

DYNASCOPE 1000 Series Patient Monitor

DS-1200 system

Ver. 01

Maintenance 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-1200 System Version 01.

 CAUTION

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

CAUTION

- Only physician or persons instructed by physicians are allowed to use the equipment.
- The information contained in this document is subject to change without notice due to improvement in the equipment.

© 2022 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.....	iii

Safety

About the Safety Precautions.....	i
The Meaning of Each Safety Precaution.....	i
Graphic Symbols.....	i
Precautions for Safe Operation of Medical Device.....	ii
Precautions about the Maintenance	iv
Precautions about the Network System	iv
Medical Telemetry.....	iv
Precautions when Using with Other Device	v
Pacemaker	v
Non-Explosion Proof	v
Defibrillator	vi
Electrosurgical Instrument.....	vi
MRI (Magnetic Resonance Imaging).....	vii
Precautions about Connections to Peripheral Devices	vii
Precautions for Using the Device	viii
This System.....	viii
Wired Network (DS-LANIII)	xviii
Wireless Network System	xix
RTC and Data Backup	xx
Precautions about the Ventilator Monitoring.....	xx
Precautions about the SpO ₂ Sensor	xxi
Precautions about the Masimo Model	xxi
Precautions about the NIBP Cuff.....	xxi
Precautions about Disposing of the Device, Accessories, or Components.....	xxi
Precautions about Transportation	xxi
Monitoring after Power Failure	xxi
To Prepare for Emergency Use.....	xxii
Electromagnetic Compatibility	xxii
Precautions for Safe Operation under Electromagnetic Influence	xxii
EMC Guidance	xxiii

Chapter 1 Installation of the Unit

Precautions for Installing the Device	1-1
Operating Environment.....	1-1
System Construction.....	1-2
Connecting the Multigas Module	1-4
Connecting the External Monitor	1-5
Power Source and Ground Connection.....	1-6
Power Connection of the Main Unit.....	1-6
Equipotential Grounding	1-7
Installing the Battery Pack (BTO-005)	1-7
Installing the attachment for Monitor (OAO-70A).....	1-8

Chapter 2 Network System Construction

Wired Network System	2-1
DS-LAN Connection	2-1
DS-LAN Setup	2-2
Precautions about the DS-LAN.....	2-3
Wireless Network.....	2-4
Example of Wireless Network Construction.....	2-5
Channel ID and Telemetry Wave Setup	2-5

Chapter 3 Using the External Media

Formatting the Full Disclosure Waveform Card.....	3-1
Formatting the USB Memory	3-2

Chapter 4 Connection to the External Devices

Ventilator Measurement and Alarm Input	4-1
Ventilator Connection	4-3
External Device Setup	4-5
SvO ₂ /CCO Monitor Connection	4-6
SvO ₂ /CCO Monitor Connection	4-7
External Device Setup	4-8
CO ₂ Concentration Data Input.....	4-8
Connecting the MG-110/ MG-120.....	4-8
Connecting the Capnostat 5	4-8
Connecting the Sampling Line (Medtronic).....	4-9
BIS Data Input	4-9
Connecting the A-2000/A-3000 (Medtronic)	4-10

External Device Setup	4-10
Connecting the BISx (Medtronic)	4-11
INVOS Data Input.....	4-11
Connecting to the INVOS	4-11
External Device Setup	4-11
FLOW-i Data Input.....	4-12
Connection with the FLOW-i	4-12
External Device Setup	4-13
Transcutaneous Blood Gas Monitor Data Input	4-13
Connecting the Transcutaneous Blood Gas Monitor.....	4-14
External Device Setup	4-14
Root Data Input	4-15
NIRO-200NX Data Input.....	4-15
Setup for the External Device Connection.....	4-16
External Device Setup	4-16
Unit Module Setup	4-17
Status Output Setup	4-19
Analog Output Setup	4-20
Using the Magnetic Card Reader	4-21
Connecting the Magnetic Card Reader	4-21
Magnetic Card Reader Setup	4-21
PC Communication.....	4-25
Connection with the System.....	4-25
External Device Setup	4-25
Connection with the Laser Printer	4-26
Laser Printer Setup	4-26

Chapter 5 Initial Settings

Initial Settings	5-1
Administrator Setup	5-2
Key Lock.....	5-2
Password Setup	5-3
Alarm Related Setup	5-4
Measurement Related Setup.....	5-9
User Label Setup.....	5-9
Measurement Unit	5-10
Other Setup	5-11
User I/F	5-13
Display/Print Setup.....	5-13
Power ON/Discharge.....	5-18
Menu Setup	5-21
Key Mask.....	5-22
Remote Control Setup.....	5-23
Operation Related Setup.....	5-26
Drug Calculation.....	5-26
System Setup	5-27
User Mode Registration.....	5-28

About the User Mode.....	5-28
To Program the User Mode	5-29

Chapter 6 Setup Item/Default Value

Setup Item	6-1
Initial Settings	6-1
External Connection (Pin Assignments)	6-35
RS-232C Connector Output Signal.....	6-35
Status I/O Signal (Status II Connector).....	6-35

Chapter 7 Replacement Parts

Periodic Replacement.....	7-1
To Check the Periodic Replacement Period.....	7-1
Disposing the Device	7-2

