

There are no setup items for BIS monitoring.

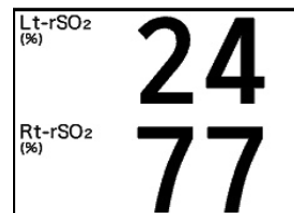
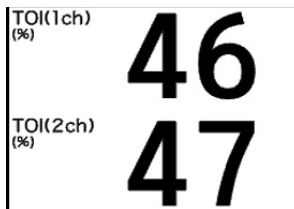
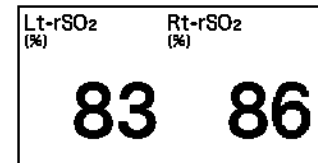


INVOS Monitor Data

The DS-1800 System can display the regional cerebral oxygen saturation (rSO₂) data measured by INVOS 5100C Non-Invasive Cerebral Oximeter connected to the bedside monitor.

There are no setup items for INVOS data monitoring.

The DS-1800 System can also display the tissue oxygenation index (TOI) data measured by NIRO monitor connected to the bedside monitor.

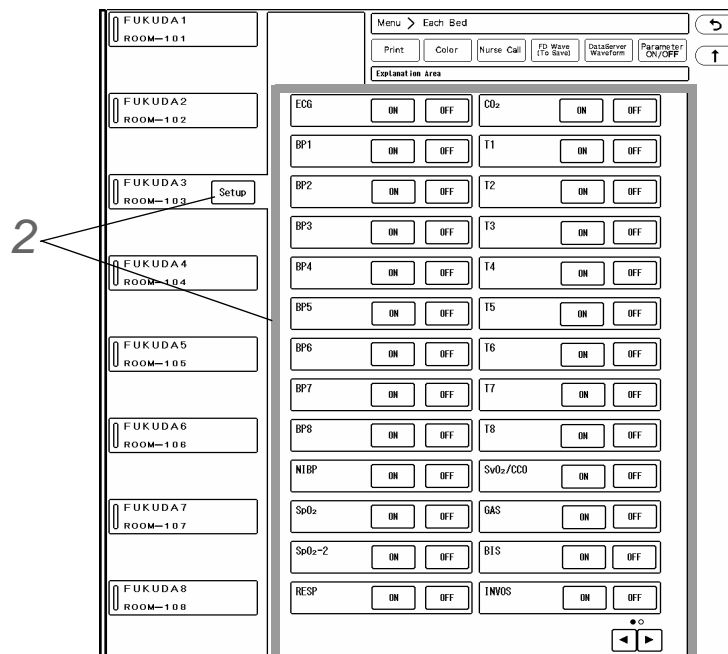


Parameter ON/OFF

Select ON/OFF of monitoring for each parameter.

1 Press the [Menu], [Parameter ON/OFF] ("Each Bed") keys.

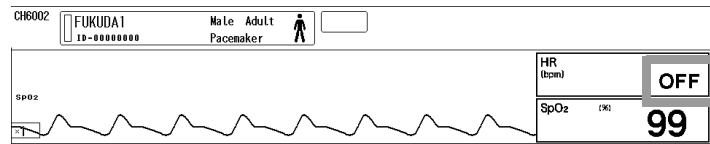
- ▶ The "Parameter ON/OFF" screen will be displayed.
- ▶ [Parameter ON/OFF] key can be also assigned to the user key.



2 Press the [Setup] key for the bed to perform the setup, and select [ON]/[OFF] for each parameter.

- ▶ When [OFF] is selected, <OFF> will be displayed inside the numeric data box for corresponding parameter.

- ▶ Pressing the numeric data box where <OFF> is displayed will display the "Parameter ON/OFF" screen.

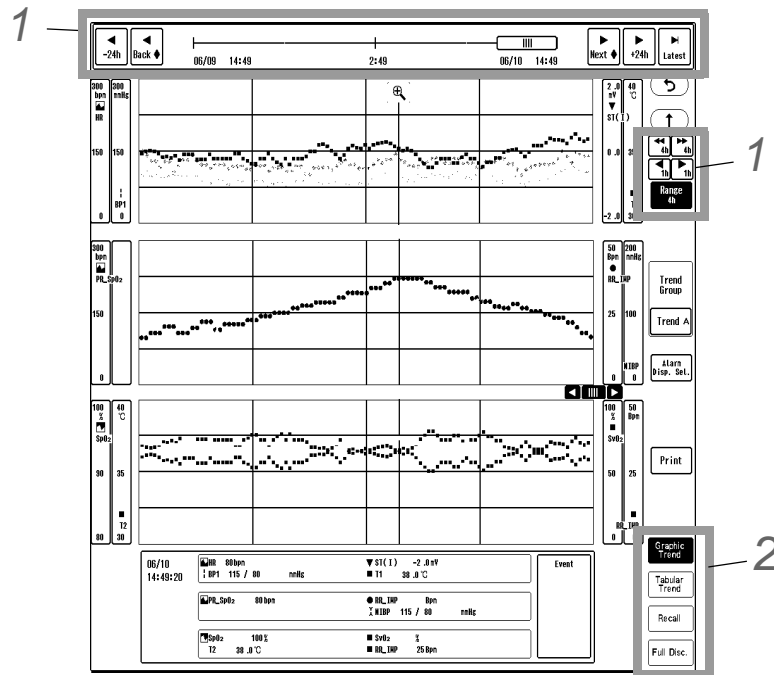


Chapter 9 Data Review

The patient review data function such as graphic trend, tabular trend, recall will be displayed.

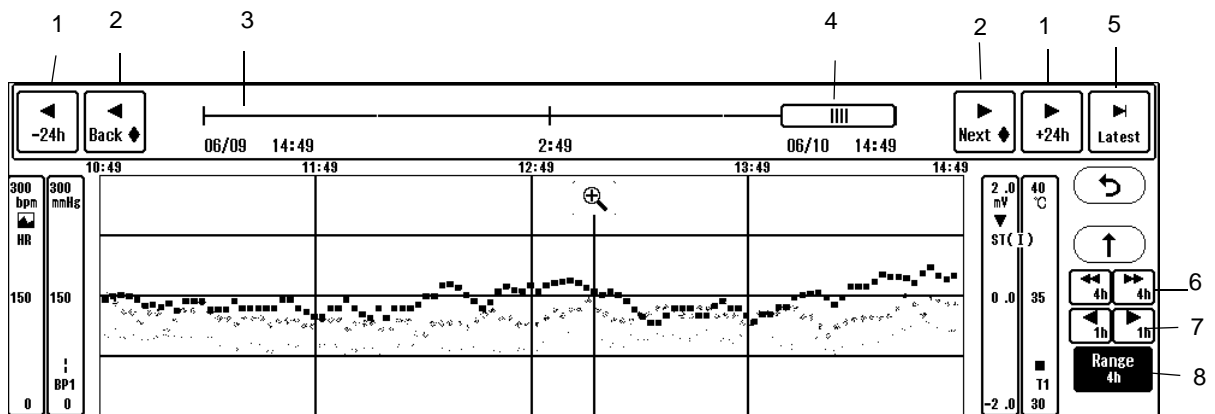
Common Operation

The common operations for all the review screens are explained below.



1 Time Bar

► Changing the time span, scrolling the time, displaying the latest data can be performed.



- 1 The time zone range can be changed in 24 hours interval.
- 2 The previous/next alarm event will be displayed.
- 3 The time zone for the whole data is shown. Pressing the time bar will display the data at pressed time.
- 4 Indicates the displayed time range with the bar length. Dragging the slider to the right will display newer data, and dragging it to the left will display older data.

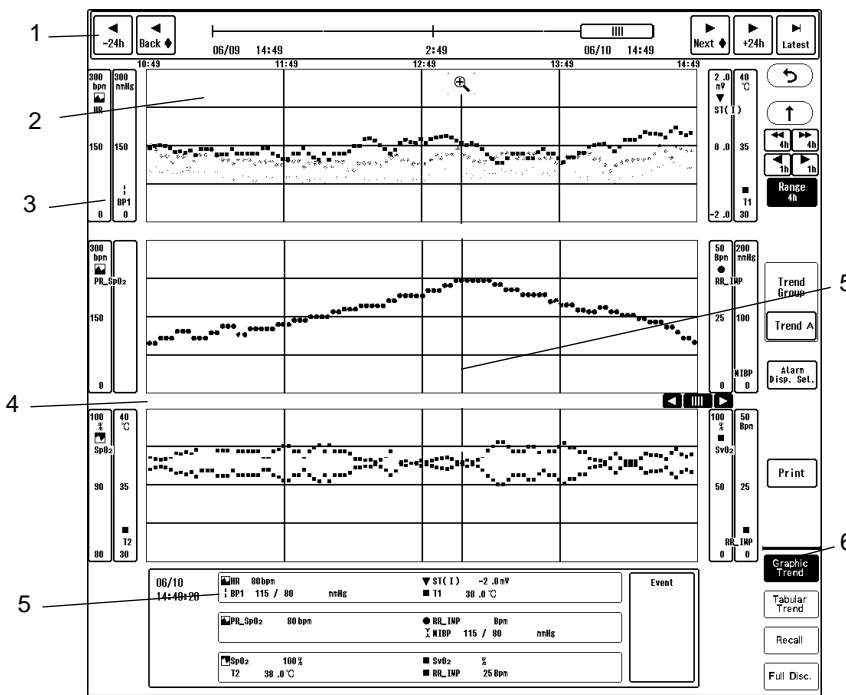
- 5 The latest data will be displayed.
 - 6 The display will switch by page.
 - 7 The display will switch by 1/4 page.
 - 8 The displayed time range can be selected.
- 2** Displays other review data at the same time.
- ▶ With the displayed date/time, the review data display can be switched.

Graphic Trend

This section explains the graphic trend function and printing procedure.
 48 hours of data will be automatically stored and displayed as trend data.
 By using the optional SD card (FSD-64G), maximum of 336 hours of data can be saved.

Displayed Items

Press the [Menu], [Trend] ("Data Review") on the individual bed display.



1	Time Bar	(☞ "Common Operation" P9-1)
2	Graph	The graphic trend of 4 parameters can be displayed simultaneously. The graph can be scrolled by dragging inside the graph.
3	Parameter and Scale	The parameters and scales of the graphic trend will be displayed.
4	Alarm Bar	Indicates the alarm occurrence point in red.
5	Date/Time at Cursor Point and Alarm Event	By moving the cursor left and right, the measurement data and alarm event at the cursor point will be displayed.
6	Other Review Data Display	(☞ "Common Operation" P9-1)

NOTE

- The apnea duration of 5 seconds or more will be stored. If less than 5 seconds, it will be

stored as "0 (zero)".

CAUTION

- When <Check SD Card1> is displayed for the system status message, internal memory error can be considered. In such case, trend data cannot be properly stored or displayed. Refer to the "Troubleshooting" section.
- The trend data is periodically stored to the internal memory, but if the AC power cable of this device is disconnected, maximum of 15 minutes of data may be lost. In such case, the lost data will be displayed as not measured data.

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 30 seconds is displayed, one mark will be displayed for the 12-minute (720-second) data.
- If the display resolution is higher than the minimum resolution of the data, the same data is repeated to match the display resolution.
Refer to the following table for resolution. The data resolution differs according to the parameter.

Display Resolution

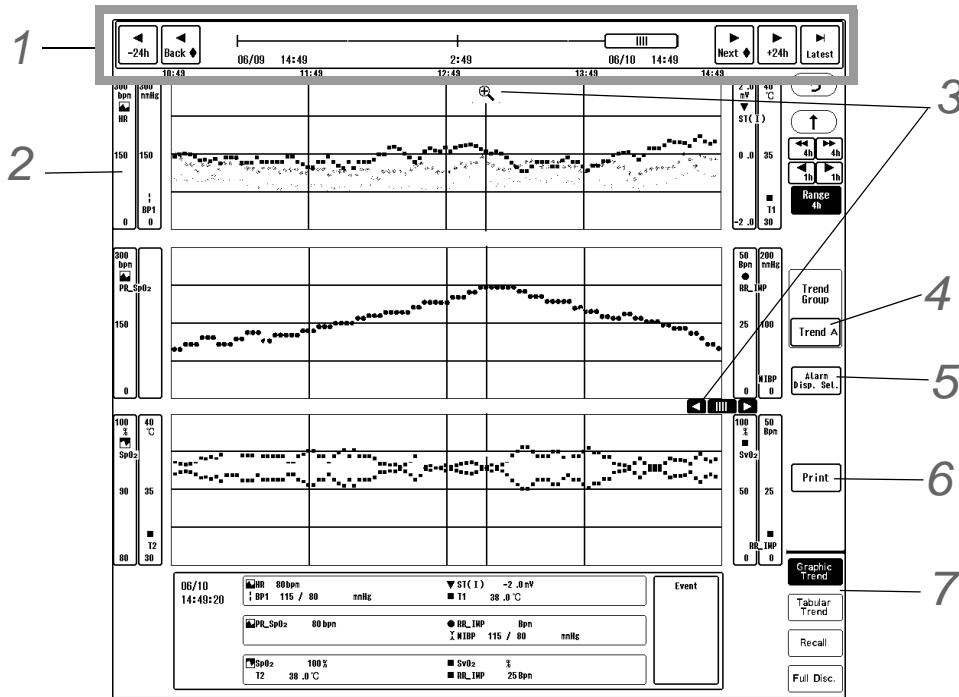
Time Span	Minimum Resolution			
	Line Display		Mark Display	
	10 sec. Sample	30 sec. Sample	10 sec. Sample	30 sec. Sample
20 min.	10 sec.	30 sec.	10 sec.	30 sec.
1 hours	10 sec.	30 sec.	30 sec.	30 sec.
2 hours	10 sec.	30 sec.	60 sec.	60 sec.
4 hours	20 sec.	60 sec.	120 sec.	120 sec.
8 hours	40 sec.	120 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.	Other than external device data
30 sec.	External device data

Graphic Trend Setup and Printing

The procedure for the graphic trend setup and printing is explained below.



1 Changing the displayed time, scrolling the time, updating the data (☞ "Common Operation" P9-1)

2 Selection of parameter, display type, scale.

▶ Pressing the scale display section of each parameter will display the "Scale" window.

1 Select the scale.

2 Select the parameter to be displayed. Changing the parameter will also change the parameter in the trend group.

3 Select the display format.
(☞ "Review Function" P15-5)



3 Moving the Cursor

▶ / : Adjusts the cursor position. The measurement data at the cursor point will be always displayed below.

▶ : 10-minute trend data before and after the cursor position will be displayed.

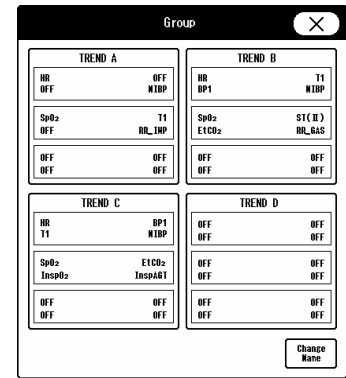
▶ : The displayed time range will return to the previous time range.

NOTE

, will not function if the displayed time range is 20 minutes.

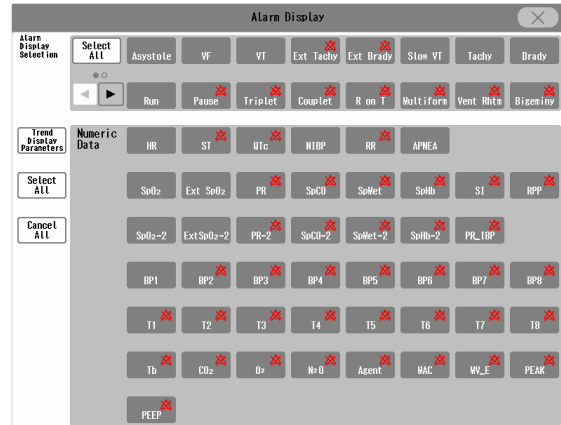
4 Trend Group Selection

- ▶ Maximum of 4 trend groups with 12 parameters each can be registered.
The trend group can be selected according to the monitoring purpose.
- ▶ Pressing the [Change Name] key will allow to change the trend group name.



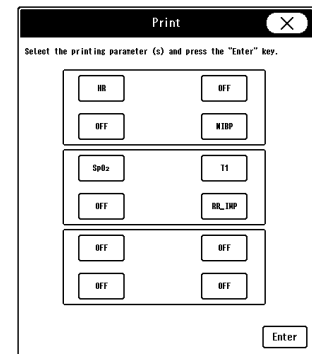
5 Alarm Display Selection

- ▶ If the alarm for the selected arrhythmia, parameter is generated during the displayed time range, it will be indicated in red on the alarm bar.
- ▶ [Trend Parameters]: The displayed trend parameters will be selected.
- ▶ [Select All]: All parameters including arrhythmia will be selected.
- ▶ [Cancel All]: All selections will be canceled.
- ▶ [Select All Arrhythmia]: All arrhythmia will be selected.
- ▶ Each parameter key: Each time the key is pressed, selected/unselected status will change.



6 Graphic Trend Printing

- ▶ To print the trend data, press the [Print] key, select the parameter, and press the [Enter] key.
- ▶ It can be output on the recorder (built-in or external) or the laser printer. (☞ "Output Printer Setup for Review Data Printing" P12-8)



7 Displays other review data of the same time. (☞ "Common Operation" P9-1)

Description for Each Parameter

The parameters and scales for the graphic trend are as follows.

Numeric Data	Description	Scale	Unit
HR	Heart Rate	100, 200, 300	bpm
VPC	VPC Counts	20, 50, 100	-
ST (ST1, ST2, I, II, III, aVR, aVL, aVF, V1 to V6)	ST Level	±0.2, ±0.5, ±1.0, ±2.0	mV
		±2, ±5, ±10, ±20	mm
SpO ₂ , SpO ₂ -2	SpO ₂ Value	0-100, 50-100, 80-100	%
PR_SpO ₂ , PR_SpO ₂ -2	SpO ₂ Pulse Rate	100, 200, 300	bpm

Numeric Data	Description	Scale	Unit
NIBP	NIBP (Systolic/Mean/Diastolic)	100, 150, 200, 300	mmHg
		16, 20, 24, 40	kPa
BP1-8	Blood Pressure (Systolic/Mean/Diastolic)	20, 50, 100, 150, 200, 300	mmHg
		4, 8, 16, 20, 24, 40	kPa
CVP	Central Venous Pressure	20, 50, 100, 150, 200, 300	mmHg
		4, 8, 16, 20, 24, 40	kPa
		20, 40	cmH ₂ O
PDP, CPP	Peak Diastolic Pressure of IABP, Cerebral Perfusion Pressure	20, 50, 100, 150, 200, 300	mmHg
		4, 8, 16, 20, 24, 40	kPa
PR_IBP	BP Pulse Rate (BP1/ART)	100, 200, 300	bpm
T1 to 8	Temperature	20-45, 30-40°C	
		68.0-113.0, 86.0-104.0°F	
Tb	Blood Temperature (Cardiac Output Measurement)	20-45, 30-40°C	
		68.0-113.0, 86.0-104.0°F	
RR_IMP	Impedance Respiration Rate	50, 100, 150	Bpm
RR_GAS	Gas Unit Respiration Rate	50, 100, 150	Bpm
RR_VENT	Ventilator Respiration Rate	50, 100, 150	Bpm
RR_SpO ₂	SpO ₂ Respiration Rate	50, 100, 150	Bpm
Apnea	Apnea Duration (Impedance, CO ₂ , Ventilator)	15, 30	sec
EtCO ₂ , InspCO ₂	Gas Unit CO ₂ Concentration	50, 100	mmHg
		4, 8, 10	kPa, %
ExpO ₂ , InspO ₂	Gas Unit O ₂ Concentration	50, 100	%
ExpN ₂ O, InspN ₂ O	Gas Unit N ₂ O Concentration	50, 100	%
ExpAGT, InspAGT	Gas Unit Agent Concentration	4, 8, 10	%
MAC	Minimal Alveolar Concentration	5, 10	-
BIS	Bispectral Index (BIS Monitor Measurement)	25, 50, 75, 100	-
SvO ₂	Mixed Venous Oxygen Saturation	0-100, 50-100, 80-100%	
ScvO ₂	Central Venous Oxygen Saturation	0-100, 50-100, 80-100%	
CCO	Continuous Cardiac Output	6, 12, 20	L/min
CCI	Continuous Cardiac Index	6, 12, 20	L/min/m ²
BT	Blood Temperature (Vigilance)	20-45, 30-40°C	
		68.0-113.0, 86.0-104.0°F	
SpCO (1, 2)	Carboxyhemoglobin Concentration	20, 40, 100	%
SpMet (1, 2)	Methemoglobin Concentration	10, 15, 100	%
SpHb (1, 2)	Total Hemoglobin Concentration	10-20, 0-25	g/dL
PI (1,2)	Perfusion Index	10, 20	%
PVI (1,2)	Pleth Variability Index	30, 60,100	%
ExpMV	Expiratory Minute Ventilation Volume	6.0, 12.0, 20.0	L/min
PEAK	Peak Airway Pressure	10, 20, 50, 100	cmH ₂ O
PEEP	Peak End Expiratory Pressure	10, 20, 50, 100	cmH ₂ O

Numeric Data	Description	Scale	Unit
Lt-rSO ₂	Regional Cerebral Oxygen Saturation	20-100	%
Rt-rSO ₂			
S1-rSO ₂			
S2-rSO ₂			

Tabular Trend

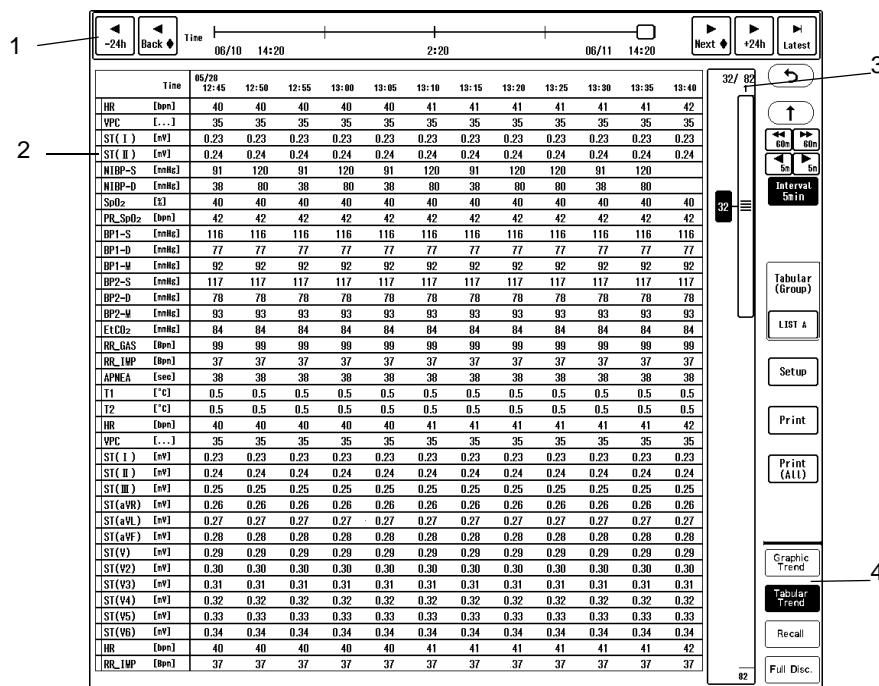
This section explains the tabular trend function and printing procedure.

The 48 hours of data in 10 sec. / 30 sec. interval will be automatically stored and displayed as tabular trend data.

By using the optional SD card (FSD-64G), maximum of 336 hours of measurement data can be saved.

Displayed Items

Press the [Menu], [Tabular Trend] ("Data Review") on the individual bed display.



1	Time Bar	(☞ "Common Operation" P9-1)
2	Numeric Data List	The numeric data will be displayed. The alarm generated data will be displayed with red background. On the left side of the parameter, the color assigned for the corresponding parameter will be displayed.
3	Scroll Parameter	If all the parameters are not displayed, the display can be scrolled.
4	Other Review Data Display	(☞ "Common Operation" P9-1)

NOTE

- The red background will be displayed for the alarm generated 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.

- 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 as shown below.

Data Resolution

Minimum Resolution	Parameter
10 sec.	HR, ST, SpO ₂ , SpO ₂ -2, PR_SpO ₂ , PR_SpO ₂ -2, BP1, BP2
30 sec.	Other than above

CAUTION

- When <Check SD Card1> is displayed for the system status message, internal memory error can be considered. In such case, trend data cannot be properly stored or displayed. Refer to the "Troubleshooting" section.
- The tabular trend data is periodically stored to the internal memory, but if the AC power cable of this device is disconnected, maximum of 5 minutes of data may be lost. In such case, the lost data will be displayed as not measured data.

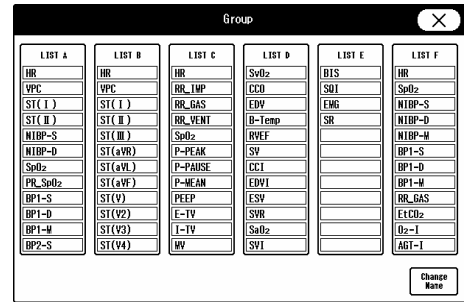
Tabular Trend Setup and Printing

1 Switching the Displaying Items

- ▶ By dragging the scroll bar slider up and down and releasing it, / will be displayed for a fixed amount of time.
- ▶ Pressing the / will switch the display by page.

2 Tabular Trend Group Selection

- ▶ Maximum of 6 groups of parameters can be registered for tabular trend.
The trend group to be displayed can be selected according to the monitoring purpose.
- ▶ Pressing the [Change Name] key will allow to change the trend group name.



3 Displaying Parameter Selection

(☞ "Parameter Selection for Tabular Trend" P9-9)

4 [Print]/[Print (All)]

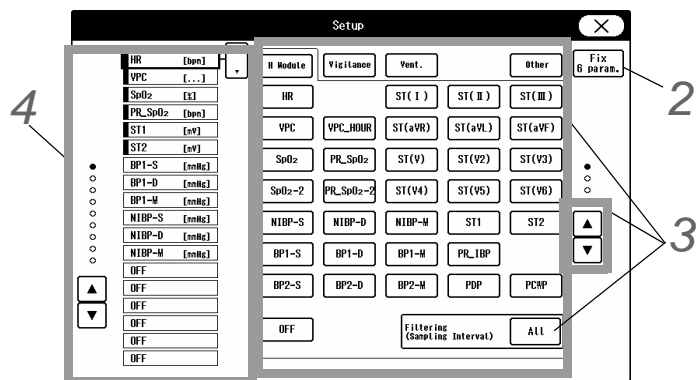
- ▶ [Print]: The currently displayed tabular trend will be printed.
- ▶ [Print (All)]: All data for 12 parameters (which fits in 1 page) will be printed.
- ▶ It can be output on the recorder (built-in or external) or the laser printer.
(☞ "Output Printer Setup for Review Data Printing" P12-8)

Parameter Selection for Tabular Trend

1 Press the [Setup] key on the Tabular Trend screen.

2 Quantity of Fixed Display Parameters





- 1 Press the [Fix x param.] key.
 - ▶ The dropdown list will be displayed.
- 2 Select from [0 param.] to [6 param.].
 - ▶ The selected quantity of parameters will be always displayed on the tabular trend, and these data will be remained displayed even when scrolled.



3 Parameter Selection for Tabular Trend

- 1 The data can be filtered by pressing the key for "Filtering".
 - ▶ [10 sec.]: The displayed data will be filtered in 10 seconds sampling interval.
 - ▶ [All]: All data will be displayed.
- 2 Select the category and displaying page.
 - ▶ [H Module]/[Vigilance]/[Vent.]/[Other]: The parameters for the corresponding category will be displayed. [H Module] is a generic term for the modules for DS-7000 series and DS-8000 series patient monitor (HS-700, HS-8000, HM-800, etc.)
 - ▶ [▲] / [▼]: The displaying page for the parameters can be selected.
- 3 Select the parameter to be displayed for the selected location on the left.
 - ▶ The blue frame will move to one row below.
 - ▶ [OFF]: The line where [OFF] is selected will not be displayed.




4 Parameter Display Location

- 1 The selected location will be displayed with blue frame and  will be displayed at the side.
- 2 To change the location, directly press the desired location or drag the  key up or down.
- 3 To change the displayed page, press the / keys on the left.

NOTE

- The apnea duration of 5 seconds or more will be stored. If less than 5 seconds, it will be stored as "0 (zero)".

The parameter with a circle mark can be displayed on the tabular trend on the central monitor by performing "Trend Data Setup" on the wired network bedside monitor. The trend data setup status on the wired network bedside monitor can be checked by the color of the circle mark.

Circle Mark	Parameter Status
 I:E (Mark: Blue)	Selected under the "Trend Data Setup" on the wired network bedside monitor.
 I:E (Mark: Gray)	Not selected under the "Trend Data Setup" on the wired network bedside monitor.
 HR (Mark: None)	Unselectable parameter for the "Trend Data Setup"

NOTE

- When the selection is turned OFF under the "Trend Data Setup" on the wired network bedside monitor, the past data will be cleared for that parameter.
- When the selection of the "Trend Data Setup" on the wired network bedside monitor has been changed by bed transfer/bed exchange, the past data will be cleared for the parameter which the selection has been turned OFF.
- There is 15 seconds to 1 minute 30 seconds delay for the tabular trend display on the central monitor compared to that on the wired network bedside monitor.
- When replacing the wired network bedside monitor while monitoring on this central monitor, register the bed before resuming monitoring.

Recall

This section explains about the recall function and the setup procedure.

 **CAUTION**

- When <Check SD Card1> is displayed for the system status message, internal memory error can be considered.
In such case, full disclosure waveform cannot be properly stored or displayed.
Refer to the "Troubleshooting" section.
- The recall data is periodically stored to the internal memory, but if the AC power cable of this device is disconnected, maximum of 1 minute of data may be lost. In such case, the lost data will be displayed as not measured data.

Displayed Items

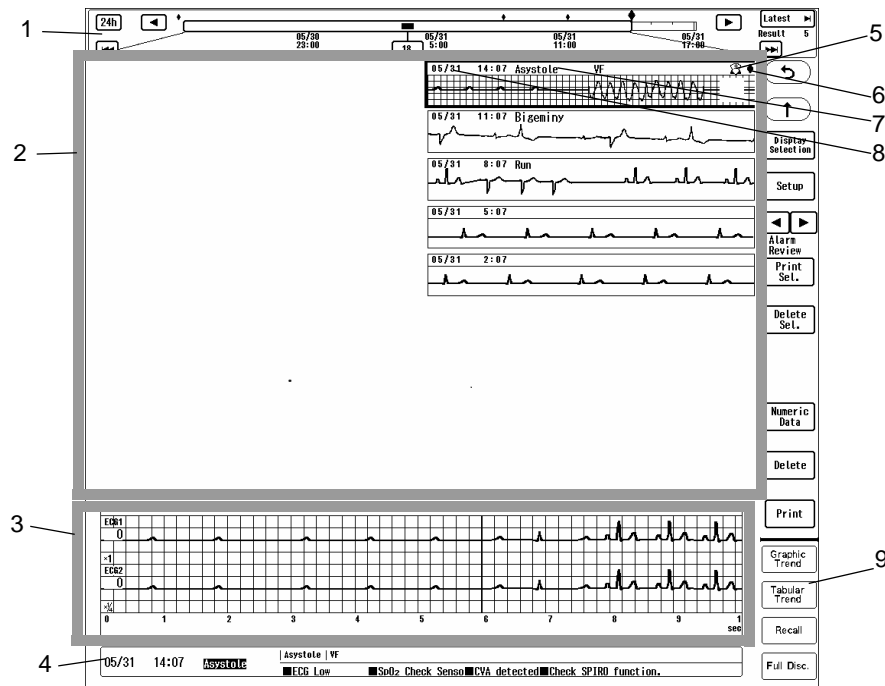
Press the [Menu], [Recall] ("Data Review") keys.

When the alarm for the specified recall factor occurs, the specified waveform (12 seconds) and numeric data for each recall factor will be stored up to 1000 data when 1 recall waveform and up to 500 data when 2 recall waveforms. The recall data to be displayed can be selected. Maximum of 18 compressed recall waveforms will be displayed.

Pressing the waveform area will display the enlarged waveform.

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.

If the recall data exceeds the maximum quantity (1000/500), the data will be erased from the oldest one.



1	Time Bar	(☞ "Common Operation" P9-1)
2	List Display Area	18 data will be displayed.
3	Enlarged Display Area	Maximum of 2 waveforms (12 seconds each) can be displayed. The waveform can be dragged to left and right. When a mouse is used, divider function can be used.
4	Date/Time at Alarm Occurrence, Recall Factor, Numeric Data	
5	Nurse Call Mark	Indicates that the recall factor was notified to the nurse call system.
6	Latest Recall Factor	A diamond shape mark will be displayed for the waveform of latest recall factor.
7	Major Recall Factor	Indicates the major recall factor.
8	Date/Time at Alarm Occurrence	Indicates the date/time at alarm occurrence.
9	Other Review Data Display	(☞ "Common Operation" P9-1)

Recall Condition 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.

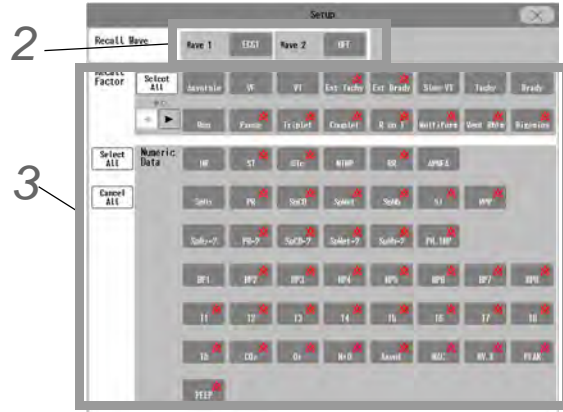
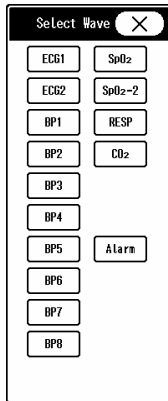
1 Press the [Setup] key on the recall screen.

▶ The "Setup" window will be displayed.

2 Recall Waveform Selection

Up to 2 waveforms can be selected for recall waveform.

▶ Select the parameter for "Wave 1" and "Wave 2".



3 Recall Factor Selection

▶ Select the alarm factor to be stored as recall waveform.

NOTE

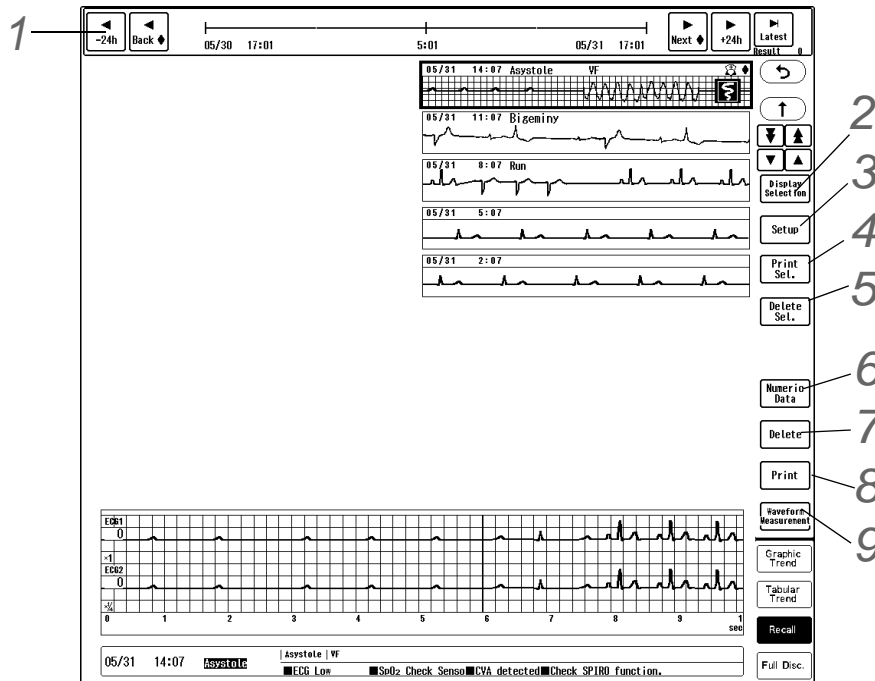
- ♦ The recall waveform will start with the following delay time tracing back from the alarm occurrence.

	Adult	Child	Neonate	
			Numeric Data Alarm	Arrhythmia Alarm
Delay Time	12 sec.	12 sec.	8 sec.	12 sec.

- ♦ For the parameters measured on the multigas unit, the delay time is 8 seconds.

Recall Setup and Printing

The procedures to select the displaying recall factor, to delete the recall waveform, to print the recall waveform, etc. are explained below.



1 Changing the displayed time, scrolling the time, updating the data (☞ "Common Operation" P9-1)

2 Selection of recall factor to display

- ▶ The key will turn blue when pressed to indicate that it is selected as the recall factor.
- ▶ [Select All]: All parameters including arrhythmia will be selected.
- ▶ [Select All Arrhythmia]: All arrhythmia will be selected.
- ▶ [Cancel All]: All selections will be canceled.
- ▶ [Event]: Event can be selected.

3 Recall Factor Selection (☞ "Recall Condition Setup" P9-12)



4 Recall List Printing

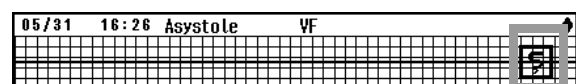
- ▶ This key will be displayed only when a laser printer is used.

1 Pressing the [Print Sel.] key will allow to print the recall list.

2 Select the waveforms to be printed on the laser printer. For the selected waveform, "☐" will be displayed. (shown on right)

To select all displayed waveforms, press [Select All].

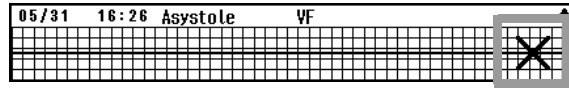
To cancel the selection, select again the waveform with "☐" mark. "☐" mark will be cleared indicating that it has been removed from the printing parameter selection.



- 3 Press [Print]. [Print OK]/[Cancel] keys will be displayed.
- 4 Press [Print OK] to print the waveforms with " [Print OK] " mark on the laser printer.

5 Deleting All Recall Waveform

- 1 Press [Delete Sel.] to enter delete mode.
- 2 Select the waveform to delete. For the selected waveform, "x" will be displayed. (shown on right)
To select all displayed waveforms, press [Select All].
To cancel the selection, select again the parameter with "x" mark. "x" mark will be cleared indicating that it has been removed from the deleting parameter selection.
- 3 Press [Delete]. [Delete OK]/[Cancel] keys will be displayed.
- 4 Press [Delete OK] to delete the parameters with "x" mark.

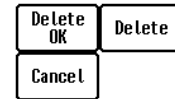


6 Displaying the Numeric Data for the Recall Factor

- ▶ The numeric data for the displayed enlarged waveform will be displayed on another window.

7 Deleting the Displayed Recall Enlarged Waveform

- ▶ Pressing the [Delete] key will display the [Delete OK]/[Cancel] keys.
- ▶ Press the [Delete OK] key to delete the displayed enlarged waveform.



8 Printing the Recall Waveform

- ▶ The displayed enlarged waveform and measurement data will be printed. The output printer can be selected under [Menu > Each Bed Setup > Print].
(☞ "Output Printer Setup for Review Data Printing" P12-8)

9 Waveform Measurement

- ▶ Select from [Divider]/[Caliper].
(☞ "Divider Function" P9-14)
(☞ "Caliper Function" P9-16)

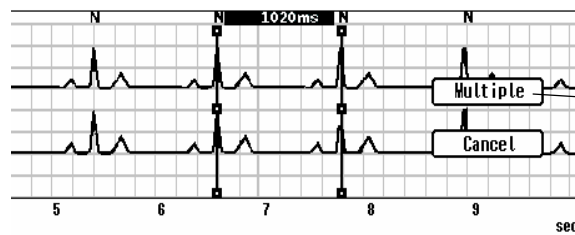
Divider Function

By using the divider function, PR, RR, PP interval of ECG can be measured.

- 1 The divider mode will be activated by selecting [Divider] for [Waveform Meas.] on the Recall screen.

2 Divider Mode Operation

- 1 The divider start line will be displayed on the dragging start point.
- 2 While dragging the mouse to the right, the divider end line will be displayed along with the mouse pointer.
- 3 When the drag operation is released, the finalized divider end line will be displayed.



- ▶ The divider interval will be displayed in "ms" unit.
- ▶ [Multiple], [Cancel] key will be displayed in the waveform area.

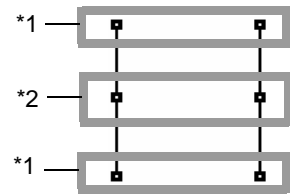
- ▶ Square marks will be displayed at upper end/lower end/center of the divider start line and end line. The divider lines can be adjusted using these marks.

4 To adjust the divider lines after they are finalized, use the square marks on the divider lines.

- ▶ By using the square marks on the upper/lower end (*1 shown on right), the divider line can be dragged.

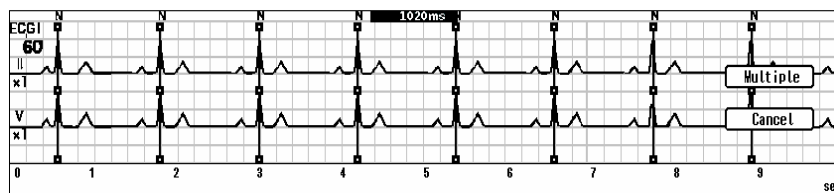
- ▶ By using the square marks on the center (*2 shown on right), the start line and end line can be dragged at the same time without changing the divider interval.

- ▶ By releasing the drag operation, a divider interval, [Multiple], [Cancel] keys will be displayed again.



3 [Multiple] Key Operation

1 Clicking the [Multiple] key will continuously display the dividers in equal intervals before and after the current divider.



- ▶ The divider interval (ms) will be displayed at the center of QRS judgment display area.

- ▶ If the divider interval is less than 200 ms, the [Multiple] key will not function.

2 To adjust the divider lines after they are finalized, use the square marks on the divider lines.

- ▶ By dragging the square marks on the upper/lower end of the divider line, the divider interval from the previous divider line can be decreased/increased.

- ▶ By using the square marks on the center, the start line and end line can be dragged at the same time without changing the divider interval.

- ▶ By releasing the drag operation, a divider interval, [Multiple], [Cancel] keys will be displayed again.

4 When the enlarged waveform is printed during the divider mode, the divider lines will be also printed.

5 The divider mode will be canceled for the following cases.

- ▶ When the display is switched to other display
- ▶ When the display is switched to other patient
- ▶ When the [Cancel] key is clicked

NOTE

- ♦ The data resolution of the divider is 10 ms. Adjustment of less than 10 ms is not possible.

Caliper Function

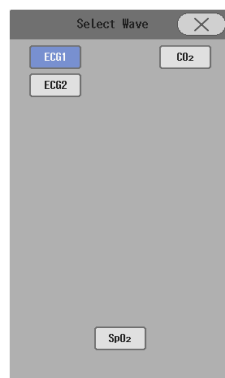
By using the caliper function, the following data can be measured depending on the saved waveform.

Waveform	Numeric Data
ECG1, ECG2, ECG I to V6	RR, HR, PR, QRS WIDTH, Q WIDTH, QT, Qtc, ST, PQ, Q AMPLITUDE
BP	PR, amplitude, SYS, DIA
SpO2, SpO2-2	PR
CO2, RESP, AWW, AWF	RR, Inspiratory Time, Expiratory Time, I:E

Caliper Mode Operation



1 Press [Waveform] and select the waveform to measure.



2 Select the measuring parameter from the lower part of the "Caliper Measurement" window.

3 Drag on the waveform.

4 The measured data of the dragged area will be saved.
To delete the measured data, click [Clear].

5 Click [Recall] to save the measured waveform and data as recall data.

Oxygen Desaturation Index (ODI)

By using the optional SD card, 336 hours of SpO₂ value (arterial oxygen saturation), pulse rate, HR value (instant) can be saved.

From the saved SpO₂ value, oxygen desaturation index (ODI) can be calculated. Maximum of 5 ODI results can be saved on the SD card.

The Oxygen Desaturation Index (number of SpO₂ drops per hour (ODI)) and its calculation conditions can also be displayed.

CAUTION

- ♦ Use only the specified SD card.
- ♦ Turn OFF the power before removing the SD card.

NOTE

- ♦ When the data exceeds 336 hours, the data will be erased from the oldest one.
- ♦ The data cannot be saved on the USB memory.
- ♦ When the extended display unit is used, "ODI" screen can be displayed only on either of the display units and not both.

ODI Display

1 Press [Menu > Data Review > ODI].

- ▶ ODI (oxygen desaturation index) results of every hour will be displayed.

The screenshot shows the ODI display screen with the following elements:

- Menu path: Menu > Data Review > ODI
- Explanation Area
- Table of ODI results (see below)
- Navigation buttons: [ODI Setup] (labeled 2) and [Result List] (labeled 3)

Time	(Time/Hr)	Minimum SpO ₂ (%)	Time	(Time/Hr)	Minimum SpO ₂ (%)
05/26 09:00 ~ 09:59	25.4	103	05/25 21:00 ~ 21:59	13.2	91
08:00 ~ 08:59	24.3	102	20:00 ~ 20:59	12.1	90
07:00 ~ 07:59	23.2	101	19:00 ~ 19:59	11.0	89
06:00 ~ 06:59	22.1	100	18:00 ~ 18:59	10.9	88
05:00 ~ 05:59	21.0	99	17:00 ~ 17:59	9.8	87
04:00 ~ 04:59	20.9	98	16:00 ~ 16:59	8.7	86
03:00 ~ 03:59	19.8	97	15:00 ~ 15:59	7.6	85
02:00 ~ 02:59	18.7	96	14:00 ~ 14:59	6.5	84
01:00 ~ 01:59	17.6	95	13:00 ~ 13:59	5.4	83
00:00 ~ 00:59	16.5	94	12:00 ~ 12:59	4.3	82
05/25 23:00 ~ 23:59	15.4	93	11:00 ~ 11:59	---	---
22:00 ~ 22:59	14.3	92	10:00 ~ 10:59	---	---

2 [ODI Setup] Key

ODI setup window will be displayed.

(☞ "ODI Setup" P9-18)

3 [Result List] Key

The ODI result list will be displayed.

(☞ "ODI Result List" P9-19)

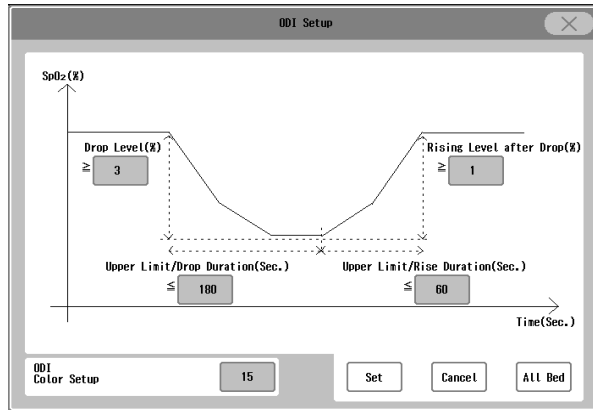
NOTE

- ♦ ODI will be recalculated when the setting is changed.
- ♦ The display will be updated every hour. However, minimum SpO₂ value will be displayed

as "---" until the set drop duration, rise duration has elapsed.

□ ODI Setup

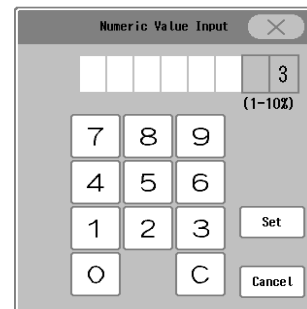
1 Press [Menu > Data Review > ODI > ODI Setup].



1 Press the key for "Drop Level", "Upper Limit of Drop Duration", "Upper Limit of Rise Duration", "Rising Level after Drop".

- ▶ The respective setup window will be displayed.
- ▶ Enter the value using the numeric keys and press the [Set] key.
- ▶ The value can be set in the following range.

Item	Range	Default
Drop Level	1%SpO ₂ to 10%SpO ₂	3%SpO ₂
Upper Limit of Drop Duration	1 sec. to 300 sec.	180 sec.
Rising Level after Drop	1%SpO ₂ to 10%SpO ₂	1%SpO ₂
Upper Limit of Rise Duration	1 sec. to 300 sec.	60 sec.



2 Press [Set] or [Cancel].

Set: The entered value will be set.

Cancel: The entered value will be canceled.

NOTE

- ♦ When the ODI setting is changed, recalculated results will be displayed on the ODI display.

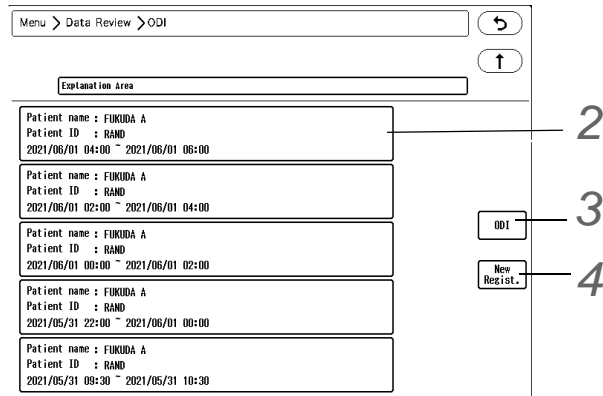
3 ODI Color Setup

The value to change the ODI color can be set.

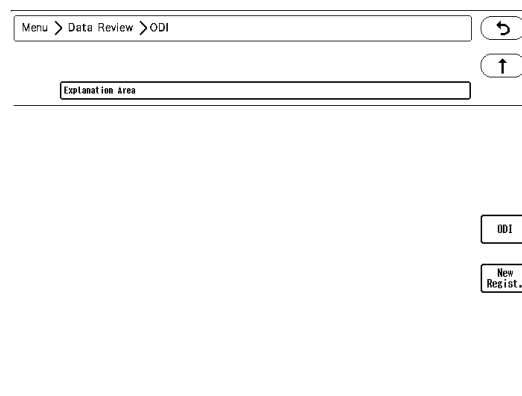
□ ODI Result List

1 Press [Menu > Data Review > ODI > Result List].

▶ The list of patients with ODI results will be displayed.



When ODI result is saved



When ODI result is not saved

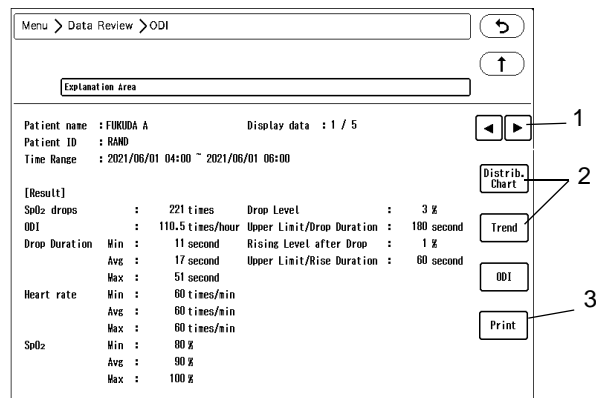
2 By selecting a patient from the list, ODI results (numeric value) of the selected patient will be displayed.
(☞ "ODI Result" P9-20)

3 [ODI] Key
The "ODI" screen will be displayed.
(☞ "ODI Display" P9-17)

4 [New Regist.] Key
ODI new registration window will be displayed.
(☞ "ODI New Registration" P9-21)

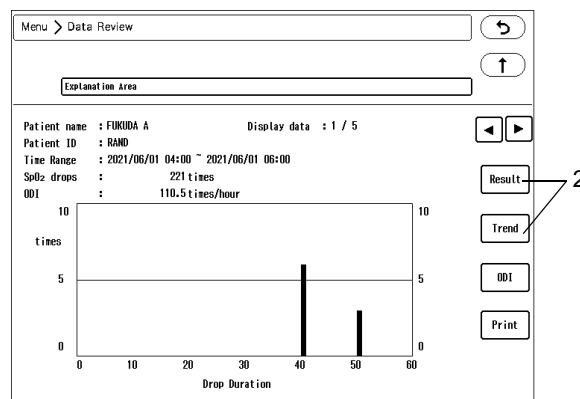
ODI Result

ODI results of the selected patient will be displayed.

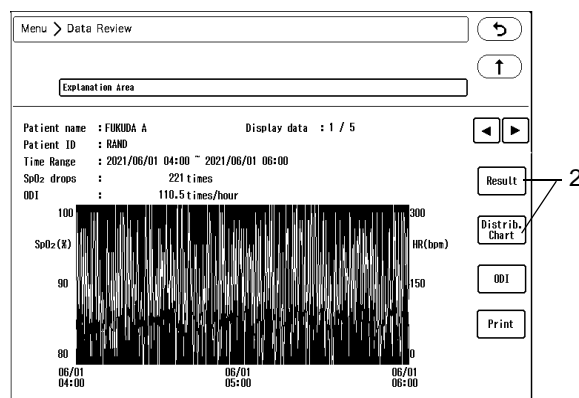


ODI Result (Numeric Value)

The result screen can be switched by pressing [Distrib. Chart], [Trend] shown on the right side.



ODI Result (Distribution Chart)



ODI Result (Trend)

- 1 / Key
 - ▶ : Previous result will be displayed.
 - ▶ : Next result will be displayed.
- 2 [Distrib. Chart], [Trend], [Result] Keys
Switches the ODI result screen.
- 3 [Print] key

- ▶ [Print]: The currently displayed result will be printed.
- ▶ [Print All]: All results (numeric, distribution chart, trend) for the currently displayed patient will be printed.

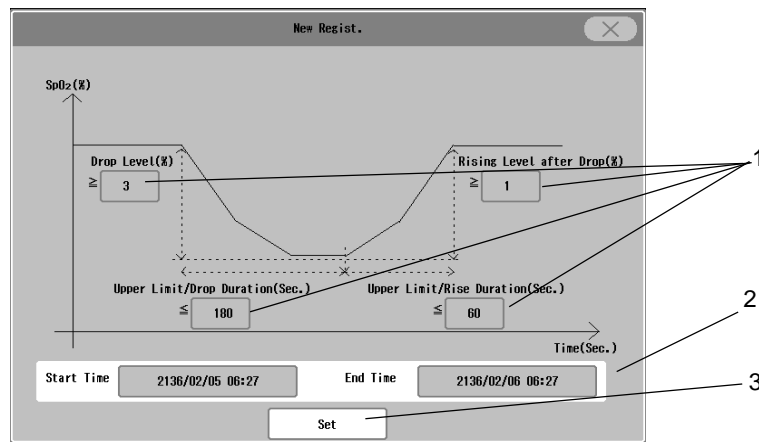
❑ ODI New Registration

Set the condition for SpO₂ drop detection.

REFERENCE

- ♦ "SpO₂ Drop Level" will be detected under the following condition.
 1. SpO₂ drops 2%SpO₂ or more. Or, 1%SpO₂ drop continues for 2/3 of the set drop duration (sec.) or longer.
 2. SpO₂ drop satisfies the set drop level within the set drop duration.
 3. SpO₂ rise satisfies the set rise level within the set rise duration.

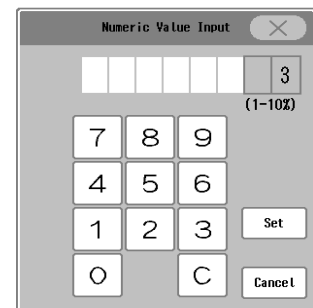
Press [Menu > Data Review > ODI > Result List > New Regist.].



1 Press the key for "Drop Level", "Upper Limit of Drop Duration", "Upper Limit of Rise Duration", "Rising Level after Drop".

- ▶ The respective setup window will be displayed.
- ▶ Enter the value using the numeric keys and press [Set].
- ▶ The value can be set in the following range.

Item	Range	Default
Drop Level	1%SpO ₂ to 10%SpO ₂	3% SpO ₂
Upper Limit of Drop Duration	1 sec. to 300 sec.	180 sec.
Rising Level after Drop	1%SpO ₂ to 10%SpO ₂	1%SpO ₂
Upper Limit of Rise Duration	1 sec. to 300 sec.	60 sec.

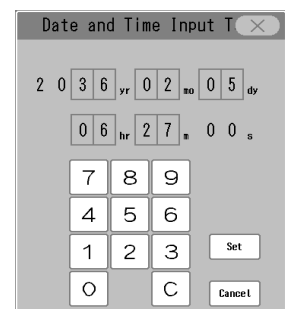


2 Press the key for "Start Time", "End Time".

- ▶ The respective setup window will be displayed.
- ▶ Enter the date/time using the numeric keys and press [Set].

3 [Set] key

SpO₂ drop detection of the set range will be performed.



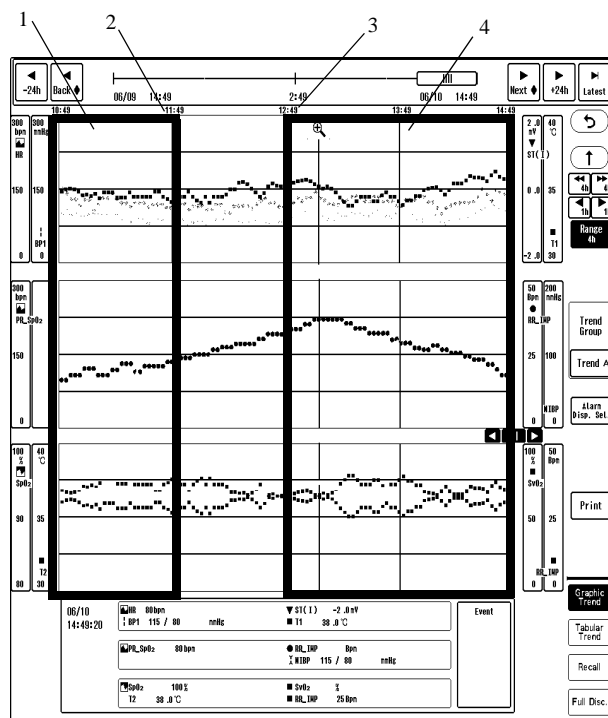
Review Data Display for Discharged Patient

The review data of the discharged patient can be displayed for the past 336 hours. (☞ "Discharged List" P13-16)
 The review data that can be displayed after the patient is discharged are as follows.

- ◆ Graphic Trend
- ◆ Tabular Trend
- ◆ Recall (List Display, Enlarged Display)
- ◆ Full Disclosure Waveform (Compressed Display, Enlarged Display)

1 On the review display for the Bed ID which the discharged patient was previously registered, scrolling back the time will display the review data for the discharged patient.

- ▶ The data for the discharged patient will be displayed with lower brightness.
- ▶ The review data can be printed along with patient information.



Example on "Graphic Trend" Display

- 1 Trend data of previous patient
- 2 Discharged date/time of previous patient
- 3 Admit date/time of current patient
- 4 Trend data of current patient

Review Data Display for Transferring Patient

The transferring data (data while the patient has been transferred) uploaded from the transport monitor, and the saved data on the original central monitor when bed transfer/exchange has been performed between the central monitors can be displayed on the currently monitored central monitor.

The following data can be displayed.

Transferring data saved on this central monitor or other central monitor.

Discharged data before transferring which is saved on this central monitor or other central monitor.

The following review data can be displayed.

- ♦ Graphic Trend
- ♦ Tabular Trend
- ♦ Recall (List Display, Enlarged Display)
- ♦ Full Disclosure Waveform (Compressed Display (except instant HR), Enlarged Display)

1 Open the review display for the monitoring patient.

- ▶ On the patient information area of the individual bed display, history icon will be displayed.



2 Press the history icon.

- ▶ The past data history of the monitoring patient will be displayed.
- ▶ On the past data history, maximum of 17 data before or during transferring will be displayed.
- ▶ The displayed colors on the past data history indicate the following data.

- Green: Data saved on this central monitor
- Orange: Data during transferring
- Purple: Data saved on other central monitor

- ▶ The current monitoring data will be displayed at the top of the past data history.

Past Data History					
	01/26 19:33	01/27 19:33	01/28 19:33	01/29 19:33	01/30 19:33
Transport CNI-001 01/29 19:34~01/28 20:04					
Transport CNI-001 01/28 19:34~01/28 20:34					
CH6001 CNI-001 01/27 19:33~01/28 19:33					
CH6001 CNI-001 01/25 19:33~01/27 19:33					

REFERENCE

- ♦ To refer the past data on the past data history screen, turn ON the central monitor communication function.
- ♦ When referring past data on one central monitor, select [Server] under [Initial Settings > External Device > Network > Central Monitor Comm.]. Set an arbitrary IP address, and connect LAN cable and HUB to the LAN connector.
- ♦ On the past data history, the data of the same patient ID with the current monitoring patient will be displayed. The patient ID at the time of discharge or bed transfer/exchange will be applied.
- ♦ When the central monitor communication function is used, the past data of the corresponding patient saved on the central monitors on the network will be displayed.

3 Select the displaying data from the past data list.

- ▶ The review data of the selected past data will be displayed.

REFERENCE

- ♦ The review display from the past data list allows to review the data within the time range of the selected past data, and can switch between different review displays. To display the current monitoring data or other past data, close the review display and open the review display again.

Searching/Displaying the Discharged Data

If the patient has been discharged without setting the patient ID, the data will not be displayed on the past data list, and in such case, search function can be used. The past data can be searched by patient ID or patient name.

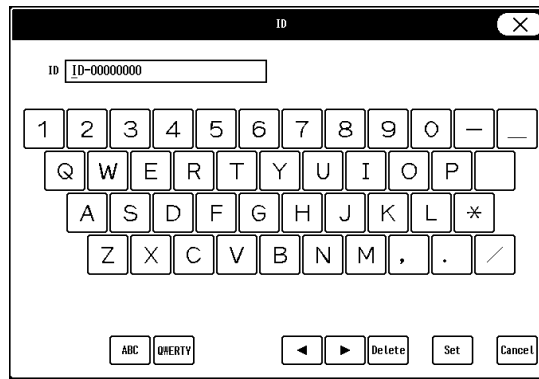
1 Press the [Menu], [Past Data] ("Data Review") on the individual bed display, and display the past data search menu.

2 Search the data.

- ▶ Select the searching item from patient ID or patient name.

The screenshot shows a menu interface for searching past data. At the top, a breadcrumb trail reads "Menu > Data Review > Past Data" with a back arrow icon to its right. Below this, there are two buttons: "Transport Monitor" and "Search Past Data", with an up arrow icon to their right. Underneath these buttons is a text input field labeled "Explanation Area". At the bottom of the screen, there is a section titled "Data Key" containing two buttons: "Patient ID" and "Name".

- ▶ Enter the searching characters, and press [Search].



REFERENCE

- ◆ The past data will be searched with exact match condition.
Ex.) If the patient ID "123" is searched, only the patient ID "123" will be searched, and patient ID "12345", "1123", etc. will not be searched.
- ◆ The past data can be searched in blank condition (without entering search characters).
Ex.) If the patient ID is searched in blank condition, the past data which the patient ID was not set will be displayed.
- ◆ When the central monitor communication function is used, the past data of the corresponding patient saved on the central monitors on the network will be displayed.

- 3** Select the displaying data from the searched data list.

	01/26 19:33	01/27 19:33	01/28 19:33	01/29 19:33	01/30 19:33
Transport CNT-001 01/29 19:34~01/28 20:04					
Transport CNT-001 01/28 19:34~01/28 20:34					
CH6001 CNT-001 01/27 19:33~01/28 19:33					
CH6001 CNT-001 01/25 19:33~01/27 19:33					

- ▶ The full disclosure waveform screen for the selected past data will be displayed.

REFERENCE

- ◆ The review display from the past data list allows to review the data within the time range of the selected past data, and can switch between different review displays. To display the current monitoring data or other past data, close the review display and open the review display again.

NOTE

- When the past data is searched and displayed, the patient information displayed on the individual bed display will change to the patient information of the past data.
 - When the past data is displayed, the alarm message on the individual bed display will not be displayed, and <Displaying Past Data> will be displayed instead.
-

Chapter 10 Waveform Review

ST Measurement

This section explains about the ST measurement and QT alarm function.

ST Measurement Display

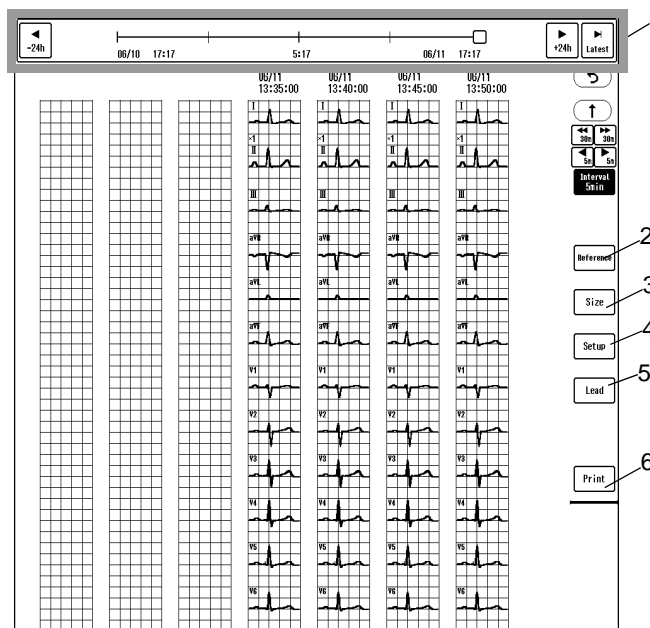
On the ST display, ECG for the selected time duration (5 min./10 min./20 min./30 min.) will be displayed overlapped in one block.

NOTE

- ◆ 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 [Menu > Waveform Review > ST].
Or, press [ST] on the user key area.

- ▶ The "ST" screen will be displayed.



- 1 Time Bar (☞ "Common Operation" P9-1)

- 2 Reference Waveform

Set the reference waveform. (☞ "Reference Waveform Setup" P10-2)

- 3 Changing the Displayed Waveform Size

Select from [x1/4]/[x1/2]/[x1]/[x2]/[x4]. The same waveform size will be applied to all the leads. The selected size will not be applied to the ECG waveform on the home display.

- 4 ST Display Setup

Set ON/OFF of reference waveform, displaying lead groups, and group name.

5 Displaying Leads

Select the lead group to display.

6 Printing

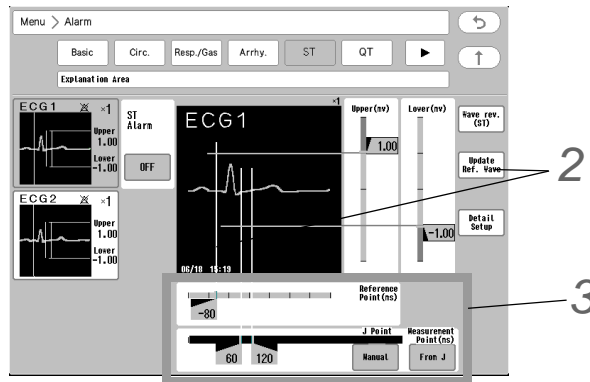
The currently displayed ST waveform will be printed.

Reference Waveform Setup

The ST reference waveform will be automatically set after learning the arrhythmia. The reference waveform can be updated manually.

1 Press the [Reference] key on the ST display.

▶ The ST alarm setup screen will be displayed.



2 Update the ST reference waveform.

CAUTION

- ♦ For the lead which the electrode is detached, the reference waveform cannot be set. Check if the electrode is correctly attached, and perform the setup again.

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 electrode quantity is changed, the reference waveform will be automatically updated.

3 Set the reference point and measurement point.

- 1 Slide the reference point to right and left using the **[XXX]** key.
- 2 Slide the measurement point to right and left using the **[XXX]** key.

NOTE

- ♦ Set the reference point in the range of -240 ms to 0 ms in increments of 10 ms from the peak of QRS to the P wave direction.
- ♦ Set the measurement point in the range of 0 ms to 560 ms in increments of 10 ms from the peak of QRS to the T wave direction.

ST Alarm Setup

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

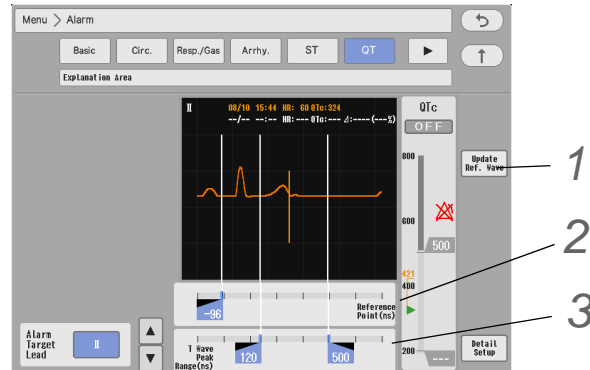
(☞ "ST Setup" P8-3)

QT Measurement

This section explains about the QT reference waveform and QT alarm function.

QT Reference Waveform Setup

The QT reference waveform will be automatically set 1 minute to 2 minutes after learning the arrhythmia. Also, it can be updated manually. The average waveform will be automatically set in 1 minute interval after the reference waveform is set. The displayed colors are orange for the reference waveform and green for the average waveform. (The numeric data of the average waveform is displayed in white.)



- 1 Press the [Update Ref. Wave] key.

CAUTION

- ♦ For the lead which the electrode is detached or the lead which the amplitude is too low to detect the T wave, the reference waveform cannot be set. Check if the electrode is correctly attached, and perform the setup again.

- 2 Set the reference point for the baseline position.

- 3 Set the starting point and ending point to detect the T wave.

QT Alarm Setup

Set the QT alarm.



1 Select the lead to set the alarm limit.

- ▶ The selected lead will be displayed large at the right.
- ▶ For the lead not selected on the screen, switch the page using /.

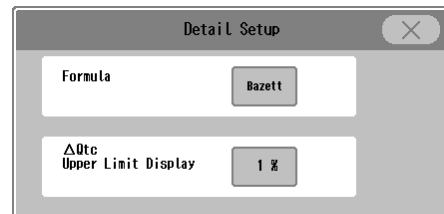
2 Select [ON]/[OFF] for "Qtc Alarm" .

3 Slide the numeric value on the right side of the bar to set the upper/lower limit. It can be set in 4 msec increments.

- ▶ Upper Limit: Set in the range of 204 msec to 800 msec.
- ▶ Lower Limit: Set in the range of 200 msec to 796 msec.

4 Set the details.

- ▶ Formula: Select from Bazett/Fridericia/Framingham.
- ▶ Δ QTc Upper Limit Display: Use the numeric keys to enter in the range of 0% to 100%.



The set value of the Δ QTc upper limit display will be displayed in orange which can be used for indication of the alarm threshold setting.



Full Disclosure Waveform

By using the optional SD card (FSD-64G), maximum of 336 hours of data can be saved.

The waveforms that can be stored as full disclosure waveforms are as follows.

ECG1, ECG2, ECG(I)-ECG(V6), BP1-8, SpO₂, SpO₂-2, RESP, AWP, AWF, AWV, CO₂, O₂, AGENT

The alarm event and time will be also saved which allows to search the waveform by each factor.

CAUTION

- ♦ When <Check SD Card1> is displayed for the system status message, internal memory error can be considered.
In such case, full disclosure waveform cannot be properly stored or displayed.
Refer to the "Troubleshooting" section. (☞ "Troubleshooting" P14-11)
 - ♦ The full disclosure waveform data is periodically stored to the internal memory, but if the AC power cable of this device is disconnected, maximum of 20 seconds of data may be lost. In such case, the lost data will be displayed as not measured data.
-

NOTE

- ♦ When the full disclosure waveform data exceeds the maximum capacity, the data will be deleted from the old one. To delete the full disclosure waveform data, perform the discharge procedure.
(☞ "Discharge" P6-18)
-

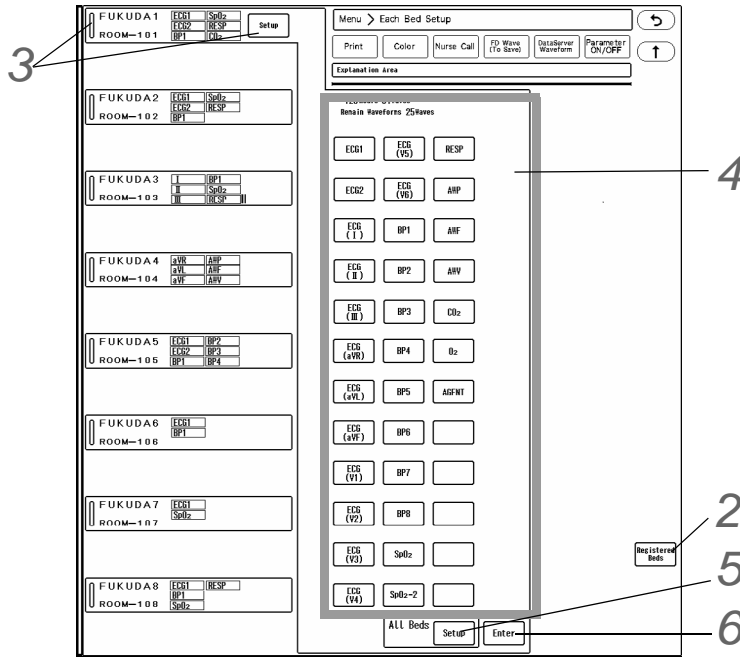
To Select the Waveform to Store

The beds and waveforms to store for full disclosure waveform data can be selected in the following 2 ways.

- ♦ Displayed Beds: Maximum of 32 beds which are displayed on the home display.
- ♦ Registered Beds: Maximum of 32 beds which are previously registered.

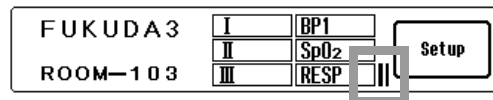
1 Press the [Menu], [FD Wave (To Save)] ("Each Bed") keys.

▶ The full disclosure waveform selection window will be displayed.



2 Select from [Displayed Beds] or [Registered Beds].

3 Press the [Setup] key for the bed to perform the setup. On the bed selection area, maximum of 6 selected parameters will be displayed. If there are more than 6 parameters, a bar mark will be displayed. (shown on right)



4 Select the waveform to store. The key for the selected waveform will be displayed in blue.

The remaining quantity of waveforms that can be stored will be displayed at the upper part of the display. Use this quantity as an indication, and select the waveforms for each bed. To cancel the selection, press the key for the corresponding waveform.

5 Set the same settings to all beds.

Pressing the [Setup] key will display a confirmation window. Press the [OK] key to update the settings for all beds.

6 Press the [Enter] key.

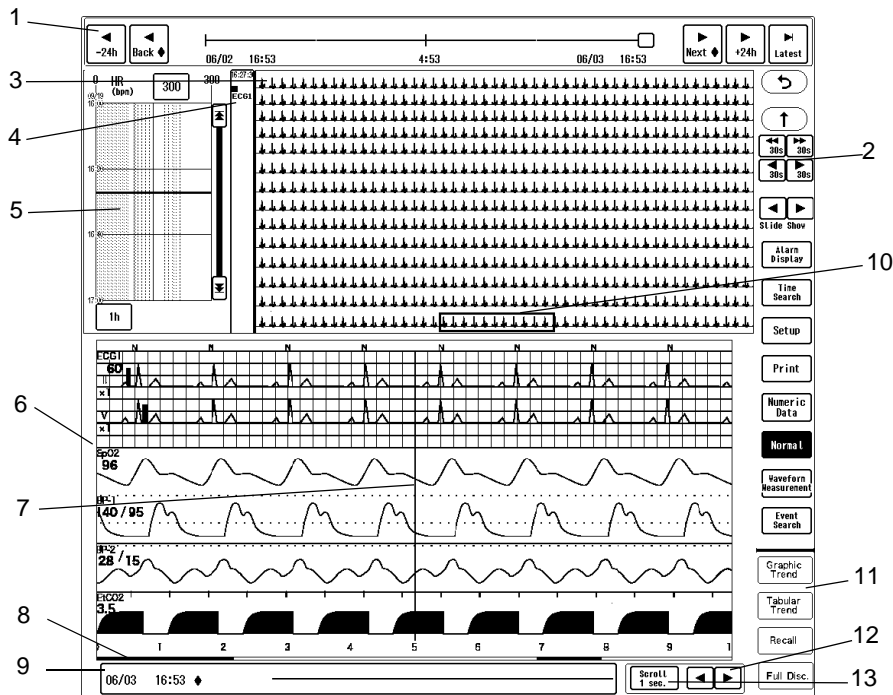
▶ The settings will be finalized.

NOTE

- When the waveform selection is canceled, the previously stored waveforms will be also deleted.
- If the [Setup] for "All Beds" is used, the stored waveforms for all beds will be updated. Make sure that changing the setting will not cause any problem to other beds.
- The [Setup] key for "All Beds" cannot be used if the set waveforms exceeds the maximum quantity that can be saved for other beds.

Displayed Items

This section explains about the items displayed on the full disclosure waveform display. Press [Menu > Waveform Review > Full Disc.] for the selected bed.



1 Time Bar

The stored duration for the full disclosure waveform data will be displayed. A diamond shape mark indicates the alarm occurrence point.

2 Time Duration of Compressed Waveform

The time duration of the displayed compressed waveform can be changed. The display duration can be selected from 10 seconds, 30 seconds, 1 minute, and the displayed number of lines differs depending on the displayed number of compressed waveform and enlarged waveform.

Ex.) [1 min. 30 sec. x 2 lines]: Waveform of 1 minute (2 lines of 30 seconds waveform) will be displayed.

3 Full Disclosure Compressed Waveform Display Area

Maximum of 6 waveforms can be displayed. The display duration per line can be selected from 10 sec. / 30 sec. / 1 min.

Pressing the waveform area will display the enlarged full disclosure waveform at the lower part of the display.

4 Displayed Waveform and Color

5 Instant HR Trend Display Area

Displays the instant HR trend. The trend display duration can be changed.

Pressing any area will display the compressed and enlarged waveform at that point.

Whether to display or not display the instant HR trend can be selected.

6 Full Disclosure Enlarged Waveform Display Area

The display format can be selected from the following.

Standard Display (Maximum 6 waveforms)

12-Lead Waveform Display (12 waveforms x 1 column)

12-Lead Waveform Display (6 waveforms x 2 columns)

When a mouse is used, divider function can be used. (☞ "Divider Function" P9-14)

7 Cursor

8 Alarm Bar

Indicates the alarm occurrence point.

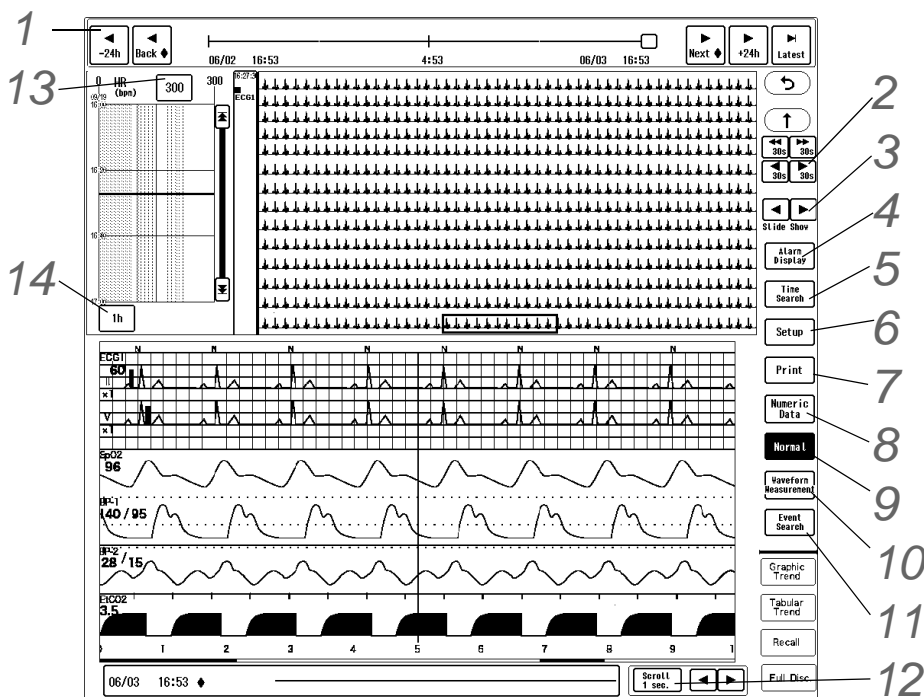
NOTE

- On the full disclosure waveform display, the arrhythmia occurrence point will be displayed 7 seconds before the actual arrhythmia occurrence. (Excluding Asystole, Tachy, Brady, Ext Tachy, Ext Brady)

- Date/Time at Cursor Point and Alarm Event
- Displayed Range of Enlarged Waveform
- Other Review Data Display
Other review data at the same date/time of cursor point will be displayed.
- Scroll Key
The enlarged waveform will shift with the set interval for the "Scroll Interval".
- Scroll Interval
The scroll interval will switch to 1 sec. > 4 sec. > 8 sec.

Full Disclosure Waveform Setup

This section describes the setup and operation procedure of full disclosure waveform.



1 Changing the displayed time, scrolling the time, updating the data (☞ "Common Operation" P9-1)

2 Changing the displayed time
(☞ "Common Operation" P9-1)

3 Slide Show (Update of Display)

- ▶ ◀ / ▶ : Updates the compressed waveform with the set interval.
The updating interval will be according to the set interval for "Slide Show Interval" under "Setup".
During the slide show mode, the key will turn to . Pressing the key again will cease the slide show.

4 Alarm Display

- ▶ When turned ON (when the key is blue), alarm occurrence point on the compressed waveform area will be highlighted.

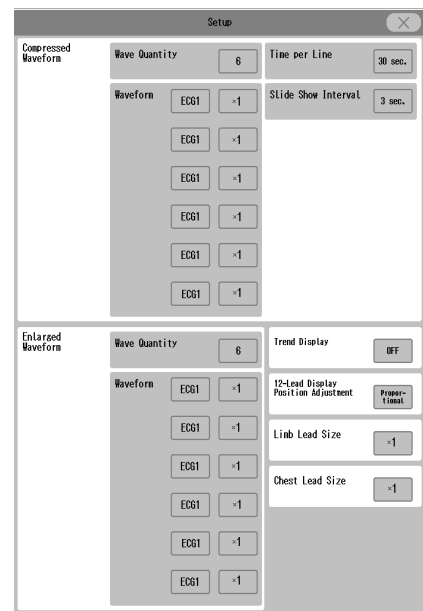
NOTE

- On the full disclosure waveform display, the arrhythmia occurrence point will be displayed 7 seconds before the actual arrhythmia occurrence. (Excluding Asystole, Tachy, Brady, Ext Tachy, Ext Brady)

5 Time Search (☞ "To Search by Time" P10-12)

6 Displaying Waveform Setup (Quantity, Type, Duration, etc.)

- ▶ Wave Quantity for Compressed Waveform: Select from [1]/[2]/[3]/[4]/[5]/[6].
- ▶ Compressed Waveform: Select from the displayed parameters.
- ▶ Compressed Waveform Display Duration per Line: Select from [10 sec.] / [30 sec.] / [1 min.].
- ▶ Slide Show Interval: [3 sec.]/[5 sec.]/[10 sec.]/[20 sec.]/[30 sec.].
- ▶ Wave Quantity for Enlarged Waveform: Select from [1]/[2]/[3]/[4]/[5]/[6].
- ▶ Enlarged Waveform: Select from the displayed parameters.
- ▶ Trend Display: Select [ON] (display) / [OFF] (not display) for instant HR trend display.
- ▶ 12-Lead Display Position Adjustment (only for DS-LAN bed): Select the 12-lead display position from [Center]/[Proportional]/[OFF].



7 Print Waveform (☞ "To Print the Full Disclosure Waveform" P10-10)

8 Numeric Data Display at Cursor Point

- ▶ The numeric data at the cursor position (blue line) on the enlarged waveform area will be displayed in another window.

9 Display Type (only for DS-LAN Bed)

- ▶ Select the enlarged waveform display type from [Normal]/[12-Lead (12W)]/[12-Lead (6W×2)].

10 Waveform Measurement

- ▶ Select from [Divider] / [Caliper].

11 Event Search

[Event Search] will be displayed when a data server is used.

The data server setup can be performed under [Menu > Initial Settings > External Device > Network > Data Server].

(☞ Maintenance Manual "Data Server" P2-18)

- ▶ The bed ID and time of event will be transmitted to the data server.

- ▶ When the communication with the data server is not established, the key is grayed out and will not function.

12 Scroll Interval

- ▶ Select the scroll interval from [1 sec.] / [4 sec.] / [8 sec.].

13 Instant HR Trend Scale

- ▶ Select from [100]/[200]/[300].

14 Instant HR Trend Display Duration

- ▶ Select from [24h] / [12h] / [6h] / [1h] / [30m].

To Print the Full Disclosure Waveform

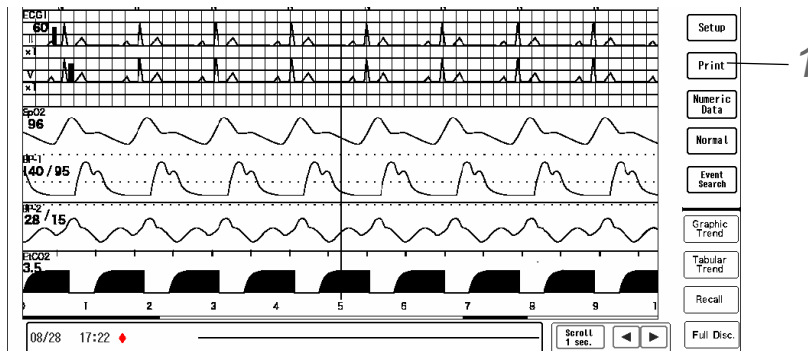
This section describes the printing procedure of full disclosure waveform.

Compressed waveform, enlarged waveform, or 12-lead waveform can be printed. The printing range can be specified.

The output printer can be selected under [Menu > Each Bed Setup > Print]. (☞ "Output Printer Setup for Review Data Printing" P12-8)

NOTE

- For the telemetry beds, 12-lead waveform cannot be printed.
- To print the 12-lead waveform, [ECG (I)] to [ECG (V6)] need to be set under the full disclosure waveform setup menu. (☞ "To Select the Waveform to Store" P10-5)



1 Pressing the [Print] key will display the dropdown list of [Compress] / [Enlarge] / [12-Lead] / [Select Area] / [Report]. (shown on right)

2 Compressed Waveform Printing

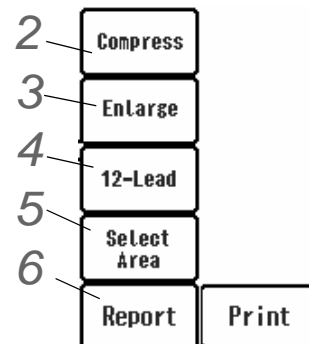
- ▶ The currently displayed compressed waveform will be printed.

3 Zoom Waveform Recording

- ▶ The currently displayed enlarged waveform will be printed.

4 12-lead Waveform Printing

- ▶ When printing on the recorder, the 12-lead waveform for the enlarged display time range will be printed.
- ▶ When printing on the laser printer, currently displayed enlarged 12-lead waveform will be printed on one page. The printing format can be set under [Menu > Each Bed Setup > Print > 12-Lead]. (☞ "12-Lead Printing Setup" P12-6)



5 Specifying the Printing Range

- 1 Selecting [Select Area] from the dropdown list will change the display to "Select Area" mode.
 - ▶ During the "Select Area" mode, the [Print] key will change to [Select Area] key, and the key will be displayed in blue.
- 2 Specify the print range.

On the compressed waveform display area, the print range starts from the point where it is first pressed and ends at the point where it is pressed next.

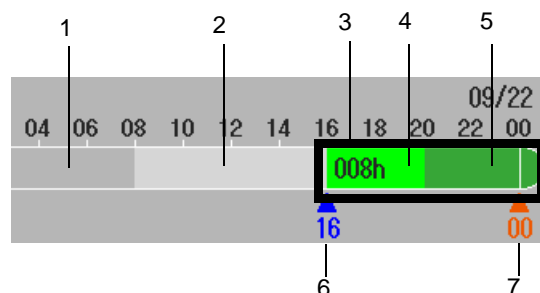
 - ▶ The print range will be displayed in light blue.
 - ▶ When the end point of the print range is finalized, [Enlarge]/[12-Lead]/[Cancel] keys will be displayed beside the end point.
 - ▶ If the compressed waveform display area is pressed, the end point will be reset to the pressed point.
- 3 Start the printing.
 - ▶ Pressing the [Enlarge] key will print the enlarged waveform of the selected print range.
 - ▶ Pressing the [12-Lead] key will print the 12-lead waveform of the selected print range. The printing format will be according to the pre-set format. (Menu > Each Bed Setup > Print > 12-Lead)
 - ▶ Pressing the [Cancel] key will cancel the selected print range.
- 4 The "Select Area" mode will be canceled for the following cases.
 - * When the [Select Area] key is pressed again
 - * When the display is switched to other display
 - * When the display is switched to other patient
 - ▶ When the "Select Area" mode is canceled, the [Select Area] key will change to [Print] key.

6 Report Printing

NOTE

- ♦ The report printing function is available only when the laser printer is used.
- ♦ On the full disclosure waveform screen, 6 waveforms are displayed, but only the first and second waveforms can be output on the report printing.

- 1 Set the "Report Duration".
 - ▶ For example, if [8 hours] is selected, the waveform starting from 8 hours before the current time will be printed.
 - ▶ If [Set Time] is selected, set the start/end time using the ◀/▶ keys.
- 2 To register the setting, press the [Register] key.
 - ▶ Gray Area: Full Disclosure Waveform Range
 - ▶ Yellow Green Area: Report Printing Range



- 1: Full Disclosure Waveform (no data saved): Time range of which full disclosure waveform is not saved
- 2: Full Disclosure Waveform (data saved): Time range of which full disclosure waveform is saved
- 3: Report Printing Range: Report Printing Range

- 4: Printing Range (data saved): Printing range of which full disclosure waveform is saved
 - 5: Printing Range (data not saved): Printing range of which full disclosure waveform is not saved
 - 6. Starting Time Mark: Indicates the starting time (h).
 - 7. Ending Time Mark: Indicates the ending time (h).
- The time bar range ends at current day + 1 day for all set display duration.

- ▶ Pressing the [Register] key will overwrite the previously registered setting.
- ▶ Maximum of 3 report details can be registered.

3 Press the [Print] key.

- ▶ The report printing will start with the set conditions.
- ▶ The following information will be printed on the report printing.
 - First Page: HR, ST, VPC Graphic Trend
 - Second Page: HR Trend, Arrhythmia Event Trend
 - Third Page Onward: 60 minutes of compressed waveform per page if 1 waveform display, and 30 minutes of compressed waveform per page if 2 waveforms display will be printed for the set report duration.
- For example, if the set report duration is 1 hour, 1 page will be output for the 1 waveform display. If the set report duration is 1 hour, 2 pages will be output for the 2 waveforms display. If the set report duration is 8 hours, 8 pages will be output for the 1 waveform display and 16 pages will be output for the 2 waveforms display.
- ▶ If the operation is performed on the full disclosure waveform screen of the main unit, graphic trend for waveform 1 will be printed beside the compressed waveform.