Chapter 8 Cleaning/Disinfecting/Storing

After Usage/Handling the Device.....	8-1
After Using the Device.....	8-1
Display	8-1
Storing the Device and Recording Paper	8-1
Device.....	8-1
Recording Paper.....	8-2
Cleaning the Device and Sensors	8-2
Touch Panel.....	8-2
Housing.....	8-3
NIBP Cuff and Air Hose.....	8-4
BP Transducer.....	8-4
SpO ₂ Sensor.....	8-4
Temperature Probe.....	8-5
Cardiac Output Relay Cable.....	8-5
Airway Adapter for Capnostat 5.....	8-5
Water Trap (Multigas Module)	8-5
BISx	8-7

Chapter 9 Maintenance Check

Daily and Periodic Check.....	9-1
-------------------------------	-----

Maintenance Check.....	9-1
Daily Check Items and Procedures	9-2
Periodic Check Items and Procedures	9-4
Handling the Lithium-Ion Battery Pack (BTO-005)	9-9
Gas Measurement Accuracy Check Procedure (MG -110/ MG -120)	9-9
CO ₂ Calibration (HC -110).....	9-11
Self-Diagnosis Function.....	9-12
Program Version.....	9-13
Software Install	9-13
bsd-2-clause	9-14
bsd-3-clause	9-14
eCos-2.0	9-15
gpl-2.0	9-15
ibm-pibs	9-20
isc	9-20
lgpl-2.0.....	9-21
lgpl-2.1.....	9-27
OFL	9-34
x11.....	9-35

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 equipment is designed for the following <Intended Use>.

<Intended Use>

This equipment is intended for measuring parameters such as ECG, respiration, NIBP, pulse rate, SpO₂, SpCO, SpMet, pulse wave, temperature, BP, CO, respiration gas (concentration of CO₂, N₂O, volatile anesthetic agent, O₂), spirometry, BIS, brain wave, and monitors patient condition by displaying/printing the measurement data on this equipment or central monitor and generates alarm as required.

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

The 12-lead ECG analysis function is intended to follow up adult and pediatric patients for before/after surgery and after the procedure.

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

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

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

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

Copyright

- (1) The copyright of this manual is owned by Fukuda Denshi. No part of this document may be copied or transmitted in any form without the prior written permission of Fukuda Denshi Co., Ltd.
- (2) This manual includes the description for the optional 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-1200 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, 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.: [Display Config.], [Manual Printing], etc.)

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

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

Composition of This Manual

The operation manual is composed of the following chapters.

Chapter Title	Description
Preface	Outline and purpose of this manual (Important Notice, About This Manual)
Safety	Warning, Precautions for Safety
1.General Description	Composition, features, menu configuration of this device
2.Name of Parts and Their Functions	Name and function of each part, external appearance
3.Operation Procedure and Screen Examples	Operation procedure, home display, window, procedure to return to the previous display, user key setup
4.Preparation	Installing the recording paper, power ON/OFF, time/date, daily checks
5.Admit/Discharge	Entering patient information (name, age, etc.) at admittance, discharging the patient, user mode selection, suspend monitoring
6.Alarm Function	General description of alarm function, alarm-related setups
7.Monitoring	Measurement condition setup of the monitoring parameters, size/scale setup, etc. Setup of the stop watch, connector
8.Review Function	Arrhythmia analysis, 12-lead analysis, trend, recall, NIBP list, ST measurement, hemodynamics, lung function, alarm history, other bed display, full disclosure waveform

Chapter Title	Description
9. Printing	Recorder output function
10. System Configuration	Setup of the display configuration, tone/volume, color, etc.
11. Troubleshooting	Message list, maintenance and troubleshooting of this device
12. Setup Item/Default Value	Setup details and default value
13. Accessories	List of accessories and optional accessories of this device.
14. Specification	Specification and performance of this 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
1.Installation of the Unit	Precautions about the operating environment, system construction
2.Network System Construction	Network connection and setup
3.Using the External Media	Procedure to use the external media
4.Connection to the External Devices	External device connection/setup, magnetic card reader usage
5.Initial Settings	Initial setup, administrator setup, alarm/measurement setup, user I/F, user mode registration
6.Setup Item/Default Value	Default and backup of setup items
7.Replacement Parts	Precautions about the periodic replacement parts, consumable parts
8.Cleaning/Disinfecting/Storing	Procedure to handle, clean, store this device
9. Maintenance Check	Daily and periodic checks, self-diagnosis function, software version software install




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

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

Symbol	Description
	Follow operating instructions (Warning); indicated in blue. Failure to follow operating instructions could place the patient or operator at risk.
	Follow operating instructions (Information); Indicates the need to refer to the related accompanying documents before operation.
	General precaution
	Caution
	Potential Equalization Terminal Indicates the terminal to equalize the potential difference when interconnecting the devices.
	Protective Earth Indicates the protective earth inside the equipment.
	Alternating Current (Main Power Input Indicator)
	Indicates that the equipment is in normal operation.
	Indicates that the equipment is in standby mode.
	Type CF Applied Part with Defibrillation-Proof Indicates the degree of protection against electric shock is Type CF Applied Part with defibrillation-proof.
	Type BF Applied Part with Defibrillation-Proof Indicates the degree of protection against electric shock is Type BF Applied Part with defibrillation-proof.
	Signal Output
	GAS Input Part

Symbol	Description
	GAS Output Part
	Signal Input Part
	TCP/IP Network Connector Connects to TCP/IP network.
	RS-232C Connector Connects the related device.
	Indicates prohibited actions. Refer to the instruction.
	Indicates mandatory or instructed actions. Refer to the instruction.
	Battery
	Date of Manufacture Indicates the date of manufacture.
	Name and Address of Manufacturer Indicates the name and address of manufacturer.
	WEEE (Waste Electrical and Electronics Equipment) Indicates a separate collection for electrical and electronic equipment.
IPX1	Waterproof (IPX1): Protection against water drops.
IPX2	Waterproof (IPX2): Protection against water drops falling vertically over 15 degrees range.
	Alarm Silence
	NIBP Start/Stop
	NIBP Periodic Measurement
	Lock
	Unlock
	Signal Input/Output Indicates the connector which inputs/outputs the signals.
	USB Connector Indicates the USB connector.