To Search by Time

The full disclosure waveform of the specified time can be displayed.

1 Press the [Time Search] key on the full disclosure waveform display.

- ▶ The "Time Search" window will be displayed.

2 Enter the searching date/time using the numeric keys and press the [Search] key.

- ▶ The time search will start.
- ▶ The searched waveform will be displayed on the full disclosure waveform display.

12-Lead Analysis

The 12-lead analysis result analyzed on the bedside monitor will be displayed. Maximum data of 2,048 (32 beds, 64 data per bed) will be saved.

REFERENCE

- ♦ By using the 12-lead analysis server, the 12-lead analysis result can be transmitted to the server.
(☞ Maintenance Manual "12-Lead Analysis Server" P2-25)

Displayed Items

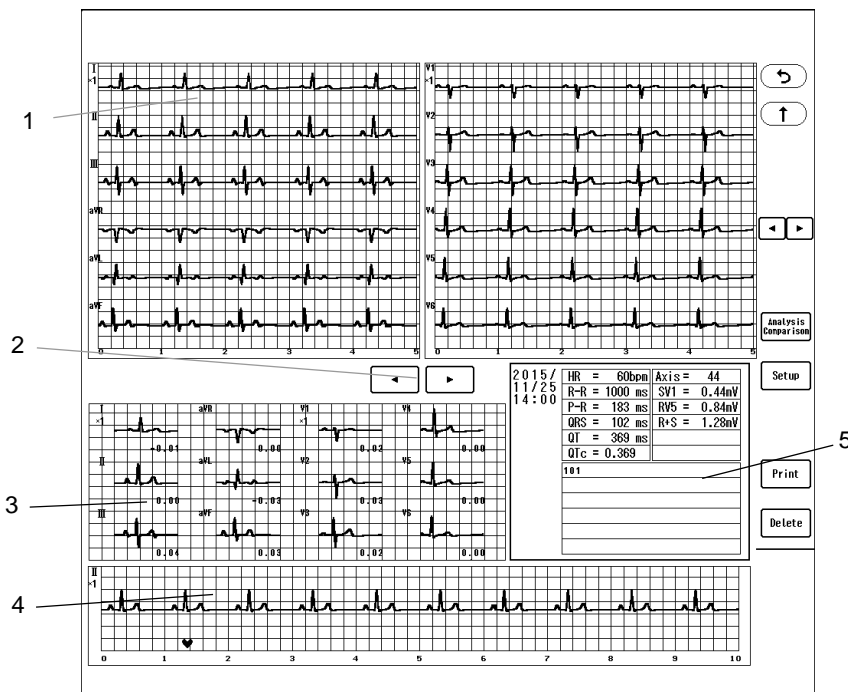
Press the [Menu], [12L Analysis] ("Data Review") on the individual bed display to display the 12-lead analysis screen.

CAUTION

- ♦ If the time/date is changed during monitoring (manually or by time synchronization), the time/date of past measurement data will not be corrected. In such case, the time/date of NIBP list, 12-lead analysis result, etc. will differ between the central monitor and the bedside monitor.

NOTE

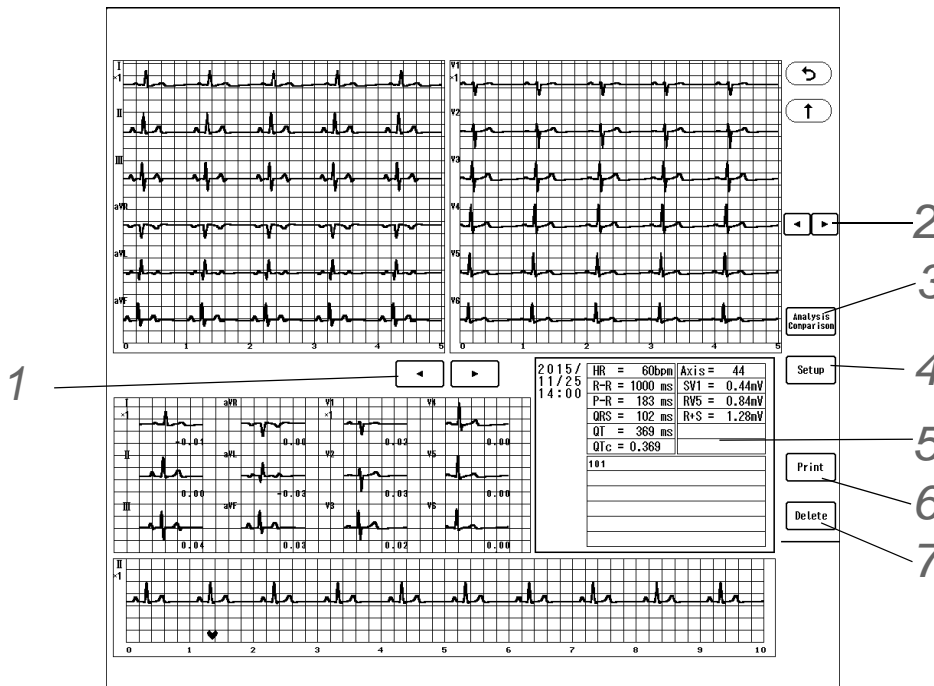
- ♦ 64 analyzed data per bed can be saved. When 64 data is exceeded, the data will be deleted from the old one.



1	Analyzed Waveform	The analyzed waveforms of limb lead and chest lead will be displayed.
2	Cursor	Moving the cursor left and right will display the waveform of 10 seconds before and after.
3	Dominant Waveform	The reference waveform used for the analysis will be displayed. The dominant waveform is the waveform at the point of ♥ mark on the rhythm waveform. On the analyzed result, the abnormal lead with the highest grade finding will be highlighted in red.
4	Rhythm Waveform	Among the ECG leads used for analysis, the lead for ECG1 displayed on the bedside monitor will be displayed.
5	Analyzed Result	Main numeric data used for ECG analysis will be displayed. The abnormal numeric data with the highest grade finding will be highlighted in red. Pressing the analyzed result area will display the data list.

Operation on the 12-Lead Analysis Screen

The operation and printing procedure for the 12-lead analysis is explained below.



1 Moving the Cursor

- ▶ The cursor can be scrolled 10 seconds before and after using the / keys.

2 Switching the Analyzes Result Display

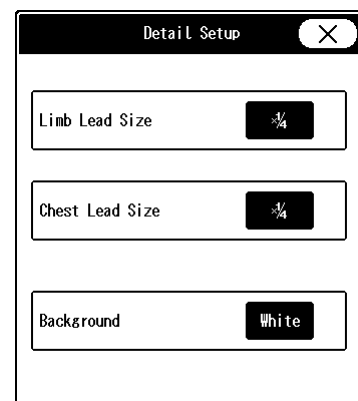
- ▶ Use the / keys to change the displaying analyzed data.

3 Analysis Comparison Display

- (☞ "Comparison of Analyzed Results" P10-15)

4 Analysis Display Setup

- ▶ Select the analysis waveform size for "Chest Lead Size" and "Limb Lead Size".
- ▶ Select "Background".
 [Black]: The displayed color will be black for background, gray for grid, green (fixed) for waveform.
 [White]: The displayed color will be white for background, orange for grid, black (fixed) for waveform.



5 Analyzed Result

- ▶ Pressing the analyzed result area will display the data list.
- ▶ Use the / keys to change the displaying time range.
- ▶ Pressing the time display area will display the analysis result of that time.

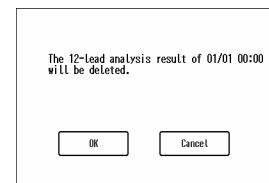
HR								01/17 12:23
R-R								123
P-R								345
P-R								567
QRS								111
QT								333
QTc								0.444
Axis								234
RV5								6.78
RV6								7.89
SV1								4.56
R+S								2.22
FOTc								0.555

6 Printing the 12-Lead Analysis

- ▶ It can be output on the recorder (built-in or external) or the laser printer.
(☞ "Output Printer Setup for Review Data Printing" P12-8)
- ▶ When [Recorder] is set, analyzed waveform will be printed.
- ▶ When [Laser] is set, analysis report will be printed on the laser printer.

7 Deleting the Analyzed Data

- ▶ Pressing the [Delete] key will display the delete confirmation window.
- ▶ Press [OK] to delete the data.



Comparison of Analyzed Results

By pressing the [Analysis Comparison] key on the 12-lead analysis result screen, the comparison of analyzed results will be displayed.

On the "12L Comparison" screen, dominant waveform, rhythm waveform, analyzed result will be displayed in two rows for comparison.

The screenshot shows a comparison of two 12-lead ECG analyses. The top row shows the original analysis with a data list window open. The bottom row shows the same analysis with the top row's data set as a reference. Red arrows and numbers 1 and 2 indicate the steps: 1 points to the analysis result window, and 2 points to the Reference Setup button.

1 Press the analysis result window to open the data list, and select the comparing data.

2 Pressing the [Reference Setup] will set the data of upper area as reference data and will move to the lower area.

Chapter 11 Calculation

Hemodynamics

This section explains the procedure for hemodynamics calculation and printing.

NOTE

- The hemodynamics data will not synchronize between this device and the bedside monitor connected to DS-LAN.

Calculation Data

This device can calculate and display the following parameters of hemodynamics.

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)	$\frac{CO \times 1000}{HR}$
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)	$\frac{(MPAP - PAWP) \times 79.90}{CO}$
PVRI	Pulmonary Vascular Resistance Index (dyn·sec·cm ⁻⁵ ·m ²)	PVRxBSA
LVW	Left Ventricular Work (kg·m)	COx(MAP-PAWP)x0.0136
LVWI	Left Ventricular Work Index (kg·m ²)	$\frac{LVW}{BSA}$
LVSW	Left Ventricular Stroke Work (g·m)	SVx(MAP-PAWP)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

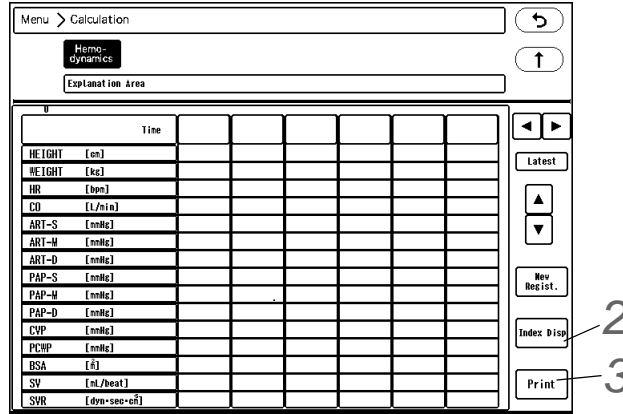
- The blood pressure unit for hemodynamics is "mmHg". If the unit is "kPa" or "cmH₂O", it will be converted to "mmHg" when calculating.

To Display/Print the Hemodynamics Data

10 hemodynamic data can be viewed in list format.

1 Press [Menu > Calculation > Hemodynamics].

▶ The hemodynamics screen will be displayed.



2 [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".

3 [Print] key

The currently displayed hemodynamic data will be printed.

New Input of Hemodynamics Calculation

The hemodynamics calculation can be performed using the newly entered data. The data can be entered manually using the numeric keys or automatically using the current data.

1 Press the [Menu], [Hemodynamics] ("Calculation"), [New Regist.] keys.

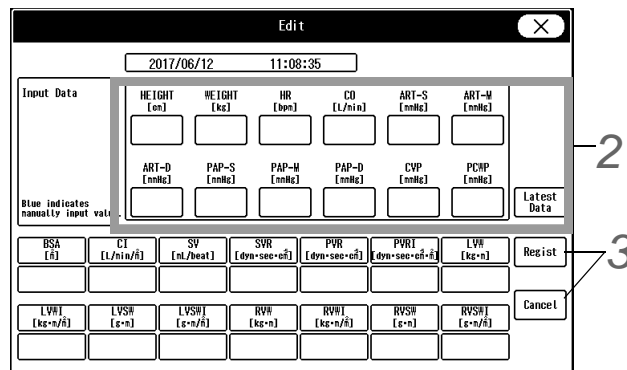
- ▶ The "Edit" window will be displayed.
- ▶ The current time will be displayed at the upper area.
- ▶ Unmeasured data will be left blank.

2 Enter the calculation data.

- 1** Press the [Latest Data] key to display the measured data.
- 2** When editing the data, press the key for the editing data, and enter the value using the numeric keys.

3 Press the [Set] key.

- ▶ The edited data will be displayed in blue.



NOTE

- ♦ If the height, weight, BSA is changed on the "Admit/Discharge" screen, the calculated

hemodynamic result will not change.

Input Data

Data	Item (Unit)	Editing Range
HEIGHT	Height (inch)	0 inch to 118.1 inch
WEIGHT	Weight (lb)	0 lb to 771.6 lb
BSA	Body Surface Area (m ²)	0 m ² to 9.99 m ²
CO	Cardiac Output (L/min)	0.00 L/min to 20.00 L/min
HR	Heart Rate (bpm)	0 bpm to 350 bpm
ART S	Systolic Arterial Pressure (mmHg / kPa)	0 mmHg to 350 mmHg / 0 kPa to 46.6 kPa
ART M	Mean Arterial Pressure (mmHg / kPa)	0 mmHg to 350 mmHg / 0 kPa to 46.6 kPa
ART D	Diastolic Arterial Pressure (mmHg / kPa)	0 mmHg to 350 mmHg / 0 kPa to 46.6 kPa
PAP S	Systolic Pulmonary Artery Pressure (mmHg / kPa)	0 mmHg to 100 mmHg / 0 kPa to 13.3 kPa
PAP M	Mean Pulmonary Artery Pressure (mmHg / kPa)	0 mmHg to 100 mmHg / 0 kPa to 13.3 kPa
PAP D	Diastolic Pulmonary Artery Pressure (mmHg / kPa)	0 mmHg to 100 mmHg / 0 kPa to 13.3 kPa
CVP	Central Venous Pressure (mmHg / kPa)	0 mmHg to 100 mmHg / 0 kPa to 13.3 kPa
PAWP	Pulmonary Artery Wedge Pressure (mmHg / kPa)	0 mmHg to 100 mmHg / 0 kPa to 13.3 kPa

3 Press the [Regist.]/[Cancel] key.

- ▶ [Regist.]: The calculation will be performed using the newly entered data, and the entered data and calculation result will be registered on the list.
- ▶ [Cancel]: The entered data will be deleted.
- ▶ The calculation result will not be displayed if sufficient data is not entered.
- ▶ If the maximum data is already registered, 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 entered 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" P11-2)

3 Register the edited data.

(☞ "New Input of Hemodynamics Calculation" P11-2)

4 Delete the data.

▶ Press the [Delete] key to display the "Delete" window, and press [Yes].

HEIGHT [cm]	HEIGHT [kg]	HR [bpm]	CO [L/min]	ART-S [mmHg]	ART-H [mmHg]
0.0	0.0	0	0.00	0	0
ART-D [mmHg]	PAP-S [mmHg]	PAP-M [mmHg]	PAP-D [mmHg]	CVP [mmHg]	PCWP [mmHg]
0	0	0	0	0	0

BSA [m ²]	CI [L/min/m ²]	SV [ml/beat]	SVR [dyn·sec·cm ⁻⁵]	PVR [dyn·sec·cm ⁻⁵]	PVRl [dyn·sec·cm ⁻⁵]	LVW [kg·m]
0.00	0.00	0	0	0	0	0.0
LVWl [kg·m/R]	LVW# [g·n]	LVW#l [g·n/R]	RVW [kg·m]	RVWl [kg·m/R]	RVW# [g·n]	RVW#l [g·n/R]
0.0	0	0	0.00	0.00	0.0	0.0

Chapter 12 Printing

Types of Printing and Output Printer

This section explains the procedure to output the monitoring data to the recorder (built-in or external) or to the laser printer (A4 size paper) connected to the TCP/IP network.

There are following types of printing.

Printing Types	Output Printer	
	Recorder	Laser Printer
Waveform Printing		
Manual Printing	Yes	No
Alarm Printing	Yes	No
Periodic Printing	Yes	No
Telemetry Remote Printing	Yes	No
Freeze Printing	Yes	No
Recall Printing	Yes	Yes
12-lead Waveform Printing	Yes	Yes
Full Disc. Wave, Compressed Wave Printing	Yes	Yes
Full Disc. Wave, Zoom Wave Printing	Yes	Yes
Graphic Printing		
Graphic Trend Printing	Yes	Yes
Recall List Printing	No	Yes
NIBP List Printing	Yes	Yes
ST Printing	Yes	Yes
12-Lead Analysis Result Printing	Yes	Yes
All Beds Alarm Settings Printing	No	Yes
All Beds Alarm Event Printing	No	Yes
All Beds Nurse Call Settings Printing	No	Yes
ODI Printing	No	Yes
Text Printing		
Tabular Trend Printing	Yes	Yes
Hemodynamics Printing	Yes	Yes
Alarm History Printing	Yes	Yes
Score List Printing	Yes	Yes

Yes: Printing can be performed.

No: Printing cannot be performed.

NOTE

- The laser printer setup should be performed by Fukuda Denshi service representative or system administrator of your institution.
(☞ Maintenance Manual "Laser Printer" P2-17)
- The data of the bedside monitor can be output to the laser printer connected to this central monitor. For details of the corresponding bedside monitor type and software version, refer to your nearest service representative.
- When printing operation is performed from the bedside monitor, the data will be output to the

central monitor with the smallest central ID.
 For example, if the bedside monitor "BED-001" is monitored on 3 central monitors, "CNT-002", "CNT-004", "CNT-006", the printing operation from "BED-001" will be output to the "CNT-002" central monitor.

Printing Condition/Output Destination Setup

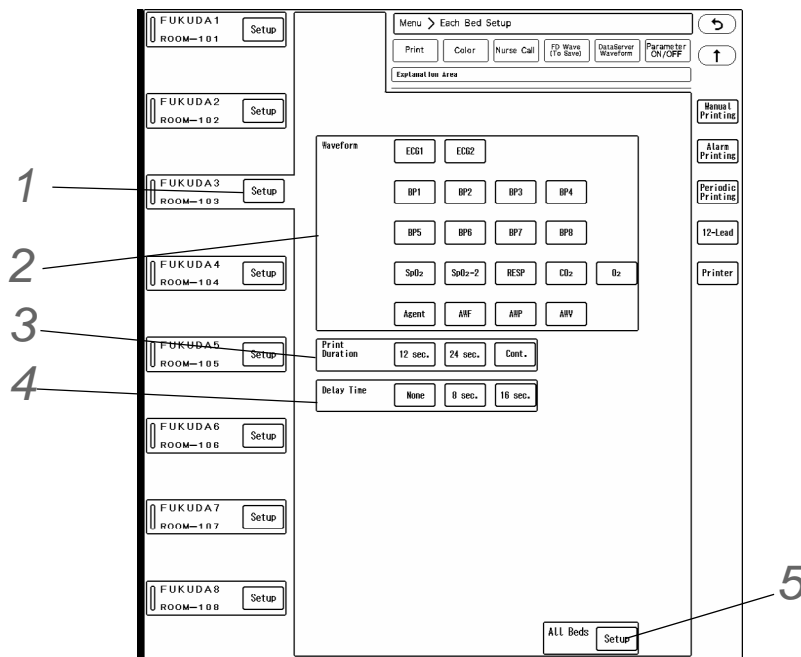
Manual Printing Setup

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 12 or 24 seconds, or continue to print until the "Print Start/Stop" key is pressed again.

- 1 Press the [Menu], [Print Settings] ("Each Bed") keys, and press the [Setup] key for the patient to perform the setup.

▶ The manual printing setup window for the selected patient will be displayed.



- 2 Output Waveform Selection

▶ Maximum of 3 waveforms can be selected for printing. When selected, the key will be displayed in blue.

- 3 Print Duration

- ▶ [12sec.]/[24sec.]: Printing will automatically stop after 12 seconds or 24 seconds.
- ▶ [Cont.]: Printing will continue until the [Print Start/Stop] key is pressed again or until paper runs out.

- 4 Delay Time

- ▶ [None]: Printing will start from the point the [Print Start/Stop] key is pressed.
- ▶ [8 sec.]/[16 sec.]: Printing will start 8 sec. or 16 sec. prior from the point the [Print Start/Stop] key is pressed.

NOTE

- ♦ If [None] is selected for the manual printing delay time, QRS classification symbol will not be printed. To print the QRS symbol, set the delay time to [8 sec.] or [16 sec.].

5 All Beds

- Applies the same setting for manual printing to all beds.

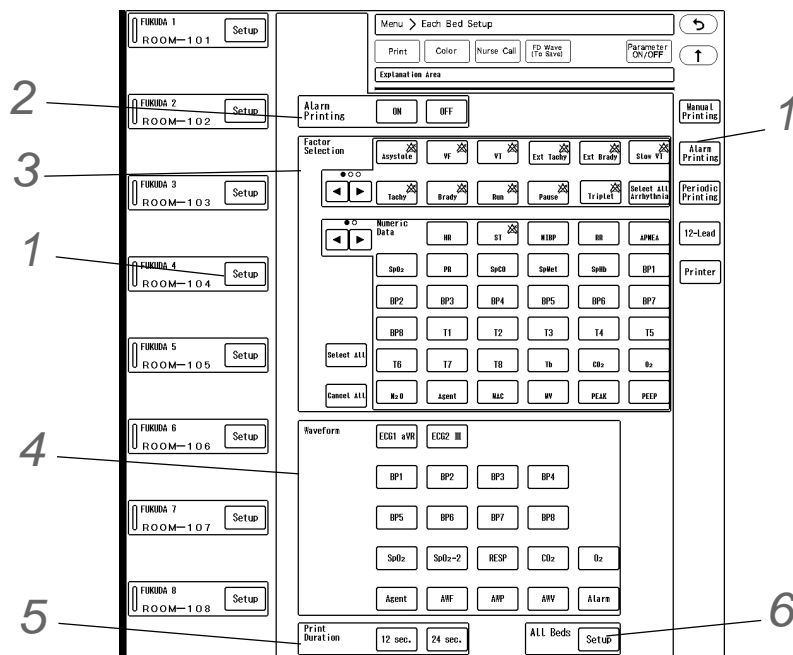
Alarm Printing Setup

When numeric data alarm or arrhythmia alarm occurs, printing will automatically start.

NOTE

- ♦ Alarm printing will be canceled at condition such as <Printer Busy>, <Paper Out>, or <Check Cassette>. The data will be stored as recall data instead.
- ♦ If alarm generates simultaneously at more than one bed, the data for the bed that could not be printed will be also stored as recall data.
- ♦ The priority of alarm printing factor will be according to the alarm priority.
If the alarms of same priority generates, the priority will be in the following order.
Asystole > VF > VT > Slow VT > Run > Couplet > Pause > Bigeminy > Trigeminy > Frequent > Tachy > Brady > HR > ST1 > ST2 > SpO₂ > PR > Apnea > EtCO₂ > InspCO₂ > T1 > T2 > MVe > PEAK > PEEP > SpO₂-2 > PR-2 > SpMet > NIBP > BP1 > ... > BP6 > SpMet-2 > SpCO > SpCO-2 > ST(I) > ... > ST(V6) > BP7 > BP8 > Tb > T3 > T4 > T5 > T6 > T7 > T8 > O₂-I > O₂-E > N₂O-I > N₂O-E > Agent1-I > Agent1-E > Agent2-I > Agent2-E > MAC > SpHb > SpHb-2 > PR_IBP > RR_IMP > RR_GAS > RR_VENT > Ext Tachy > Ext Brady > Triplet > R on T > Multiform > Vent Rhythm > SVT > AFib > Irregular RR > Prolonged RR > S Frequent > S Couplet > VPC > SVPC > Pacer Not Capture > Pacer Not Pacing > SI, RPP


1 Under [Menu > Each Bed Setup > Print], select a patient and press [Setup > Alarm Printing].



2 Alarm Printing

- ▶ [ON]: Printing will automatically start at alarm occurrence.
- ▶ [OFF]: Printing will not start at alarm occurrence.

3 Alarm Factor Selection

- ▶ Select the alarm factor for alarm printing. When selected, the key will be displayed in blue.
- ▶ The alarm OFF mark  will be displayed inside the key for the parameter in alarm OFF condition.
- ▶ [Select All Arrhythmia]: All arrhythmia factors will be selected.
- ▶ [All ON]: All alarm factors will be selected.
- ▶ [All OFF]: All selections for the alarm factor will be canceled.

4 Waveform

- ▶ Maximum of 3 waveforms can be selected for printing.
- ▶ [Alarm]: Prints the waveform of the alarm factor.
(☞ "Alarm Factor and Printed Waveform" P12-4)

5 Print Duration

- ▶ [12sec.]/[24sec.]: Printing will automatically stop after 12 seconds or 24 seconds.
- ▶ 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.
	8 sec. for the multigas unit alarm			
24 sec.	16 sec.	16 sec.	16 sec.	16 sec.

6 Common Setting for All Beds

- ▶ Applies the same setting for alarm printing to all beds.

Alarm Factor and Printed Waveform

Alarm Factor	Printed Waveform
Numeric Data	
HR	ECG1, ECG2
ST1, ST2	ECG1, ECG2
ST(I) to ST(V6)	ECG1, ECG2
BP1 to 8, CVP	BP1 to 8
NIBP	-
SpO ₂	SpO ₂
SpO ₂ -2	SpO ₂ -2
PR	SpO ₂
PR-2	SpO ₂ -2
RR	RESP (Other than CO ₂ , SpO ₂ source)
	CO ₂ (CO ₂ source)
	- (SpO ₂ source)

Alarm Factor	Printed Waveform
Numeric Data	
SpHb	SpO ₂
SpHb-2	SpO ₂ -2
InspO ₂ , ExpO ₂	O ₂
InspN ₂ O, ExpN ₂ O	CO ₂
InspAGT, ExpAGT	AGENT
InspAGT2, ExpAGT2	AGENT
MAC	AGENT
Ventilator	-
Periodic	-
Telemeter	-
Arrhythmia	
Asystole	ECG1, ECG2

Alarm Factor	Printed Waveform
Apnea	RESP (Other than CO ₂ source)
	CO ₂ (CO ₂ source)
EtCO ₂ , InspCO ₂	CO ₂
T1 to 8	-
MV	AWF
PEAK	AWF
PEEP	AWF
SpCO	SpO ₂
SpCO-2	SpO ₂ -2
SpMet	SpO ₂
SpMet-2	SpO ₂ -2

Alarm Factor	Printed Waveform
VF	ECG1, ECG2
VT	ECG1, ECG2
Slow VT	ECG1, ECG2
Run	ECG1, ECG2
Couplet	ECG1, ECG2
Pause	ECG1, ECG2
Bigeminy	ECG1, ECG2
Trigeminy	ECG1, ECG2
Frequent	ECG1, ECG2
Tachy	ECG1, ECG2
Brady	ECG1, ECG2

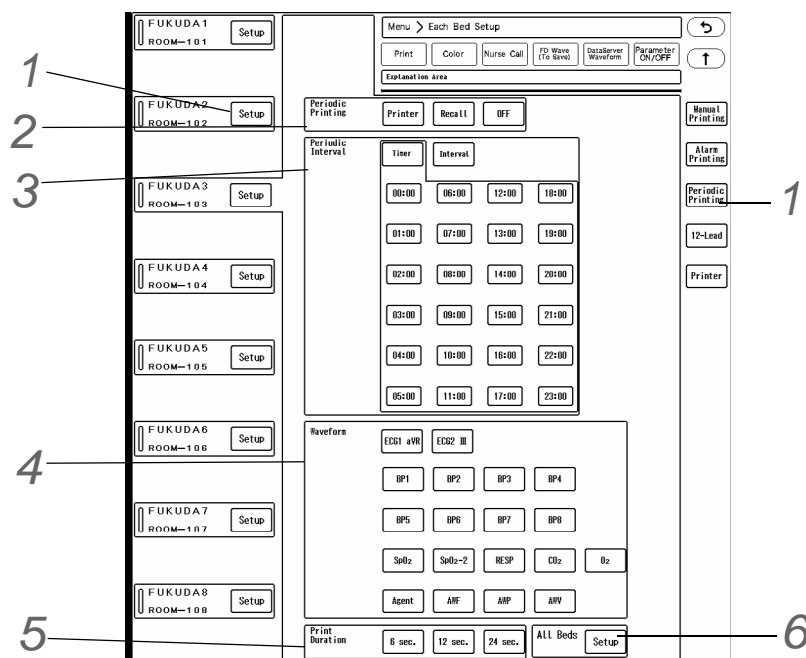
Periodic Printing Setup

The printing will automatically start with the selected interval.

NOTE

- When other data is in process of printing or if the printer is in paper out condition, one data per bed will be stacked for printing.

1 On the "Print Settings" menu, press the [Setup], [Periodic Printing] key for the patient to perform the setup.

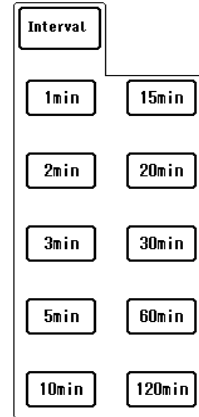


2 Periodic Printing Setup

- ▶ [Printer]: Prints the data.
- ▶ [Recall]: Stores the data as recall waveform.
- ▶ [OFF]: Turns OFF the periodic printing function.

3 Periodic Interval

- ▶ [Timer]: Printing will automatically start at selected time.
- ▶ [Interval]: Printing will automatically start at selected interval. (shown on right)
For example, 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 Waveform

- ▶ Maximum of 3 waveforms can be selected for printing. When selected, the key will be displayed in blue.

5 Print Duration

- ▶ The printing will automatically stop after the selected duration.

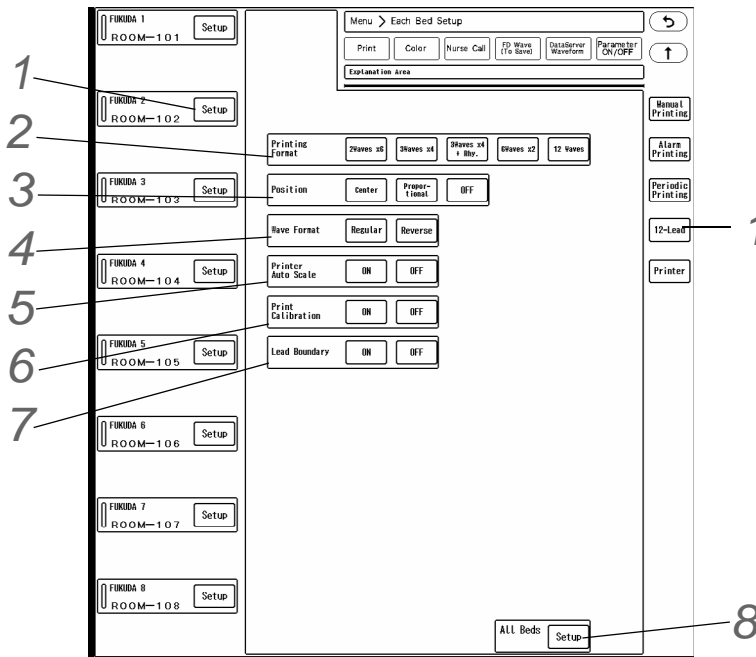
6 All Beds

- ▶ Applies the same setting for periodic printing to all beds.

12-Lead Printing Setup

When monitoring 12-lead waveform, the 12-lead waveform can be printed.

1 On the "Print Settings" menu, press the [Setup], [12-Lead] key for the patient to perform the setup.



2 Printing Format

- ◆ When [Recorder Unit] is selected:
 - ▶ [2 Waves x6] : Prints 2 waveforms in 6 columns.
 - ▶ [3 Waves x4] : Prints 3 waveforms in 4 columns.
- ◆ When [Laser Printer] is selected:
 - ▶ [3 Waves x4] : Prints 3 waveforms in 4 columns.
 - ▶ [3 Wavesx4+Rhy.] : Prints 3 waveforms in 4 columns along with 10 seconds of rhythm waveform (ECG1 lead on the home display).
 - ▶ [6 Waves x2] : Prints 6 waveforms in 2 columns.

- ▶ [12 Waves]: Prints 12 waveforms in 1 column.

	Printing Format	Printing Duration	Delay Time
When [Recorder Unit] is selected:	2 waves x 6	6 sec.	6 sec.
	3 Waves x 4	6 sec.	
When [Laser Printer] is selected:	3 Waves x 4	2.5 sec.	10 sec.
	3Wavesx4+Rhythm	2.5 sec.	
	6Wavesx2	5 sec.	
	12 waves	10 sec.	

3 Position

- ▶ [Center]: Equalizes the printing width of each lead so that the waveform baseline will be at the center. The printing scale of the waveform will be also automatically adjusted.
- ▶ [Proportional]: Equalizes the blank space between each lead to avoid overlapping of the waveforms. The printing scale of the waveform will be also automatically adjusted.
- ▶ [OFF]: Waveform position will not be adjusted when printing.

4 Wave Format

- ▶ [Regular]: Printing will start from the limb leads. (In the order of I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5, V6)
- ▶ [Reverse]: Printing will start from the chest leads. (In the order of V1, V2, V3, V4, V5, V6, I, II, III, aVR, aVL, aVF)

5 Printer Auto Scale

- ▶ When "Position" is set to [OFF], select whether or not to automatically adjust the scale.
- ▶ The printer scale will be adjusted in the range of x1, x1/2, x1/4. It will not be adjusted to x2 or x4 even if the amplitude is small.
- ▶ [ON]: Printing scale will be automatically adjusted.
- ▶ [OFF]: Printing will be performed with the displayed scale.

6 Print Calibration

- ▶ [ON]: Calibration waveform will be printed.
If [Bar (10mm)] is set for "Waveform Size Display" under [Initial Settings>User I/F>Display/Print], the amplitude value corresponding to the displayed waveform size will be printed.
- ▶ [OFF]: Calibration waveform will not be printed.

7 Lead Boundary

- ▶ [ON]: Lead boundary between the leads will be printed.
- ▶ [OFF]: Lead boundary will not be printed.

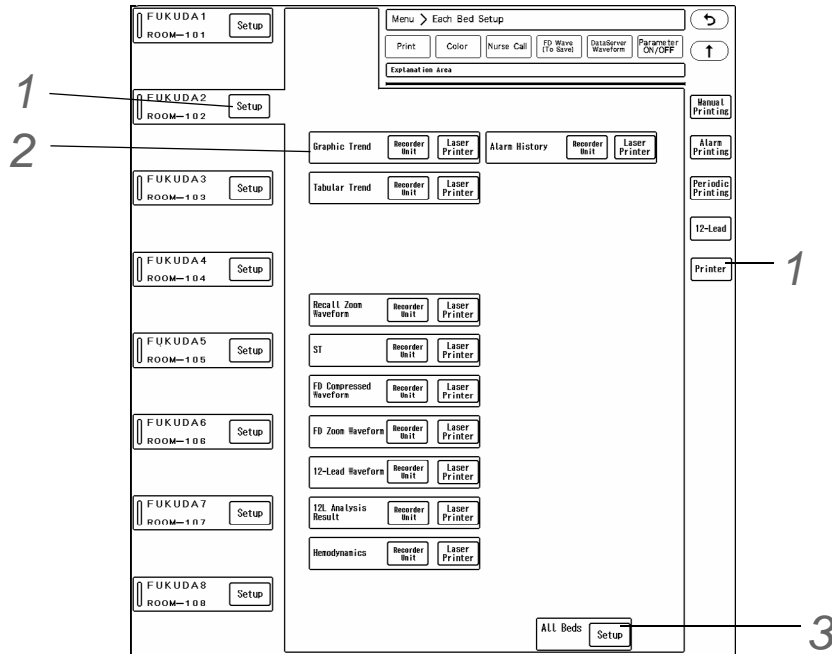
8 Common Setting for All Beds

- ▶ Applies the same setting for 12-lead printing to all beds.

Output Printer Setup for Review Data Printing

Review data printing is a printing performed from the data review screen such as graphic trend and tabular trend. Select the output printer for each review data.

1 Under [Menu > Each Bed Setup > Print], select a patient and press [Setup > Printer].



2 Output Printer Selection

- ▶ [Recorder Unit]: Data will be printed on the recorder (built-in or external).
- ▶ [Laser]: Data will be printed on the laser printer.

REFERENCE

- ◆ If selecting laser printer for the output printer, it is necessary to perform network setting in advance.
(☞ Maintenance Manual "Laser Printer" P2-17)

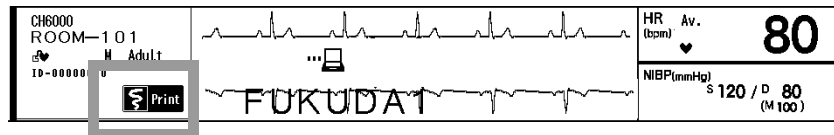
3 Common Setting for All Beds

- ▶ Applies the same setting for output printer to all beds.

To Start/Stop the Printing

Manual Printing

❑ Operation from the Home Display



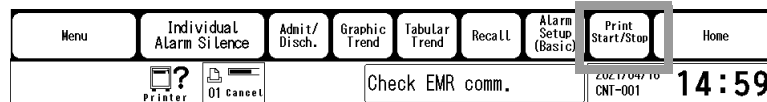
- 1 Press the [Print] key. To stop the printing, press the (Print) key again for the same bed.

REFERENCE

- ♦ Pressing the (Print) keys for more than one bed will sequentially start the printing for the pressed beds. However, [12 sec.] or [24 sec.] should be selected for "Print Duration" under [Manual Printing].

❑ Operation from the User Key for Individual Bed

- 1 Assign [Print Start/Stop] key on the user key area for the individual bed.
(☞ Maintenance Manual "User Key" P5-19)



- 2 Press the [Print Start/Stop] key.

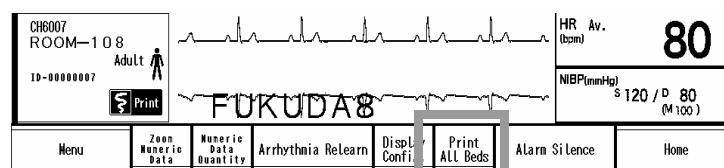
- ▶ Printing will start.

❑ Operation from the User Key for All Beds

NOTE

- ♦ Using this procedure will start the printing for all beds displayed on the home display.
- ♦ The printing duration is 12 seconds and the delay time is 8 seconds for all beds.

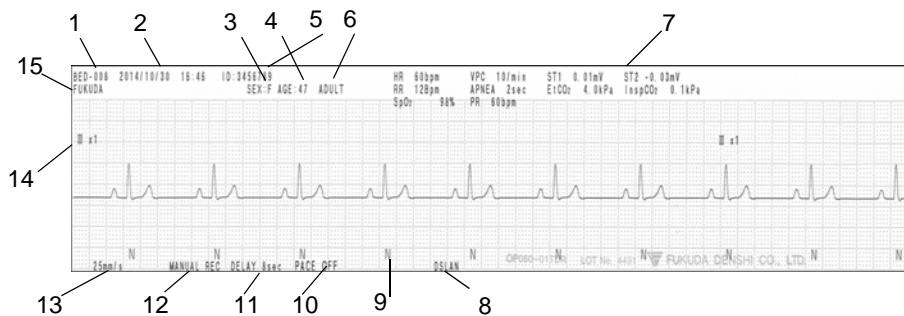
- 1 Assign [Print All Beds] on the user key area for all beds.
(☞ Maintenance Manual "User Key" P5-19)



- 2 Press the [Print All Beds] key.

- ▶ Printing will start.

□ Example of Manual Printing



1 Bed ID/Channel ID

2 Time of Printed Waveform

3 Sex

4 Age

5 Patient ID

6 Patient Classification

7 Numeric Data

The measurement value at the beginning of the waveform (at the bed ID, channel ID display area) will be printed.

8 Bed Type: DSLAN (wired network bed), RF (telemetry bed)

9 QRS Classification

Selecting [ON] for "QRS Classification" (Menu > Initial Settings > User I/F > Display/Print) will print the following symbols.

(☞ Maintenance Manual "Display/Print" P5-11)

10 Pacemaker

The pacemaker usage information will be printed.

11 Delay Time

If [None] is selected for "Delay Time" on "Manual Printing" setup window, <MANUAL REC. DIRECT> will be printed.

12 Printing Mode

13 Printing Speed

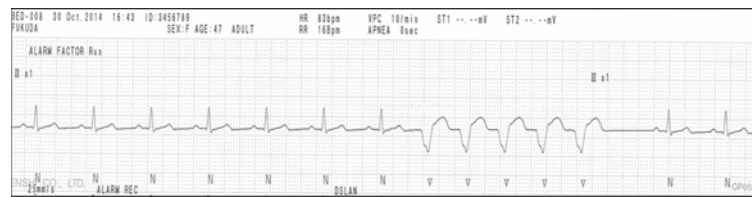
14 Waveform Type, Lead, Size

15 Patient Name

Alarm Printing, Periodic Printing

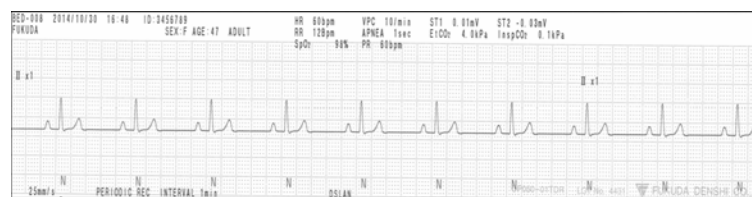
When the set condition is met, alarm/periodic printing will automatically start/stop.

The measurement value at alarm occurrence (at about 7 seconds point) will be printed for alarm printing.



Example of Alarm Printing

The measurement value at the beginning of the waveform (at the bed ID, channel ID display area) will be printed for periodic printing.



Example of Periodic Printing

Remote Printing

When the [Print] key of the bedside monitor or [EVENT] key of the telemetry transmitter is pressed, remote printing can be performed on the recorder (built-in or external) of this device.

Waveform Remote Printing from the Wired Network Bedside Monitor

1 Press the [Print Start/Stop] key on the bedside monitor.

- ▶ Printing will be performed on the recorder (built-in or external) of this device.
- ▶ If more than one central monitors are connected to the network, printing will be performed on the central monitor with the smallest central ID.
- ▶ The printing will be performed according to the printing setting on the bedside monitor and not the central monitor.
- ▶ For the patient ID, maximum of 10 digits will be printed.

NOTE

- ♦ [Central] should be selected as output printer for waveform printing on the bedside monitor.

Graphic Remote Printing from the Wired Network Bedside Monitor

1 Press the [Print] key on the graphic trend screen, etc.

- ▶ Graphic printing will be performed on the recorder of this device.
- ▶ The printing will be performed according to the printing setting on the bedside monitor.

NOTE

- ♦ [Central] should be selected as output printer for graphic printing on the bedside monitor.

Remote Printing from the Telemetry Bedside Monitor (with HLX-501)

From the bedside monitor (DS-5400, DS-5100, etc.) without a recorder module (HR-500, etc.), remote printing can be performed through the telemetry transmitter (ex. HLX-501) to the recorder of this central monitor.

NOTE

- Only manual printing is possible for telemetry remote printing. If a recorder is connected to the bedside monitor, telemetry remote printing will not function.
- Select [Central] for output printer on the bedside monitor printing setting.

REFERENCE

- The print duration and delay time is fixed as 24 seconds and 12 seconds respectively.
- The waveform selection will be according to the manual printing setup on the central monitor (this unit) and not the bedside monitor.

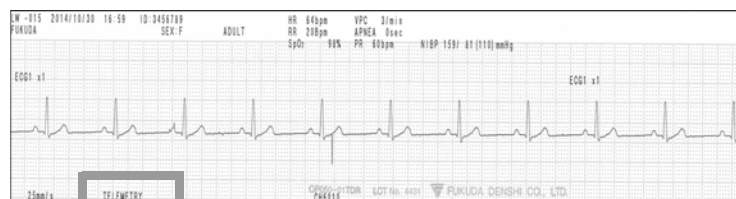
Remote Printing from the Telemetry Transmitter

1 Press the event key for more than 2 seconds for the LX-8100, LX-8300.

- ▶ Printing will be performed on the recorder of the central monitor.
- ▶ The print duration and delay time is fixed as 24 seconds and 12 seconds respectively.
- ▶ The waveform selection will be according to the manual printing setup on the central monitor (this unit).

NOTE

- Select [ON] for "LX Remote Printing" under [Menu > Initial Settings > User I/F > Display/Print].
(☞ Maintenance Manual "Display/Print" P5-11)
- If a recorder is not used on this central monitor, it will be saved to recall data as "Telemeter". (Except for LW beds)
- If a recorder is in busy or error state, it will be also saved to recall data. (Except for LW beds)

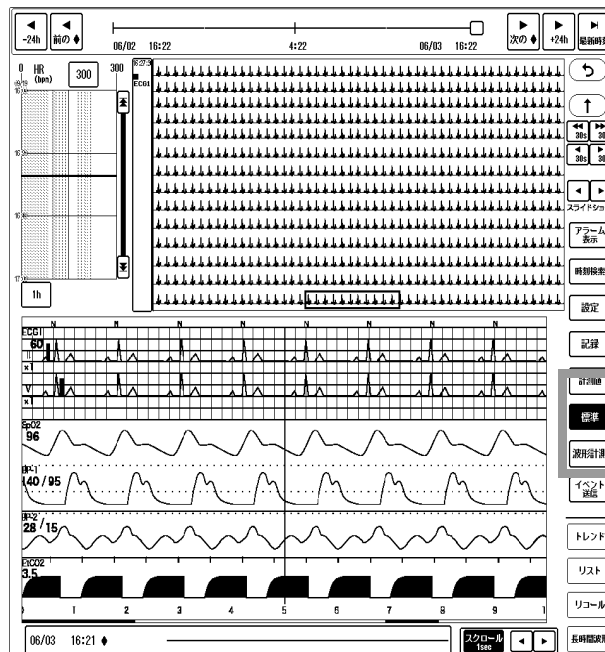


Example of Telemetry Remote Printing

The measurement value at the beginning of the waveform (at the bed ID, channel ID display area) will be printed.