Precautions for Safe Operation of Medical Device

CAUTION

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

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.
- ♦ Make sure to secure the device during usage.
- ♦ Do not place this device or accessories in any position that might cause it to fall on the patient.
- ♦ Do not place this device where the controls can be changed by the patient.
- ♦ Do not place this device on electrical device that may affect the device.
- ♦ To minimize wireless interference, other electrical device that emits radio waves should not be in close proximity to this device.

Precautions Before Using the device

- ♦ Verify the power voltage. Charge the battery pack fully before operating the system with the battery pack.
- ♦ Check the cable connection and polarity to ensure proper operation of the 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 Using 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.
- ♦ On start-up of the system, verify that the start-up tone generates and alarm indicator lights.
- ♦ For the connectors which are not Type BF, CF applied part, do not touch them and the patient at the same time.

Precautions After Using the device

- ♦ Unplug all the cables from the patient before turning off the power.
- ♦ When unplugging the cables, make sure to pull from the connector part of the cable and avoid applying excessive force.
- ♦ Clean the accessories and cables, and keep them together in one place.
- ♦ Keep the device clean to ensure proper operation for the next use.
- ♦ Before cleaning, be sure to turn off the power and unplug from all the power cables.

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.
- ♦ If water or other liquids enter the device, cease using the device and contact your nearest service representative.

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.

☐ Precautions when Using with Other device

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

Precautions about the 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.
- ♦ This device will return to standard operating mode within 10 seconds after defibrillating. However, when in diagnosis mode, it may require 10 seconds or more after defibrillation to display the normal ECG waveform as the time constant setting is large.
The stored data will not be affected. The measurement accuracy will temporarily decrease during defibrillation, but it will not compromise the safety of patient and the device.
- ♦ The QRS synchronized signal is not intended to be used as synchronized signal for defibrillator.

Electrosurgical Instrument

⚠ WARNING

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

Location:

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

Power Supply:

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

Electrode Placement

The amount of noise interference is considerably different depending on the electrode position and surgery site. Place the ECG electrodes as far away as possible from the surgery site and the ground plate. Do not place electrodes in the path between the surgery site and the ground plate. If the electrodes are placed in this path, the amount of interference will be quite large. Position (+) and (–) electrodes as close as possible to each other.

To reduce the hazard of burns during high-frequency surgical procedure, ensure that electrodes, sensors and transducers never come into contact with the high-frequency surgical units.

Ground Plate


When using electrosurgical instruments, make sure the contact between the patient and the ground plate is secure. If the connection is incomplete, the patient may suffer from burn at the electrode site. The electrode should also be attached as far away from the surgery site as possible to decrease the risk of burns. To decrease risk of burns, make sure that the cables, sensors and transducer are located in a place where an electrosurgical instrument will not contact.

- ♦ The stored data will not be affected. The measurement accuracy will temporarily decrease during electrosurgery, but it will not compromise the safety of patient and the device.

- ♦ When using the electrosurgery-proof type ECG relay cable, the impedance respiration cannot be measured, and its numeric data and waveform will not be displayed. When measuring in an environment where electrosurgery is not performed, make sure to use the standard ECG relay cable.
- ♦ As this device utilizes capacitive touch panel, the energy from the electrosurgical knife may pass through the cable to the touch panel causing unintentional touch panel control. Locate the cables as far away as possible from the touch panel.

MRI (Magnetic Resonance Imaging)

WARNING

 MR Unsafe-Keep away from magnetic resonance imaging (MRI) 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 about Connections to Peripheral Devices

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.

WARNING

- ♦ When multiple devices are connected to the patient, it may be necessary to take measures for connection (use of separation device), power supply (use of isolation power), grounding (additional protective earth). If these measures are not properly taken, a leakage current may flow between the devices, or the total amount of leakage current may exceed the limit specified on IEC 60601-1-1.
- ♦ Only the peripheral devices specified by Fukuda Denshi should be connected with the given procedure. Use of an unspecified device may cause electric shock to the patient and/or operator due to excessive leakage current.

CAUTION

- ♦ Although the peripheral device connectors on the DS-1200 System are, with some exceptions, isolated from the power supply, the connecting peripheral devices should comply with IEC 60601-1. It is the user's responsibility to verify that the overall system complies with IEC 60601-1-1.
- ♦ To prevent danger of electric shock, always position the peripheral devices away from the patient.
- ♦ Network device including printer and hub should be located outside the "Patient Environment". If located inside the "Patient Environment", it may result in electric shock to the patient or the operator.
- ♦ Combinations of medical device with non-medical device must comply with IEC 60601-1-1 or IEC 60601-1. Never use a multiple portable socket-outlet or extension cable when connecting the devices unless it is supplied specifically for use with that device.

Precautions for Using the Device

This System

DANGER

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

WARNING Warnings about the System

- ◆ Do not connect any device or cable not authorized by Fukuda Denshi to any I/O connector. Also, do not connect any damaged device or cable. The device cannot deliver its maximum performance, the device may be damaged and safety cannot be ensured.
- ◆ 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. If using the device under condition other than specified, contact your nearest representative.
- ◆ Use only the supplied 3-way AC power cable. Use of other cables may result in electric shock to the patient and the operator.
- ◆ The power cable must be connected to a hospital grade outlet.
- ◆ When using multiple ME device simultaneously, perform equipotential grounding to prevent potential difference between the devices. Even a small potential difference may result in electric shock to the patient and the operator.
- ◆ Carefully route the cables to avoid patient entanglement and strangulation.
- ◆ When lifting this device, hold the bottom part of the main unit.
- ◆ Damage to the LCD may cause leakage of liquid crystal. In such case, do not touch the leaked liquid crystal with bare hands, or put it into your mouth as it may cause intoxication. If the liquid crystal accidentally enters the eyes or mouth, wash off immediately with water and consult a physician.
- ◆ To ensure safety, avoid stacking multiple devices or placing anything on the device during operation.
- ◆ To prevent injury, follow the directions below:
 - ◆ Avoid placing the device on liquid on surface with visible liquid spills.
 - ◆ Do not soak or immerse the device in liquids.
 - ◆ Do not sterilize the device.
 - ◆ Use cleaning solutions only as instructed in this operation manual.
 - ◆ Do not disinfect the device while monitoring patient.

WARNING Warnings about the monitoring

- ◆ The patient classification selection influences the precision of the QRS detection and NIBP measurement. Make sure the proper selection is made.
- ◆ The pacemaker usage setting influences the precision of the QRS detection and arrhythmia analysis. Make sure the correct selection is made.
- ◆ If the QRS pace mask function is set to [OFF], [10ms]/ [20 ms], the pace pulse may be erroneously be detected as a QRS complex and HR alarm or asystole alarm may not generate due to incorrect HR (counting pace pulse as QRS complex). Set this function to [OFF], [10ms]/ [20ms] only if you are sure that pacing failure will not occur, or when the patient can be constantly monitored.
- ◆ Before bathing the patient, make sure to remove the sensor and device from the patient.
- ◆ When measuring the SpO₂ of patient with high fever or peripheral circulatory insufficiency, check the sensor attachment periodically and change the attachment site. The temperature of the attachment site will rise due to the sensor heat which may result in burn injury.

- ♦ For the following case, accurate measurement of SpO₂ may not be possible.
 - ♦ Patient with excessive abnormal hemoglobin (COHb, MetHb)
 - ♦ Patient with the pigment injected to the blood
 - ♦ Patient receiving CPR treatment
 - ♦ When a sensor is applied to a limb with NIBP cuff, arterial catheter, or intracatheter
 - ♦ When measuring at site with venous pulse
 - ♦ Patient with body motion
 - ♦ Patient with small pulse
- ♦ When a patient is receiving a photodynamic therapy, measuring SpO₂ on a same site for a long duration may cause blisters from the irradiation light of the SpO₂ sensor. Make sure to periodically change the sensor attachment site.
- ♦ Before the measurement, make sure the patient classification (Adult/Child/Neonate) is properly selected. Otherwise, correct measurement cannot be performed, and congestion or other injury may result.
- ♦ When the system alarm is suspended, all the alarm will be suspended even if the parameter alarm is set to [ON]. Also, the alarms will not be stored as recall events.
- ♦ If the upper/lower alarm limit of the parameter is set to [OFF], or if , arrhythmia alarm is set to [OFF], alarm will not function even if the system alarm is enabled. Pay attention when setting them [OFF].
- ♦ Objective and constant arrhythmia detection is possible through the fixed algorithm incorporated in this unit. However, excessive waveform morphology change, motion artifact, or the inability to determine the waveform pattern may cause an error, or fail to make adequate detection. Therefore, physicians should make final decisions using manual printing, alarm printing and recall waveform for evaluation.
- ♦ The RR/APNEA alarm will not be generated unless the numeric data box corresponded to the selected RR/APNEA alarm source is displayed. Make sure to display the numeric data box for the RR/APNEA alarm source.
- ♦ The SpO₂ respiration measurement is not intended for use as an APNEA monitor.
- ♦ When selecting [0] for "Volume" or [Timer] for "Display" for the Night Mode, pay attention not to miss any important alarm by simultaneously monitoring the patient on central monitor or other monitors.
- ♦ When the alarm sound is suspended, the alarm sound will not generate for the fixed amount of time. Pay attention not to miss any important alarm by simultaneously monitoring the patient on central monitor or other monitors.
- ♦ If the safety of the patient cannot be ensured, do not suspend the alarm or decrease the alarm volume.
- ♦ The oxygenator mode is intended to prevent alarms during cardiopulmonary bypass surgery. Pay special attention when using this mode as the alarm generation will not be the same as to the standard monitoring mode.
- ♦ If the "Alarm Setting" under the Oxygenator Mode Setup is set to [All OFF], all vital alarm will not generate regardless of the alarm setting of each parameter. Also, if [Sel. Parameter] is set, vital alarm for unselected parameter will not generate. Pay attention to not miss any significant change of the patient's vital sign as the alarms will not be generated during the Oxygenator Mode.
- ♦ Once the cardiopulmonary bypass is finished, make sure to cancel the Oxygenator Mode and return to the standard monitoring mode.