Review Data Printing

The review data such as graphic trend, tabular trend, NIBP list, recall waveform, ST waveform can be printed. The review data can be printed by pressing the [Print] key displayed on each review data screen.

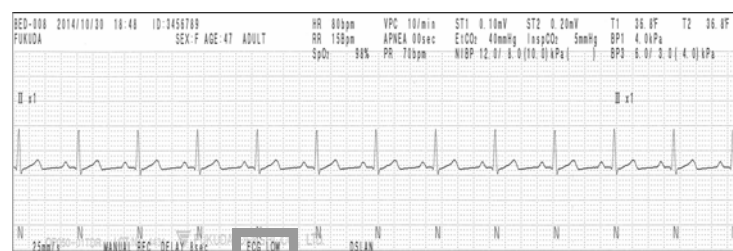


NOTE

- When using a laser printer, printing cannot be performed if the stacked data reaches the maximum quantity.
- When using a laser printer, pressing the [Print] key during printing will not stop the printing. It will stack a new data instead.

Measurement Status

Measurement status such as vital signal condition and device status will be printed after the printing type.



The following measurement status will be printed.

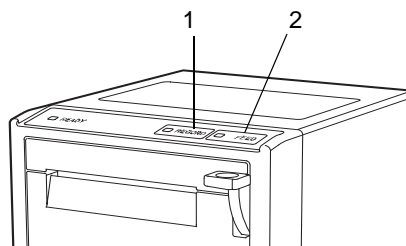
Measurement Status	Description
LEAD OFF	The electrode is detached. Check electrodes.
CVA	CVA is detected.
P SEARCH	SpO ₂ pulse wave is small. SpO ₂ probe sensor attachment is not appropriate, etc.
ECG LOW	The amplitude of ECG waveform is too low.
ECG CAN'T	Cannot analyze

Measurement Status	Description
ECG1 LOW	The amplitude of ECG1 waveform is low.
ECG2 LOW	The amplitude of ECG2 waveform is low.
ECG1 CAN'T	Cannot perform arrhythmia analysis of ECG1.
ECG2 CAN'T	Cannot perform arrhythmia analysis of ECG2.
CO ₂ CHECK	CO ₂ sensor error.
TLM OFF	Too far, noise interference.
TLM LOWBAT	Telemetry battery or bedside monitor battery is depleted.
LAN OFF	Communication error with DS-LANIII. DS-LANIII connection is cut off. Cannot receive data via DS-LANIII.
CHECK SPIRO	SPIRO unit is malfunctioning.

Operation Procedure for HR-800

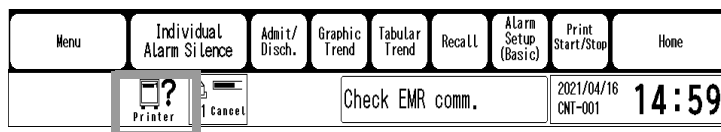
Paper Feed, Stop Printing

- 1 Print Key
Starts/stops the printing.
- 2 Paper Feed Key
While not printing, press to feed the paper.



Status Message

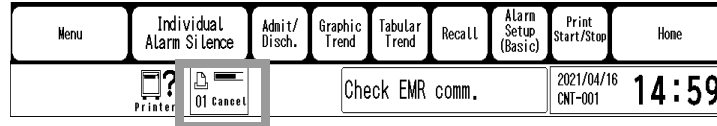
The recorder unit status is displayed as follows.



Displayed Message	Description
Check Recorder	Thermal head error
Check Cassette	The paper cassette is open. Set the cassette properly.
Paper Out	There is no paper. The printing will automatically stop when the paper is out. Set a new pad of paper. (☞ "Installing the Recording Paper" P5-2) The message will continue to be displayed until the paper is set.
Printing in process	Printing is in operation.
Low Battery	During battery operation, the printing will stop when the remaining battery level becomes lower than 20%. Charge the battery or connect the AC power cable to continue printing. (☞ "Recorder" P14-15)

Laser Printer Operation

The laser printer status is displayed as follows.



Displayed Message	Description
(Numeric Value)	Total number of stacked data for all beds will be displayed. Maximum of 64 data can be stacked.
(Printing Status Icon)	The printing status is shown by 5 types of status bar, 0%, 25%, 50%, 75%, 100%.
Check Connection	Indicates communication error with the laser printer.
LP Waiting	Indicates that the printer is waiting for printing.
Cancel Printing	Displayed during printing on the laser printer. Pressing this key will delete all stacked data.

NOTE

- Pressing the [Print] key on each review data screen will not stop the printing. It will stack a new data instead.

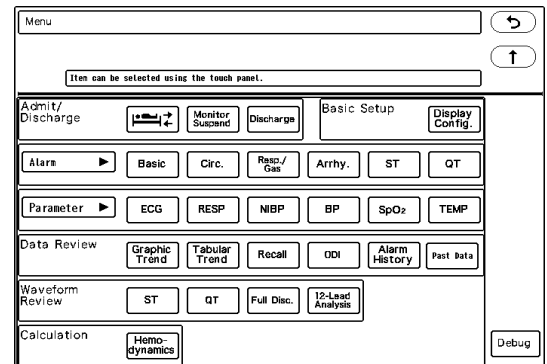
Chapter 13 Menu Items

This section describes the setup procedure of individual bed menu and central monitor menu.

General Description of the Setup Menu

Individual Bed Menu

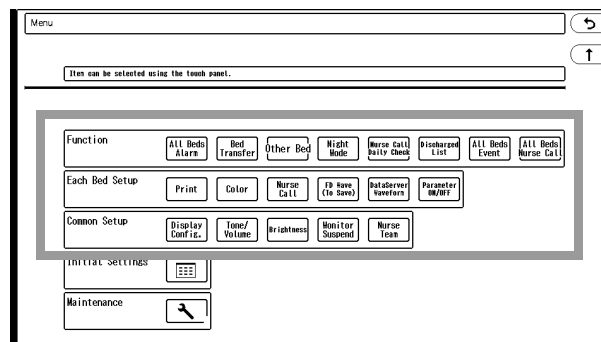
On the individual bed menu, settings for admit/discharge, alarm, parameter, display configuration of the individual bed display can be performed.



Admit/Discharge (Chapter 6)	Admit, Monitor Suspend, Discharge
Alarm (Chapter 7)	Basic, Circ., Resp/Gas, Arrhy., ST, QT, Ventilator, List
Parameter (Chapter 8)	ECG, RESP, NIBP, BP, SpO ₂ , TEMP, GAS, External Device, CO ₂ , SpO ₂ -2, Sp*, SI, RPP, Scoring
Basic Setup (Chapter 13)	Display Configuration

Central Monitor Menu

The following items can be set on the central monitor menu.



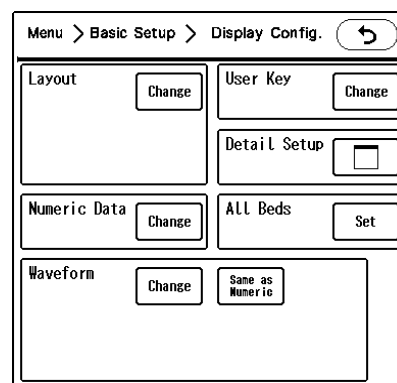
Function:	
All Beds Alarm	The alarm settings for all beds can be verified in a list format. (☞ "All Beds Alarm Settings" P7-10)
Bed Transfer	The patient information and monitoring data can be transferred/exchanged between beds. (☞ "Bed Transfer/Bed Exchange" P13-9)
Network View	The waveform and numeric data of the bedside monitor monitored on other central monitor will be displayed. (☞ "Network View" P13-12)
Night Mode	The night mode for the DS-LAN III network bed can be turned ON from this device. (☞ "Night Mode" P13-15)

Nurse Call Daily Check	Daily check of the nurse call system can be performed. The key for this function will be displayed only when [Nurse Call] is assigned to "Main Unit Port" under [Menu > Initial Settings > External Devices > Serial Comm.]. (☞ "Nurse Call Daily Check" P5-5)
Discharged List	The past data of 160 discharged list can be displayed. Whether or not to display the review data can be set. (☞ "Discharged List" P13-16)
All Beds Events	The alarm events for all beds can be verified on one display. (☞ "All Beds Alarm Events" P7-19)
All Beds Nurse Call	The nurse call setup list for all monitoring beds will be displayed and the settings can be changed. (☞ "All Beds Nurse Call Setup" P7-25)
Each Bed: Settings can be performed for each bed.	
Printing	Settings for printing the data to the recorder unit or laser printer can be performed. (☞ "Printing Condition/Output Destination Setup" P12-2)
Color	The colors of waveforms and numeric data can be set. (☞ "Color" P13-17)
Nurse Call	ON/OFF of nurse call system, nurse call factor, alarm duration before notification can be set. The key for this function will be displayed only when [Nurse Call] is assigned to "Main Unit Port" under [Menu > Initial Settings > External Devices > Serial Comm.]. (☞ "Nurse Call Setup" P13-18)
Full Disclosure Waveform	The parameters to save as full disclosure waveform can be set. (☞ "To Select the Waveform to Store" P10-5)
Data Server Waveform	Select the waveform to output to the data server. The key for this function will be displayed only when [ON] is set for "Data Server" under [Menu > Initial Settings > External Devices > Network]. (☞ "Data Server Output Waveform Setup" P13-21)
Parameter ON/OFF	Whether or not to monitor can be set for each parameter. (☞ "Parameter ON/OFF" P8-31)
Common Setup: Settings common to all beds can be performed.	
Display Configuration	The display configuration such as waveform sweep speed can be set. (☞ "Display Configuration of the Home Display" P13-22)
Tone/Volume	The volume and tone of the alarm sound, HR synchronized sound, key sound, boot sound can be set. (☞ "Tone/Volume" P13-33)
Brightness	The brightness of the display can be set. (☞ "Brightness" P13-34)
Monitor Suspend	The messages and colors to be displayed when monitoring is suspended can be set. (☞ "Monitor Suspend Setup" P13-35)
Nurse Team	The colors and name of the nurse team can be set to identify the nurse team for each patient. (☞ "Nurse Team Setup" P13-36)

Display Configuration for Individual Bed

The following settings can be performed for individual bed display configuration.

Layout	The layout of the individual bed display can be set.
Numeric Data	The parameters to be displayed and numeric data box size can be set.
Waveform	Select the displaying waveform.
User Key	User keys can be assigned to numeric data box area of the individual bed display.
Detail Setup	Alarm limit display (graph/numeric/OFF), waveform thickness, etc. can be set.
All Beds	Applies the same setting for display configuration to all beds.

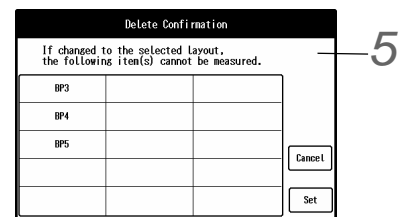
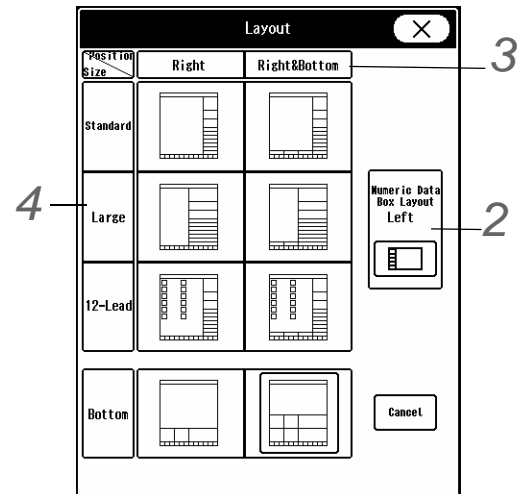


Press [Menu > Basic Setup > Display Config.] on the individual bed display.

Layout

There are 8 types of layout for the individual bed display.

- 1** Press the [Change] key for "Layout" on the display configuration menu. (Menu > Basic Setup > Display Config.)
- 2** The numeric data box can be displayed either on the right side or on the left side.
- 3** The numeric data box layout can be selected from "Right" / "Right&Bottom" / "Left" / "Left&Bottom".
- 4** The numeric data box size can be selected from [Standard] / [Large] / [12-Lead] / [Bottom].
When [Bottom] is selected, the numeric data box will be displayed large but user keys cannot be assigned to the numeric data box area
- 5** When changing the layout, some of the currently displayed parameters may not be able to be displayed and "Delete Confirmation" window will be displayed. To change the layout, press the [Set] key.



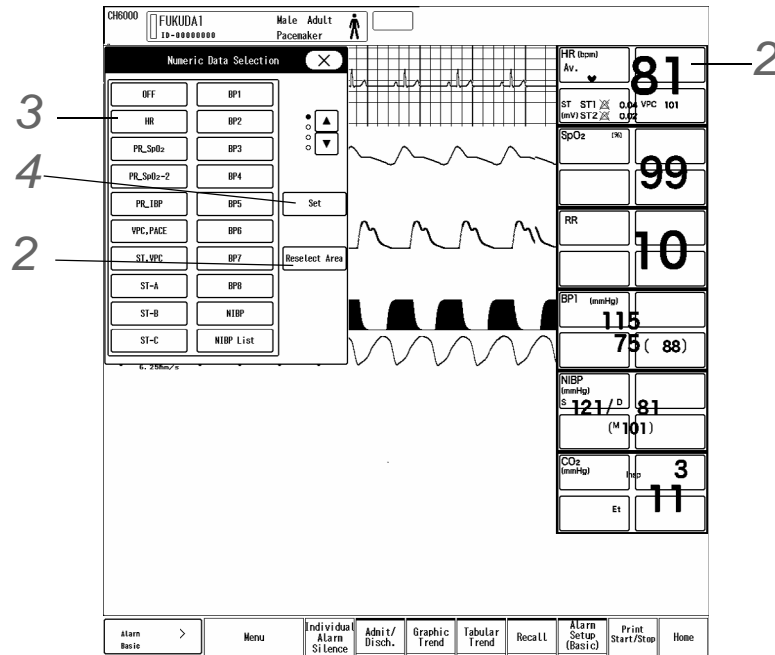
Numeric Data/Waveform

The numeric data and waveforms to be displayed for the individual bed can be selected. The numeric data box size can be also set.

Numeric Data Selection

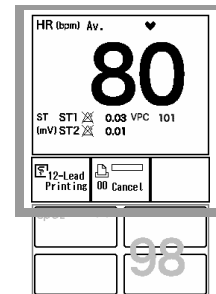
- 1** Press the [Change] key for "Numeric Data".

▶ The "Numeric Data Selection" window and numeric data box display area will be displayed.



2 Numeric Data Box Size

- ▶ The numeric data box can be assigned to the area outlined in blue. By selecting multiple areas, the numeric data box can be enlarged.
- ▶ By pressing the selected area again, the selection will be cancelled.
- ▶ To restart from the beginning, press the [Reselect Area] key.
- ▶ For the "12-Lead" layout, HR numeric data box and 12-lead user key will be automatically assigned to 6 boxes from the top and cannot be changed. (shown on right)
- ▶ The selectable box size differs depending on the parameter. (☞ "Numeric Data Box Size Range" P17-14)



3 Parameter Selection

- ▶ Select the parameters to be displayed.

4 Finalizing the Setting

- ▶ Press the [Set] key to finalize the settings for numeric data box display configuration.
- ▶ To set other parameters, repeat the procedure from step 2 to 4.

NOTE

- The selected parameter may not be displayed depending on the numeric data box size. In such case, <Size Error> will be displayed on numeric data area. Adjust the size.

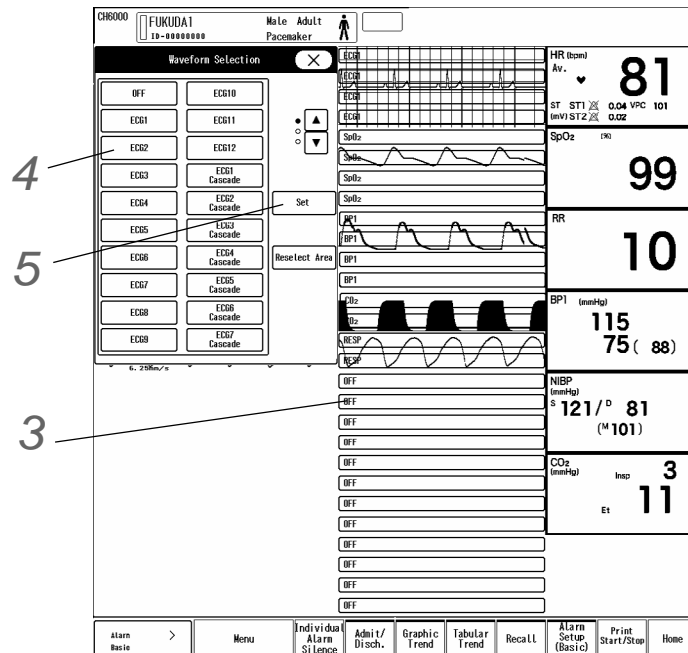
☐ Waveform Selection

Select the waveforms to be displayed on the individual bed display using the same procedure as the numeric data.

- 1 The waveforms of the displayed numeric data can be automatically configured by pressing the [Same as Numeric] key for "Waveform". (Basic Setup > Display Config.)

2 To manually set the waveforms to be displayed, press the [Change] key for "Waveform".

- ▶ The "Waveform Selection" window and waveform display area will be displayed.



3 Waveform Display Area Size

- ▶ The waveform can be assigned to the area outlined in blue. By selecting multiple areas, the waveform display can be enlarged. For ECG1 to ECG12, minimum of 2 areas needs to be assigned.
- ▶ By pressing the selected area again, the selection will be cancelled.
- ▶ To restart from the beginning, press the [Reselect Area] key.

4 Waveform Selection

- ▶ Select the waveform to display.
- ▶ When [Block Cascade] is selected, the waveform block set for "Block Cascade" (Basic Setup > Display Config. > Detail Setup) will be assigned. 2 to 6 waveforms can be displayed in one block. By assigning the block cascades to multiple waveform areas, full disclosure waveform can be monitored. (☞ "Detail Setup" P13-6)

NOTE

- ♦ To assign [Block Cascade], the area of waveform quantity x2 will be required. For example, if 3 parameters are set for block cascade waveforms, 6 or more areas will be required.

5 Finalizing the Setting

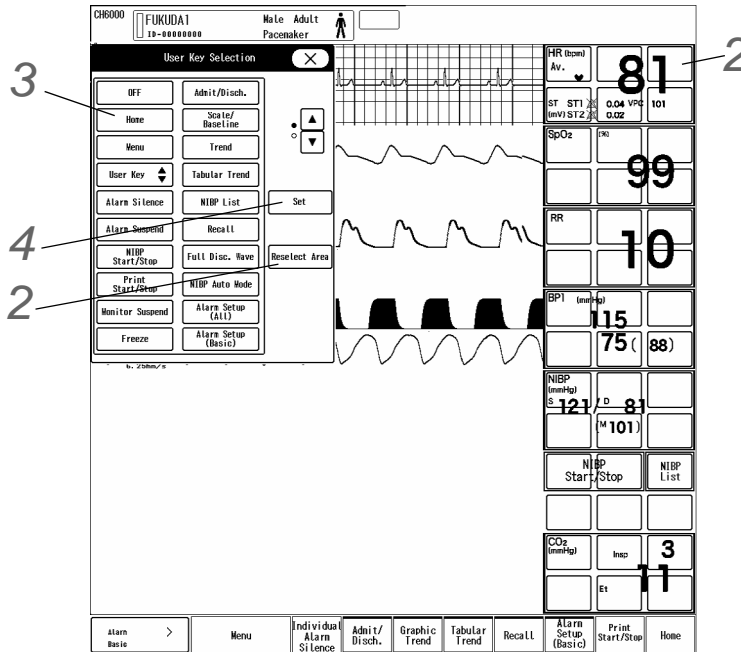
- ▶ Press the [Set] key to finalize the settings for waveform display configuration.
- ▶ To set the displaying parameters or other beds, repeat the procedure from step 3 to 5.

User Key Display on the Numeric Data Box

User keys can be assigned to numeric data box area of the individual bed display.

1 Press the [Change] key for "User Key".

▶ The "User Key Selection" window and user key display area will be displayed.



2 User Key Display Area Selection

▶ Adjust the size of the selected area which is indicated by blue box. By pressing the selected area again, the selection will be canceled.

▶ To start again from the beginning, press the [Reselect Area] key.

3 User Key Selection

▶ Press the \uparrow / \downarrow keys to switch the user key selection.

4 Finalizing the Setting

▶ Press the [Set] key to finalize the setting.

Detail Setup

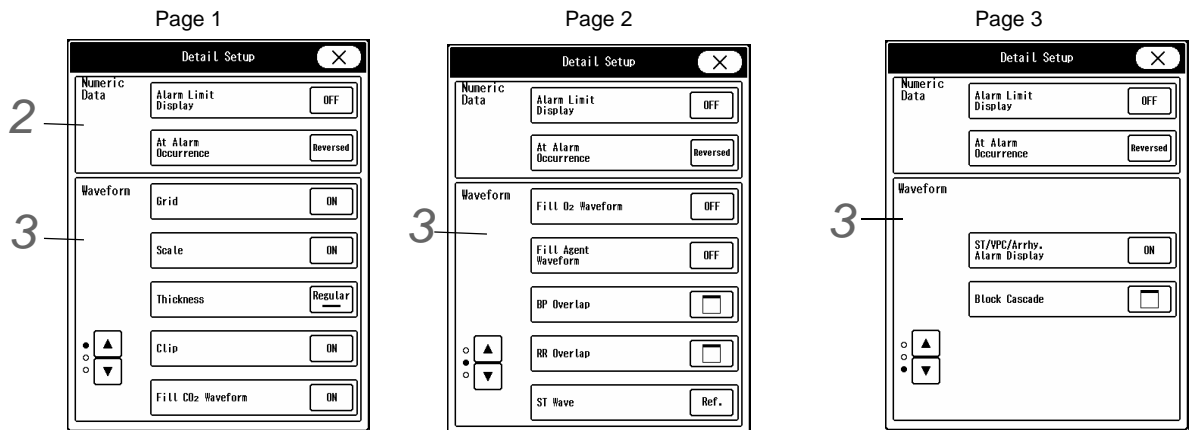
The following items can be set for numeric data and waveform display configuration.

Numeric Data	Alarm Limit Display, At Alarm Occurrence	
Waveform	Page 1	Grid, Scale, Thickness, Clip, Fill CO ₂ Waveform
	Page 2	Fill O ₂ Waveform, Fill Agent Waveform, BP Overlap, RR Overlap, ST Wave
	Page 3	ST/VPC/Arrhy. Alarm Display, Block Cascade

NOTE

- The same settings will be applied to all beds except "12-Lead ST Wave" and "Block Cascade".

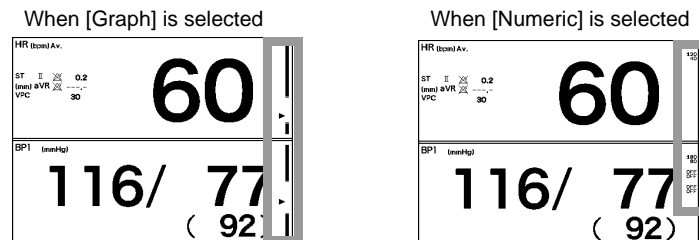
- 1 Press for "Detail Setup" under [Menu > Basic Setup > Display Config.].



2 Numeric Data Display Settings

1 Alarm Limit Display

- ▶ How to display the alarm limit inside the numeric data box can be set.



- ▶ When [Graph] is selected, SYS alarm limit will be displayed for BP numeric data box.
- ▶ When [Numeric] is selected, the alarm limit for the parameter with the alarm turned OFF will not be displayed regardless of this setting.

2 At Alarm Occurrence

- ▶ How to display the numeric data box at alarm occurrence can be set.
- ▶ [Reversed]: The numeric data display will alternately change between standard display and reversed (highlighted) display.
- ▶ [3D]: The numeric data display will alternately change between standard display and 3D display.

3 Waveform Display Settings

1 Grid

- ▶ The grid display on the ECG waveform background can be set.
- ▶ [ON]: Grid will be displayed.
- ▶ [Bold]: Grid will be displayed in bold format.
- ▶ [OFF]: Grid will not be displayed.

2 Scale

- ▶ The scale can be selected from [ON]/[Bold1]/[Bold2].

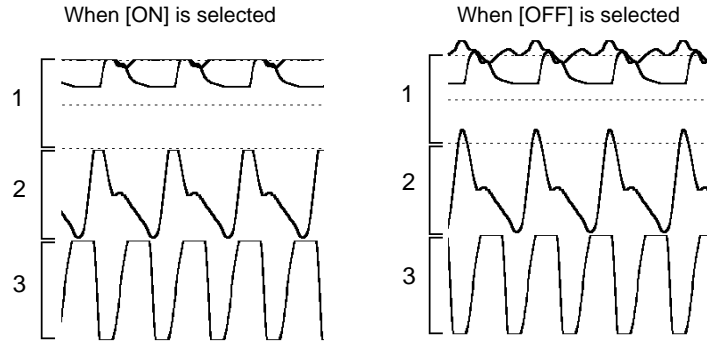
3 Thickness

- ▶ The thickness of the displayed waveforms can be selected from [Thin] / [Regular] / [Thick].

4 Wave Clip

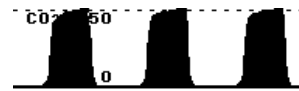
- ▶ Whether or not to clip the overlapped waveforms of the neighboring display area can be selected.
- ▶ [ON]: When the waveform amplitude exceeds the display area, the exceeded part of the waveform will be clipped.
- ▶ [OFF]: The whole waveform will be displayed even if the display area is exceeded. However, if the circulatory waveform exceeds to the respiratory waveform area, the exceeded part will be clipped, and vice versa.

Ex.)
 1. BP Waveform Display Area
 2. Pulse Waveform Display Area
 3. Respiration Waveform Display Area



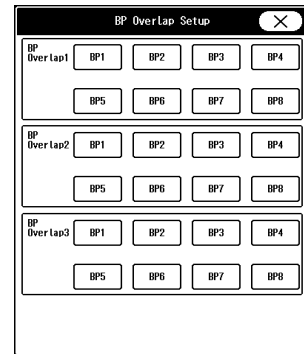
5 Fill CO₂, O₂, Agent Waveform

- ▶ [ON]: The waveform will be filled in with black color from the baseline.
- ▶ [OFF]: The waveform will not be filled in.



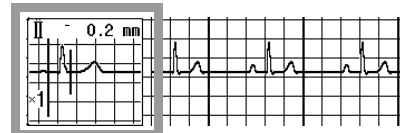
6 BP Overlap, RR Overlap Waveform

- ▶ The overlapping BP waveforms can be set for each overlap group 1 to 3.
- ▶ The overlapping RR waveforms can be set for each overlap group 1 to 3.



7 12-Lead ST Wave

- ▶ The ST waveform to be displayed for the 12-Lead layout can be set.(shown on right)
- ▶ [OFF]: ST waveform will not be displayed.
- ▶ [Ref.]: The reference waveform of 12-lead ST waveform will be displayed.

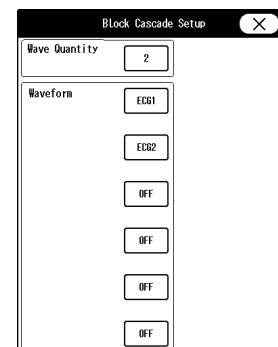


8 ST/VPC/Arrhy. Alarm Display

- ▶ 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

- ▶ By registering 2 to 6 waveforms to one block and assigning [Block Cascade] to multiple display area, full disclosure waveform can be monitored.
- ▶ Select the waveform quantity from [2] to [6].
- ▶ Select the waveforms to be displayed as one block. To display this block, [Block Cascade] needs to be assigned to the waveform display area. (☞ "Numeric Data/Waveform" P13-3)



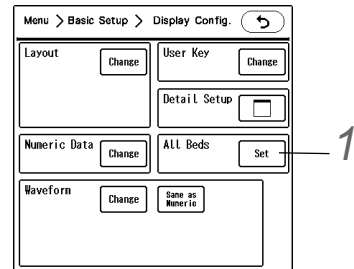
NOTE

- When the waveform quantity for block cascade is changed, [Block Cascade] assigned to the waveform area will be canceled.

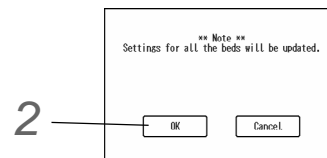
To Set the Same Setting for All Beds

The display configuration setting for the individual bed can be applied to all beds.

- 1 Press the [Set] key for "All Beds" on the display configuration menu. (Menu > Basic Setup > Display Config.)



- 2 A confirmation message will be displayed. To set the same setting, press the [OK] key.

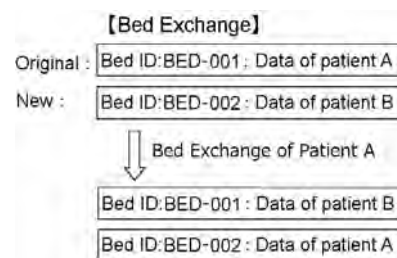
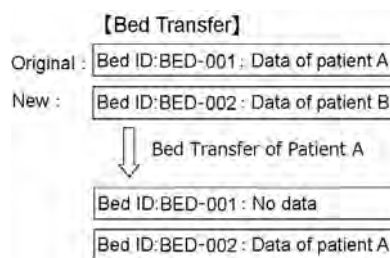


Bed Transfer/Bed Exchange

By using the bed transfer/exchange function, patient information and alarm settings can be transferred/exchanged between beds.

- Bed Transfer: The setup data of the original bed will be overwritten to the setup data of the new bed. The original bed will be treated as discharged bed, monitoring data will be cleared and setup data will be initialized.
- Bed Exchange: The setup data of the original bed and the new bed will be exchanged.

The procedure for bed transfer/exchange is explained below.



By performing central monitor communication setup, bed transfer/exchange among several central monitors can be performed through the TCP/IP network.

	Details	Bed Transfer		Bed Exchange	
		Original	New	Original	New
Patient Information	Admit Settings	Discharge *1	Transfer	Transfer	Transfer
Alarm	Alarm Settings	Discharge *2	Transfer	Transfer	Transfer
Print Settings	Print Settings	Discharge *3	Transfer*7	Transfer*7	Transfer*7
Review Data	Graphic Trend	Discharge *1	Transfer*6	Transfer*6	Transfer*6
	Tabular Trend				
	Full Disclosure Waveform				
	Recall		Delete or Transfer*4	Delete or Transfer*4	Delete or Transfer*4
	ST				
	12-Lead Analysis				
	Hemodynamics				
Nurse Call Setup	Nurse Call Settings	Discharge *2	No Change*5	No Change*5	No Change*5
Initial Settings	When PHS nurse call system is used				
	Bed Name Settings	Initialize	Initialize	Initialize	Initialize

*1: The data will be initialized or deleted.

*2: The initial settings at admittance will be applied.

*3: The settings will be backed up.

*4: The data will be deleted if between different central monitors, and the data will be transferred if within the same central monitor.

*5: The settings will not change and the same settings will be applied after bed transfer/exchange.

*6: If the bed transfer is performed within the same central monitor, the data will be transferred, and if the bed transfer is performed between the different central monitors, the original data can be monitored via TCP/IP network.

*7: If the bed transfer is performed within the same central monitor, the settings will be transferred, and if the bed transfer is performed between the different central monitors, the settings will not transfer.

CAUTION

- When a bed transfer procedure is performed, all setup data for the new bed will be updated. The data for the DS-LAN bed, LW-T bed, and the same data monitored on other central monitor will be initialized.
- If the bed transfer/exchange is performed for the DS-LAN bed, the GAS alarm settings will be backed up or initialized depending on the settings for "Backup at Discharge" on the bedside monitor.
- When using the EMR link function, bed transfer/exchange cannot be performed. However, bed transfer/exchange can be performed when the EMR link is offline.

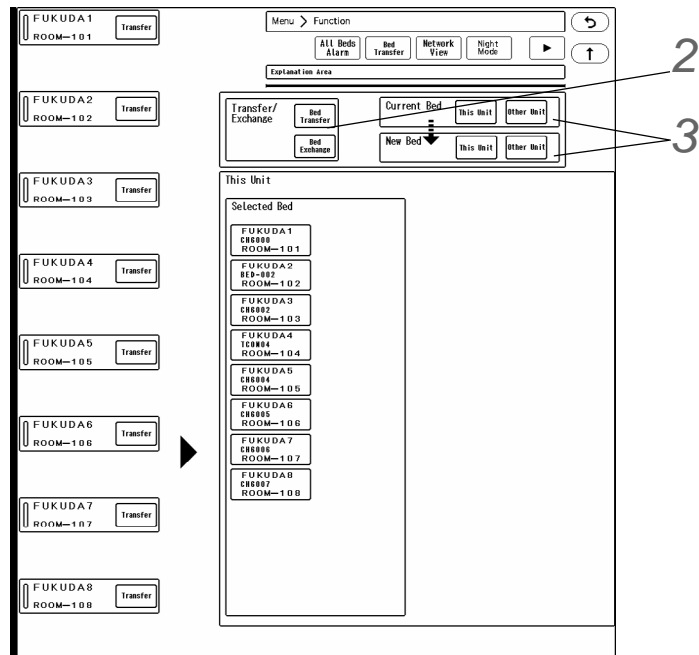
NOTE

- Perform settings for the "Central Monitor Comm." in advance. (Initial Settings > External Device > Network)
(☞ Maintenance Manual "Central Monitor Communication" P2-19)

1 Press the [Menu], [Bed Transfer] ("Function") keys.

- ▶ The "Bed Transfer" screen will be displayed.

The currently monitored beds will be displayed at the left side.



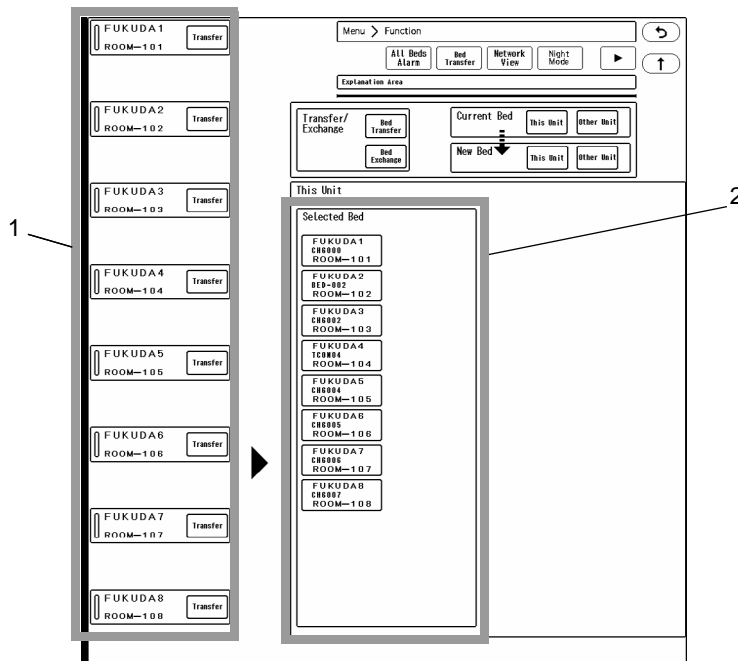
2 Select from [Bed Transfer] or [Bed Exchange].

3 Select [This Unit] or [Other Unit] for Bed 1 (Current Bed) and Bed 2 (New Bed).

NOTE

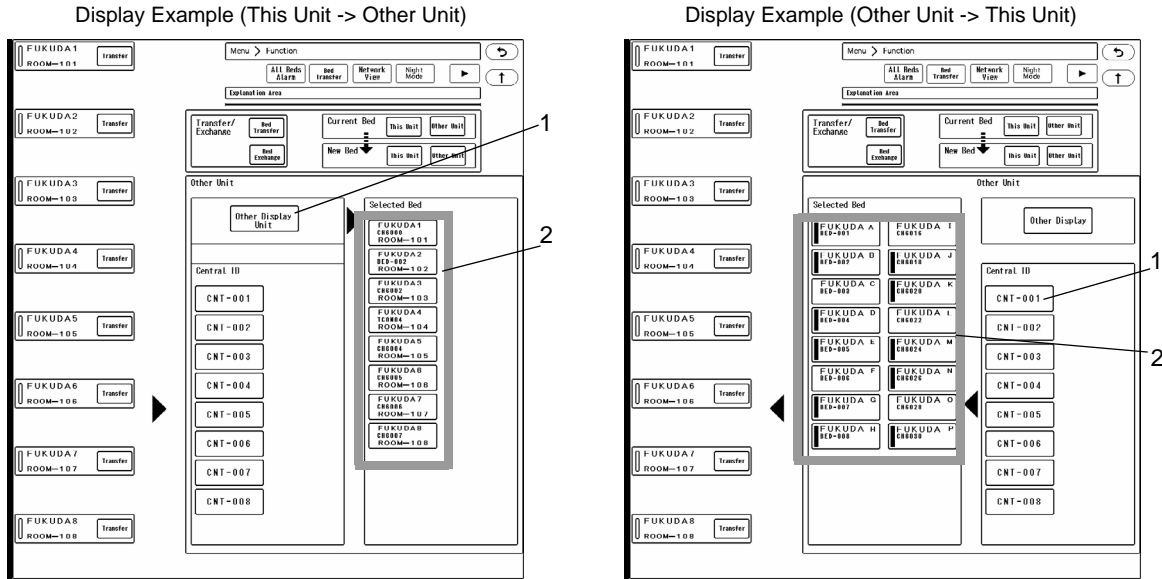
- If central communication setup (Initial Settings > External Device > Network) is not performed, [Other Unit] cannot be selected.
- [This Unit] must be set for either Bed 1 (Current Bed) or Bed 2 (New Bed). [Other Unit] cannot be set on both beds at the same time.

4 When performing bed transfer/exchange within this central monitor;

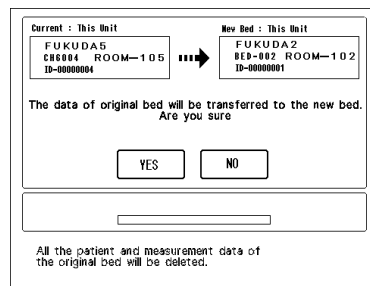


1 Press the [Transfer] or [Exchange] key for the original bed.

- 2 Select the new bed.
- 3 The confirmation window will be displayed. Proceed to step 6.
- 5 When performing bed transfer/exchange between this central monitor and other central monitor/extended display unit;



- 1 When [Other Unit] is selected, the list of central ID of the central monitors (max. 15) connected to the TCP/IP network will be displayed. Select [Other Display Unit] or central monitor on the list.
- 2 The list of beds monitored on the selected central monitor will be displayed. Select the bed from the list.
- 3 The confirmation window will be displayed. Proceed to step 6.
- 6 The "New Bed" or "Bed B" will be finalized and a confirmation message will be displayed. To perform bed transfer/exchange, press the [YES] key.



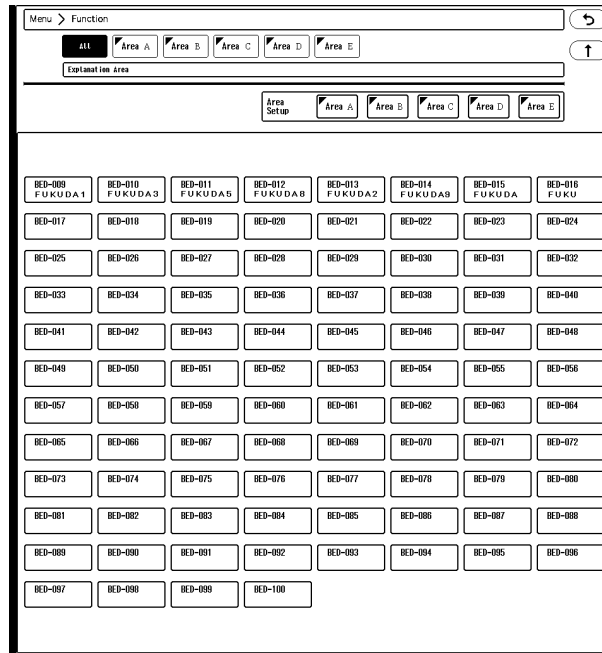
Network View

The list of DS-LAN network beds connected to the DS-1800 System and the selected individual bed can be displayed.

CAUTION

- On the network view, DS-LAN III network beds except the registered beds can be displayed.
- For the beds displayed on the network view, alarm message will be displayed, but alarm sound will not generate. Also, synchronized tone will not generate, and HR/PR, RR synchronized mark will not be displayed.

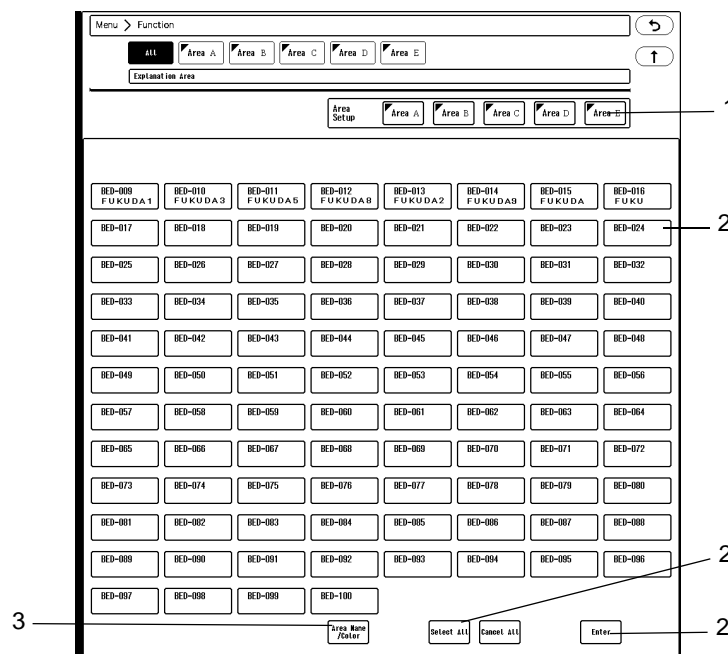
1 Press [Menu > Function > Network View].



- On the network view, select the bed to display from maximum of 100 beds (in case of DS-LAN III) connected to the wired network. The Room/Bed ID key for the alarm generating bed will be indicated in red.

2 Set the area name and the bed to register to that area.

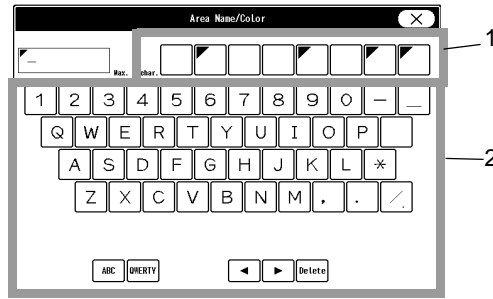
All the beds connected to the network can be displayed, but it is also possible to divide the beds by areas, which allows to display the beds by each area.



- Press the key for "Area Setup" to change the screen to area setup mode. When the mode is changed, the key for selected area will be displayed in blue. To return to the original mode, press the key again.
- 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/cancelation for all the beds can be performed at once.

▶ [Enter]: The selection will be finalized.

3 Press the [Area Name/Color] key to set the area name and color.

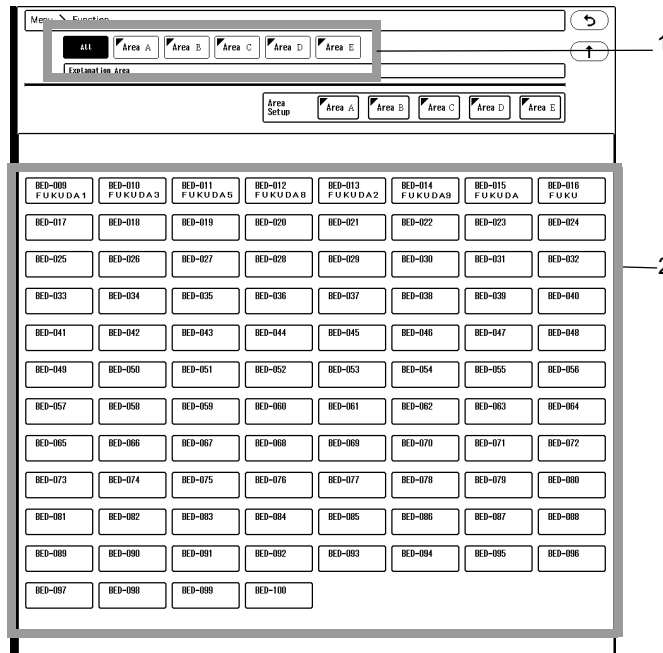


1 Select the color to distinguish the area.

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. Maximum of 8 characters can be set for the area name.