**WARNING**

Warnings about the CO₂ Monitoring
(HC-110, HC-120)

- ♦ Only one of either HC-110/HC-120 can be connected.
- ♦ When using a sampling line for intubated patients with a closed suction system, do not place the airway adapter between the suction catheter and endotracheal tube. This is to ensure that the airway adapter does not interfere with the functioning of the suction catheter.
- ♦ To prevent cross-infection, do not allow the sampling gas to return to the breathing system.
- ♦ To protect the hospital staffs from unnecessary anesthetic agent when using the HC-110, it is strongly

recommended to connect the exhaust hole to the gas exhaust system in the hospital.

- ♦ Loose or damaged connections of the sampling line may compromise ventilation or cause an inaccurate measurement of respiratory gases. Securely connect all components and check connections for leaks according to standard clinical procedures.
- ♦ Do not cut or remove any part of the sampling line. It could lead to erroneous readings.
- ♦ If too much moisture enters the sampling line (i.e., from ambient humidity or breathing of unusually humid air) when using the HC-110, <Check Sample Line> will be displayed in the message area. Replace the sampling line once this message is displayed.
- ♦ Carefully route the sampling line to reduce the possibility of patient entanglement or strangulation.
- ♦ Do not lift the HC-110 by the sampling line, as the sampling line could disconnect from the device, causing the device to fall on the patient.
- ♦ CO₂ readings and respiratory rate can be affected by sensor application errors, certain ambient environmental conditions, and certain patient conditions.



WARNING

Warnings about the Gas Monitoring (MG-110/120)

- ♦ Make sure to use only the specified Mindray Medical Sweden AB product.
(☞ "Anesthetic Gas Concentration Measurement (Manufactured by Mindray Medical Sweden AB)" P13-10)
- ♦ Be careful not to damage the water trap during operation as bacteria and/or mucus may contaminate the equipment.
- ♦ The airway adapter, sampling line, flow sensor are disposable products that are intended for single patient use only. Do not reuse them on other patients as it may cause cross-infection.
- ♦ To prevent cross-infection, do not allow the sampling gas to return to the breathing system.
- ♦ When using a sampling line for intubated patients with a closed suction system, do not place the airway adapter between the suction catheter and endotracheal tube. This is to ensure that the airway adapter does not interfere with the functioning of the suction catheter.
- ♦ Do not use the equipment with the flammable anesthetic agents.
- ♦ To protect the hospital staffs from unnecessary anesthetic agent, it is strongly recommended to connect the exhaust hole to the gas exhaust system in the hospital.
- ♦ The sampling line may get clogged by internal condensation.
- ♦ The contents of the water trap should be handled as a potential infection hazard.
- ♦ Do not use adult/pediatric type water traps and/or sampling lines with neonates to avoid high sampling flow.
- ♦ Connect only DRYLINE gas sampling lines to the water trap. Note that there may be other compatible tubing present, e.g. IV-lines.
- ♦ Do not use DRYLINE neonatal sampling lines (blue luer lock nuts) with DRYLINE adult water traps as this could result in incorrect measurement data.
- ♦ Do not use DRYLINE adult sampling lines (colorless luer lock nuts) with DRYLINE neonatal water traps as this could result in incorrect measurement data.
- ♦ Only combine the SPIRIT Flow Sensors and DRYLINE Water Traps as specified. Other combinations might lead to incorrect measurements.
(☞ "Connecting to the Respiration Circuit" P7-90)
- ♦ Use the adult flow sensor for a patient whose tidal volume is above 150 mL.
- ♦ Use the pediatric flow sensor for a patient whose tidal volume is below 300 mL.
- ♦ Make sure to use the correct flow sensor depending on the patient conditions, adult or pediatric and the tidal volume.
- ♦ Do not confuse the gas sampling line with other compatible tubing, e.g. IV-lines.




WARNING

Warnings about the 12-Lead ECG Analysis Function


- ♦ The 12-Lead ECG analysis function is designed to acquire and interpret ECG data from a resting, supine

patient. If ECG signals from moving or shaking patients are acquired, erroneous 12-lead interpretation result may occur. Always ensure that the patient is kept motionless during 12-lead ECG signal acquisition and analysis.


- ♦ The 12-lead ECG analysis function is intended for use with adult and pediatric patients.
- ♦ All computerized ECG analysis results should be reviewed by a physician before making decision for the patient treatment.

 **WARNING** Warnings about the BIS Monitoring

- ♦ Clinical judgment should always be used when interpreting BIS in conjunction with other available clinical signs. Reliance on BIS alone for intra-operative anesthetic management is not recommended.
- ♦ BIS values should also be interpreted cautiously with certain anesthetic combinations, such as those relying primarily on either ketamine or nitrous oxide/narcotics to produce unconsciousness.
- ♦ As with any monitored parameter, artifacts and poor signal quality may lead to inappropriate BIS values. Potential artifacts may be caused by poor skin contact (high impedance), muscle activity or rigidity, head and body motion, sustained eye movements, improper sensor placement and unusual or excessive electrical interference.

 **CAUTION** Precautions about the System

- ♦ Do not assess the patient's condition only with the information from this device. A clinical judgment based on the information from the device should be made by a doctor who fully understands functions of the device, in a comprehensive manner combined with clinical findings and other test results.
- ♦ Do not assess the patient's condition only with the alarm from this device. When the alarm is set to OFF or if the alarm priority is low, a sudden change 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.
- ♦ When measuring for a long period of time, make sure not to compress the patient with the lead cables and the electrodes. Compressing the same site for a long duration may inhibit the blood flow and generate compression necrosis and burn injury.
- ♦ Use only the spare parts specified for this device. Otherwise, proper function cannot be executed.
- ♦ Do not use the touch panel with the film attached. It may cause malfunction or damage the touch panel.
- ♦ For quality improvement, specifications are subject to change without prior notice.
- ♦ This 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.
- ♦ This device is intended to be used for only one patient.
- ♦ 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 lithium-ion battery.
- ♦ Although the LCD utilizes highly accurate picture elements, occasionally, there may be a few pixels which do not light or constantly light. Please note that this is not an device failure, and will not affect monitoring operation.
- ♦ Exposing LCD panel to intense light may deteriorate display property. Do not expose the panel to direct sunlight or strong ultra violet (UV) light.
- ♦ The lithium-ion battery can only be charged in the specified operational temperatures of the device. Refer to the operation manual of the lithium-ion battery (BTO-005) for details.

 **CAUTION** Precautions about the ECG Monitoring

- ♦ If any electrodes get detached from the patient after being connected to the lead cable and patient monitor, pay attention that the metal part of the electrode does not get in touch with any metal parts of the bed or any conductive parts. Also, the operator should not touch any conductive parts with bare hands. Otherwise, it may

cause electric shock to the patient and/or operator due to excessive leakage current.

- ◆ The indication for continuous use of the electrode is about one day.
- ◆ Replace the electrode if the skin contact gets loosen due to perspiration, etc.
- ◆ When an electrode is attached to the same location for a long period, some patients may develop skin irritation. Check the patient's skin condition periodically and change the electrode site as required.
- ◆ For stable arrhythmia detection and ECG monitoring, verify proper electrode placement, lead, waveform size, and filter mode selection. If not properly selected, it may cause erroneous detection.
- ◆ The threshold level for arrhythmia detection changes with ECG waveform size. Set a proper waveform size for monitoring.
 - ◆ When the ECG waveform size is $x1/4$, $x1/2$, or $x1$, the arrhythmia detection level is $250 \mu V$.
 - ◆ When the ECG waveform size is $x2$ or $x4$, the arrhythmia detection level is $150 \mu V$.
- ◆ The leads for arrhythmia detection, central monitor display, printing are fixed as ECG1 and ECG2. Set the most appropriate leads with high QRS for ECG1 and ECG2, especially for arrhythmia detection. If the QRS amplitude for the set lead is low, it may cause erroneous arrhythmia detection.
- ◆ In ESIS Mode, artifacts such as electrosurgical noise or EMG can be largely reduced, but QRS amplitude attenuation, waveform distortion, or ST segment change may occur compared with other filter modes.
- ◆ The ESIS mode cannot completely reduce the electrical noise, and may erroneously detect the pacemaker spike. This mode should be selected only when a high frequency noise largely affects the HR measurement.
- ◆ There are some cases when the pacemaker pulse cannot be detected depending on the pacemaker type, pulse voltage, pulse width, electrode lead type (unipolar, bipolar), or electrode placement which causes the pacemaker pulse amplitude to decrease, and disables the pacemaker pulse detection.
- ◆ If signals similar to a pacemaker pulse are present, such as electric blanket noise or excessive AC frequency noise, these may be erroneously detected and displayed as a pacemaker pulse.
- ◆ When a spontaneous QRS and pacemaker pulse overlap (ex. fusion beat, etc.), QRS detection cannot be performed properly. In this case, the heart rate is degraded.
- ◆ If a pacemaker pulse is continuously detected due to AC frequency interference, QRS detection will be suspended and the heart rate will be reduced. Arrhythmia will not be detected either.

CAUTION Precautions about the ST Measurement


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

CAUTION Precautions about the 12-Lead Analysis

- ◆ Interpretation and Minnesota codes given by this device do not instruct the physician as to the kind and degree of cardiac disease. Accordingly, four value judgments are given for ECG waveform and although "abnormal" indicates a large possibility of organic cardiac disease, there are cases where no cardiac disease exists despite an abnormal ECG (that is, an abnormal ECG may be caused by something other than heart).
On the other hand, care should be taken in the event any preclinical coronary arteriosclerosis could be present despite a normal ECG interpretation.
Therefore, for a proper diagnosis, the ECG should be integrated with other interpretations.
- ◆ ECG Recording by the Mason-Likar System
The 12-lead ECG recorded with the torso placement of the limb leads (Mason-Likar 12-lead system) may differ from the standard 12-lead ECG. Moreover, waveforms may differ somewhat also in a supine position and a standing position (sitting position).
Fukuda Denshi recommends to carry out the recording of the ECG by taking into consideration the waveform differences according to electrode positions or postures.
- ◆ For the model installed with ECG analysis program
The ECG analysis program is intended to analyze the standard 12-lead ECG waveforms. Therefore, the

analyzed result for waveforms recorded with the torso placement of the limb leads (Mason-Likar 12-lead system) may differ from that of the standard 12-lead ECG waveforms.