3 Select the patient to be displayed.



1 Select the area of the patient.

▶ [All]: The beds for all the area connected to the network will be displayed.

▶ [Area 1 to 5]: The beds for each area will be displayed.

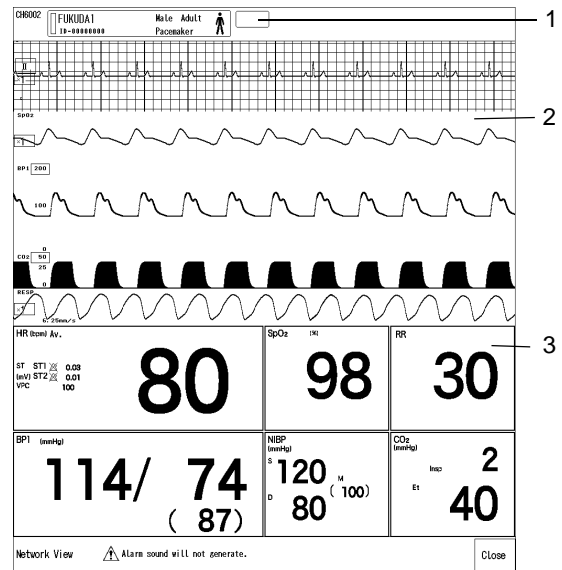
2 Press the Room/Bed ID key to select the patient.

4 Waveforms and numeric data for the selected patient will be displayed. If an alarm is generated for this bed, the vital alarm/arrhythmia alarm message will be displayed.

NOTE

- ♦ The alarm sound will not generate for the bed on network view.

- 1 Message Area
The message for the other bed will be displayed.
- 2 Waveform Display Area
The display will be automatically configured with the measured parameters and the measured waveforms will be displayed.
- 3 Numeric Data Area
The display will be automatically configured with the measured parameters and the measured numeric data will be displayed.



Night Mode

The night mode for the DS-LAN bed can be turned ON or OFF on this device.

The night mode is a function to decrease the screen brightness and alarm volume when turning OFF the light of the ward or when the patient is asleep, etc.

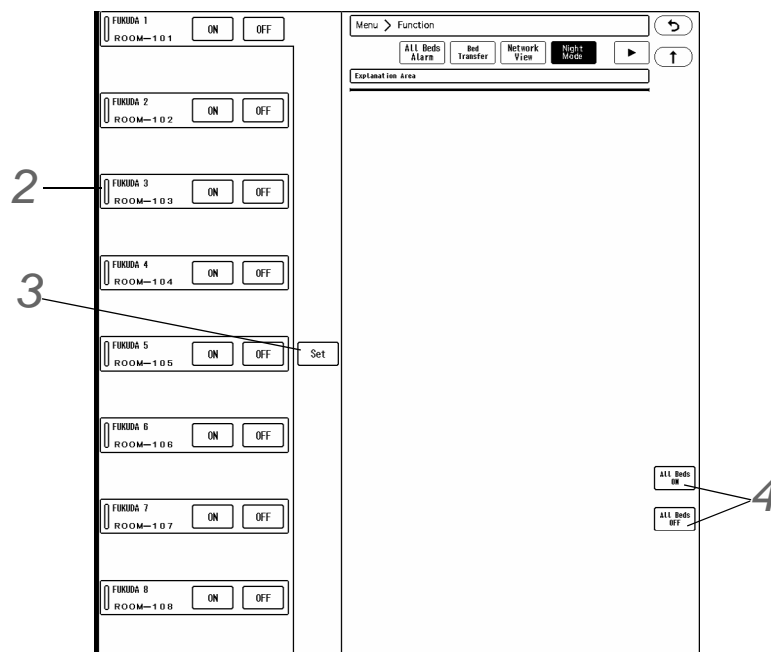
The brightness and alarm volume settings during night mode needs to be preprogrammed on the bedside monitor.

NOTE

- ◆ The night mode can be set only for the DS-LAN bed.

- 1 Press the [Menu], [Night Mode] ("Function") keys.

- ▶ The "Night Mode" menu will be displayed.

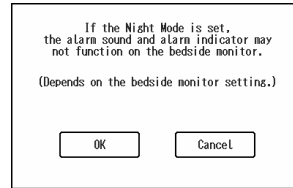


- ▶ For the bed in night mode, [ON] key will be displayed in blue, and for the bed in normal monitoring mode, [OFF] key will be displayed in blue.

2 Press the [ON] or [OFF] key for the bed to change the mode.

3 Press the [Set] key.

- ▶ When changing to night mode, a confirmation window will be displayed.
Press the [OK] key to enter into night mode.
- ▶ When turning OFF the night mode (when [OFF] key is pressed), the night mode confirmation window will not be displayed.



4 The same setting can be applied to all beds.

- ▶ [All Beds ON]: The night mode will be set to all beds.
- ▶ [All Beds OFF]: The normal monitoring mode will be set to all beds.

Discharged List

The review data can be displayed/printed even after the patient is discharged.

120 hours of trend data can be stored for the discharged patient. (Ex. 64 waveforms / 120 hours)

In case of recall data, total of 1000 data can be stored.

In case of full disclosure waveform, only the waveforms which the storing waveform setup is not changed between the discharged patient and admitted patient will be displayed.

□ Selecting a Patient to Display the Data

1 Press the [Menu], [Discharged List] ("Function") keys.

- ▶ The list of discharged patients will be displayed.

Bed ID	ID	Name	Start Time	End Time	SV/S
CH5001	XXXX-XXXX		2014/07/30 15:46:40	2014/08/06 11:53:20	1
CH4001	FFFF-TTTT		2014/08/20 22:00:00	2014/07/21 08:06:40	
BED-030	000-EEE		2014/07/21 06:31:40	2014/08/01 4:45:00	
BED-020	ABCDEFGHIJ		2014/07/21 18:46:40	2014/08/02 1:06:40	
BED-010	123456789		2014/08/01 4:53:20	2014/08/02 1:06:40	

- ▶ The discharged patients list for all beds will be displayed in the order of discharged date/time from new to old.
- ▶ For each discharged patient, bed ID, patient ID, patient name, data start/end time will be displayed.
- ▶ The discharged patient key will be displayed in blue if the review data display is valid, and white if the review

data display is invalid.

- ▶ The review data display can be validated for only one patient. If it is validated on one patient, it will be invalidated for all the other patients.

REFERENCE

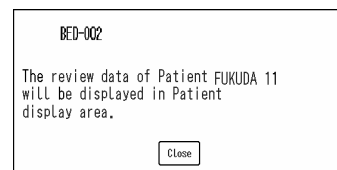
- ♦ The data start/end time will differ depending on whether EMR link function is used or not.

When EMR link function is used: The admitted time will be displayed for start time. The discharged time will be displayed for end time.

When EMR link function is not used: The discharged time of previous patient will be displayed for start time. The discharged time of current patient will be displayed for end time.

- 2** Pressing the key for the discharged patient will switch the valid/invalid status of review data display. When the status is changed from invalid to valid, a confirmation window will be displayed.

- ▶ The review data display for the selected patient will be validated.



CAUTION

- ♦ To avoid mixing up with the current patient data, invalidate the review data display after reviewing the data.

□ Viewing the Review Data for the Discharged Patient

The review data for the discharged patient can be viewed on the following display.

- ♦ Graphic Trend
- ♦ Tabular Trend
- ♦ Recall (List Display, Enlarged Display)
- ♦ Full Disclosure Waveform

(☞ "Review Data Display for Discharged Patient" P9-22)

Color

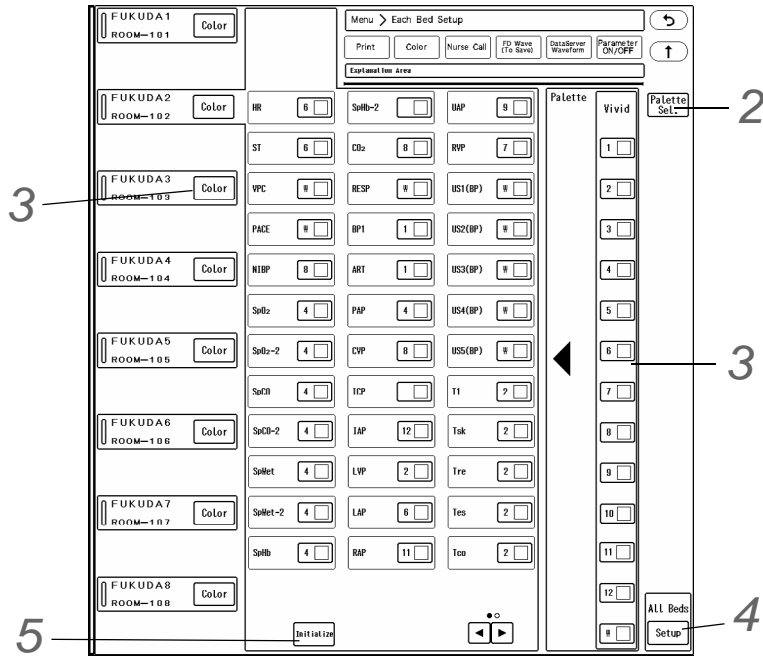
The color palette and color for the numeric data/waveform can be customized.

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.

The color can be selected from 12 colors (+white) of the selected palette. The selected color for the parameter will be applied to the waveform, numeric data, graphic trend, and tabular trend.

- 1** Press the [Menu], [Color] ("Each Bed") keys.

▶ The "Color" selection window will be displayed.



2 Color Palette Selection

▶ Select the palette from [Light] / [Clear] / [Deep] / [Vivid].

3 Changing the Color

1 Press the [Color] key for the bed to change the color.

2 Select the color from 13 selections on "Palette" window.

3 Press the key for the parameter to change the color.

▶ The color of the numeric data and waveform will change to the selected color.

4 Common Setting for All Beds

▶ The same setting can be assigned to all beds.

▶ Pressing the [Setup] key will display confirmation window. Press the [OK] key to update the settings.

5 Initializing the Setting

▶ The settings can be initialized.

▶ Pressing the [Initialize] key will display confirmation window. Press the [Initialize] key again on the confirmation window to initialize the settings.

(☞ "Each Bed Setup" P15-14)

Nurse Call Setup

By connecting the PHS nurse call system to this device, the alarm generation will be notified to the PHS of the hospital staffs. The alarm factors will be displayed on the PHS display.

⚠ WARNING

- The PHS nurse call system should be used as supplementary function of alarm notification. Make sure to monitor the alarm on this device as it may not be notified to the PHS depending on the nurse call system condition.

- Unless the current nurse call alarm is canceled, the next nurse call alarm of the same or lower priority will not be notified. This is to reduce the unnecessary nurse call notification. In order not to forget to cancel the alarm, it is recommended to use the re-notification function. (Default: OFF) If it is necessary to always notify the alarm, use the higher priority function. (Default: OFF)
 - (👉 Maintenance Manual "Re-notify Nurse Call" P4-8)
 - (👉 Maintenance Manual "Higher Priority (than others)" P4-8)

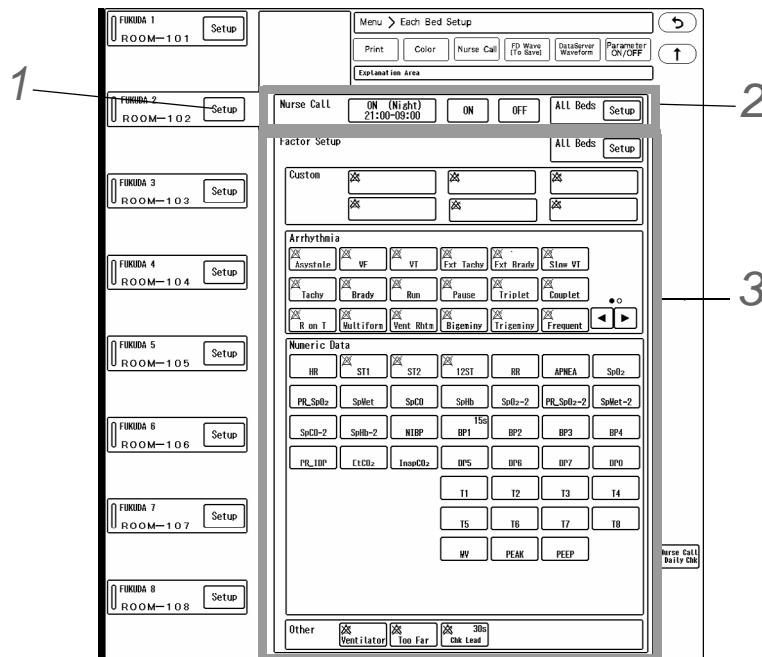
ON/OFF of nurse call system, nurse call factor, alarm duration before notification can be set.

! WARNING

- When using the PHS nurse call system, make sure to set the "Bed Name" as it will be used for alarm notification to the PHS. If the "Bed Name" is not set, the patient cannot be specified on the nurse call system. The "Bed Name" can be selected under [Menu > Admit/Disch.]. (👉 "Entering the Patient Information" P6-2)

1 Press [Menu > Each Bed > Nurse Call], select a patient, and press [Setup].

▶ The "Nurse Call Setup" menu will be displayed.



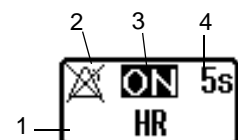
2 Nurse Call Mode Selection

- ▶ [ON (Night)] will be displayed only when [Enable] is selected for "Night Use" under [Menu > Initial Settings > External Device > Serial Comm. > Nurse Call].
- ▶ To set the same setting for all beds, press [Setup] for "All Beds".

3 Nurse Call Factor Setup

Select ON/OFF for each parameter. The information displayed inside each key is explained below.

- 1 The blue key indicates that it is selected as the nurse call factor.
- 2 The current alarm status (ON/OFF) is displayed. is displayed when OFF, and nothing is displayed when ON.
- 3 This indicates that the parameter is set as the high priority factor for

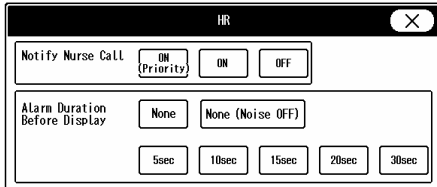


notification. It is displayed when [ON (Priority)] is selected for "Notify Nurse Call".

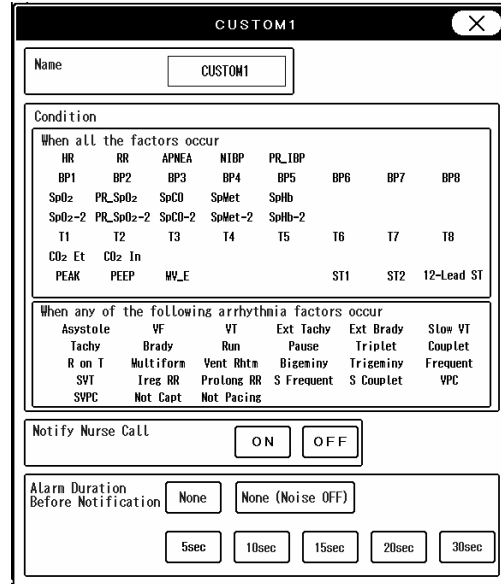
- 4 The alarm duration before notification is displayed. It will not be displayed if [None] is selected for "Alarm Duration Before Notification".

1 Select the nurse call alarm factor by pressing the key for the corresponding parameter or custom setting. Custom Factor

- ▶ The setup window will be displayed.



Example of [HR]



Example of Customized Notification

2 Set the "Notify Nurse Call" .

- ▶ [ON (Priority)]: The parameter will be set as the high priority alarm factor.
- ▶ [ON]: The parameter will be set as the normal alarm factor.
- ▶ [OFF]: The parameter will not be set as the alarm factor.

NOTE

- ♦ [ON (Priority)] will be displayed only when [ON] is selected for "Higher Priority (than others)" for the nurse call detail setup under [Initial Settings > External Device > Serial Comm.].

3 Set the "Alarm Duration Before Notification".

The alarm will be notified to the nurse call system when the alarm duration exceeds the set duration.

- ▶ Select from [5sec.] / [10sec.] / [15sec.] / [20sec.] / [30sec.] / [None] / [None (Noise OFF)].
- ▶ For HR, Tachy, Brady, Ext Tachy, Ext Brady, and the custom factor including these parameters, [None (Noise OFF)] will be displayed.
- ▶ [None], [Noise OFF]: Alarm will be notified to the nurse call system at alarm generation without any delay.

REFERENCE

- ♦ When [None (Noise OFF)] is selected, noise detection will be performed before nurse call notification. If detected as noise, the alarm will not be notified to the nurse call system.
- ♦ For "Arrhythmia Alarm", "APNEA", "NIBP", "Too Far", alarm duration before notification cannot be set. The alarm will be notified to the nurse call system at alarm

generation without any delay.

- 4 To set the same setting for all beds, press the [Setup] key for "All Beds".

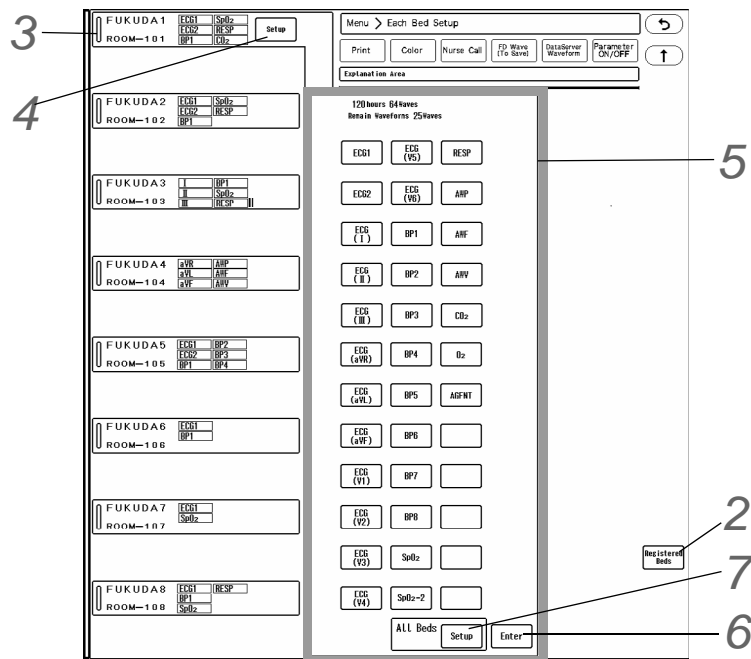
Data Server Output Waveform Setup

The beds and waveforms to output to the data server can be set. There are following 2 types of settings.

- ♦ Displayed Beds: Maximum of 16 beds which are displayed on the home display.
- ♦ Registered Beds: Maximum of 32 beds which are previously registered.

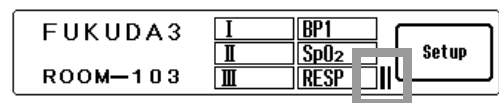
- 1 Press the [Menu], [Data Server Waveform] ("Each Bed") keys.

▶ "The screen to set the data server waveform will be displayed.



- 2 Select from [Displayed Beds] or [Registered Beds].

- 3 Press the [Setup] key for the bed to perform the setup. On the bed selection area, maximum of 6 selected parameters will be displayed. If there are more than 6 parameters, a bar mark will be displayed. (shown on right)



- 4 Press the [Set] key.

- 5 Select the waveform to output. At the upper part of the display, the remaining quantity of waveforms will be displayed.

NOTE

- ♦ There are following restrictions for waveform selection depending on the data server

communication protocol.

Protocol	Waveform Quantity	Selectable Waveform
Ver.01	Total: 32 Waveforms For Each Bed: 8 Waveforms Maximum of 16 Beds	ECG1, ECG2, BP1, BP2, SpO ₂ , RESP, CO ₂
Ver.02	Total: 32 Waveforms For Each Bed: 8 Waveforms Maximum of 16 Beds	ECG1, ECG2, BP1 to BP8, SpO ₂ , SpO ₂ -2, RESP, AWF, AWP, AWV, AGT, CO ₂ , O ₂
Ver.03	Total: 64 Waveforms For Each Bed: 8 Waveforms Maximum of 32 Beds	

6 Press the [Enter] key.

- ▶ The settings will be finalized.

7 Repeat the procedure from step 2 to 6 and set the output waveform for other beds.

By pressing the [Setup] key for "All Beds", the same setting can be applied to all beds.

NOTE

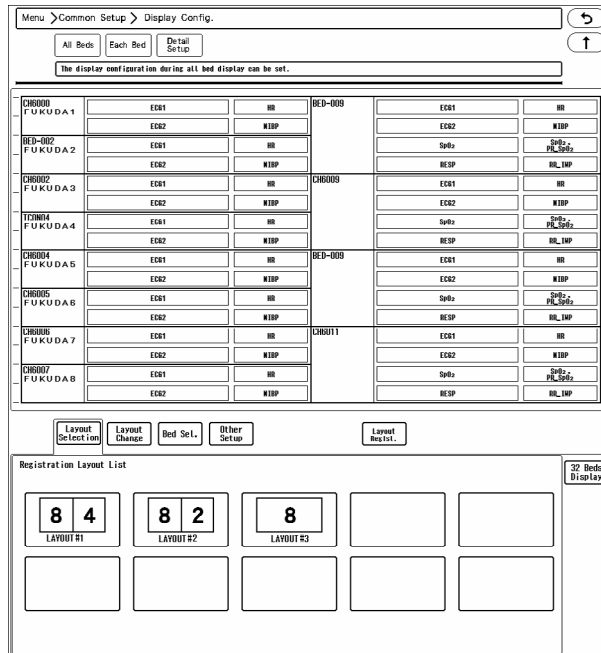
- By canceling the selection of the waveform, the output of that waveform will cease.
- If the [Setup] for "All Beds" is used, the output waveforms for all beds will be updated. Make sure that changing the setting will not cause any problem to other beds.
- The [Setup] key for "All Beds" cannot be used if the set output waveforms exceeds the maximum allowable quantity of each data server protocol.

Display Configuration of the Home Display

On the "Display Configuration" screen, the following setup can be performed.

All Beds	Layout Selection	The home display layout can be selected from the registered layouts.
	Layout Change	The layout of the home display can be set.
	Bed Selection	The beds to be displayed on the home display can be selected.
	Other Setup	The numeric data box size can be set.
Each Bed	Numeric Data	The parameters to be displayed and numeric data box size can be set.
	Waveform	The waveforms to be displayed can be set.
Detail Setup		The waveform sweep speed, patient name display, waveform thickness, etc. can be set.

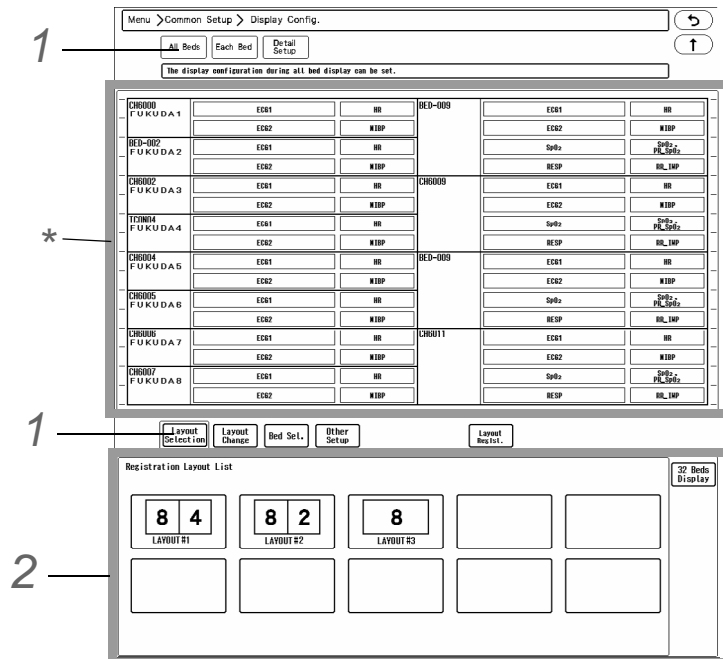
Press the [Menu], [Display Config.] ("Common Setup") on the central monitor display.



Setting/Registering the Layout

❑ Selection from the Registered Layout

- 1 Press [Menu > Common Setup > Display Config. > All Beds > Layout Selection].
- 2 The list of registered layout will be displayed. Select the layout from the list.



- ▶ The selected layout will be displayed on the preview area. (* part on the display example shown above.)
- ▶ To display 32 beds, select [32 Beds Display].
- ▶ To set a more detailed layout, refer to the next section, "Changing the Layout".

NOTE

- When 32 beds display layout is set, extended display unit monitoring can not be performed.

Layout Change

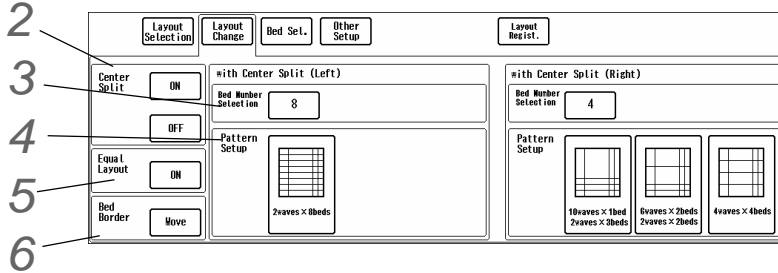
More detailed layout can be set for the following items.

ON/OFF of Center Split

Number of Displaying Beds

Moving the Borderline between the Beds

1 Press [Layout Change].



2 Center Split Selection

- ▶ Select [ON] / [OFF] for "Center Split".

3 Quantity of Beds

- ▶ Select from 1/2/3/4/5/6/7/8 beds.
- ▶ If center split is set, the setting should be made for both left and right side of the home display.

4 Pattern Selection

- ▶ Depending on the settings made on step 2, 3, the selectable layout pattern will differ.

5 Equal Layout

- ▶ By selecting [ON] for "Equal Layout", each bed will be equally arranged on the home display.

6 Moving the borderline between the beds

1 After pressing the [Move] key for "Bed Border", press the borderline on the preview area to display the cursors to move the borderline.

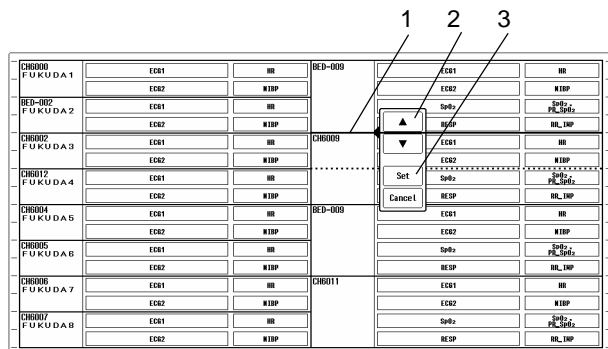
The selected borderline will be displayed in blue line.

2 / : Use these keys to move the borderline.

The moved borderline will be displayed in blue dashed line.

To cancel the moved borderline, press the [Cancel] key.

3 By pressing the [Set] key, the moved borderline will be set.



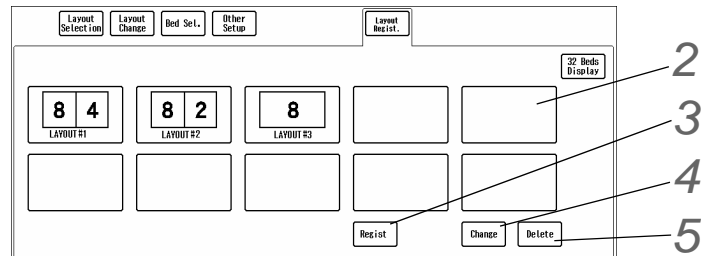
Layout Registration

Maximum of 10 layout patterns can be registered. By registering frequently used layout, the layout setting procedure can be simplified.

The layout pattern includes the following settings.

ON/OFF of Center Split, Number of Displaying Beds, Bed Area Size, Numeric Data Box Size, parameter selection

- 1 Press the [Layout Regist.] key under [Menu > Common Setup > Display Config. > All Beds].



- 2 Select the area to register.

- 3 The set layout will be registered.

- 4 The name for the registered layout can be changed.

- 5 The registered layout will be deleted.

NOTE

- If [Regist] key is pressed while the registered layout is selected, the settings will be overwritten.

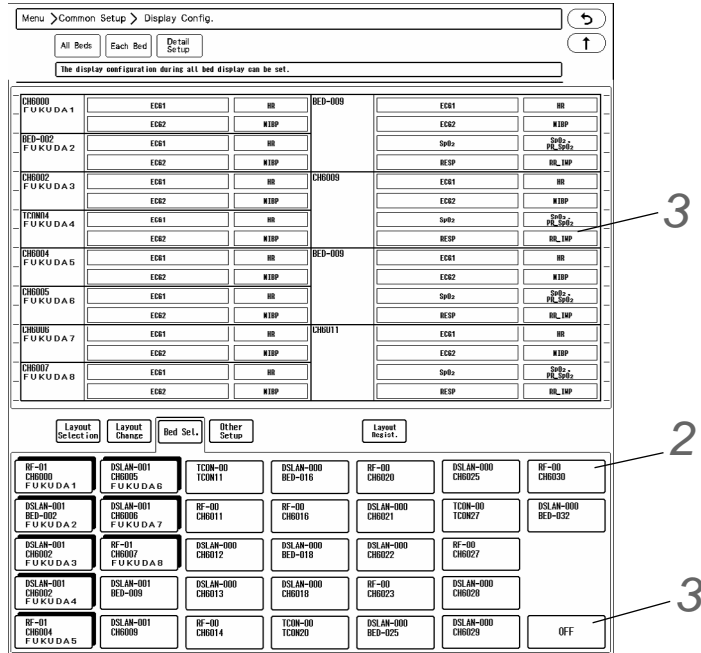
Selecting the Displaying Bed

The displaying beds can be selected from the registered beds. (Max. 32 beds)

- 1 Press the [Bed Sel.] on the display configuration menu for all beds. (Common Setup > Display Config. > All Beds)

- ▶ The list of registered beds will be displayed at the lower part of the display.

▶ On the upper preview area, the current bed layout will be displayed.



2 From the bed selection list, select the bed to display.

The color of the key will change depending on the status.

- White: Selectable bed
- White with blue shadow Bed selected on other display unit
- Blue: Bed already selected and displayed on the preview area
- Blue with blue shadow: Bed selected on this device and other display unit

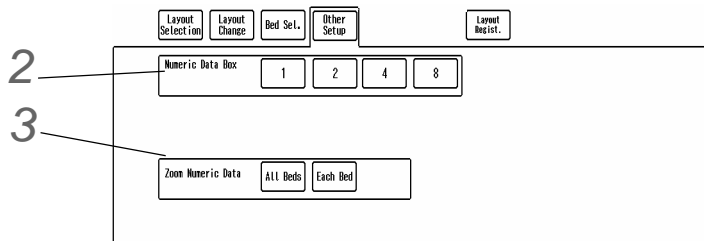
3 On the upper preview area, select the area to display the bed.

▶ By selecting [OFF] on the bed list and then pressing the preview area, the bed display can be cancelled.

Numeric Data Box Size

Set the "Numeric Data Box Size" and "Meas Zoom".

1 Press the [Other Setup] key on the display configuration menu for all beds. (Common Setup > Display Config. > All Beds)



2 Numeric Data Box Size

- ▶ Select from [1]/ [2]/ [4]/ [8].
- When center split is set, select from [1]/ [2].

3 Meas Zoom

The [Meas Zoom] key function (enlarging/reducing the numeric data box) can be set to be applied to all beds or only to the selected bed.

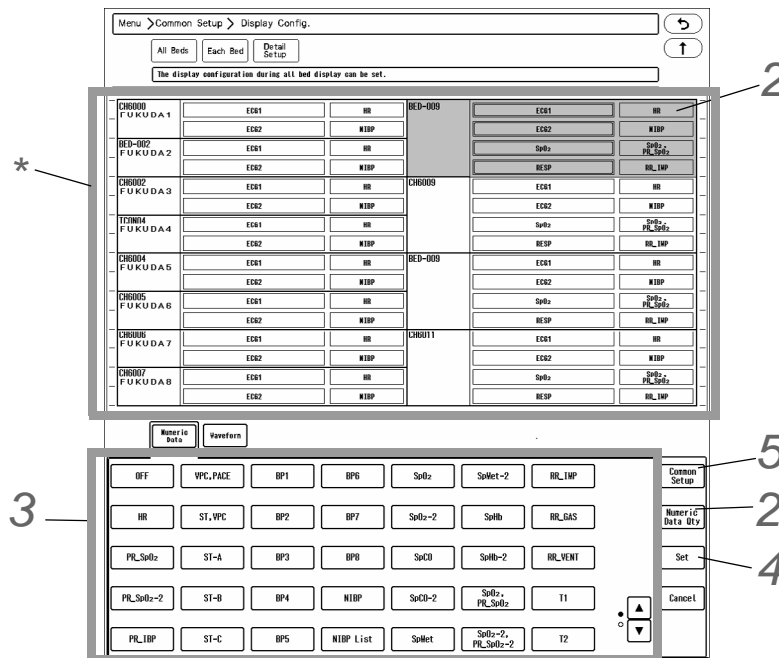
- ▶ [All Beds]: When the [Meas Zoom] key (user key) is pressed, numeric data for all beds will be enlarged/reduced.
- ▶ [Each Bed]: When the [Meas Zoom] key (user key) is pressed, numeric data for only the selected bed will be enlarged/reduced.

Numeric Data/Waveform

The numeric data and waveforms to be displayed for the home display can be selected. The numeric data box size can be also set.

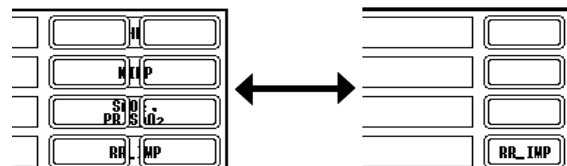
□ Numeric Data Selection

1 Press [Menu > Common Setup > Display Config. > Each Bed > Numeric Data].



2 Select the bed and set the numeric data box size.

- ▶ The numeric data box can be assigned to the area outlined in blue on the preview area. (* part on the display example shown above.)
- ▶ The selectable box size differs depending on the parameter. (☞ "Numeric Data Box Size Range" P17-14)
- ▶ To change the numeric data box size, press the [Meas Qty] key. Pressing this key will sequentially change the quantity of displayed numeric data and changes the numeric data box size.



3 Parameter Selection

- ▶ Select the parameters to be displayed.

4 Finalizing the Setting

- ▶ Press the [Set] key to finalize the settings for numeric data box display configuration.

- ▶ To set the displaying parameters for other beds, repeat the procedure from step 2 to 4.

5 Common Setup

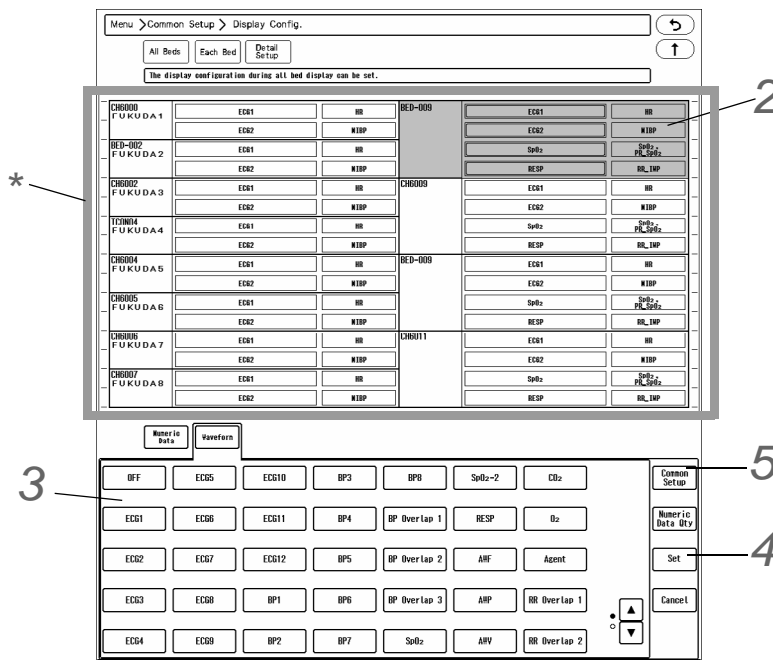
- ▶ The settings of the numeric data/waveform display will be applied to all beds.

NOTE

- ♦ The selected parameter may not be displayed depending on the combination of the parameters and size. In such case, "Size Error" will be displayed in numeric data area. Adjust the size.

□ Waveform Selection

- 1 Press [Menu > Common Setup > Display Config. > Each Bed > Waveform].



- 2 Select the bed and set the waveform display area size.

- ▶ The waveform can be assigned to the area outlined in blue on the preview area. (* part on the display example shown above.)

- 3 Waveform Selection

- ▶ Select the waveform to display.

- 4 Finalizing the Setting

- ▶ Press the [Set] key to finalize the settings for waveform display configuration.
- ▶ To set the displaying parameters or other beds, repeat the procedure from step 2 to 4.

5 Common Setup

- ▶ The settings of the numeric data/waveform display will be applied to all beds.

Detail Setup

Detailed display setup for the Patient Name/Room ID, Numeric Data, Waveform can be performed.

- 1 Press [Detail Setup] under [Menu > Common Setup > Display Config.].

2 Patient Name/Room ID Display

- ▶ For the patient data area and waveform area, select the items to be displayed from [Patient Name] / [Room ID] / [OFF].
- ▶ For the waveform display area, select also the displaying size from [Large Size] / [Standard Size].

NOTE

- ♦ The same item cannot be assigned to both patient data area and waveform area.

3 Auto Display Configuration

- ▶ If [ON] is selected;
 - Numeric Data: The numeric data box will be displayed according to the priority set under [Menu > Common Setup > Display Config. > Detail Setup > Numeric Data > Display Priority].
 - Waveform: The waveform will be displayed according to the priority set under [Menu > Common Setup > Display Config. > Detail Setup > Waveform > Display Priority].
- ▶ Selecting [OFF] will return the display to previous layout.

NOTE

- ♦ For the bed with 12-lead waveform display, "Auto Display Config." cannot be set to [ON].

4 Numeric Data Display Settings

1 ST/VP/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.

2 Alarm Limit Display

- ▶ The alarm limit display inside the numeric data box can be selected from [Graph] / [Numeric] / [OFF].
- ▶ When [Graph] is selected, SYS alarm limit will be displayed for BP numeric data box.
- ▶ When [Numeric] is selected, the alarm limit for the parameter with the alarm turned OFF will not be displayed regardless of this setting.

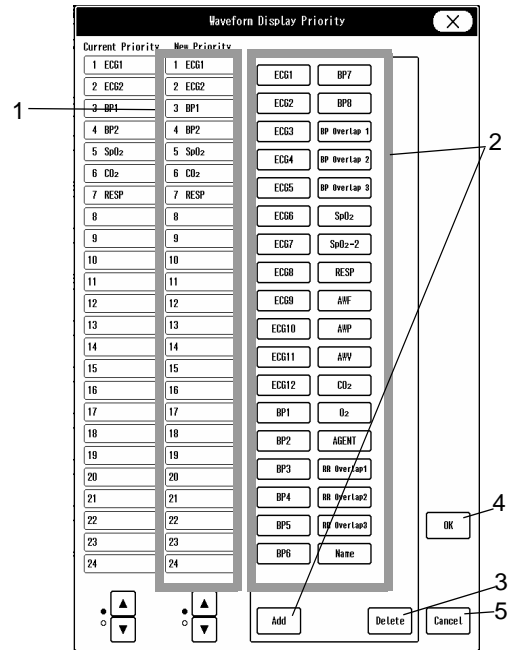
3 At Alarm Occurrence

- ▶ How to display the numeric data box at alarm occurrence can be set.
- ▶ [Reversed]: The numeric data display will alternately change between standard display and reversed (highlighted) display.
- ▶ [3D]: The numeric data display will alternately change between standard display and 3D display.

4 Display Priority

- ▶ On the "Numeric Data Display Priority Window" (shown on right), the display priority of the parameter can be set. When the quantity of numeric data box is changed, the display will change according to this display priority.

- 1 First, select the priority from 1 to 72 under "New Priority", and then select the parameter from the right.
- 2 Pressing the [Add] key will insert the parameter to the specified priority order, and the priority of the subsequent parameters will move down.
- 3 Pressing the [Delete] key will delete the parameter, and the priority of the subsequent parameters will move up.
- 4 [OK]: The settings will be finalized.
- 5 [Cancel]: The settings will be canceled.



5 Waveform Display Settings

1 Circulatory Waveform Sweep Speed

- ▶ Select the ECG, BP, pulse waveform sweep speed from [12.5] / [25] (mm/s).

2 Respiratory Waveform Sweep Speed

- ▶ Select the RESP, CO₂ waveform sweep speed from [6.25] / [12.5] / [25] (mm/s).

3 Grid

- ▶ The grid display on the ECG waveform background can be set.
- ▶ [ON]: Grid will be displayed.
- ▶ [Bold]: Grid will be displayed in bold format.
- ▶ [OFF]: Grid will not be displayed.

4 Scale

- ▶ The scale can be selected from [ON]/[Bold1]/[Bold2].

5 Thickness

- ▶ The thickness of the displayed waveforms can be selected from [Thin] / [Regular] / [Thick].

6 Wave Clip

- ▶ Whether or not to clip the overlapped waveforms of the neighboring display area can be selected.

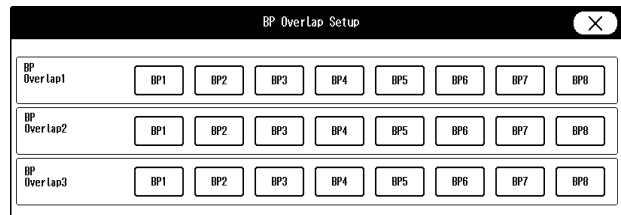
- ▶ [ON]: When the waveform amplitude exceeds the display area, the exceeded part of the waveform will be clipped.
- ▶ [OFF]: The whole waveform will be displayed even if the display area is exceeded. However, if the circulatory waveform exceeds to the respiratory waveform area, the exceeded part will be clipped, and vice versa.

7 Fill CO₂, O₂, Agent Waveform

- ▶ [ON]: The waveform will be filled in with black color from the baseline.
- ▶ [OFF]: The waveform will not be filled in.

8 BP Overlap / RR Overlap Waveform

- ▶ The overlapping BP waveforms can be set for each overlap group 1 to 3.
- ▶ The overlapping RR waveforms can be set for each overlap group 1 to 3.



9 Display Priority

- ▶ Set the waveform display priority using the same procedure for setting the numeric data display priority. (Step 4: Numeric Data Display Settings / 4. Display Priority)

6 Other Setup

1 Patient Data Area

- ▶ Select whether or not to display the patient data area.
- ▶ [ON]: Patient data area will be displayed.
- ▶ [OFF]: Patient data area will not be displayed. Waveform display area will be enlarged, and the patient information will be displayed in the waveform area.

NOTE

- ◆ When the patient data area is [OFF], alarm history or comment will not be displayed even if selected for "Disp. Item for Patient Info. Area".

2 Displaying Item for Patient Data Area

- ▶ [Alarm History]: The generated alarm history in list format will be displayed in patient data area.
- ▶ [Comment]: The entered comment in admit menu will be displayed in patient data area.

REFERENCE

- ◆ Maximum of 30 characters can be entered for comment.
- ◆ The comment can be entered using the displayed keys and keyboard.

- ▶ [OFF]: Alarm history and comment will not be displayed in the patient data area.

3 Display Numeric Data on Waveform Area

- ▶ [ON]: Maximum of four (4) numeric data can be displayed in the waveform area.
- ▶ [OFF]: Numeric data will not be displayed in the waveform area.

REFERENCE

- ◆ By setting [Numeric ON/OFF] as user key, ON/OFF of numeric data display on waveform area can be switched by pressing this user key.

NOTE

- ♦ If [OFF] is set for "Center Split" under [Menu>Common Setup>Display Config.>All Beds>Layout Change], numeric data cannot be displayed in the waveform area.
- ♦ If [Name] or [Bed Name] is set for "Waveform Area" under [Menu>Common Setup>Display Config.>Detail Setup], maximum of 2 numeric data can be displayed.
- ♦ If [Patient Name] is set for [Waveform] under [Menu>Common Setup>Display Config.>Each Bed], numeric data cannot be displayed in the waveform area.
- ♦ For the bed with one (1) waveform display, numeric data cannot be displayed in the waveform area.
- ♦ The following numeric data cannot be displayed in the waveform area.
 "ST-A", "ST-B", "ST-C", "T1/T2", "T3/T4", "T5/T6", "T7/T8", "SvO₂, CO", "RR, CO₂, Agent, O₂, N₂O", "CO₂, Agent, O₂, N₂O", "RR, Agent, O₂, N₂O", "Agent, O₂, N₂O", "Agent, N₂O", "SPIRO", "GAS, SPIRO", "VENT"

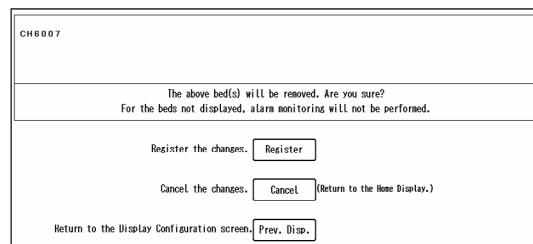
- ▶ The numeric data on the waveform area will be displayed with the following priority.
 High Priority: Common Setup>Display Config.>Each Bed>Numeric Data
 Low Priority: Common Setup>Display Config.>Detail Setup>Numeric Data>Display Priority
 The highest priority is the numeric data set at the top left on the "Each Bed" setting, and the lowest priority is the numeric data set at the bottom on the "Display Priority" setting.