- ♦ Select "Used" for the pacemaker setting on the patient admit/discharge menu if a patient has a pacemaker.
- ♦ The threshold values for classification of 12-lead ECG interpretation and Minnesota code are set by age and sex as follows:
 1. Male and Female of ages 19 years old and above
 2. Male of age 12 through 18 years old
 3. Female of age 12 through 18 years old
 4. Male and Female of ages 3 through 11 years old
 5. Male and Female of ages below 2 years old
- ♦ If no patient information (i.e. Default : "Class." [Adult], "Sex": undetermined, and "Age" [0]) has been entered, the system algorithm will handle the patient as a "35 years old male".
- ♦ Before the analysis, make sure the patient classification ([Adult] / [Child]) is properly selected. If [Neonate] is selected, the 12-lead ECG analysis will not function.
- ♦ Enter the age of patient if known. If no age information (i.e. Default: [0]) has been entered, the system algorithm will handle the patient as "35 years old".
- ♦ Enter the sex of patient if known. If no sex information (i.e. Default: undetermined) has been entered, the system algorithm will handle the patient as "Male".
- ♦ If the patient classification is set as [Child] and no age (i.e. Default: [0]) has been entered, the system algorithm will handle the patient as "less than 2 years old"

 **CAUTION** Precautions about the SpO₂ Monitoring


- ♦ Use only the sensor/relay cable specified by Fukuda Denshi. Otherwise, it may cause measurement error. If the sensor is damaged, stop using it.
- ♦ If the nail is rough, dirty, or manicured, accurate measurement will not be possible. Change the finger or clean the nail before attaching the sensor.
- ♦ If irritation such as skin reddening appears with the sensor use, change the attachment site or stop using the sensor.
- ♦ Do not apply the sensor too tight. At the same time, check the blood flow constantly so that congestion is not generated at the peripheral site.
- ♦ Do not use tape to attach the sensor.
- ♦ Even attachment for a short duration may inhibit the blood flow and generate compression necrosis or burn injury. Also, blood flow inhibition may prevent correct measurements.
- ♦ Check the sensor attachment site constantly in every 4 hours when probes or reusable sensor are used, and at least every 8 hours when single patient use sensors are used. Be especially careful of a patient with bad perfusion. If the sensor attachment position is not changed constantly, skin irritation or skin necrosis due to compression may be developed. For the patient with bad perfusion, check the sensor attachment position at least every 2 hours.
- ♦ As skin for neonate, premature infant is immature, change the sensor attachment site more frequently depending on the condition.
- ♦ Direct sunlight to the sensor area can cause a measurement error. Place a black or dark cloth over the sensor if using in direct sunlight.
- ♦ When not measuring, unplug the relay cable and sensor from the SpO₂ connector. Otherwise, the outside light may affect to falsely display measurements.
- ♦ The pulse wave is normalized for SpO₂ measurement, and does not indicate perfused blood volume. Check proper probe attachment by observing the pulse wave.
- ♦ Precautions for Reusable Sensors
The light-emitting part of the sensor should be over the root of the fingernail or as instructed per the related sensor instruction manual. Do not insert the finger too far into the sensor as it may hurt the patient. For details,

refer to the SpO₂ sensor instruction manual.


◆ Precautions for Single-Patient-Use Type Sensors

The sensor can be reused on the same patient as long as the adhesive tape attaches without slippage. But do not reuse on other patients to avoid cross contamination. It is intended for single patient use only. For details, refer to the SpO₂ sensor instruction manual.

- ◆ If "---" is displayed for the SpO₂ numeric data, make sure that the sensor is properly attached.
- ◆ Measuring on a limb with NIBP cuff, arterial catheter, or intracatheter may result in incorrect measurement.
- ◆ Venous congestion may cause under reading of actual oxygen saturation. Therefore, assure proper venous outflow from monitored site. Sensor should not be below heart level (e.g. sensor on hand of a patient in a bed with arm dangling to the floor).

 **CAUTION** Precautions about the NIBP Monitoring

- ◆ Do not apply the NIBP cuff to site of injury. An injury may be worsened by the measurement.
- ◆ Do not apply the NIBP cuff to the arm on side treated axillary lymph nodes dissection. It may lead to lymphatic edema by the cuff pressure.
- ◆ Measuring on a limb with SpO₂ sensor, arterial catheter, or intracatheter may result in incorrect measurement.
- ◆ An operator must not get away from a patient during the NIBP measurement. However, when getting away from the patient is necessary, do not activate the Alarm Suspend and Silence functions in order not to miss any sudden changes in the patient's condition.
- ◆ Pay attention when measuring the NIBP of patient with bleeding disorders or hyper coagulation. The cuff inflation may cause petechia or circulatory failure by the blood clot.
- ◆ For the following situation, measurements will be terminated.
 - ◆ When the measurement time has exceeded 160 seconds for adult and child, 80 seconds for neonate.
 - ◆ When the inflation value has exceeded 300mmHg for adult, 210mmHg for child, and 150mmHg for neonate.
- ◆ If used with the incorrect patient classification, it will not only cause erroneous measurement, but the inflating level for the adult may be applied to child or neonate causing dangerous situation to the patient.
- ◆ The continuous measurement and 1-minute interval measurement will automatically stop after 12 minutes (maximum 15 minutes).
- ◆ If the mean MAP display is set to OFF, the MAP alarm will not be generated. Also the MAP data will not be displayed for the tabular trend or the NIBP list.