Setup Item	Priority
"Each Bed" setting: Top Left	High
"Each Bed" setting: Top Right	↑
"Each Bed" setting: Bottom Left	
"Each Bed" setting: Bottom Right	
"Display Priority" setting: Top	↓
"Display Priority" setting: Bottom	Low

Exiting the Display Configuration Setup

To end the display configuration setup, follow the procedure below.

- 1** Press [Home] or other user key.
 - ▶ A confirmation message will be displayed.
- 2** To register the settings, press the [Register] key.
 - ▶ [Cancel] : The settings will be canceled.
 - ▶ [Prev. Disp]: The display will return to the display configuration menu.



Tone/Volume

This section explains the tone/volume setup procedure for alarm sound, HR synchronized tone, key sound, and boot/shutdown sound.

WARNING

- Changing the setting for "Alarm System" under [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

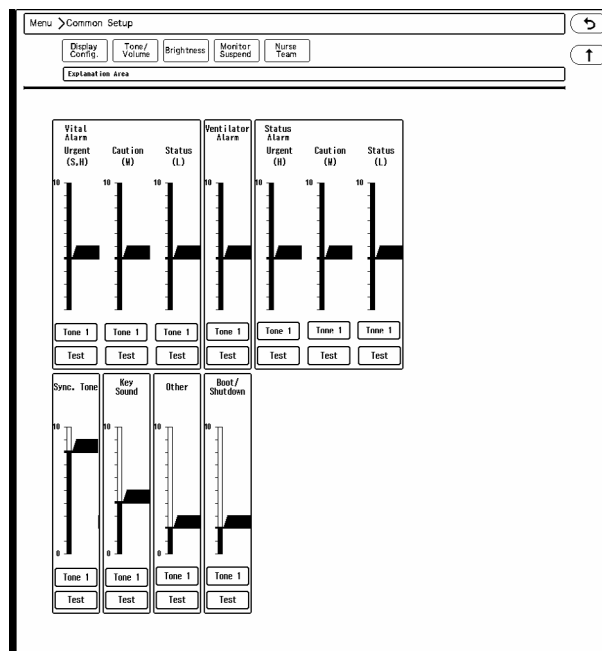
- Pay attention not to set the alarm volume too low to avoid missing any important alarms. When [Melodic Tone] is set for the "Alarm System", the alarm sound for ECG, SpO₂, CO₂ will be different from the test sound. The set volume will be applied but the set tone will not be applied to these parameters.
- When [IEC Tone] is set for the "Alarm System", the alarm volume and tone for the ventilator alarm and device status alarm will be the same with that of the vital alarm.

NOTE

- The tone setup for the synchronized tone is effective only for HR and BP synchronized tone.

1 Press [Menu > Common Setup > Tone/Volume].

- ▶ The "Tone/Volume" menu will be displayed.



2 Set the tone/volume for each sound.

- Slide up or down to adjust the volume. By releasing the finger from the key, ▲/▼ will be displayed to allow fine adjustment.
- To change the tone, press the [Tone] key and select from the dropdown list. The tone selection is different for the synchronized tone, alarm sound, and key sound.
- Press the [Test] key to check the set volume/tone.

REFERENCE

- The volume above the set minimum volume can be set.
(☞ Maintenance Manual "Alarm" P5-2)
- The order of alarm priority is Urgent (H) > Caution (M) > Status (L).
The volume is also set according to the alarm priority.
The volume for high priority alarm cannot be set lower than the lower priority alarm, and vice versa.
- The [Test] button will not function when the vital alarm or device status alarm is generated.

Brightness

In this section, brightness adjustment of the monitor display is explained.




CAUTION



- This device 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 [Menu > Common Setup > Brightness].

▶ The "Brightness" menu will be displayed.



2 Slide  up or down. By releasing the finger from the key, / will be displayed.

3 /: Use these keys to adjust the brightness.

Monitor Suspend Setup

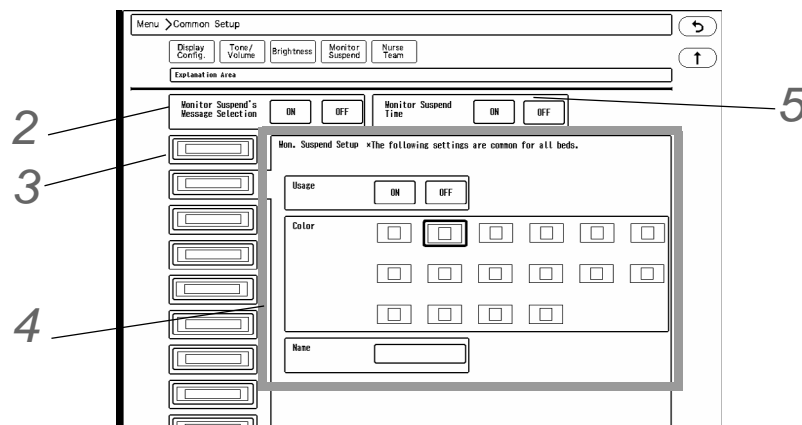
During monitoring suspend condition, different messages in different colors according to the patient's destination can be displayed. Monitor suspend timer function can be also used.

When using the monitor suspend timer function, alarm sound will generate after the preprogrammed duration to remind the user to resume monitoring.

The labels and colors to be displayed when monitoring is suspended, and monitor suspend time can be set. Maximum of 15 labels can be set.

1 Press [Menu > Common Setup > Monitor Suspend].

- ▶ The monitor suspend confirmation window will be displayed.



2 Select [ON] for "Monitor Suspend's Message Selection" to set the details (message, color, etc.)

3 Select the key to edit the monitor suspend message.

4 Set the details.

- ▶ "Usage": Select whether or not to use this monitor suspend message.
- ▶ "Color" : Select the color for the label. The background of the monitor suspend label will be displayed with the selected color.
- ▶ "Name" : Set the monitor suspend message to be displayed. Maximum of 14 alphanumeric characters can be entered.

5 Select ON/OFF for "Monitor Suspend Time".

[ON] will turn ON the monitor suspend timer function, and timer will start when monitoring is suspended.

(☞ "Suspend Monitoring" P6-13)

NOTE

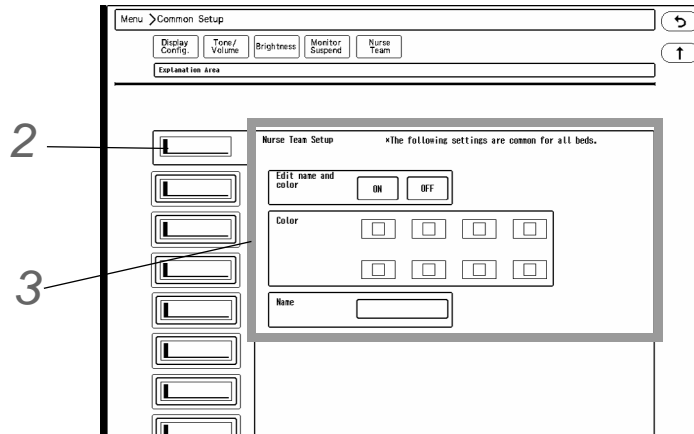
- ♦ If "Auto Resume Monitoring" function is ON, monitoring may automatically resume regardless of the monitor suspend timer setting.
(☞ "To Resume Monitoring Automatically" P6-16)

Nurse Team Setup

The nurse team colors can be displayed for each bed to distinguish the beds according to the nurse team. Maximum of 8 nurse teams can be set.

1 Press the [Menu], [Nurse Team] ("Common Setup") keys.

▶ The nurse team setup screen will be displayed.



2 Select the key to edit the nurse team.

3 Set the details.

1 "Edit name and color": Select whether or not to use this nurse team.

2 "Color": Select the color for the nurse team.

The set color will be displayed on the waveform area of each bed according to the nurse team.

3 "Name": Set the nurse team name. Use the touch panel keys or keyboard to enter the name up to 14 characters.

Chapter 14 Troubleshooting

Message List

In this section, the displayed messages on this device are described.

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

CAUTION

- ♦ The alarm level can be changed under "Initial Settings > Alarm Setup > Alarm Level".
For the DS-LAN beds, the setting on the bedside monitor will be applied.

The following table shows the alarm level selection for each parameter.
There are 5 alarm levels.

Ex.) HR alarm level : "S H M x x"

- S: Top Priority (Top Priority Alarm)
- H: High Priority (Urgent Alarm)
- M: Medium Priority (Cautionary Alarm)
- L: Low Priority (Status Alarm)
- N: Notification (Notification Alarm)

The alarm level that cannot be set will be indicated by "x".

For the HR Alarm, the alarm level of S (Top) / H (High) / M (Medium) can be set, and L (Low) / N (Notification) cannot be set.

Numeric Data Alarm

Parameter	Message	Default Level	Alarm Level Selection	Note
-	Alarm Suspend: xxx sec.	N	x x x x N	"xxx s" indicates remaining time.
ECG	Upper HR	M	S H M x x	
	Lower HR			
ST	Upper ST (1, 2)	M	x H M x x	
	Lower ST (1, 2)			
ΔST	Upper ΔST (1, 2)	M	x H M x x	
	Lower ΔST (1, 2)			
12-Lead ST	Upper ST (xxx)	M	x H M x x	(xxx) indicates lead I to V6.
	Lower ST (xxx)			
QT	QTc (1, 2) prolongation	M	x H M L x	
	Short QTc (1, 2)			

Parameter	Message	Default Level	Alarm Level Selection	Note	
BP1 to BP8	Upper ###	H/M	x H M x x	### indicates BP label. Default Alarm Level BP1: H, BP2 to BP8: M	
	Lower ###				
	Upper PR_IBP	H	x H M x x		
	Lower PR_IBP				
SpO ₂ , SpO ₂ -2, ExtSpO ₂ , ExtSpO ₂ -2	Upper SpO ₂ ##	H	x H M x x		## indicates the label when used.
	Lower SpO ₂ ##				
	Upper SpCO##	M	x H M L x		
	Upper SpMet##	M	x H M L x		
	Upper SpHb##	M	x H M L x		
	Lower SpHb##				
	Upper PR_SpO ₂ ##	H	x H M x x		
	Lower PR_SpO ₂ ##				
	ExtSpO ₂ ##	H	S H M x x		
	Upper RR	H	x H M x x		
	Lower RR				
NIBP	Upper NIBP	H	x H M x x		
	Lower NIBP				
T1 to T8	Upper Tn (###)	M	x H M L x	n: 1 to 8 ### indicates TEMP label.	
	Lower Tn (###)				
Tb	Upper Tb	M	x H M L x		
	Lower Tb				
RESP	Upper RR	H	x H M x x		
	Lower RR				
	Apnea Alarm	H	S H M x x		
CO ₂	Upper CO ₂ -E	H	x H M x x		
	Lower CO ₂ -E				
	Upper CO ₂ -I	M	x H M x x		
	Upper RR	H	x H M x x		
	Lower RR				
	Apnea Alarm	H	S H M x x		
Anesthetic agent	Upper CO ₂ -E	H	x H M x x		
	Lower CO ₂ -E				
	Upper CO ₂ -I	M	x H M x x		
	Upper O ₂ -E	H	x H M x x		
	Lower O ₂ -E				
	Upper O ₂ -I	H	x H M x x		
	Lower O ₂ -I				
	Upper N ₂ O-E	H	x H M x x		
Lower N ₂ O-E					

Parameter	Message	Default Level	Alarm Level Selection	Note
	Upper N ₂ O-I	H	x H M x x	### indicates the label for AGT-1, AGT-2.
	Lower N ₂ O-I			
	Upper ###-E	H	x H M x x	
	Lower ###-E			
	Upper ###-I	H	x H M x x	
	Lower ###-I			
	Upper MAC	H	x H M x x	
SPIRO	Upper MV-E	M	x H M L x	
	Lower MV-E			
	Upper PEAK	M	x H M L x	
	Lower PEAK			
	Lower PEEP	M	x H M L x	
VENT	Upper RR	H	x H M x x	
	Lower RR			
	Apnea Alarm	H	S H M x x	
SI	Upper SI	H	S H M x x	
RPP	Upper RPP	M	S H M x x	
	Lower RPP			

Arrhythmia Alarm

CAUTION

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

Message	Default Level	Alarm Level Selection	Note
<Learn>	N	x x x x N	
<Arrhythmia Alarm OFF>	N	x x x x N	
<Asystole>	H	S H x x x	
<VF>	H	S H x x x	
<VT>	H	S H x x x	
<Ext Tachy>	H	S H x x x	
<Ext Brady>	H	S H x x x	
<Slow VT>	H	x H M x x	
<Run>	H	x H M x x	
<Couplet>	M	x H M L x	
<R on T>	L	x H M L x	
<Multiform>	L	x H M L x	
<Vent Rhtm>	L	x H M L x	
<Pause>	M	x H M x x	

Message	Default Level	Alarm Level Selection	Note
<Bigeminy>	M	x H M L x	
<Trigeminy>	M	x H M L x	
<Frequent>	M	x H M L x	
<Tachy>	M	S H M x x	
<Brady>	M	S H M x x	
<SVT>	L	x H M L x	
<Afib>	L	x H M L x	
<Ireg. RR>	L	x H M L x	
<Prolong RR>	L	x H M L x	
<Not Capt>	L	x H M L x	
<Not Pacing>	L	x H M L x	
<Triplet>	L	x H M L x	
<S Frequent>	L	x H M L x	
<S Couplet>	L	x H M L x	
<VPC>	L	x x x L x	
<SVPC>	L	x x x L x	

Arrhythmia Status

Message	Level	Note
<Cannot analyze>	L	
<ECG Low>	L/N	Level L when "Suspend Arrhy. Analysis during Noise Interference" is [ON]
<ECG Artifact>	L/N	Level L when "Suspend Arrhy. Analysis during Noise Interference" is [ON]
<ECG1 Low>	N	
<ECG2 Low>	N	
<ECG1 Artifact>	N	
<ECG2 Artifact>	N	

NOTE

- The <ARRHY OFF> message will be displayed when all arrhythmia alarm is set to OFF.

Measurement Status

Message	Level	Note
<Alarm Sound Suspended>	N	
<Chk DS-LAN Comm>	N	
<Chk TLM Receive>	M/L	"Too Far" alarm is generating.
<Chk TLM Receive>	N	Interference with other devices
<Chk TLM Battery>	S/H/M/L/N	Chk TLM Battery Alarm
<NIBP meas. failed.>	M/L/N	

Message	Level	Note
<Chk Electrode>	H/M/L	Alarm level setting will be applied regardless of ON/OFF setting of "Alarm Judgment" (Menu>Initial Settings>Alarm>During Lead OFF).
<Chk Electrode (xx)>	H/M/L	xx: lead type Alarm level setting will be applied regardless of ON/OFF setting of "Alarm Judgment" (Menu>Initial Settings>Alarm>During Lead OFF).
<ECG Artifact>	N	Noise interference on ECG
<SpO ₂ Check Sensor>	H/M/L	Alarm level setting will be applied.
<SpO ₂ ## Check Sensor>	H/M/L	When SpO ₂ label is used. Alarm level is same as "SpO ₂ Check Sensor".
<SpO ₂ Disconnected>	H/M/L/N	
<CVA Detect>	L	
<Check CO ₂ >	L	
<Check SPIRO>	M	
<Check BIS>	L	
<Uploading>	N	Data Transfer: Uploading transferring data from the bedside monitor to DS-1800.
<Failed to upload.>	N	Data Transfer: Failed to upload transferring data from the bedside monitor to DS-1800.
<Upload Standby>	N	Data Transfer: Uploading of other bed is in progress.
<Transmitting Data>	N	Data Transfer: Transmitting data from the DS-1800 to data server.
<Chk Data Transfer>	N	Data Transfer: Failed to transmit data from the DS-1800 to data server.

NOTE

- ♦ <NIBP meas. failed> alarm will be canceled when [Alarm Silence] key is pressed. Pay attention not to cancel the important alarm.

System Status

Message	Level	Description
Central ID is duplicated. Check PHS comm.MCommunication error with the PHS nurse call system.	M	Central ID is duplicated with other central monitor.
Check PHS call target	N	All the PHS nurse call targets are not functioning.
Check PHS monitor ID	N	Monitor ID is not set for the PHS nurse call system.
Updating PHS room info.	M	Receiving room information from the nurse call system controller.
Check SD Card 1	M	SD card 1 error, or the card cannot be identified.
Check Telemetry Module Comm.	M	Communication error with the telemetry module.
Check Data Server Comm.	N	When a data server is used, communication with the data server fails.
Check EMR comm.	N	When EMR link function is used, communication with the patient data server fails.
Check Patient Server Comm.	N	When "Search ID" is used, communication with the patient data server fails.
Check SNTP Comm.	N	When a SNTP server is used, communication with the SNTP server fails.

Message	Level	Description
Check extended display conn.	N	Serial communication with the extended display unit fails.
DS-1800 Check Unit	L	Communication failure with the charge control part is occurring. Or, the charge control part is outside the operating temperature range.
DS-1800 Failure	H	The control part of the main unit is inoperative.
Speaker Failure	H	The speaker is inoperative.
Charge the battery.	H	Remaining Battery (Less than 20%)
Charge the battery.	M	Remaining Battery (20% to 29%)
Check Backup Battery	N	Backup battery is depleted.
EMR Offline	N	EMR link function is used, and EMR offline is set.
Remove the battery. (temperature)	M	Battery temperature is out of specification range.
Battery Charge Suspended	N	Battery temperature is out of specification range.
Reinstall the battery.	L	Battery Charging Error
Replace the battery.	M	Battery Failure

External Device Alarm

 **CAUTION**

- For the SV-900 ventilator, alarm factor will not be transmitted to the central monitor.

Message	Default Level	Alarm Level Selection	Note
<Ventilator>	H	S H x x x	No transmission of ventilator alarm factor
<VENT_AWP>			
<VENT_MV>			
<VENT_APNEA>			
<VENT_CONT. HP>			
<Upper VENT_FiO ₂ >			
<Lower VENT_FiO ₂ >			
<Upper VENT_CO ₂ >			
<Lower VENT_CO ₂ >			
<Upper VENT_RR>			
<Lower VENT_RR>			
<VENT_PEEP>			
<VENT_COMM>			
<VENT_URGENT>			

Printer Status

Message	Level	Note
Check Printer	N	Printer error is generated.
Check Cassette	N	The printer cassette is open.

Check Paper	N	There is no paper.
Printing in process	N	Printing in process

Messages Displayed inside the Numeric Data Box

HR

Message
<Upper HR Alarm>
<Lower HR Alarm>
<Cannot Analyze>
<Check Electrodes>
<Low Amplitude>
<Noise Interference>

ST

Message
<Lower ST Alarm>
<Upper ST Alarm>

QTc

Message
<QTc prolongation>
<Short QTc>

BP1 to 8

Message
<Lower BP Alarm>
<Upper BP Alarm>

Pulse Rate (BP Source)

Message
<Upper PR Alarm> (BP)
<Lower PR Alarm> (BP)

NIBP

Message
<Upper NIBP Alarm>
<Lower NIBP Alarm>
<Measurement Failed.>

SpO₂/SpCO/SpMet/SpHb/ExtSpO₂

Message
<Upper SpO ₂ Alarm>
<Lower SpO ₂ Alarm>
<Check SpO ₂ Connector>
<Check Sensor Attach.>
<No Pulse Detected>
<Pulse Search>
<Upper SpCO Alarm>
<Upper SpMet Alarm>
<Upper SpHb Alarm>
<Lower SpHb Alarm>
<ExtSpO ₂ Alarm>

 PR-SpO₂

Message
<Upper PR Alarm> (SpO ₂)
<Lower PR Alarm> (SpO ₂)

 TEMP1 to 8

Message
<Upper TEMP Alarm>
<Lower TEMP Alarm>

 Tb

Message
<Lower Tb Alarm>
<Upper Tb Alarm>

 RR (Impedance)

Message
<Apnea Alarm>
<Upper RR Alarm>
<Lower RR Alarm>
<CVA detected>

 RR (Ventilator)

Message
<Apnea Alarm>
<Upper RR Alarm>
<Lower RR Alarm>

RR (Gas)

Message
<Apnea Alarm>
<Upper RR Alarm>
<Lower RR Alarm>

 RR (SpO₂)

Message
<Upper RR Alarm>
<Lower RR Alarm>

 CO₂

Message
<Upper CO ₂ -E Alarm>
<Lower CO ₂ -E Alarm>
<Upper CO ₂ -I Alarm>
<Cal. in progress>
<Cal. Error>
<Sensor Error>
<Warming Up>

 Gas (MGU-800)

Message
<Upper CO ₂ -E Alarm>
<Lower CO ₂ -E Alarm>
<Upper CO ₂ -I Alarm>
<Upper O ₂ -E Alarm>
<Lower O ₂ -E Alarm>
<Upper O ₂ -I Alarm>
<Lower O ₂ -I Alarm>
<Upper N ₂ O-E Alarm>
<Lower N ₂ O-E Alarm>
<Upper N ₂ O-I Alarm>
<Lower N ₂ O-I Alarm>
<Upper AGT-E Alarm>*
<Lower AGT-E Alarm>*
<Upper AGT-I Alarm>*
<Lower AGT-I Alarm>*
<Upper MAC Alarm>
<Upper RR Alarm>
<Lower RR Alarm>
<Apnea Alarm>

*: The selected or detected label will be displayed for the agent label.

SPIRO (MGU-810)

Message
<Check SPIRO function>
<Upper RR Alarm>
<Lower RR Alarm>
<Apnea Alarm>
<Upper MV Alarm>
<Lower MV Alarm>
<Upper PEAK Alarm>
<Lower PEAK Alarm>
<Upper PEEP Alarm>
<Lower PEEP Alarm>

 BIS (When BISx is used)

Message
<Upper BIS Alarm> (Level M)
<Lower BIS Alarm> (Level M)

 SI

Message
<Upper SI Alarm>

 RPP

Message
<Upper RPP Alarm>
<Lower RPP Alarm>

Troubleshooting

This section explains the troubleshooting for each case.

Other than the troubles stated below, troubles of the bedside monitor, telemetry transmitter, or other device can be considered.

Refer also to the operation manual of those devices.

Wired Network (DS-LANIII), TCP/IP Network

Situation	Cause	Solution
The waveforms and numeric data for the wired network beds are not displayed.	The central ID is duplicated.	Make sure to set a unique central ID for each central monitor. (1 to 16) (☞ "Central ID" P5-26)
	The Bed ID of the bedside monitor or LAN-ID of the telemetry receiver is duplicated.	Make sure to set a unique Bed ID for the bedside monitor and LAN-ID for the telemetry receiver.
	The administrator does not exist.	One of the central monitors must have the Central ID, "001" in a network system. (☞ "Central ID" P5-26)
	A HUB not compatible to wired network is used.	For the DS-LANIII network, use the recommended switching HUB. Do not confuse the HUB for DS-LAN and TCP/IP network.
	A central monitor which is not compatible is used.	The following central monitors can not be used with the DS-LANIII network. DS-5700 DS-5800N/NX/NXMB DS-7600/7600W with software version V05 and prior
	DS-LAN Cable (Ethernet branch cable or connection cable) is not correctly connected. Or, the wire is broken.	Check if DS-LAN cable is properly connected. Or, replace the DS-LAN cable.
	The network connecting device is malfunctioning.	Replace the device.
	A monitor with DS-LANII setting is used.	Make sure to set DS-LANIII for all the monitors.

Telemetry

Situation	Cause	Solution
The waveform transmission is often interrupted.	A low battery mark is displayed in the waveform area for the telemetry receiving bed.	Replace the transmitter battery with a new one.
	The patient is located too far from the receiver antenna.	Check the antenna system.
	There is a metallic obstruction (elevator, door, etc.) between the transmitter and receiver.	Try to prevent metallic obstruction between the transmitter and receiver.

Situation	Cause	Solution
A noise is interfering on the waveform, and the waveform suddenly changes.	[OFF] is selected for the AC filter.	Select [ON] for "AC Filter" under [Parameter>ECG]. (☞ "Detail Setup" P8-8)
	The AC filter frequency is not selected correctly.	Set the correct frequency ([50Hz] or [60Hz]) for "AC Filter" . (☞ Maintenance Manual "Other" P5-30)
	[OFF] is selected for the ECG drift filter.	Select [ON] for "ECG Drift Filter" under [Parameter>ECG]. (☞ "Detail Setup" P8-8)
	A transmitter with the same channel ID is used nearby. Or, a transmitter with a channel ID of close frequency is used nearby.	Stop using the other transmitter.
The waveform is not transmitted The waveform is not displayed.	Antenna is disconnected from the telemetry receiver.	Connect the antenna securely.
	The battery is installed with opposite polarity.	Verify the (+) (-) direction of the battery and install correctly.
	The battery of the transmitter is depleted.	Replace the transmitter battery with a new one.
	The channel setup is not correct.	The antenna connection and receiver setup should correspond.
	A transmitter with an interfering channel ID is used nearby.	Use the transmitter with a channel ID that does not interfere.

Bed Register

Situation	Cause	Solution
A bed cannot be selected on the "Bed Register" screen.	The remaining displayable bed is 0.	The maximum numbers of beds that can be registered are 32 beds. (☞ Maintenance Manual "Bed Register" P5-26)
The bed is wired network bed, and the bed ID or channel ID is not displayed.	The wired network setup is incorrect.	Check the wired network connection.
	The central ID, room/bed ID is incorrect.	Check if the Central ID, Room/Bed ID of this device and the monitors connected to the DS-LANIII are not duplicated. If duplicated, set the correct ID.

Alarm

Situation	Cause	Solution
Alarm does not generate.	Alarm is suspended.	Cancel the [Alarm Suspend] under Alarm setup of the Individual Bed Display. (☞ "Alarm Suspend" P7-14)
	Alarm setup for the parameter is set to [OFF].	On the alarm setup menu for the corresponding parameter, set the alarm [ON]. (☞ "Alarm Limit Setup for Each Parameter" P7-4)
	The alarm threshold level is not set for the parameter.	Set the upper/lower alarm threshold level on the alarm setup menu for the corresponding parameter. (☞ "Alarm Limit Setup for Each Parameter" P7-4)

Situation	Cause	Solution
Alarm sound is not generated.	Alarm sound is suspended.	When the alarm sound is suspended on the bedside monitor, the alarm sound will be also suspended on this central monitor. The alarm sound on this central monitor will resume when the alarm sound on the bedside monitor resumes. Whether or not to link the alarm sound suspend function can be set on the "Alarm Setup" under the "Initial Settings" menu. (☞ Maintenance Manual "Alarm" P5-2)
	Alarm is silenced.	Press the [Resume All Al. Sound] key on the alarm setup window of the Individual Bed Display.
Alarm sound is difficult to recognize.	The volume of the alarm sound is too low.	If the alarm volume is set too low, alarm occurrence may not be recognized. On the "Tone/Volume" menu, increase the alarm volume. (☞ "Tone/Volume" P13-33)
Arrhythmia alarm does not generate. Arrhythmia alarm is not displayed.	The arrhythmia alarm is set to [OFF].	On the "Arrhythmia Alarm" screen, select [ON] for the alarm of the corresponding arrhythmia. (☞ "Arrhythmia Alarm Setup" P7-6)
	The precision of arrhythmia detection has decreased.	Perform the arrhythmia learn process. (☞ "To Perform Arrhythmia Learning" P7-7)
	Due to noise and myoelectricity interference, arrhythmia analysis is suspended. When "Suspend Arrhy. Analysis during Noise Interference" is set to [ON] (Initial Settings > Alarm), arrhythmia analysis will be suspended at noise and myoelectricity interference. The <Cannot analyze> message will be displayed when the analysis suspended duration exceeds 30 seconds.	Check the electrode attachment on the bedside monitor or telemetry transmitter, and remove the noise source.
Alarm generated on the bedside monitor can not be silenced or suspended from this device.	[NG] is set for "Alarm Suspend/Alarm Silence from Central Monitor" (Initial Settings > Alarm)	Set to [OK]. (☞ Maintenance Manual "Alarm" P5-2)
HR alarm, PR alarm does not generate. [ON] can not be selected for the alarm setting.	For the DS-7000 series bedside monitors, the alarm for the parameter not selected for the "HR/PR Alarm Source" (ECG/SpO ₂ /BP) on the bedside monitor will be automatically set to OFF on this device.	Setup cannot be performed on the central monitor.
Alarm indicator does not light.	"Pattern Setup" under "Alarm Indicator" (Initial Settings > Alarm) is set to [OFF].	Set the alarm indicator flashing pattern for each alarm level. (Initial Settings > Alarm) (☞ Maintenance Manual "Alarm" P5-2)

Display

Situation	Cause	Solution
A certain parameter cannot be displayed.	The parameter is not set to be displayed on the bedside monitor.	Set the parameter to be displayed on the bedside monitor.
	The parameter is set to [OFF] on the "Parameter ON/OFF" screen.	On the "Parameter ON/OFF" screen, select [ON] for the parameter to be displayed. (☞ "Parameter ON/OFF" P8-31)


Situation	Cause	Solution
Waveform and numeric data for certain bed cannot be displayed.	If using a wired network system, there is no central monitor with the Central ID, "001". Or, the Central ID is duplicated	The central monitor with the central ID: 001 will function as a network-administrating monitor and controls the whole network segment. One of the central monitors must have the Central ID: 001 in a network system. Also, make sure not to duplicate the Central ID with other monitors. (☞ Maintenance Manual "Room ID/Central ID Setup" P2-10)
	Monitoring is suspended for that bed.	Press [Resume] and resume monitoring for that patient.
	Monitoring is suspended on the bedside monitor.	Resume monitoring on the bedside monitor.
	The bed to be displayed is not selected under [Common Setup > Display Config. > Bed Sel.].	Select the bed under [Common Setup > Display Config. > Bed Sel.]. (☞ "Selecting the Displaying Bed" P13-25)
	The waveform/numeric data to be displayed are not selected under [Common Setup > Display Config. > Each Bed].	Select the waveform/numeric data to be displayed. (☞ "Numeric Data/Waveform" P13-27)
	The bedside monitor is not properly connected to the DS-LANIII network.	Connect using the Ethernet branch cable (CJ-522) or LAN interface cable (CJ-530).
	The power is turned OFF on the bedside monitor or telemetry receiver.	Turn ON the power.
	The software version of the telemetry receiver does not correspond.	Refer to your nearest service representative.
The ECG waveform and HR are not displayed.	[BP] is selected for HR alarm source on the DS-7000 series bedside monitor.	Select [HR]/[SpO ₂] for HR alarm source.
The BP numeric data, BP waveform, NIBP numeric data are not displayed.	The BP measurement unit (mmHg/kPa) is different between the bedside monitor and the central monitor.	If the measurement unit is different between the bedside monitor and the central monitor, BP waveform, BP numeric data, NIBP numeric data will not be transmitted from the bedside monitor. It will be treated as not measured data, and will not be displayed on this unit. Set the same unit for bedside monitor and central monitor. (☞ "Unit" P5-8)
The temperature numeric data is not displayed.	The temperature measurement unit (°C/°F) is different between the bedside monitor and the central monitor.	If the temperature measurement unit is different between the bedside monitor and the central monitor, the temperature data will not be transmitted from the bedside monitor. It will be treated as not measured data, and will not be displayed on this unit. Set the same unit for bedside monitor and central monitor. (☞ "Unit" P5-8)


General

Situation	Cause	Solution
The data was initialized when the power was turned ON.	AC power cable is disconnected.	The NIBP list data will be deleted when the AC power cable of this device is disconnected after standby mode. Do not disconnect the AC power cable.
	Internal memory error is generated.	Refer to your nearest service representative.

Situation	Cause	Solution
The data is initialized each time the power is turned ON.	The internal switch is set to initialize.	The internal switch setting needs to be changed. Refer to your nearest service representative.
	The backup battery is depleted.	The long-term backup battery needs to be replaced. Refer to your nearest service representative.
The display is too dark.	The display brightness is not adjusted.	Due to the LCD characteristic, the visible range is limited. Adjust to the appropriate brightness on the "Brightness Setup" screen. (☞ "Brightness" P13-34)
Afterimage appears on the screen.	The same image has been displayed for a long time and caused ghosting of the screen.	By switching to different display, the afterimage will gradually disappear. If not using the system for a long time, turn off the power to prevent ghosting. For details, refer to your nearest service representative.
<Check Backup Battery> is displayed.	The battery for the backup memory is depleted.	The long-term backup battery needs to be replaced. Refer to your nearest service representative.
There is an offset in the touch panel.	Calibration has failed at system startup.	Turn ON the power again without touching any part on the touch panel. If the error persists, refer to your nearest service representative.
The touch panel does not function properly.	A scratch on the touch panel surface or foreign object entering the touch panel junction is causing misdetection of the key area.	The touch panel needs to be replaced. Refer to your nearest service representative.
The date/time is displayed in yellow.	The time synchronization with the SNTP server or patient data server has failed.	Check the connection with the SNTP server or patient data server.
The system does not start although the standby switch is pressed.	Standby switch will not function during the standby state for 6 seconds.	Press the standby switch after 6 seconds of standby state has elapsed.
<Check battery> is displayed.	The communication with the battery is unstable. Or, battery is almost empty.	If the battery level is low, charge the battery. Even if the battery is not in use, the remaining capacity decreases due to self-discharge. If the battery level is sufficient, reinstall the battery. If the situation is none of the above, refer to your nearest service representative.

Recorder

Situation	Cause	Solution
<Check Paper> is displayed.	There is no paper.	Set the paper in the paper holder.
<Check Cassette> is displayed.	The paper holder is open.	Close the cassette until it locks into place with a click sound.
<Check Paper> or <Check Cassette> is not displayed, but printing cannot be performed.	The paper is not correctly set. The front and backside of the paper is set oppositely.	Set the paper in the paper holder so that the logo, FUKUDA DENSHI CO., LTD appears on the upper surface. (☞ "Installing the Recording Paper" P5-2)
Only the ECG waveform is printed.	The waveforms to be printed is not set under [Each Bed Setup > Print].	Set the printing waveforms for manual, alarm, periodic printing for each bed. (☞ "Printing Condition/Output Destination Setup" P12-2)
Printing does not function.	The setting is not properly made under [Initial Settings > External Device > Printer].	Make sure that the selection of [Built-in]/[External] is correct.
	While operating with battery,  is displayed.	Charge the battery or connect the AC power cable to continue printing.

Situation	Cause	Solution
Alarm printing does not function.	The alarm printing mode is set to [OFF].	Select [ON] for "Alarm Printing" under [Each Bed Setup > Print]. Also, set the printing waveforms and alarm factors. (☞ "Alarm Printing Setup" P12-3)
	Alarm setup for the parameter is set to [OFF].	On the alarm setup menu for the corresponding parameter, set the alarm [ON]. Also, set the upper and lower alarm limit. (☞ "Alarm Limit Setup for Each Parameter" P7-4)
Periodic printing does not function.	The periodic printing mode is set to [OFF].	Select [Printer] or [Recall] for "Periodic Printing" under [Each Bed Setup > Print]. Also, set the printing waveforms and periodic interval/timer. (☞ "Periodic Printing Setup" P12-5)
Telemetry remote printing does not function.	The Event button on the transmitter is not pressed long enough to transmit the signal to this device.	Press the Event button for more than 3 seconds.
	The telemetry remote printing function is set to [OFF].	Select [ON] for "LX Remote Printing" under [Initial Settings > User I/F > Display/Print]. (☞ Maintenance Manual "Display/Print" P5-11)
Remote printing does not function.	Recorder is connected to the bedside monitor.	Perform the printing on the bedside monitor. If a recorder is connected to the bedside monitor, remote printing will not function.
<Check Printer> is displayed.	The thermal head temperature has increased.	Damage to the thermal head can be considered. Refer to your nearest service representative.
<Low Battery> is displayed and printing has stopped.	While operating with battery,  is displayed.	Charge the battery or connect the AC power cable to continue printing.

Laser Printer

Situation	Cause	Solution
The data is not output to the laser printer.	The paper cassette is not firmly closed.	Close the paper cassette.
	The paper cassette is empty.	Install the paper in to the paper cassette.
	Printer cable is disconnected.	Connect the printer cable.
	The printer is in offline mode.	Set the printer to online mode.
	HUB failure has occurred.	Check the LED on the HUB if it is properly communicating. If the LED is off, refer to your nearest service representative.
	Other monitor is in process of printing.	Suspend the ongoing printing or wait until the printing is complete.
	The network setup for the laser printer is not performed.	Refer to your nearest service representative.
	The MAC address, IP address setting of the printer is incorrect.	Set the correct MAC address, IP address and restart the printer.
The data cannot be output to the printer.	The network board of the laser printer is malfunctioning.	Check if any error message or error code is displayed on the printer LCD. If displayed, refer to your nearest service representative.
	Printer cable is disconnected.	Connect the printer cable.
	The printer is in offline mode.	Set the printer to online mode.
	Printer is in sleep mode.	Change the printer setting so that it will not enter into sleep mode.

Situation	Cause	Solution
Printer output does not stop.	Printing operation was performed too frequently.	Wait until the printing is complete. Or, deleted the stacked data. Do not turn off the power of the printer during printing as it may cause a printing error.
The printed output is incomplete or frame only.	The printer cover or paper cassette was opened during printing, or the printer was left out of paper for a certain time.	Do not open the cover or paper cassette during printing. Also, supply new pad of paper immediately when the paper is out.
	The system was restarted during printing.	Do not restart the system during printing.
Printer output is garbled.	The power of the printer was reset during printing.	Do not power cycle the printer while the printing is in process.
The [Print] key does not function.	The stacked data has reached the maximum quantity (64).	Wait until the quantity of stacked data decreases. Or, press [Cancel Printing] displayed at the lower part of the home display to delete the stacked data. (☞ "Laser Printer Operation" P12-15)

SD Card

Situation	Cause	Solution
<Card is not inserted> or <Check SD Card> is displayed on [Maintenance > Memory Media > SD Card].	SD card is not inserted or not correctly set in the SD card slot.	Set the card correctly in the card slot.
Formatting of the SD card has failed.	SD card is not correctly set in the SD card slot.	Set the card correctly in the card slot.
	Unspecified card is used.	Use the specified SD card.
	The card is defective.	Use a new card.

USB Memory

Situation	Cause	Solution
<Error reading from card.> or <Error writing to card.> is displayed on the "Data Transfer" screen.	Error is detected during read/write process.	If the error has been detected during writing, try again. If the error has been detected during reading, data might not be correctly written on the USB memory. Format the USB memory again and try the write/read process again.
	The USB memory is not properly inserted.	Remove the USB memory and insert it again properly.
	Unspecified USB memory is used.	Use the specified USB memory.
The data cannot be transferred. The key on the "Data Transfer" screen cannot be pressed.	Unspecified USB memory is used.	Use the specified USB memory.
	USB Memory is defective.	Replace with a new USB memory.

Remote Control

Situation	Cause	Solution
The remote control does not function.	The remote control bed ID is not correct.	Set the correct remote control ID. (☞ Maintenance Manual "Remote Control Setup" P1-7)
	The remote control room ID is not correct.	Set the correct remote control ID. (☞ Maintenance Manual "Remote Control Setup" P1-7)

Magnetic Card Reader/Barcode Reader

Situation	Cause	Solution
The magnetic card reader or barcode reader does not function.	The conversion cable (CJ-756) is not connected.	If the magnetic card reader or barcode reader is connected directly to the serial connector on this device, it will not function. Make sure to use the conversion cable. (☞ Maintenance Manual "Using the Magnetic Card Reader" P4-16) (☞ Maintenance Manual "Using the Barcode Reader" P4-18)

PHS Nurse Call System

Situation	Cause	Solution
<Check PHS comm.> is displayed. Or, <Failed> is displayed as a result of Nurse Call Daily Check.	Communication error with nurse call system.	Check the connection with the nurse call system. (☞ Maintenance Manual "Connecting the Nurse Call System" P4-7)
On [Function > Nurse Call Daily Check], the check key is lit in blue and other check keys do not function.	The check key lit in blue is in process of nurse call.	The key will remain blue until the nurse call connection is verified at the call target (base station, PHS, etc.). Verify the connection at the call target.
<Check PHS call target> is displayed.	All the PHS nurse call targets (base station, PHS, etc.) are not functioning.	Check the power and connection of the nurse call targets (base station, PHS, etc.).
<Check PHS monitor ID> is displayed.	[0] is set for "Monitor ID" under [Initial Settings > External Device > Serial Comm. > Nurse Call].	Set the "Monitor ID" in the range from 1 to 99 which does not duplicate with other central monitors. (☞ Maintenance Manual "Nurse Call Detail Setup" P4-8)

EMR Link Function

Situation	Cause	Solution
<Check EMR comm.> is displayed. <Check Data Server Comm> is displayed.	Communication failure between the DS-1800 System and the patient data server is occurring.	Make sure the DS-1800 System, patient data server, EMR machine is connected properly.
	The network setup is incorrect.	Set the correct IP address and port number under [Initial Settings > External Device > Network]. (☞ Maintenance Manual "Patient Data Server" P2-20)
	The patient data server is down.	Check if the patient data server is properly operating. If not, refer to the operation manual of the patient data server.
	The connection cable is disconnected.	Check if the DS-1800 System, patient data server, EMR machine is connected properly. If not, connect them properly.
	The protocol of data server setting on this device does not correspond with the setting on the data server.	Check if protocol of data server setting on this device corresponds with the setting on the data server. If not corresponded, set it correctly.

Data Transfer

Situation	Cause	Solution
<Failed to upload.> is displayed.	DS-LAN communication error has occurred during uploading.	While uploading, do not turn OFF the power of the central monitor, host monitor, and transport monitor. Select the data to upload under [Data Review > Past Data > Transport Monitor], and upload the data again. Press the [Alarm Silence] key on the individual bed display to clear the message.
<Chk Data Transfer> is displayed.	The network setup is incorrect.	Set the correct IP address and port number under [Initial Settings > External Device > Network]. Select the data to upload under [Data Review > Past Data > Transport Monitor], and upload the data again.
	The data server is down.	Check if the data server is properly operating. If not, refer to the operation manual of the data server. Select the data to upload under [Data Review > Past Data > Transport Monitor] of the individual bed menu, and upload the data again.
	The connection cable is disconnected.	Check if the DS-1800 System, data server is connected properly. If not, connect them properly. Select the data to upload under [Data Review > Past Data > Transport Monitor] of the individual bed menu, and upload the data again.

Mouse/Keyboard

Situation	Cause	Solution
The mouse pointer does not move.	A mouse other than recommended is used.	If a mouse other than recommended is used, it may not function or may suddenly stop functioning. Use the recommended mouse.
	The keyboard and mouse are not properly connected.	Properly connect the keyboard and mouse to the corresponding connectors.
The mouse stopped functioning.	The mouse is not recognizing the control signal from the DS-1800 System.	Press the [Home] key on the touch panel. (The mouse control signal from this device will reset.) If the mouse still does not function, the mouse connector may be disconnected. Securely plug in the connector again.
The keyboard is not functioning.	A keyboard other than recommended is used.	If a keyboard other than recommended is used, it may not function or may suddenly stop functioning. Use the recommended keyboard.
	The keyboard and mouse are not properly connected.	Properly connect the keyboard and mouse to the corresponding connectors.
	The keyboard is disconnected.	Connect the keyboard. If it does not function within 30 seconds, securely plug in the connector again.

Slave Monitor

Situation	Cause	Solution
Nothing is displayed on the slave monitor, or the display flickers.	The display resolution does not satisfy the specification.	Use a slave monitor with resolution of Full HD (1920dot x 1080dot). Do not use any monitors which has the function to display higher resolution than the actual resolution.
	Synchronization has failed.	Use the monitor which satisfies the following horizontal/vertical frequency. Horizontal Frequency: 67.5 kHz, Vertical Frequency: 60 Hz For the compatible slave monitor, refer to your nearest service representative.
	The connection cable is disconnected.	Securely connect the cable to the external monitor connector on the DS-1800 System and the other end to the connector on the slave monitor.

Bed Transfer/Exchange

Situation	Cause	Solution
The central monitor for the new bed is not displayed for "Other Unit".	The connection cable is disconnected.	Check if the DS-1800 System for transferring the data (original and new) is properly connected.
	The network setup is incorrect.	Set the correct IP address and port number under [Initial Settings > External Device > Network].
	The server does not exist within the network for central monitor communication.	Assign one central monitor within the network to [Server] under [Initial Settings > External Device > Network > Central Monitor Comm.]

Situation	Cause	Solution
<TCP/IP network is disconnected. (Central Monitor Communication Error)> is displayed.	The connection cable for the central monitor assigned as server is disconnected.	Check if the DS-1800 System for transferring the data (original and new) is properly connected.
	The network setup is incorrect.	Set the correct IP address and port number under [Initial Settings > External Device > Network].
	The server does not exist within the network for central monitor communication.	Assign one central monitor within the network to [Server] under [Initial Settings > External Device > Network > Central Monitor Comm.]
<TCP/IP network is disconnected. (Bed exchange data communication error.)> is displayed.	The connection cable is disconnected.	Check if the DS-1800 System for transferring the data (original and new) is properly connected.

Extended Display Unit

Situation	Cause	Solution
Nothing is displayed on the extended display unit.	The connection cable is disconnected.	Connect this device and the extended display unit with display unit connection cable.
	AC power is not supplied to the extended display unit.	Check the connection of AC adapter and power supply cable of the extended display unit.
	[OFF] is selected for "Extended Display Unit Usage" under [Initial Settings > External Device > Extended Display].	Select [ON] for "Extended Display Unit Usage" under [Initial Settings > External Device > Extended Display]. (☞ Maintenance Manual "Setup" P1-10)
	32 beds display mode is used.	When 32 beds display mode is used, monitoring on the extended display unit cannot be performed.
<Check extended display conn.> is displayed.	The connection cable is disconnected.	Connect the CJ-726 relay cable properly to the COM-A connector of the DS-1800 and the serial connector of the extended display unit.
The touch panel of the extended display unit does not function.	The connection cable is disconnected.	Connect the CJ-726 relay cable properly to the COM-A connector of the DS-1800 and the serial connector of the extended display unit.

Chapter 15 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.

REFERENCE

- ♦ The <Setting at Discharge> column indicates the following status.
 - ♦ <No Change> : Settings will be retained even after the patient is discharged.
 - ♦ <Default>: Settings will be initialized to factory default settings when the patient is discharged.
 - ♦ <Admit Setup>: Settings will be changed to the settings made for "Admit Setup" under "Pre-Set Menu" when the patient is discharged.
 - ♦ <-> or item without <Setting at Discharge>: These items are not the setting for each patient and will not be affected by the discharge process.

Patient Admit/Discharge

Item	Description	Default	Setting at Discharge
ID	Numeric, Alphabet, Symbol (20 characters)	Blank	Default
Patient Name	Numeric, Alphabet, Symbol (16 characters)	Blank	Default
Birth Date	Birth Date	Blank	Default
Age	0 to 150 years or 0 to 999 days	0 year	Default
Height	0 to 118.1	0.0 inch	Default
Weight	0 to 771.6	0.0 lb	Default
BSA	0 to 9.99	0.0m ²	Default
Admit Date	Blank	Blank	Default
Bed Name	The set bed name will be displayed, or <Bed name unselected> will be displayed.	No selection	Default
Patient Classification	Adult, Child, Neonate	Adult	No Change
Sex	Male, Female	No selection	Default
Nurse Team	Red, Orange, Yellow, Yellow-green, Green, Light Blue, Blue, Purple (Colored Block)	Not registered.	Default
Pacemaker	Used, Not Used	Not Used	Default

Alarm Setup

Item	Description	Default	Setting at Discharge
System Alarm	Suspend, ON	Suspend	-
Each Parameter	Refer to "Admit Setup" under "Initial Settings" on Chapter 8 "Setup Item/Default Value" of Maintenance Manual.		Admit Setup

Parameter Setup

For the items which synchronizes within the same wired network, "Setting at Discharge" will be according to the setting made on the connected bedside monitor.

Refer following for the synchronizing setting items.

☞ Maintenance Manual "Setup Item Synchronizing within the Same Wired Network" P2-2

ECG

Item	Description	Default	Setting at Discharge
Leads	I, II, III, aVR, aVL, aVF, V, V1 to V6	ECG1: II ECG2: I ECG3: III ECG4: aVR ECG5: aVL ECG6: aVF ECG7: V1 ECG8: V2 ECG9: V3 ECG10: V4 ECG11: V5 ECG12: V6	Default
Waveform Size	Auto, x1/4, x1/2, x1, x2, x4	ECG1 to ECG12: x1	Default
Filter Mode (Display Only)	Monitor, Diagnosis, ESIS	Monitor	No Change
Synchronized Mark/Tone	ECG, SpO ₂ , SpO ₂ -2, BP	ECG	No Change
Pacemaker	*Same with "Patient Admit/Discharge" section.		
Pacemaker Pulse	ON, OFF, Distinct Color	Distinct Color	No Change
Pace Pulse Mask Time	Auto, 10 ms, 20 ms, 40 ms, OFF	40 ms	No Change
QRS Detect	ECG1, ECG1+2	ECG1+2	No Change
Drift Filter	ON, OFF	ON	No Change
AC Filter	ON, OFF	ON	No Change
Auto Lead	ON, OFF	OFF	No Change
ST/VPC/Arrhy. Alarm Display	ON, OFF	ON	No Change
HR Delay	ON, OFF	ON	No Change

RESP

Item	Description	Default	Setting at Discharge
Waveform Size	x1/4, x1/2, x1, x2, x4	x1	Default
RR Synchronized Mark	ON, OFF	ON	No Change
RR/APNEA Alarm Source	Auto, Impedance, Vent., CO ₂ /GAS, SpO ₂	Impedance	No Change
CVA Detect	ON, OFF	OFF	Default

SpO₂

Item	Description	Default	Setting at Discharge
Waveform Size	x1/4, x1/2, x1, x2, x4	x1	Default
Synchronized Mark/Tone	*Same with ECG setting.		
Perfusion Index	ON, OFF	ON	No Change

NIBP

Item	Description	Default	Setting at Discharge
NIBP Periodic Measurement	OFF, Interval, Timer	OFF	Default
Measurement Interval	2 min, 2.5 min, 3 min, 5 min, 10 min, 15 min, 20 min, 30 min, 60 min, 120 min	120 min.	No Change
Timer	00:00 to 23:00	No Selection	No Change
Patient Classification	*Same with "Patient Admit/Discharge" section.		
PR Display	ON, OFF	OFF	No Change
Mean	ON, OFF	ON	No Change
Time Display	Elapsed, Meas.	Elapsed Time	No Change

 BP1 to BP8

Item	Description	Default	Setting at Discharge
Scale*	20, 50, 75, 100, 150, 200, 250, 300 mmHg	200 mmHg	Default
	4, 8, 12, 16, 20, 24, 32, 40 kPa	24 kPa	
Synchronized Mark/Tone	*Same with ECG setting.		
Display Type	S/M/D, S/D, M	S/M/D	No Change

*: The scale selection will differ depending on the label.

 TEMP1 to TEMP8

Item	Description	Default	Setting at Discharge
Label	T*, Tsk, Tre, Tes, Tco, User 1 to User 7	T* (T1 to T8)	No Change

 CO₂

Item	Description	Default	Setting at Discharge
Unit	mmHg, kPa, %	mmHg	No Change
Scale	0-50, 0-100 mmHg	0-50 mmHg	Default
	0-4, 0-8, 0-10 kPa	0-4 kPa	
	0-4, 0-8, 0-10%	0-4%	

 Ventilator

Item	Description	Default	Setting at Discharge
AWP Scale	10, 20, 30, 50, 120 cmH ₂ O	50 cmH ₂ O	Default
AWF Scale	±5, ±10, ±20, ±50, ±180 L/min	±50 L/min	
AWV Scale	50, 250, 500, 1000, 3000 mL	500 mL	

Multigas Concentration

Item	Description	Default	Setting at Discharge
CO ₂ Scale	0-50, 0-100 mmHg	0-50 mmHg	Default
	0-4, 0-8, 0-10 kPa	0-4 kPa	
	0-4, 0-8, 0-10%	0-4%	
GAS_O ₂ Scale	18-30, 18-60, 18-100, 0-30, 0-60, 0-100%	18-30%	Default
GAS_AGT Scale	0-4, 0-8, 0-16%	0-4%	Default
AWP Scale	10, 20, 30, 50, 120 cmH ₂ O	50 cmH ₂ O	Default
AWF Scale	±5, ±10, ±20, ±50, ±180 L/min	±50 L/min	
AWV Scale	50, 250, 500, 1000, 3000 mL	500 mL	
Wave Clip	ON, OFF	ON	No Change

 SI

Item	Description	Default	Setting at Discharge
HR/PR	ECG, SpO ₂ , SpO ₂ -2, BP	ECG	Default
BP_S	NIBP, BP	NIBP	

 RPP


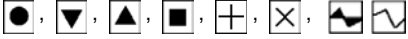


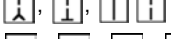




Item	Description	Default	Setting at Discharge
HR/PR	ECG, SpO ₂ , SpO ₂ -2, BP	ECG	Default
BP_S	NIBP, BP	NIBP	

 Scoring












Item	Description	Default	Setting at Discharge
Score Calculation			No Change
Parameter Selection	Supp.O ₂ , SpO ₂ , RR, LOC, GCS, JCS, TEMP, Urine Out., NIBP-S, HR/PR, Sixth Sense, Age, Blood Glucose, Weight, Pain (NRS), Pain (FPS), OFF	NIBP-S, HR/PR, TEMP, SpO ₂ , RR, Supp.O ₂ , LOC	
Source Select			
HR/PR	HR, PR_IBP, PR_SpO ₂	HR	
RR	IMP, SpO ₂ , VENT, CO ₂ , Manual Input	IMP	
BP	BP1 to BP8, NIBP	NIBP	
TEMP	T1 to T8, Manual Input	T1	
Update Setup	Timer, Manual, OFF	OFF	
Score Setup			
Score Mode	EWS1, EWS2, qSOFA, NEWS2	EWS1	
Score Mode General Setup			
Score Threshold	Level 0 to 3: 0-27	Level 0: 0 Level 1: 1-4 Level 2: 5-6 Level 3: 7-21	
Interval until Next Check	Level 0 to 3: OFF, 00:01 to 24:00	Level 0 to 3: OFF	

Review Function

Graphic Trend

Item	Description	Default	Setting at Discharge	
Trend A	(H Module) HR, ST1, ST2, ST(I-V6), SpO ₂ , SpO ₂ -2, PR_ SpO ₂ , PR_ SpO ₂ -2, VPC, VPC_HOUR, ΔST1, ΔST2, ΔST(I-V6), QTc1, QTc2, Qtc (I-V6), AFib, AFib 1h, AFib 24h, NIBP, BP1-BP8, PR_IBP, PDP, CPP, T1-T8, SI, RPP, Tb, RR_IMP, APNEA, EtCO ₂ , InspCO ₂ , RR_GAS, ExpN ₂ O, InspN ₂ O, ExpAGT, InspAGT, MAC, RR_VENT, ExpO ₂ , InspO ₂ , PI, PI-2, PVI, PVI-2, SpCO, SpCO-2, SpMet, SpMet-2, SpHb, SpHb-2, PEAK, PEEP, ExpMV	Upper Row: HR, OFF, OFF, NIBP Middle Row: SpO ₂ , OFF, T1, RR_IMP Lower Row: OFF, OFF, OFF, OFF	No Change	
Trend B	(Vigilance) SvO ₂ , ScvO ₂ , CCO, CCI, BT(Other) BIS, Lt-rSO ₂ , Rt-rSO ₂ , S1-rSO ₂ , S2-rSO ₂	Upper Row: HR, BP1, T1, NIBP Middle Row: SpO ₂ , EtCO ₂ , ST (II), RR_GAS Lower Row: OFF, OFF, OFF, OFF	No Change	
Trend C	(Vigilance) SvO ₂ , ScvO ₂ , CCO, CCI, BT(Other) BIS, Lt-rSO ₂ , Rt-rSO ₂ , S1-rSO ₂ , S2-rSO ₂	Upper Row: HR, T1, BP1, NIBP Middle Row: SpO ₂ , InspCO ₂ , EtCO ₂ , InspAGT Lower Row: OFF, OFF, OFF, OFF	No Change	
Trend D		Upper Row: OFF, OFF, OFF, OFF Middle Row: OFF, OFF, OFF, OFF Lower Row: OFF, OFF, OFF, OFF	No Change	
Trend Data Setup	OFF (H Module) HR, VPC, VPC_HOUR, ST1, ST2, ST(I)-ST(V6), ΔST1, ΔST2, ST(I-V6), QTc1, QTc2, QTc (I-V6), AFib, AFib 1h, AFib 24h, SpO ₂ , PR_ SpO ₂ , SpO ₂ _2, PR_ SpO ₂ -2, BP1-S-BP8-S, BP1-D-BP8-D, BP1-M-BP8-M, NIBP-S-NIBP-M, PR_IBP, CPP, PDP, PAWP, T1-T8, SI, RPP, Tb, PI, PI-2, PVI, PVI-2, SpCO, SpCO_2, SpMet, SpMet_2, SpHb, SpHb_2, EtCO ₂ , InspCO ₂ , APNEA, RR_IMP, RR_GAS, RR_VENT, RR_SpO ₂ , O ₂ -E, O ₂ -I, N ₂ O-E, N ₂ O-I, AGT-E, AGT-I, AGT2-E, AGT2-I, E-TV, I-TV, E-MV, P-PEAK, PEEP, P-MEAN (Vigilance) SvO ₂ , ScvO ₂ , SaO ₂ , O ₂ EI, 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, ESV, ESVI, CFI, iCO, iCI, iSV, iSVI, iSVR, iSVRI, GEDV, GEDI, GEF, EVLW, ELWI, PVPI, ITBV, ITBI, VO ₂ e, VO ₂ l, VO ₂ le, iB-Temp, SQI, MAP, CVP, HR, PR, SpO ₂ , iMAP, iCVP, iAvgPR, DO ₂ l, HGB, dPmx, CO CAL (Ventilator) E-TV, I-TV, E-MV, I-MV, SMV, P-PEAK, P-PAUSE, PEEP, P-MEAN, P-MIN, E-RES, I-RES, FiO ₂ , D-COMP, S-COMP, I:E, S_RR, VTCO ₂ , etCO ₂ , VCOv, Flowee, Ti, Ti/Ttot, PEEPtot, Elastance, D-Chara. , Leakage, S-Mve/Mve, Tc, WOBvent, WOBpat, CPAP, P 0.1, Edipeak, Edimin, SBI, VT/PBW (Anesthesia) Sup.Air, Sup.O ₂ , Sup.N ₂ O (Other) BIS, SQI, EMG, SR, Lt-rSO ₂ , Rt-rSO ₂ , S1-rSO ₂ , S2-rSO ₂ , tcpO ₂ , tcpCO ₂		No Change	
Graphic Display		A:  B:  C:  D:  E:  F: 		
Scale, Display Selection	HR, PR_ SpO ₂ , PR_IBP	100, 200, 300 bpm (Graphic A)	300 bpm 	No Change
	ST1, ST2, ST (I-V6) ΔST1, ΔST2, ΔST(I-V6)	±0.2, ±0.5, ±1.0, ±2.0 mV ±2.0, ±5.0, ±10.0, ±20.0 mm (Graphic B)	±0.5 mV  ±5.0 mm 	No Change

Item	Description	Default	Setting at Discharge
QTc1, QTc2, QTc (I-V6)	0-800, 200-800 ms (Graphic A)	200-800 ms	No Change
AFib, AFib 1h, AFib 24h	0-100, 50-100% (Graphic A)	0-100%	No Change
VPC, VPC_HOUR	20, 50, 100 beats (Graphic C)	20 beats	No Change
BP1 to BP8 (S/D/M)	20, 50, 100, 150, 200, 300 mmHg 4, 8, 16, 20, 24, 40 kPa (Graphic D)	200 mmHg 24 kPa	No Change
PDP, CPP	20, 50, 100, 150, 200, 300 mmHg 4, 8, 16, 20, 24, 40 kPa (Graphic A)	200 mmHg 24 kPa	No Change
NIBP (S/D/M)	100, 150, 200, 300 mmHg 16, 20, 24, 40 kPa (Graphic E)	200 mmHg 24 kPa	No Change
T1 to T8	20.0-45.0, 30.0-40.0°C (Graphic A)	30.0°C to 40.0°C	No Change
SpO ₂ , SpO ₂ -2	0-100, 50-100, 80-100% (Graphic A)	80-100%	No Change
SpCO, SpCO-2	20, 40, 100% (Graphic A)	20%	No Change
SpMet, SpMet-2	10, 15, 100% (Graphic A)	10%	No Change
SpHb, SpHb-2	10.0-20.0, 0-25.0 g/dL (Graphic A)	10.0-20.0 g/dL	No Change
PI, PI-2	10, 20% (Graphic A)	10%	No Change
PVI, PVI-2	30, 60, 100% (Graphic A)	30%	No Change
RR_IMP, RR_VENT, RR_GAS, RR_SpO ₂	50, 100, 150 Bpm (Graphic A)	50 Bpm	No Change
Apnea	15, 30 sec. (Graphic C)	15 sec.	No Change
EtCO ₂ , InspCO ₂	50, 100 mHg 4.0, 8.0, 10.0 kPa 4.0, 8.0, 10.0% (Graphic A)	50 mmHg, 4.0 kPa, 4.0%	No Change
ExpO ₂ , InspO ₂	50, 100% (Graphic A)	100%	No Change
ExpN ₂ O, InspN ₂ O	50, 100% (Graphic A)	100%	No Change
ExpAGT, InspAGT	4.0, 8.0, 10.0% (Graphic A)	8.0%	No Change
SvO ₂ , ScvO ₂	0-100, 50-100, 80-100% (Graphic A)	0-100%	No Change
CCO	6.0, 12.0, 20.0 L/min (Graphic A)	6.0 L/min	No Change
CCI	6.0, 12.0, 20.0 L/min/m ² (Graphic A)	6.0 L/min/m ²	No Change
BT	20.0-45.0, 30.0-40.0°C (Graphic A)	20.0-45.0°C	No Change

Item	Description	Default	Setting at Discharge	
	BIS	25, 50, 75, 100 (Graphic A)	100 	No Change
	MAC	5.0, 10.0% (Graphic A)	5.0% 	No Change
	PEAK	10, 20, 50, 100 cmH ₂ O (Graphic A)	20 cmH ₂ O 	No Change
	PEEP	10, 20, 50, 100 cmH ₂ O (Graphic A)	20 cmH ₂ O 	No Change
	ExpMV	6.0, 12.0, 20.0 L/min (Graphic A)	12.0 L/min 	No Change
	Lt-rSO ₂	20-100 (Graphic A)	20-100 	No Change
	Rt-rSO ₂	20-100 (Graphic A)	20-100 	No Change
	S1-rSO ₂	20-100 (Graphic A)	20-100 	No Change
	S2-rSO ₂	20-100 (Graphic A)	20-100 	No Change
	SI	2.0, 3.0 (Graphic F)	2.0 	No Change
	RPP	0-300, 50-200 (Graphic F)	50-200 	No Change
Alarm Display Selection	<p>Arrhythmia: Asystole, VF, VT, Ext_Tachy, Ext_Brady, Slow VT, Tachy, Brady, Run, Pause, Triplet, Couplet, R on T, Multiform, Vent Rhtm, Bigeminy, Trigeminy, Frequent, SVT, Afib, Ireg RR, Prolong RR, S Frequent, S Couplet, VPC, SVPC, Not Capt, Not Pacing</p> <p>Numeric Data: HR, ST, ΔST, QTc, NIBP, RR, APNEA, SpO₂, PR, SpCO, SpMet, SpHb, SpO₂-2, PR-2, SpCO-2, SpMet-2, SpHb-2, PR_IBP, BP1-BP8, T1-T8, Tb, CO₂, O₂, N₂O, Agent, MAC, MV, PEAK, PEEP, SI, RPP</p>	All ON	No Change	

Tabular Trend

Item	Description	Default	At Discharge
Display Time Interval	10 sec, 30s ec, 1 min, 2 min, 2.5 min, 5 min, 10 min, 15 min, 30 min, 60 min, NIBP	5 min.	No Change
Group	A to F	A	No Change
Fixed Parameters	0 to 6 param.	0 param.	No Change

Item	Description	Default	At Discharge
Parameter Selection Trend Data Setup	OFF (H Module) HR, VPC, VPC_HOUR, ST1, ST2, ST(I)-ST(V6), ΔST1, ΔST2, ST(I-V6), QTc1, QTc2, QTc (I-V6), AFib, SpO ₂ , PR_SpO ₂ , SpO ₂₋₂ , PR_SpO ₂₋₂ , BP1-S-BP8-S, BP1-D-BP8-D, BP1-M-BP8-M, NIBP-S-NIBP-M, PR_IBP, CPP, PDP, PAWP, T1 to T8, Tb, PI, PI-2, PVI, PVI-2, SpCO, SpCO ₂ , SpMet, SpMet ₂ , SpHb, SpHb ₂ , EtCO ₂ , InspCO ₂ , APNEA, RR_IMP, RR_GAS, RR_VENT, RR_SpO ₂ , O ₂ -E, O ₂ -I, N ₂ O-E, N ₂ O-I, AGT-E, AGT-I, AGT2-E, AGT2-I, E-TV, I-TV, E-MV, P-PEAK, PEEP, P-MEAN (Vigilance) SvO ₂ , ScvO ₂ , SaO ₂ , O ₂ EI, B-Temp, SI, RPP, 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, ESV, ESVI, CFI, iCO, iCI, iSV, iSVI, iSVR, iSVRI, GEDV, GEDI, GEF, EVLW, ELWI, PVPI, ITBV, ITBI, VO ₂ e, VO ₂ l, VO ₂ le, iB-Temp, SQI, MAP, CVP, HR, PR, SpO ₂ , iMAP, iCVP, iAvgPR, DO ₂ l, HGB, dPmx, CO CAL (Ventilator) E-TV, I-TV, E-MV, I-MV, SMV, P-PEAK, P-PAUSE, PEEP, P-MEAN, P-MIN, E-RES, I-RES, FiO ₂ , D-COMP, S-COMP, I:E, S_RR, VTCO ₂ , etCO ₂ , VCOv, Flowee, Ti, Ti/Ttot, PEEPtot, Elastance, D-Chara., Leakage, S-Mve/Mve, Tc, WOBvent, WOBpat, CPAP, P 0.1, Edipeak, Edimin, SBI, VT/PBW (Anesthesia) Sup.Air, Sup.O ₂ , Sup.N ₂ O (Other) BIS, SQI, EMG, SR, Lt-rSO ₂ , Rt-rSO ₂ , S1-rSO ₂ , S2-rSO ₂ , tcpO ₂ , tcpCO ₂		
	Group A	HR, VPC, ST1, ST2, 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	No Change
	Group B	HR, VPC, ST(I), ST(II), ST(III), ST(aVR), ST(aVL), ST(aVF), ST(V1), ST(V2), ST(V3), ST(V4), ST(V5), ST(V6)	No Change
	Group C	HR, RR_IMP, RR_GAS, RR_VENT, SpO ₂ , P-PEAK, P-MEAN, PEEP, E-TV, I-TV, MV, O ₂ -I, EtCO ₂ , APNEA	No Change
	Group D	SvO ₂ , CCO, CCI, B-TEMP	No Change
	Group E	BIS, SQI, EMG, SR	No Change
	Group F	HR, SpO ₂ , NIBP-S, NIBP-D, NIBP-M, BP1-S, BP1-D, BP1-M, RR_GAS, EtCO ₂ , O ₂ -I, AGT-I	No Change

Recall

Item	Description	Default	Setting at Discharge
Waveform	OFF, ECG1, ECG2, BP1 to BP8, SpO ₂ , SpO ₂₋₂ , CO ₂ , Alarm	Wave 1: ECG1 Wave 2: OFF	No Change
Recall Factor, Display Selection	Asystole, VF, VT, Ext_Tachy, Ext_Brady, Slow VT, Tachy, Brady, Run, Pause, Triplet, Couplet, R on T, Multiform, Vent Rhtm, Bigeminy, Trigeminy, Frequent, SVT, AFib, Ireg RR, Prolong RR, S Frequent, S Couplet, VPC, SVPC, Not Capt, Not Pacing, HR, ST, ΔST, QTc, NIBP, RR, APNEA, SpO ₂ , PR, SpCO, SpMet, SpHb, SpO ₂₋₂ , PR-2, SpCO-2, SpMet-2, SpHb-2, PR_IBP, BP1-BP8, T1-T8, Tb, CO ₂ , O ₂ , N ₂ O, AGENT, MAC, MV, PEAK, PEEP, SI, RPP, Ventilator, Caliper	Select All	No Change
List	18 waves	18 waves	No Change

ODI

Item		Description	Default	Setting at Discharge
ODI Setup	Drop Level	1-10%	3%	No Change
	Upper Limit of Drop Duration	1 sec. to 300 sec.	180 sec.	No Change
	Rising Level after Drop	1-10%	1%	No Change
	Upper Limit of Rise Duration	1 sec. to 300 sec.	60 sec.	No Change
	ODI Color Setup	1 to 200 times/hour	15 times/hour	No Change
ODI Range Setup	Drop Level	1-10%	3%	No Change
	Upper Limit of Drop Duration	1 sec. to 300 sec.	180 sec.	No Change
	Rising Level after Drop	1-10%	1%	No Change
	Upper Limit of Rise Duration	1 sec. to 300 sec.	60 sec.	No Change

 Alarm History

Item		Description	Default	Setting at Discharge
Display Selection	Alarm Level	S, H, M, L, N	Select All	No Change
	Alarm Type	Numeric Data, Arrhy., Equip. Status, Admit/Disch., Other	Select All	No Change

 ST Measurement

Item		Description	Default	Setting at Discharge
Numeric Data Display		Absolute Value, Relative Value	Absolute Value	No Change
J Point Setup		Manual, Auto	Manual	No Change
Measurement Point Setup		From J, From R	From R	No Change
J Point		0 ms to 560 ms (10 ms increments)	60 ms	No Change
Measurement Point		0 ms to 560 ms	120 ms	No Change
Reference Point		0 ms to -240 ms	-80 ms	No Change
ST Waveform Size		x1/4, x1/2, x1, x2, x4	x1	No Change
ST Waveform Interval		5 min, 10 min, 20 min, 30 min, 60 min	5 min.	No Change
Reference Waveform		ON, OFF	OFF	No Change
Displaying Leads		Standard 12-lead, Cabrera, Anteroseptal Infarction, Inferior Infarction, Lateral Infarction	Standard 12-lead	No Change

 QT Measurement

Item		Description	Default	Setting at Discharge
Alarm Lead		ECG1, ECG2, ECG (I) to (V6)	ECG1	Default
Reference Point		-240 ms to 0 ms	-96 ms	Default

Item	Description	Default	Setting at Discharge
T Wave Peak Range	0 ms to 800 ms	120 ms to 500 ms	Default
Formula	Bazett, Fridericia, Framingham	Bazett	Default
Δ QTc Upper Limit Display	0% to 100%	25%	Default

 Full Disclosure Waveform

Item	Description	Default	Setting at Discharge
Compressed Waveform/Quantity	1 to 6	1	No Change
Compressed Waveform/Parameter	OFF, ECG1, ECG2, ECG (I) to ECG (V6), BP1 to BP8, SpO ₂ , SpO ₂ -2, RESP, AWP, AWF, AWW, CO ₂ , O ₂ , Agent	All OFF	No Change
Enlarged Waveform/Quantity	1 to 6	1	No Change
Enlarged Waveform/Parameter	OFF, ECG1, ECG2, ECG (I) to ECG (V6), BP1 to BP8, SpO ₂ , SpO ₂ -2, RESP, AWP, AWF, AWW, CO ₂ , O ₂ , Agent	All OFF	No Change
Trend Display	ON, OFF	OFF	No Change
Time per Line	10 sec, 30 sec, 1 min	30 sec.	No Change
Slide Show Interval	3 sec, 5 sec, 10 sec, 20 sec, 30 sec	10 sec.	No Change
Enlarged Waveform Scroll Interval	1 sec, 4 sec, 8 sec	1 sec	No Change
Size of ECG1, ECG2, ECG (I) to (V6)	x1/4, x1/2, x1, x2, x4	x1 for all waveforms	No Change
BP Scale	20, 50, 75, 100, 150, 200, 250, 300 mmHg 4, 8, 12, 16, 20, 24, 32, 40 kPa	200 mmHg 24 kPa	No Change
SpO ₂ Size	x1/4, x1/2, x1, x2, x4	x1 for all waveforms	No Change
RESP Size	x1/4, x1/2, x1, x2, x4	x1 for all waveforms	No Change
CO ₂ Scale	0-50, 0-100 mmHg, 0-4, 0-8, 0-10 kPa, 0-4, 0-8, 0-10%	0-50 mmHg 0-4 kPa 0-4%	No Change
O ₂ Scale	18-30, 18-60, 18-100, 0-30, 0-60, 0-100%	18-30%	No Change
Agent Scale	0-4, 0-8, 0-16%	0-4%	No Change
AWP Scale	10, 20, 30, 50, 120 cmH ₂ O	50 cmH ₂ O	No Change
AWF Scale	±5, ±10, ±20, ±50, ±180 L/min	±50 L/min	No Change
AWV Scale	50, 250, 500, 1000, 3000 mL	500 mL	No Change

 12-Lead Analysis

Item	Description	Default	Setting at Discharge
Limb Lead Size	x1/4, x1/2, x1, x2, x4	x1	No Change
Chest Lead Size	x1/4, x1/2, x1, x2, x4	x1	No Change
Background Color	White, Black	Black	No Change

Basic Setup for Individual Bed Display

□ Display Configuration

All Beds

Item		Description	Default	Setting at Discharge
Layout	Display Pattern	Size: Standard, Position: Right Size: Standard, Position: Right&Bottom Size: Large, Position: Right Size: Large, Position: Right&Bottom Size: 12-Lead, Position: Right Size: 12-Lead, Position: Right&Bottom Zoom Numeric Data: Bottom 1 row Zoom Numeric Data: Bottom 2 rows	Zoom Numeric Data: Bottom 2 rows	No Change
	Numeric Data Box	Right Layout, Left Layout	Right Layout	No Change
Numeric Data		OFF, HR, PR_SpO ₂ , PR_SpO _{2_2} , PR_IBP, [VPC,PACE], [ST,VPC], ST-A, ST-B, ST-C, BP1-BP8, NIBP, NIBP List, SpO ₂ , SpO _{2_2} , SpCO, SpCO_2, SpMet, SpMet_2, SpHb, SpHb_2, [SpO ₂ , PR_SpO ₂], [SpO _{2_2} , PR_SpO _{2_2}], RR_IMP, RR_GAS, RR_VENT, RR_SpO ₂ , T1-T8, Tb, [T1,T2], [T3,T4], [T5,T6], [T7,T8], VENT, [SvO ₂ , CO], BIS, INVOS, CO ₂ , O ₂ , N ₂ O, Agent, [RR, CO ₂ , Agent, O ₂ , N ₂ O], [CO ₂ ,Agent,O ₂ ,N ₂ O], [RR,Agent,O ₂ ,N ₂ O], [Agent,O ₂ ,N ₂ O], [Agent,N ₂ O], SPIRO, [GAS,SPIRO], [CO,SV,SVV], VENT-A, VENT-B, Hemo-A, Hemo-B, Scoring, ODI, QTc, QTc-A, QTc-B, QTc-C, SI, RPP	HR, SpO ₂ , RESP, BP1, NIBP, CO ₂	No Change
Waveform		OFF, ECG1-ECG12, ECG1-ECG12 Cascade, BP1-BP8, BP Overlap1-Overlap3, SpO ₂ , SpO _{2_2} , RESP, AWF, AWP, AWV, CO ₂ , O ₂ , Agent, Block Cascade, RR Overlap1-Overlap3	ECG1, SpO ₂ , BP1, RESP, CO ₂	No Change
User Key		OFF, Home, Menu, User Key Up/Down, Alarm Silence, Alarm Suspend, NIBP Start/Stop, Print Start/Stop, Monitor Suspend, Freeze, Admit/Discharge, Scale, Trend, Tabular Trend, NIBP List, Recall, Full Disc. Wave, NIBP Auto Mode, Alarm Setup (All), Alarm Setup (Basic), Display Config., Print (LBP) Cancel, Print Settings, Color, Nurse Call Setup, Full Disc. Wave (To Save), Data Server Output Setup, Parameter ON/OFF, Screenshot	All OFF	No Change

Detail Setup

Item	Description	Default	Setting at Discharge
Alarm Limit Display	OFF, Numeric, Graph	Graph	No Change
At Alarm Occurrence	Reversed, 3D	Reversed	No Change
Grid	OFF, ON, Bold	ON	No Change
Scale	ON, Bold1, Bold2	ON	No Change
Thickness	Thin, Regular, Thick	Regular	No Change
Clip	ON, OFF	ON	No Change
Fill CO ₂ Waveform	ON, OFF	ON	No Change
Fill O ₂ Waveform	ON, OFF	OFF	No Change
Fill Agent Waveform	ON, OFF	OFF	No Change

Detail Setup

Item		Description	Default	Setting at Discharge
BP Overlap		BP1 to BP8	BP Overlap1: BP1, BP2, BP3, BP4 BP Overlap2: no selection BP Overlap3: no selection	No Change
RR Overlap		CO ₂ , O ₂ , Agent	RR Overlap1: CO ₂ , O ₂ , Agent RR Overlap2: no selection RR Overlap3: no selection	No Change
12-Lead ST Wave		Ref., OFF	Ref.	No Change
ST/VPC/Arrhy. Alarm Display		ON, OFF	ON	No Change
Block Cascade	Waveform Quantity	2, 3, 4, 5, 6	2	No Change
	Displayed Waveform	OFF, ECG1 to 12, BP1 to BP8, SpO ₂ , SpO ₂ -2, RESP, AWP, AWF, AWV, CO ₂ , O ₂ , AGENT	Wave 1: ECG1 Wave 2: ECG2 Wave 3 to 6: OFF	No Change

Menu (Central Monitor Display)

Functions

All Beds Alarm Settings

Item	Description	Default	Setting at Discharge
Alarm Items	Basic, Circ., Resp./Gas, Arrhy., ST/QTc, ΔST/QTc, List, Priority (Top), Priority (High), Priority (Med.), Priority (Low)	Basic	No Change
Highlight	Alarm ON, Alarm OFF, Nurse Call ON, Nurse Call OFF, OFF	OFF	No Change

All Beds Events

Item	Description	Default	Setting at Discharge
Event A	Arrhythmia: Asystole, VF, VT, Slow VT, Run, Couplet, Pause, Bigeminy, Trigeminy, Frequent, Tachy, Brady, Ext Tachy, Ext Brady, Triplet, R on T, Multiform, Vent Rhythm, SVT, AFib, Irregular RR, Prolonged RR, S Frequent, S Couplet, VPC, S VPC, Pacer not Capture, Pace not Pacing	Line 1: HR Line 2: Asystole Line 3: VF Line 4: VT	No Change
Event B	Numeric Data: HR, ST, ΔST, QTc, NIBP, RR, APNEA, SpO ₂ , Ext SpO ₂ , PR, SpCO, SpMet, SpHb, SpO ₂ -2, Ext SpO ₂ -2, PR-2, SpCO-2, SpMet-2, SpHb-2, PR_IBP, BP1-BP8, T1-T8, Tb, CO ₂ , O ₂ , N ₂ O, ISO, HAL, ENF, SEV, DES, MAC, MV, PEAK, PEEP, SI, RPP	Line 1: HR Line 2: SpO ₂ Line 3: NIBP Line 4: BP1	No Change
Event C	Other: Ventilator, Too Far, Chk Electrode, SpO ₂ Sensor Chk	Line 1: RR Line 2: APNEA Line 3: CO ₂ Line 4: OFF	No Change
Event D		Line 1: Chk Electrode Line 2: SpO ₂ Sensor Chk Line 3: OFF Line 4: OFF	No Change

Event List

Item	Description	Default	Setting at Discharge
Event 1	Arrhythmia: Asystole, VF, VT, Slow VT, Run, Couplet, Pause, Bigeminy, Trigeminy, Frequent, Tachy, Brady, Ext Tachy, Ext Brady, Triplet, R on T, Multiform, Vent Rhythm, SVT, AFib, Irregular RR, Prolonged RR, S Frequent, S Couplet, VPC, S VPC, Pacer not Capture, Pace not Pacing Numeric Data: HR, ST, ΔST, QTc, NIBP, RR, APNEA, SpO ₂ , Ext SpO ₂ , PR, SpCO, SpMet, SpHb, SpO ₂ -2, Ext SpO ₂ -2, PR-2, SpCO-2, SpMet-2, SpHb-2, PR_IBP, BP1-BP8, T1-T8, Tb, CO ₂ , O ₂ , N ₂ O, ISO, HAL, ENF, SEV, DES, MAC, MV, PEAK, PEEP, SI, RPP Other: Ventilator, Too Far, Chk Electrode, SpO ₂ Sensor Chk	HR	No Change
Event 2		Asystole	No Change
Event 3		VF	No Change
Event 4		VT	No Change
Event 5		SpO ₂	No Change
Event 6		NIBP	No Change
Event 7		BP1	No Change
Event 8		OFF	No Change
Event 9		RR	No Change
Event 10		Apnea	No Change
Event 11		CO ₂	No Change
Event 12		OFF	No Change
Event 13		Check Electrode	No Change
Event 14		SpO ₂ Check Sensor	No Change
Event 15		Ventilator	No Change
Event 16		Too Far	No Change
Event 17 to Event 32		OFF	No Change

 All Beds Nurse Call Setup

Item	Description	Default	Setting at Discharge
Alarm Items	Basic, Circ., Resp./Gas, Arrhy., ST/QTc, ΔST/QTc, List, Custom, Other, Priority (Top), Priority (High), Priority (Med.), Priority (Low)	Basic	No Change
Highlight	Alarm ON, Alarm OFF, Nurse Call ON, Nurse Call OFF, OFF	OFF	No Change

Each Bed Setup

 Print Settings

Manual Printing

Item	Description	Default	Setting at Discharge
Waveform	ECG1, ECG2, BP1 to 8, SpO ₂ , SpO ₂ -2, RESP, CO ₂ , O ₂ , AWF, AWP, AWW	ECG1	No Change
Print Duration	12 sec., 24 sec., Cont.	24 sec.	No Change
Delay Time	None, 8 sec., 16 sec.	8 sec.	No Change

Alarm Printing

Item	Description	Default	Setting at Discharge
Alarm Printing	ON, OFF	OFF	No Change
Factor	Alarm for each arrhythmia, parameter	ON: HR, Asystole, VF, VT, Tachy, Brady, Ext Tachy, Ext Brady	No Change
Waveform	ECG1, ECG2, BP1 to 8, SpO ₂ , SpO ₂ -2, RESP, CO ₂ , O ₂ , Agent, AWF, AWP, AWV, Alarm	Selection: ECG1	No Change
Print Duration	12 sec, 24 sec	12 sec.	No Change

Periodic Printing

Item	Description	Default	Setting at Discharge
Periodic Printing	Printer, Recall, OFF	OFF	No Change
Periodic Interval	Interval, Timer	Interval	No Change
Interval	1, 2, 3, 5, 10, 15, 20, 30, 60, 120 min.	60 min.	No Change
Timer	0:00, 1:00, 2:00 ... 21:00, 22:00, 23:00	All OFF	No Change
Waveform	ECG1, ECG2, BP1 to 8, SpO ₂ , SpO ₂ -2, RESP, CO ₂ , O ₂ , Agent, AWF, AWP, AWV	Selection: ECG1	No Change
Print Duration	6 sec, 12 sec, 24 sec	12 sec.	No Change

12-Lead Printing Setup

Item	Description	Default	Setting at Discharge
Printing Format	3 Wavesx4, 3 Wavesx4+Rhy., 6 Wavesx2, 12 Waves, 2 Wavesx6	3 Waves x 4	No Change
Position	Center, Proportional, OFF	OFF	No Change
Wave Format	Regular, Reverse	Regular	No Change
Printer Auto Scale	ON, OFF	OFF	No Change
Print Calibration	ON, OFF	OFF	No Change
Lead Boundary	ON, OFF	OFF	No Change

Printer

Item	Description	Default	Setting at Discharge
Graphic Trend	Recorder Unit, Laser Printer	Printer	No Change
Tabular Trend		Printer	No Change
Recall Enlarged Waveform		Printer	No Change
ST		Printer	No Change
Full Disc. Compressed Wave		Printer	No Change
Full Disc. Zoom Wave		Printer	No Change
12-Lead Waveform		Printer	No Change
12-Lead Analysis		Printer	No Change
Hemodynamics		Printer	No Change
Alarm History		Printer	No Change
QT		Printer	No Change
Score List		Printer	No Change

Color Setup

Item	Description	Default	Setting at Discharge
Palette Selection	Light, Clear, Deep, Vivid	Vivid	No Change
HR	Red (1), Orange (2), Orange (3), Yellow (4), Yellow (5), Green (6), Peppermint (7), Cyan (8), Blue (9), Violet (10), Magenta (11), Pink (12), White (13)	Green (6)	No Change
ST		Green (6)	No Change
VPC		White (13)	No Change
PACE		White (13)	No Change
NIBP		Cyan (8)	No Change
SpO ₂ /SpCO/SpMet/SpHb SpO ₂ -2/SpCO-2/SpMet-2/SpHb-2		Yellow (4)	No Change
CO ₂		Cyan (8)	No Change
RESP		White (13)	No Change
BP1		Red (1)	No Change
ART		Red (1)	No Change
PAP		Yellow (4)	No Change
CVP		Cyan (8)	No Change
ICP		Peppermint (7)	No Change
IAP		Pink (12)	No Change
LVP		Orange (2)	No Change
LAP		Green (6)	No Change
RAP		Magenta (11)	No Change
UAP		Blue (9)	No Change
RVP		Peppermint (7)	No Change
US1 to US5 (BP)		White (13)	No Change
BP2	Cyan (8)	No Change	
BP3	Yellow (4)	No Change	
BP4	Green (6)	No Change	
BP5	Orange (2)	No Change	
BP6	Pink (12)	No Change	
BP7	Blue (9)	No Change	
BP8	Peppermint (7)	No Change	
TEMP1 to TEMP8, Tb	Orange (2)	No Change	
Tsk, Tre, Tes, Tco, US1 to US7	Orange (2)	No Change	
AWF	Green (6)	No Change	
AWP	Yellow (4)	No Change	
AWV	Cyan (8)	No Change	
BIS	White (13)	No Change	
INVOS	White (13)	No Change	
SvO ₂ , CO	White (13)	No Change	
MV+CO	White (13)	No Change	
RR_SpO ₂	Yellow (4)	No Change	
QT	Green (6)	No Change	
SI	Yellow (4)	No Change	

Item	Description	Default	Setting at Discharge
RPP		White (13)	No Change
ODI		Yellow (4)	No Change
Patient Name		White (13)	No Change

 Nurse Call Setup

Item	Description	Default	Setting at Discharge
Nurse Call		ON, OFF	OFF
Nurse Call Factor	Arrhythmia: Asystole, VF, VT, Slow VT, Run, Couplet, Pause, Bigeminy, Trigeminy, Frequent, Tachy, Brady, Ext Tachy, Ext Brady, Triplet, R on T, Multiform, Vent Rhythm, SVT, AFib, Irregular RR, Prolonged RR, S Frequent, VPC, S VPC, Pacer not Capture, Pace not Pacing Numeric Data: HR, ST1-2, 12ST, ΔST1-2, 12ΔST, RR, APNEA, SpO ₂ , SpO ₂₋₂ , PR_SpO ₂ , PR_SpO ₂₋₂ , SpMet, SpMet_2, SpCO, SpCO_2, SpHb, SpHb_2, NIBP, BP1-BP8, PR_IBP, EtCO ₂ , InspCO ₂ , T1-T8, MV, PEAK, PEEP, SI, RPP Other: Ventilator, Too Far, Chk Electrode	ON, OFF	All OFF
When Nurse Call Factor Setup is ON	Alarm Duration Before Notification	None, None (Noise OFF), 5 sec, 10 sec, 15 sec, 20 sec, 30 sec	Setting at Admittance

 Full Disclosure Waveform

Item	Description	Default	Setting at Discharge
Waveforms to Save	ECG1, ECG2, ECG (I) to ECG (V6), BP1 to BP8, SpO ₂ , SpO ₂₋₂ , RESP, AWP, AWF, AWV, CO ₂ , O ₂ , AGENT	user selection	no selection

 Data Server Waveform

Item	Description	Default	Setting at Discharge
Waveform Selection	OFF, ECG1, ECG2, SpO ₂ , SpO ₂₋₂ , RESP, BP1 to BP8, AWF, AWP, AWV, Agent, CO ₂ , O ₂	OFF	No Change

 Parameter ON/OFF

Item	Detail	Default	Setting at Discharge
ECG, BP1 to BP8, NIBP, SpO ₂ 1, SpO ₂₋₂ , RESP, CO ₂ , T1 to 8, SvO ₂ /CCO, GAS, BIS, INVOS, SPIRO, VENT	ON, OFF	ON	Admit Setup

Common Setup

Display Configuration

All Beds

Item		Description	Default
Layout Selection		Selection from registered layouts	No
32 Beds Display		-	OFF
Center Split		ON, OFF	ON
Equal Layout		ON, OFF	ON
Layout Change		1 bed: [16 waves x 1 bed] 2 beds: [12 waves x 1 bed, 4 waves x 1 bed], [10 waves x 1 bed, 6 waves x 1 bed], [8 waves x 2 beds] 3 beds: [12 waves x 1 bed, 2 waves x 2 beds], [8 waves x 1 bed, 4 waves x 2 beds], [6 waves x 2 beds, 4 waves x 1 bed] 4 beds: [10 waves x 1 bed, 2 waves x 3 beds], [6 waves x 2 beds, 2 waves x 2 beds], [4 waves x 4 beds] 5 beds: [8 waves x 1 bed, 2 waves x 4 beds], [5 waves x 2 beds, 2 waves x 3 beds], [4 waves x 3 beds, 2 waves x 2 beds] 6 beds: [6 waves x 1 bed, 2 waves x 5 beds], [4 waves x 2 beds, 2 waves x 5 beds] 7 beds: [4 waves x 1 bed, 2 waves x 6 beds] 8 beds: [2 waves x 8 beds]	DS-1800L* Left: 4 beds 4 waves x 4 beds Right: 4 beds 4 waves x 4 beds DS-1812* Left: 6 beds 2 waves x 6 beds Right: 6 beds 2 waves x 6 beds
Bed Selection	Registered Beds, OFF	Selection from registered beds	DS-1812* All RF beds DS-1800L* None
Other Setup	Numeric Data Box	1, 2, 4, 8	2
	Zoom Numeric Data	All Beds, Each Bed	All Beds
Layout Registration		Quantity of beds (left, right), etc.	1: 8 beds display (left 2, right 6) 2: 7 beds display (left 3, right 4) 3: 16 beds display (left 8, right 8) 4 to 10: not registered

Each Bed

Item	Description	Default
Numeric Data	OFF, HR, PR_SpO ₂ , PR_SpO ₂₋₂ , PR_IBP, [VPC,PACE],[ST,VPC], ST-A to ST-C, BP1 to BP8, NIBP, NIBP List, SpO ₂ , SpO ₂₋₂ , SpCO, SpCO-2, SpMet, SpMet-2, SpHb, SpHb-2, [SpO ₂ ,PR_SpO ₂], [SpO ₂₋₂ , PR_SpO ₂₋₂], RR_IMP, RR_GAS, RR_VENT, RR_SpO ₂ , T1 to T8, [T1, T2], [T3, T4], [T5, T6], [T7, T8], VENT, [SvO ₂ ,CO], BIS, CO ₂ , O ₂ , N ₂ O, Agent, [RR,CO ₂ ,Agent,O ₂ ,N ₂ O], [CO ₂ ,Agent,O ₂ ,N ₂ O], [RR,Agent,O ₂ ,N ₂ O], [Agent,O ₂ ,N ₂ O], [Agent,N ₂ O], [GAS,SPIRO], SPIRO, [CO,SV,SVV], VENT-A, VENT-B, Hemo/etc-A, Hemo/etc-B, Scoring, ODI, QTc, QTc-A, QTc-B, QTc-C, SI, RPP	HR, NIBP, [SpO ₂ , PR_SpO ₂], RR_IMP
Waveform	OFF, ECG1 to ECG12, ECG1 Cascade to ECG12 Cascade, BP1 to BP8, BP Overlap 1 to BP Overlap 3, SpO ₂ , SpO ₂₋₂ , RESP, AWF, AWP, AWV, CO ₂ , O ₂ , Agent, RR Overlap 1 to 3, Patient Name	ECG1, ECG2, SpO ₂ , RESP

Detail Setup

	Item	Description	Default
Patient Name/Bed Name	Patient Data Area	ON, OFF	ON
	Patient Data Area	Patient Name, Bed Name, OFF	Bed Name
	Waveform Area	Patient Name, Bed Name, OFF	Patient Name
		Large Size, Standard Size	Large Size
Auto Configuration	Auto Display Configuration	ON, OFF	OFF
Numeric Data	ST/VPC/Arrhy. Alarm Display	ON, OFF	ON
	Alarm Limit Display	Graph, Numeric, OFF	Graph
	At Alarm Occurrence	Reversed, 3D	Reversed
	Display Priority	OFF, HR, PR_SpO ₂ , PR_SpO ₂₋₂ , PR_IBP, [VPC,PACE], [ST,VPC], ST-A to ST-C, BP1 to BP8, NIBP, NIBP List, SpO ₂ , SpO ₂₋₂ , SpCO, SpCO-2, SpMet, SpMet-2, SpHb, SpHb-2, [SpO ₂ ,PR_SpO ₂], [SpO ₂₋₂ , PR_SpO ₂₋₂], RR_IMP, RR_GAS, RR_VENT, RR_SpO ₂ , T1 to T8, [T1, T2], [T3, T4], [T5, T6], [T7, T8], VENT, [SvO ₂ ,CO], BIS, CO ₂ , O ₂ , N ₂ O, Agent, [RR,CO ₂ ,Agent,O ₂ ,N ₂ O], [CO ₂ ,Agent,O ₂ ,N ₂ O], [RR,Agent,O ₂ ,N ₂ O], [Agent,O ₂ ,N ₂ O], [Agent,N ₂ O], [GAS,SPIRO], SPIRO, Scoring, ODI, QTc, QTc-A, QTc-B, QTc-C, SI, RPP	1: HR 2: BP1 3: BP2 4: SpO ₂ , PR_SpO ₂ 5: NIBP 6: CO ₂ 7: PR_IMP 8: T1, T2 9-72: no selection
Waveform	Circulatory [mm/s]	12.5, 25	25
	Respiratory [mm/s]	6.25, 12.5, 25	6.25
	Grid	Standard, Bold, OFF	Standard
	Scale	ON, Bold1, Bold2	ON
	Thickness	Regular, Thin, Thick	Regular
	Wave Clip	ON, OFF	ON
	Fill CO ₂ Waveform	ON, OFF	ON
	Fill O ₂ Waveform	ON, OFF	OFF
	Fill Agent Waveform	ON, OFF	OFF
	BP Overlap	BP1 to BP8	BP Overlap1: BP1 to BP4 BP Overlap2: no selection BP Overlap3: no selection
	RR Overlap	CO ₂ , O ₂ , Agent	RR Overlap1: CO ₂ , O ₂ , Agent RR Overlap2: no selection RR Overlap3: no selection
	Display Priority	ECG1 to ECG12, BP1 to BP8, BP Overlap1 to BP Overlap3, SpO ₂ , SpO ₂₋₂ , RESP, AWF, AWP, AWV, CO ₂ , O ₂ , Agent, RR Overlap1 to RR Overlap3, Patient Name	1: ECG1 2: ECG2 3: BP1 4: BP2 5: SpO ₂ 6: CO ₂ 7: RESP 8-48: no selection
Other	Patient Data Area	ON, OFF	ON
	Displaying Item for Patient Data Area	Alarm History, Comment, OFF	OFF

Detail Setup

Item	Description	Default
Display Numeric Data on Waveform Area	ON, OFF	OFF

 Tone/Volume

Item	Description	Default	
Vital Alarm	Urgent, Caution	Volume: 11 levels	4
		Tone: 5 types*	1
	Status	Volume: 11 levels	4
		Tone: 4 type*	1
Ventilator Alarm	Volume: 11 levels	4	
	Tone: 1 type	1	
Status Alarm	Urgent, Caution, Status	Volume: 11 levels	4
		Tone: 1 type*	1
Sync. Tone	Volume: 11 levels	2	
	Tone: 5 types	1	
Key Sound	Volume: 11 levels	4	
	Tone: 3 types	1	
Other	Volume: 11 levels	4	
	Tone: 1 type	1	
Boot Sound / Shutdown Sound	Volume: 11 levels	2	
	Tone: 3 types	1	

* When [Fukuda Tone] is selected for "Alarm System", the tone can be selected from 8 levels.

 Brightness

Item	Description	Default
Brightness	7 levels	Fourth Level

 Monitor Suspend Setup

Item	Description	Default
Monitor Suspend's Message Selection	ON, OFF	OFF
Monitor Suspend Time	ON, OFF	OFF
Label 1	ON/OFF Label: Max. 14 characters Color: 16 colors	Blank
Label 2		Blank
Label 3		Blank
Label 4		Blank
Label 5		Blank
Label 6		Blank
Label 7 to 15		Blank
		OFF

Nurse Team Setup

Item	Description	Default
Team 1	ON/OFF Label: Max. 14 characters Color: 8 colors	ON, Red
Team 2		ON, Orange
Team 3		ON, Yellow
Team 4		ON, Yellow-green
Team 5		ON, Green
Team 6		ON, Light Blue
Team 7		ON, Blue
Team 8		ON, Purple

Chapter 16 System Components

Medical Device

The following model types are available

Type	Number of Telemetry Receiving Beds	Printer	Extended Display
DS-1800LRE	0	Yes	Yes
DS-1812RE	12	Yes	Yes
DS-1800L	0	No	No
DS-1812	12	No	No
DS-1800LR	0	Yes	No
DS-1812R	12	Yes	No

Accessories

The accessories for this medical device are shown below.

 **CAUTION**

- ♦ Use only the products specified for this device. If unspecified products are used, proper function cannot be executed.
- ♦ For quality improvement, specifications are subject to change without prior notice.

Item	Model Type	Note
Power Cable	CS-34	
Recorder Unit	HR-800	Used with roll type thermal paper (50 mm wide).
Recording Paper	OP050-02TDR	50 mm wide
Unit Connection Cable	CJO-09SS0.3	For connecting the recorder unit (0.3 m)
	CJO-09SS1.5	For connecting the recorder unit (1.5 m)
SD Card	FSD-64G	For recording the full disclosure waveform
Lithium-Ion Battery Pack	BTO-005	
Ethernet Branch Cable	CJ-522A	Length 1 m (For HUB connection)
	CJ-522B	Length 2 m (For HUB connection)
	CJ-522C	Length 4 m (For HUB connection)
	CJ-522D	Length 10 m (For HUB connection)
	CJ-522E	Length 20 m (For HUB connection)
Connection Cable	CJ-530A	Length: 2.5 m (For direct connection to devices)
	CJ-530B	Length: 5 m (For direct connection to devices)
	CJ-530C	Length: 10m (For direct connection to devices)
IR Remote Control Unit	CF-820	
RS-232C Cross Cable	CJ-725	Serial Communication (Cross)

Item	Model Type	Note
Relay Cable (Straight)	CJ-726	Serial Communication (Straight)
Serial Converter Cable	CJ-756	
Relay Cable	CJ-502	Nurse Call System Connection (Cross)
GCX Attachment for Monitor	OAO-70A	
Trolley (L)	OTO-16L	
Card Reader Mounting Bracket	OAE-50A	
Basket	OAE-52A	
Chart Box	OAE-53A	
Storage Drawer	OAE-61A	
Height Adjustment Spacer	OAO-1007A	
Barcode Reader Holder	OAO-1008A	
Mounting Bracket for LW-1000	OAO-1012A	

The Other Products

The other non-medical products to be used in combination with this device as a system are shown below.

Item	Model Type	Note
Ethernet HUB	AT-GS910/24	
Mouse	No model specified.	With USB 2.0 interface (Type A) Compliant with IEC 62368-1, CISPR 32, CISPR 35 or equivalent standard
Keyboard	No model specified.	With USB 2.0 interface (Type A) Compliant with IEC 62368-1, CISPR 32, CISPR 35 or equivalent standard
Barcode Reader	LS2208	
USB Barcode Reader	1950GHD-U	
USB Memory	SFU34096C1AE2TO-C-GE-1AP-STD	
Extended Display Unit	ET2703LM	
Slave Monitor	No model specified.	With VGA interface Compliant with IEC 62368-1, CISPR 32, CISPR 35 or equivalent standard Resolution: Full HD (1920 dot x 1080 dot) Horizontal Frequency: 67.5 kHz Vertical Frequency: 60 Hz
Laser Printer	No model specified.	With TCP/IP interface Compliant with IEC 62368-1, CISPR 32, CISPR 35 or equivalent standard
Server	No model specified.	With TCP/IP or serial interface Compliant with IEC 62368-1, CISPR 32, CISPR 35 or equivalent standard

Chapter 17 Specification

Specification/Performance

Specification

Size	660 (W) mm x 473 (H) mm x 210 (D) mm ±10 mm (not including the protrusion)
Weight	13 kg ±3 kg (not including the optional accessories)
Environmental Conditions	
Operating Temperature	10°C to 40°C
Operating Humidity	30% to 85% (non-condensing)
Operating Atmospheric Pressure	80 kPa to 106 kPa
Transport/Storage Temperature	-10°C to 60°C
Transport/Storage Humidity	10% to 95% (non-condensing)
Storage Atmospheric Pressure	80 kPa to 106 kPa
Safety	
General Safety Standard	ANSI / AAMI ES 60601-1: 2005 / (R) 2012 and A1: 2012, C1:2009 / (r) 2012 and A2: 2010 / (r) 2012 (Medical electrical equipment - Part 1: General requirements for basic safety and essential performance)
EMC Standard	IEC 60601-1-2: 2014 (Medical electrical equipment - Part 1-2: General requirements for basic safety and essential performance - Collateral standard: Electromagnetic disturbances - Requirements and tests)
Protection against electrical shock	Class I Equipment/Internally Powered Equipment
Operation Mode	Continuous Operation
Degree of protection against ingress of water	IPX0 (no protection)
Classification according to the degree of safety when using in the presence of air or flammable anesthetic gas or oxygen or nitrous oxide and flammable anesthetic gas	Not provided
Power Supply	
Rated Voltage	115 V AC DC 14.4 V (when using the battery)
Frequency	50/60 Hz
Power Consumption	100 VA and below
Battery for Operating the Device	
Rated Voltage	14.4 V
Rated Capacity	4100 mAh
Operation Time	60 minutes and more (at 23°C)
Charging Time	2.5 hours (during standby), 5 hours (during normal operation)

Storage Media	SD card, USB memory
Usable Life	
6 years	According to self-certification (☞ Maintenance Manual "Periodic Replacement" P7-1)

Performance

Display

Display Element	Color LCD with Touch Panel
Size	27 inch (diagonal) wide
Resolution	1920 dot x 1080 dot (Full HD)
Waveform Trace	Stationary Trace
Touch Panel	Capacitive Touch Panel
Displayed Parameter	ECG, RESP, TEMP, SpO ₂ /SpO ₂ -2 (Arterial Oxygen Saturation), Pulse Rate, BP1-8, NIBP, CO ₂ concentration, O ₂ concentration, N ₂ O concentration, AGENT, SvO ₂ (Mixed Venous Oxygen Saturation), CCO (Continuous Cardiac Output), CCI (Continuous Cardiac Index), BT (Blood Temperature), SpCO (Carboxyhemoglobin Concentration), SpMet (Methemoglobin Concentration), SpHb (Total Hemoglobin Concentration), MVe (Expiratory Minute Volume), TVe (Expiratory Tidal Volume), TVi (Inspiratory Tidal Volume), PEAK (Peak Airway Pressure), PEEP (Peak End Expiratory Pressure), MEAN (Mean Airway Pressure), ScvO ₂ (Central Venous Oxygen Saturation), rSO ₂ (Regional Oxygen Saturation), TOI (Tissue Oxygenation Index), BIS
Displayed Waveform	ECG, RESP, BP, SpO ₂ /SpO ₂ -2 (Arterial Oxygen Saturation), CO ₂ concentration, O ₂ concentration, AGENT (anesthetic gas concentration), AWP (Airway Pressure), AWF (Airway Flow), AWV (Airway Volume)
Sweep Speed	ECG, SpO ₂ /SpO ₂ -2 (Arterial Oxygen Saturation), IBP: 12.5, 25 mm/sec. RESP, CO ₂ concentration, O ₂ concentration, AGENT (anesthetic gas concentration), AWP (Airway Pressure), AWF (Airway Flow), AWV (Airway Volume): 6.25, 12.5, 25 mm/sec.
Network Configuration	DS-LAN III Network, Wireless System
Sound Pressure	Alarm Sound (IEC Tone) High Priority Maximum: 80 dB, Minimum: 45 dB Medium Priority Maximum: 78 dB, Minimum: 39 dB Low Priority Maximum: 77 dB, Minimum: 38 dB HR Synchronized Tone (ECG, SpO ₂ , BP) Maximum: 75 dB, Minimum: 37 dB

NOTE

- The alarm sound pressure is measured in accordance with IEC 60601-1-8: 2006 Amd1: 2012 6.3.3.2.

Telemetry Reception

Number of Receiving Beds	Maximum of 12 beds
Reception Frequency	608.0125 MHz to 613.9875 MHz
Preferred Frequency or Frequency Band	None
Bandwidth of the receiving section of the medical device in those bands	12.5 kHz
Reception Method	Crystal Controlled PLL Type Double Super Heterodyne

Transmitter	LX-8100, LX-8300, HLX-801, Bedside Monitor (with HLX-801 or equivalent)
Antenna Connector	F Type
DC Power Output	+12 V 100 mA (Default: OFF)

 **CAUTION**

- ♦ The parameters that can be monitored on this device differs depending on the bedside monitor, transmitter, and software version.
 - ♦ The DS-LAN II network cannot be used.
-

Input/Output Interface

Serial Connector (COM1 to COM2, COMA)
 Status Input/Output Connector (Status II)
 DS-LAN Connector
 USB Connector
 External Monitor Connector
 U-LINK Connector
 LAN Connector
 SD Card Slot 1, 2
 Standby Switch
 Infrared Remote Control Input
 Antenna Connector 1, 2
 AUX Connector
 Extended Display Unit Connector

Analysis Process

Arrhythmia Analysis
 ST Measurement

ECG

HR Measurement Range	Adult, Child: 0, 12 bpm to 300 bpm Neonate: 0, 30 bpm to 300 bpm
HR Measurement Accuracy	±3% or ±5 bpm, whichever is greater
HR Display Response Time	Adult/Child: 6 sec., Neonate: 3 sec.
Instant HR	Calculated each second based on the latest RR interval.
Waveform Size	1/4, 1/2, 1, 2, 4
Voltage Receiving Range	±6.4 mV
Lead Type	Depends on the transmitter, bedside monitor.
Frequency Characteristic	Depends on the transmitter, bedside monitor.
AC Filter	50 Hz / 60 Hz
Drift Filter	Shuts off 1.1 Hz and below
Pacemaker	Artificial pacemaker pulse display

Heart rate meter accuracy and response to irregular rhythm

80 bpm Ventricular Bigeminy: 80 bpm



60 bpm Ventricular Bigeminy: 60 bpm



120 bpm Ventricular Bigeminy: 120 bpm



90 bpm Bidirectional Systoles: 90 bpm



Response time of heart rate meter to change in heart rate

HR change from 80 bpm to 120 bpm:
Range 5 sec. to 7 sec., Average 6 sec.

HR change from 80 bpm to 40 bpm:
Range 5 sec. to 7 sec., Average 6 sec.

Time to ALARM for tachycardia

Ventricular Tachycardia 1 mVpp, 206 bpm:
Range 7 sec. to 10 sec., Average 8 sec.



Ventricular Tachycardia 1 mVpp, 206 bpm:
Range 7 sec. to 10 sec., Average 8 sec.

Ventricular Tachycardia 0.5 mVpp, 206 bpm:
Range 11 sec. to 14 sec., Average 12 sec.

Ventricular Tachycardia 2 mVpp, 195 bpm:
Range 7 sec. to 10 sec., Average 8 sec.



Ventricular Tachycardia 4 mVpp, 195 bpm:
Range 7 sec. to 10 sec., Average 8 sec.

Ventricular Tachycardia 1 mVpp, 195 bpm:
Range 8 sec. to 12 sec., Average 10 sec.

Tall T-wave Rejection Capability

1.2 mV T-wave can be removed when tested according to IEC 60601-2-27.

Rejection of Pacemaker Pulse

- a) Pacemaker Pulse without Over/Undershoot
Capable to reject pulses of pulse width 0.1 ms to 2 ms, amplitude ± 2 mV to ± 700 mV
- b) Pacemaker Pulse with Over/Undershoot: Rejection is not possible.

Respiration

Measurement Method	Depends on the transmitter, bedside monitor.
RR Measurement Range	0, 4 Bpm to 150 Bpm
RR Measurement Accuracy	± 3 Bpm
Frequency Characteristic	Depends on the transmitter, bedside monitor.
Measurement Current	Depends on the transmitter, bedside monitor.

Blood Pressure

BP Measurement Range	Depends on the transmitter, bedside monitor.
Frequency Characteristic	Depends on the transmitter, bedside monitor.

Measurement Accuracy	Depends on the transmitter, bedside monitor.
Maximum Number of Receiving Channels	8 channels

Non-Invasive Blood Pressure

Measurement Method	Depends on the transmitter, bedside monitor.
Receiving Range	Depends on the transmitter, bedside monitor.
Measurement Accuracy	Depends on the transmitter, bedside monitor.

Arterial Oxygen Saturation (SpO₂)

Measurement Method	Depends on the transmitter, bedside monitor.
Oxygen Saturation Receiving Range	Depends on the transmitter, bedside monitor.
PR Receiving Range	Depends on the transmitter, bedside monitor.
Carboxyhemoglobin Concentration Receiving Range	Depends on the bedside monitor.
Methemoglobin Concentration Receiving Range	Depends on the bedside monitor.
Total Hemoglobin Concentration Receiving Range	Depends on the bedside monitor.
Measurement Accuracy	Depends on the transmitter, bedside monitor.

Temperature

Measurement Method	Depends on the transmitter, bedside monitor.
Receiving Range	Depends on the transmitter, bedside monitor.
Measurement Accuracy	Depends on the transmitter, bedside monitor.
Maximum Number of Receiving Channels	8 channels

CO₂ Concentration

Measurement Method	Depends on the transmitter, bedside monitor.
CO ₂ Measurement Range	Depends on the transmitter, bedside monitor.
Frequency Characteristic	Depends on the transmitter, bedside monitor.
Measurement Accuracy	Depends on the transmitter, bedside monitor.

Gas Concentration

Measurement Method	Depends on the bedside monitor.
Measurement Range	Depends on the bedside monitor.
Measurement Accuracy	Depends on the bedside monitor.

INVOS	Depends on the bedside monitor.
BIS	Depends on the bedside monitor.
SPIRO	Depends on the bedside monitor.
SvO ₂ /CCO	Depends on the bedside monitor.
VENT	Depends on the bedside monitor.

Full Disclosure Waveform Recording

Continuous Storing of Patient Data	Maximum of 336 hours (When SD card: FSD-64G is used)
------------------------------------	------------------------------------------------------

Recorder Specification

Printing Waveforms	3 waveforms (Maximum)
--------------------	-----------------------

Printing Speed	25 mm/sec., 50 mm/sec.
Waveform Type	ECG, RESP, BP, SpO ₂ , IBP, CO ₂ , O ₂ , AGENT, AWF, AWP, AWW
Status	paper out, paper holder open, paper jam
Protective Circuit	Provided

Receiving Device

Reception Sensitivity	+10 dB μ V and below ("Too Far" level)
-----------------------	--------------------------------------------

Measurement Unit for Each Parameter

The measurement units of the parameters for this device are as follows.

Parameter	Description	Display	Unit (Default unit is underlined.)	
ECG	Heart Rate	HR	bpm (beats per minute)	
	ST Level	ST1/ST2	<u>mm/mV</u>	
	12-lead ST Level	ST I, ST II ST III, ST aVR, ST aVL, ST aVF, ST V ₁ , ST V ₂ , ST V ₃ , ST V ₄ , ST V ₅ , ST V ₆ , Δ ST1/ Δ ST2, Δ ST I to V6		<u>mm/mV</u>
	QTc	QTc1/QTc2, QTc (I-V6)	ms	
Respiration	Respiration Rate	RR (RESP)	Bpm (breaths per minute)	
	Apnea Duration	Apnea	s (second)	
Blood Pressure	Blood Pressure 1 to 8	BP1 to 8	<u>mmHg/kPa</u>	
	Central Venous Pressure	CVP	mmHg/kPa/cmH ₂ O*	
Non-Invasive Blood Pressure	Non-Invasive Blood Pressure	NIBP	<u>mmHg/kPa</u>	
SpO ₂	Arterial Oxygen Saturation	SpO ₂ , SpO ₂ -2	%	
	Pulse Rate	PR, PR-2	bpm (beats per minute)	
	Carboxyhemoglobin Concentration	SpCO, SpCO-2	%	
	Methemoglobin Concentration	SpMet, SpMet-2	%	
	Total Hemoglobin Concentration	SpHb, SpHb-2	g/dL	
Temperature	TEMP1 to TEMP8	T1 to T8	<u>°C</u> /°F	
CO ₂ Concentration	End Tidal CO ₂ Concentration	EtCO ₂	<u>mmHg/kPa</u> /%	
	Inspiratory CO ₂ Concentration	InspCO ₂	<u>mmHg/kPa</u> /%	

Parameter	Description	Display	Unit (Default unit is underlined.)
Gas Data	End Tidal Oxygen	O ₂ -E	%
	Fraction of Inspiratory Oxygen	O ₂ -I	%
	Expired Nitrous Oxide	N ₂ O-E	%
	Inspired Nitrous Oxide	N ₂ O-I	%
	End Tidal Anesthetic Gas	AGT-E	%
	Inspired Anesthetic Gas	AGT-I	%
	Expired Isoflurane	ISO-E	%
	Inspired Isoflurane	ISO-I	%
	Expired Halothane	HAL-E	%
	Inspired Halothane	HAL-I	%
	Expired Enflurane	ENF-E	%
	Inspired Enflurane	ENF-I	%
	Expired Sevoflurane	SEV-E	%
	Inspired Sevoflurane	SEV-I	%
	Expired Desflurane	DES-E	%
	Inspired Desflurane	DES-I	%
Airway Pressure	Peak Airway Pressure	PEAK	cmH ₂ O
	Mean Airway Pressure	MEAN	cmH ₂ O
Peak End Expiratory Pressure	Peak End Expiratory Pressure	PEEP	cmH ₂ O
Ventilatory Volume	Expiratory Minute Ventilation Volume	MVe	L/min
	Expiratory Tidal Volume	TVe	mL
	Inspiratory Tidal Volume	TVi	mL
Oximeter Data	Mixed Venous Oxygen Saturation	SvO ₂	%
	Central Venous Oxygen Saturation	ScvO ₂	%
	Continuous Cardiac Output	CCO	L/minute
	Continuous Cardiac Index	CCI	L/minute/m ²
	Blood Temperature	BT	°C
BIS Monitor Data	Bispectral Index	BIS	(no unit)
	Signal Quality Index	SQI	%
	Electromyograph	EMG	dB
	Suppression Ratio	SR	%
INVOS 5100C Monitor Data	Regional Cerebral Oxygen Saturation	Lt-rSO ₂ , Rt-rSO ₂ , S1-rSO ₂ , S2-rSO ₂	%
NIRO Monitor Data	Tissue Oxygenation Index	TOI	%

*: Depends on the setting on the transmitting side.

NOTE

- ♦ In case of DS-LAN network, if the measurement unit for BP (mmHg/kPa) and temperature (°C/°F) is different between the bedside monitor and the central monitor, the corresponding waveform and numeric data will not be displayed on the central monitor.

External Connection

This section lists the connector pin assignments.

RS-232C Connector Output Signal (Serial Connector)

□ COM1 to COM2 Connector

No.	Signal Name	Note	Signal Level
1	RESET	Reset	
2	NC	Not connected	
3	TxD	Serial Transmission Data Output	RS232C
4	GND_ISO	Isolation Ground	
5	RxD	Serial Reception Data Input	RS232C
6	+5V	+5V Power Supply Input	+5V Power Supply (150mA)
7	NC	Not connected	
8	NC	Not connected	

Technical Information

Settings for Each Alarm System

Alarm System	Fukuda Tone (1) Tone 1 to 4 (2) Tone 5 to 8	Melodic Tone	IEC Tone
Sound: Physiological Alarm			
Level H	(1) Continuous melodic tone (2) Continuous single 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 single tone
Level M	(1) Melodic tone in interval of about 4 seconds (2) Single tone in interval of about 4 seconds	ECG: Melodic tone of rising pitch in interval of about 4 seconds SpO ₂ , O ₂ : Melodic tone of falling pitch in interval of about 4 seconds CO ₂ : Melodic tone of mixed low and high pitch in interval of about 4 seconds Other than above: Melodic tone in interval of about 4 seconds	Single tone in 4 seconds interval

Alarm System	Fukuda Tone (1) Tone 1 to 4 (2) Tone 5 to 8	Melodic Tone	IEC Tone
Level L	(1) Melodic tone in interval of about 17 seconds (2) Single tone in interval of about 17 seconds	Melodic tone in interval of about 17 seconds	Single tone (twice) in interval of about 17 seconds
Sound: Device Status Alarm			
Level H	(1) Continuous melodic tone (2) Continuous single tone	Continuous melodic tone	Continuous single tone
Level M	(1) Melodic tone in interval of about 4 seconds (2) Single tone in interval of about 4 seconds	Melodic tone in interval of about 4 seconds	Single tone in interval of about 4 seconds
Level L	(1) Melodic tone in interval of about 17 seconds (2) Single tone in interval of about 17 seconds	Single tone in interval of about 17 seconds	Single tone (twice) in interval of about 17 seconds
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	Physiological Alarm: Setup can be performed. Device Status Alarm: Setup can be performed.	Physiological Alarm: Setup can be performed. Device Status Alarm: Setup cannot be changed.	
Level M			
Level L			
Setup other than above			
Ventilator Alarm Sound	Sound: Continuous single tone Tone: Cannot be changed. Volume: Can be adjusted.	Sound: Continuous melodic tone Tone: Cannot be changed. Volume: Can be adjusted.	Continuous single tone

Alarm Limit Range for Each Parameter

The alarm limit for the bedside monitor and central telemetry receiver can be set in the following range.

Item	Adjustable Range		[Auto] Setting *
	Lower Limit	Upper Limit	
	Adjustable Increments		
HR	20 bpm to 295 bpm	22 bpm to 300 bpm	Upper: current value +40 bpm Lower: current value -40 bpm
	60 bpm and below: 1 bpm increments 60 bpm and above: 5 bpm increments		
ST 12-Lead ST	-2.0 mV to +1.9 mV	-1.9 mV to +2.0 mV	Upper: current value +0.2 mV (+2 mm) Lower: current value -0.2 mV (-2 mm)
	0.1 mV increments		
	-20 mm to +19 mm	-19 mm to +20 mm	
	1 mm increments		
Δ ST 12-Lead Δ ST	-2.0 mV to +1.9 mV	-1.9 mV to +2.0 mV	Upper: current value +0.2 mV (+2 mm) Lower: current value -0.2 mV (-2 mm)
	0.1 mV increments		
	-20 mm to +19 mm	-19 mm to +20 mm	
	1 mm increments		

Item	Adjustable Range		[Auto] Setting *	
	Lower Limit	Upper Limit		
	Adjustable Increments			
QTc	200 ms to 796 ms	204 ms to 800 ms	None	
	4 ms increments			
RR (Adult)	5 Bpm to 145 Bpm	10 Bpm to 150 Bpm	Upper: current value +20 Bpm Lower: current value -20 Bpm	
	5 Bpm increments			
RR (Child/Neonate)	2 Bpm to 148 Bpm	4 Bpm to 150 Bpm		
	2 Bpm increments			
RR_SpO ₂ (Adult)	5 Bpm to 30 Bpm	10 Bpm to 35 Bpm	Upper: 30 Bpm Lower: 5 Bpm	
	5 Bpm increments			
RR_SpO ₂ (Child)	6 Bpm to 32 Bpm	8 Bpm to 34 Bpm	Upper: 30 Bpm Lower: 6 Bpm	
	2 Bpm increments			
Apnea	-	5 sec. to 60 sec.	15 sec.	
	1 second increments			
BP1 to BP8 (mmHg)	SYS	0 mmHg to 295 mmHg	2 mmHg to 300 mmHg	When BP label is BP1/ART: Upper: current value +40 mmHg (+5.0 kPa) Lower: current value -20 mmHg (-3.0 kPa) When BP label is other than BP1/ART: Upper: current value +20% Lower: current value -20%
	MEAN	0 mmHg to 295 mmHg	2 mmHg to 300 mmHg	
	DIA	0 mmHg to 295 mmHg	2 mmHg to 300 mmHg	
	0 mmHg to 50 mmHg: 2 mmHg increments 50 mmHg and above: 5 mmHg increments			
BP1 to BP8 (kPa)	SYS	0.0 kPa to 39.5 kPa	0.2 kPa to 40.0 kPa	
	MEAN	0.0 kPa to 39.5 kPa	0.2 kPa to 40.0 kPa	
	DIA	0.0 kPa to 39.5 kPa	0.2 kPa to 40.0 kPa	
	0 kPa to 7.0 kPa: 0.2 kPa increments 7.0 kPa and above: 0.5 kPa increments			
CVP	0.0 cmH ₂ O to 38 cmH ₂ O	2 cmH ₂ O to 40 cmH ₂ O		
	1 cmH ₂ O increments			
NIBP (mmHg)	SYS	10 mmHg to 295 mmHg	15 mmHg to 300 mmHg	Upper: current value +40 mmHg Lower: current value -20 mmHg
	MAP	10 mmHg to 295 mmHg	15 mmHg to 300 mmHg	
	DIA	10 mmHg to 295 mmHg	15 mmHg to 300 mmHg	
	5 mmHg increments			
NIBP (kPa)	SYS	1.5 kPa to 39.5 kPa	2.0 kPa to 40.0 kPa	
	MAP	1.5 kPa to 39.5 kPa	2.0 kPa to 40.0 kPa	
	DIA	1.5 kPa to 39.5 kPa	2.0 kPa to 40.0 kPa	
	0.5 kPa increments			
SpO ₂ /SpO ₂ -2	50% to 99%	51% to 100%	Upper: OFF Lower: 90%	
	1% increments			
Ext-SpO ₂ /Ext-SpO ₂ -2	50% to 98%	-	Adult/Child: Lower: SpO ₂ -10% Neonate: Lower: SpO ₂ -5%	
	1% increments			
PR/PR-2	20 bpm to 295 bpm	22 bpm to 300 bpm	Upper: current value +40 bpm Lower: current value -40 bpm	
	60 bpm and below: 1 bpm increments 60 bpm and above: 5 bpm increments			

Item		Adjustable Range		[Auto] Setting *	
		Lower Limit	Upper Limit		
		Adjustable Increments			
EtCO ₂		1 mmHg to 98 mmHg	3 mmHg to 115 mmHg	Upper: current value +10 mmHg (+1.3 kPa / +1.3%) Lower: current value -10 mmHg (-1.3 kPa / -1.3%)	
		1 mmHg increments			
		0.1 kPa to 13.1 kPa	0.3 kPa to 15.0 kPa		
		0.1 kPa increments			
		0.1% to 13.1%	0.3% to 15.0%		
		0.1% increments			
InspCO ₂		-	1 mmHg to 24 mmHg	3 mmHg (0.3 kPa / 0.3%)	
		1 mmHg increments			
		-	0.1 kPa to 3.0 kPa		
		0.1 kPa increments			
		-	0.1% to 3.0%		
		0.1% increments			
TEMP		30.0°C to 49.0°C	31.0°C to 50.0°C	Upper: current value +2°C (+3°F) Lower: current value -2°C (-3°F)	
		0.5°C increments			
		86.0°F to 120.0°F	88.0°F to 122.0°F		
		1.0°F increments			
GAS	O ₂ -E, O ₂ -I		18% to 100%	18% to 100%	N/A
			2% increments		
	N ₂ O_E, N ₂ O_I		0% to 100%	0% to 100%	N/A
			2% increments		
	ISO	Insp ISO	0.5% to 6.0%	0.5% to 6.0%	Depends on the detected gas type.
		Exp ISO	0.5% increments		
	SEV	Insp SEV	0.5% to 8.0%	0.5% to 8.0%	
		Exp SEV	0.5% increments		
	HAL	Insp HAL	0.5% to 6.0%	0.5% to 6.0%	
		Exp HAL	0.5% increments		
	ENF	Insp ENF	0.5% to 6.0%	0.5% to 6.0%	
		Exp ENF	0.5% increments		
	DES	Insp DES	0.5% to 18.0%	0.5% to 18.0%	
		Exp DES	0.5% increments		
MVe (Adult)		2.0 L/min to 18.0 L/min	4.0 L/min to 20.0 L/min	N/A	
		0.5 L/min increments			
MVe (Child/Neonate)		0.5 L/min to 4.5 L/min	1.0 L/min to 5.0 L/min	N/A	
		0.5 L/min increments			
PEAK		8 cmH ₂ O to 98 cmH ₂ O	10 cmH ₂ O to 100 cmH ₂ O	N/A	
		1 cmH ₂ O increments			
PEEP		2 cmH ₂ O to 48 cmH ₂ O	4 cmH ₂ O to 50 cmH ₂ O	N/A	
		1 cmH ₂ O increments			
SpCO/SpCO-2		-	1% to 40%	N/A	
		1% increments			

Item	Adjustable Range		[Auto] Setting *
	Lower Limit	Upper Limit	
	Adjustable Increments		
SpMet/SpMet-2	-	1% to 15%	N/A
	1% increments		
SpHb/SpHb-2	1.0 g/dL to 24.0 g/dL	2.0 g/dL to 24.5 g/dL	N/A
	0.1 g/dL increments		
SI	-	0.5 to 2.0	N/A
	0.1 increments		
RPP	10 to 290 (x100)	20 to 300 (x100)	N/A
	10 increments		

*: If the value exceeds the adjustable range, the limit within the range will be set.

The automatic setup will not be performed for the turned OFF limit.

Arrhythmia Type

The following arrhythmia alarm results can be displayed on this device.

CAUTION

- The arrhythmia detection result differs depending on the model type and software version of the bedside monitor and central telemetry receiver connected to the network.

Arrhythmia	Description	Detection Criteria (The arrhythmia analysis is performed on the bedside monitor.)
Asystole (Cardiac Arrest)	ON 3 sec. to 10 sec., 1 sec. increments	Cardiac arrest is detected for more than preprogrammed time.
VF (Ventricular Fibrillation)	ON	A random, rapid electrical activity of the heart is detected.
VT (Ventricular Tachycardia)	ON	9 or more continuous VPC beats are detected.* ¹
Slow VT	ON, OFF	9 or more continuous VPC beats are detected.* ²
Run (Consecutive VPC)	ON, OFF 2 beats to 8 beats, 1 beat increments	Continuous VPC exceeding the preprogrammed value (2 beats to 8 beats) is detected.* ³
Couplet (Couplet VPC)	ON, OFF	2 continuous VPC beats are detected.
Pause	ON, OFF 1.5 sec. to 5.0 sec., 0.5 sec. increments	Cardiac arrest exceeding the preprogrammed duration is detected.
Bigeminy (Ventricular Bigeminy)	ON, OFF	QRS pattern of V-x-V-x-V-x is detected.* ⁴
Trigeminy (Ventricular Trigeminy)	ON, OFF	QRS pattern of x-x-V-x-x-V is detected.* ⁴
Frequent (Frequent VPC)	ON, OFF 1 beat to 50 beats, 1 beat increments	VPC exceeding the preprogrammed value is detected within 1 minute.
Tachy (Tachycardia)	ON, OFF	The upper HR alarm limit is exceeded.
Brady (Bradycardia)	ON, OFF	The lower HR alarm limit is exceeded.

Arrhythmia	Description	Detection Criteria (The arrhythmia analysis is performed on the bedside monitor.)
Ext Tachy (Extreme Tachycardia)	ON, OFF 22 bpm to 300 bpm, 22 bpm to 60 bpm: 1 bpm increments 60 bpm to 300 bpm: 5 bpm increments	The upper alarm limit of extreme tachycardia is exceeded.
Ext Brady (Extreme Bradycardia)	ON, OFF 20 bpm to 295 bpm, 22 bpm to 60 bpm: 1 bpm increments 60 bpm to 295 bpm: 5 bpm increments	The lower alarm limit of extreme bradycardia is exceeded.
R on T (R on T VPC)	ON, OFF 200 ms to 600 ms, 8 ms increments	VPC with the RR interval of same or less than the set interval (200 ms to 600 ms) is detected.
Multiform (Multiform VPC)	ON, OFF	2 different forms of VPC beats are detected within 4 minutes.
Vent Rhythm (Ventricular Rhythm)	ON, OFF	Continuous VPC beats with HR below the set value for "HR Lower Limit for Run" (0 bpm to 100 bpm), and same or above value of the set beats for Run (2 beats to 8 beats) are detected.
SVT (Supraventricular Tachycardia)	ON, OFF 2 beats to 10 beats, 1 beat increments	Continuous SVPC exceeding the preprogrammed value (2 beats to 10 beats) is detected.* ⁵
AFib (Atrial Fibrillation)	ON, OFF 1% to 100%, 1% increments	Fluctuating value of RR interval continues to exceed the preset value for a certain period of time, and the learned P wave cannot be detected.* ⁶
Irregular RR (Irregular RR Interval)	ON, OFF 10% to 20%, 5% increments	RR interval variability exceeding the preprogrammed value (10% to 20%) is detected.
Prolonged RR (Prolonged RR Interval)	ON, OFF	RR interval of 1.75 times longer than the normal RR interval is detected.
Pacer Not Capture (Non-Capture)	ON, OFF 80 ms to 480 ms, 8 ms increments	HR is not detected from the pacing pulse within the set duration.
Pacer Not Pacing (Oversensing)	ON, OFF 20 bpm to 200 bpm, 20 bpm to 150 bpm: 5 bpm increments 150 bpm to 200 bpm: 10 bpm increments	Pacing pulse and HR are not detected during the set instant HR.
Triplet (Triplet VPC)	ON, OFF	3 continuous VPC beats are detected.
S Frequent (Frequent SVPC)	ON, OFF 1 bpm to 50 bpm, 1 bpm increments	SVPC exceeding the preprogrammed value is detected within 1 minute.
S Couplet (Couplet SVPC)	ON, OFF	2 continuous SVPC beats are detected.
VPC (Ventricular Extrasystole)	ON, OFF	VPC is detected.
SVPC (Supraventricular Extrasystole)	ON, OFF	SVPC is detected.

*1: HR of same or above the set value of "HR Lower Limit for VT" (120 bpm to 200 bpm)

*2: HR of same or above the set value of "HR Lower Limit for SlowVT" (100 bpm to 180 bpm), and below the set value of "HR Lower Limit for VT" (120 bpm to 200 bpm)

*3: HR of same or above the set value of "HR Lower Limit for RUN" (0 bpm to 100 bpm)

*4: * indicates N, P, F, ?.

*5: HR of same or above the set value of "HR Lower Limit for SVT" (100 bpm to 250 bpm)

*6: AFib can be detected only when the patient classification is "Adult". If the patient classification is "Child" or "Neonate", AFib cannot be detected.

Numeric Data Box Size Range

The adjustable size of the numeric data box depends on the parameter.

Adjustable Size of the Numeric Data Box

Yes: Setup can be performed.

- Setup cannot be performed.

Parameter	Size						
	W6xH1	W6xH2	W6xH3	W3xH1	W3xH2	W3xH3	W1.5xH1
HR	Yes	Yes	Yes	Yes	Yes	Yes	Yes
PR_SpO ₂ , PR_SpO ₂ -2	Yes	Yes	Yes	Yes	Yes	Yes	Yes
PR_IBP	Yes	Yes	Yes	Yes	Yes	Yes	Yes
VPC, PACE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ST, VPC	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ST-A, ST-B, ST-C	-	Yes	Yes	-	Yes	Yes	-
BP1 to BP8	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NIBP	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NIBP List	Yes	Yes	Yes	Yes	Yes	Yes	-
SpO ₂ , SpO ₂ -2	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SpCO, SpCO-2	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SpMet, SpMet-2	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SpHb, SpHb-2	-	-	-	Yes	Yes	-	Yes
SpO ₂ , PR_SpO ₂	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SpO ₂ -2, PR_SpO ₂ -2	Yes	Yes	Yes	Yes	Yes	Yes	Yes
RR_IMP	Yes	Yes	Yes	Yes	Yes	Yes	Yes
RR_GAS	Yes	Yes	Yes	Yes	Yes	Yes	Yes
RR_VENT	Yes	Yes	Yes	Yes	Yes	Yes	Yes
RR_SpO ₂	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T1 to T8	-	-	-	Yes	Yes	-	Yes
Tb	-	-	-	Yes	Yes	-	Yes
T1,T2	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T3,T4	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T5,T6	Yes	Yes	Yes	Yes	Yes	Yes	Yes
T7,T8	Yes	Yes	Yes	Yes	Yes	Yes	Yes
VENT	-	-	-	-	Yes	Yes	-
SvO ₂ , CO	-	Yes	Yes	-	Yes	Yes	-
BIS	Yes	Yes	Yes	Yes	Yes	Yes	Yes
INVOS	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CO ₂	Yes	Yes	Yes	Yes	Yes	Yes	Yes
O ₂	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N ₂ O	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Agent	Yes	Yes	Yes	Yes	Yes	Yes	Yes
RR, CO ₂ , Agent, O ₂ , N ₂ O	-	Yes	Yes	-	Yes	Yes	-
CO ₂ , Agent, O ₂ , N ₂ O	-	Yes	Yes	-	Yes	Yes	-

Adjustable Size of the Numeric Data Box

Yes: Setup can be performed.

- Setup cannot be performed.

Parameter	Size						
	W6xH1	W6xH2	W6xH3	W3xH1	W3xH2	W3xH3	W1.5xH1
RR, Agent, O ₂ , N ₂ O	-	Yes	Yes	-	Yes	Yes	-
Agent, O ₂ , N ₂ O	-	Yes	Yes	-	Yes	Yes	-
Agent, N ₂ O	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SPIRO	-	Yes	Yes	-	Yes	Yes	-
GAS, SPIRO	-	Yes	Yes	-	Yes	Yes	-
CO, SV, SVV	-	Yes	Yes	-	Yes	Yes	-
VENT-A	Yes	Yes	Yes	Yes	Yes	Yes	-
VENT-B	Yes	Yes	Yes	Yes	Yes	Yes	-
Hemo/etc-A	Yes	Yes	Yes	Yes	Yes	Yes	-
Hemo/etc-B	Yes	Yes	Yes	Yes	Yes	Yes	-
QTc	Yes	Yes	Yes	Yes	Yes	Yes	Yes
QTc-A, QTc-B, QTc-C	-	Yes	Yes	-	Yes	Yes	-
Scoring	Yes	Yes	Yes	Yes	Yes	Yes	Yes
ODI	Yes	Yes	Yes	Yes	Yes	Yes	-
SI	Yes	Yes	Yes	Yes	Yes	Yes	-
RPP	Yes	Yes	Yes	Yes	Yes	Yes	-

FUKUDA DENSHI CO.,LTD.

3-39-4 Hongo, Bunkyo-ku, Tokyo 113-8483 Japan
Tel: +81-3-5684-1455 Fax: +81-3-3814-1222
<https://fukuda.com/>

Printed in Japan 4L0120910 202304