 **CAUTION** Precautions about the BP Monitoring

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

- ♦ When the power is turned ON, the BP value will not be displayed until zero balance is performed. Make sure to perform the zero balance. Once the zero balance is performed, the zero balance information will be maintained, and the BP value will be displayed.
- ♦ Each time the blood pressure transducer or tubing is replaced, the zero balance procedure is required to ensure accurate measurements.
- ♦ The zero balance procedure is required for the following case.
 - ♦ When starting the measurement.
 - ♦ When the position of the heart has changed due to body movement.
 - ♦ When the position of the transducer has changed.
 - ♦ When measuring for a long period of time and there is a possibility of measurement error due to change in ambient temperature, etc.
 - ♦ When a connector is connected/disconnected, or a transducer is replaced.
- ♦ Note that Systolic Pressure (SYS) = Peak Systolic Pressure (PSP) for the graphic trend, data base, and alarm setup.
- ♦ When ECG is not measured, Peak Diastolic Pressure (PDP) cannot be calculated.
- ♦ The undisplayed BP data (SYS/DIA/Mean) will not generate a BP alarm or be displayed in the tabular trend. Select the appropriate display type according to the monitoring purpose.

**CAUTION****Precautions about the CO₂ Monitoring (HC-110)**

- ♦ Conduct CO₂ calibration for the following case.

If the CO₂ gas calibration is not performed at a specified interval, CO₂ measurement accuracy may be affected and also subsequent gas calibration may not be possible.

 - ♦ When the accumulated measurement time exceeds 1,200 hours from the first use.

However, if the first calibration was performed before the accumulated measurement time reaches 720 hours, another calibration is required when the accumulated measurement time exceeds 1,200 hours from the first calibration.
 - ♦ When 12 months has elapsed or the accumulated measurement time has exceeded 4,000 hours from the previous calibration.
 - ♦ When EtCO₂ measurement is not stable or accuracy is degraded compared with other measuring device.
 - ♦ When the patient monitor was not used for a while, or when EtCO₂ was not measured for a while.
- ♦ Perform the calibration 5 minutes after turning ON the power on the HC-110.
- ♦ Do not disconnect the sampling tube during calibration. If disconnected, calibration will cease.
- ♦ Dispose of calibration gas according to the regulation of each medical institution.
- ♦ Microstream™ EtCO₂ sampling tubes are designed for single patient use, and are not to be reused. Do not attempt to clean, disinfect, sterilize or flush any part of the sampling tube as this can cause damage to the monitor or lead to cross-infection.
- ♦ Dispose of sampling tubes according to standard operating procedures or local regulations for the disposal of contaminated medical waste.
- ♦ Before use, carefully read the Directions for Use for the Microstream™ EtCO₂ sampling tube.
- ♦ Only use Microstream™ EtCO₂ sampling lines to ensure the monitor functions properly.
- ♦ The nominal accuracy indicated in Table 5: CO₂ Measurement Accuracy, above, is not reduced by more than 4% of the reading in the presence of interfering gases, as detailed in ISO 80601-2-55 [S2] clauses 201.12.1.101.3, 201.101. The gases include Heliox with up to 80% Helium and with up to 15% Oxygen, Ethanol, Isopropanol and Acetone at up to 0.1%, as well as Methane at up to 1%, and Oxygen.
- ♦ The purchase or possession of this product does not explicitly or implicitly permit the use of this product with replacement parts. Whether the equipment is used alone or in combination with other parts, it is protected by the patent rights of the related devices.

- ♦ Microstream™ and FilterLine™ are trademarks of a Medtronic company. Oridion Medical 1987 Ltd. is a Medtronic company. The US Patents for the nanoMediCO₂™ module are listed at: US Patents: www.covidien.com/patents

 **CAUTION**

Precautions about the CO₂ Monitoring (HC-120 Gas Unit I/F Module)

- ♦ The disposable airway adapter should be opened just before use.
- ♦ Do not reuse the disposable airway adapter. If sterilized, it will become unusable.
- ♦ The airway adapter should be attached with the thicker side facing to the patient. If attached oppositely, it may damage the CO₂ sensor or airway adapter.
- ♦ Dispose of calibration gas according to the regulation of each medical institution.

 **CAUTION**

Precautions about the BIS Monitoring

- ♦ The conductive parts of sensors and connectors should not contact other conductive parts, including earth.
- ♦ To reduce the hazard of burns in the high-frequency surgical neutral electrode connection, the BIS sensor should not be located between the surgical site and the electrosurgical unit return electrode.
- ♦ The BIS sensor must not be located between defibrillator pads when a defibrillator is used on a patient connected to the patient monitor.
- ♦ Continuous impedance checking may need to be disabled if the 1 nA, 128 Hz impedance check signal interferes with other device (e.g., evoked potential monitors).
- ♦ Considerations when using Electro-Convulsive Therapy (ECT) device during BIS monitoring: Place ECT electrodes as far as possible from the BIS sensor to minimize the effect of interference. Certain ECT device may interfere with the proper function of the BIS monitoring system.

 **CAUTION**

Precautions about the Alarm

- ♦ Alarm messages will be displayed according to the priority. (Level S > Level H > Level M > Level L > Level N)
- ♦ For the same alarm level, the alarm message for the newer alarm will be displayed. However, arrhythmia alarm will be displayed according to the arrhythmia priority.
- ♦ The arrhythmia alarm message other than Tachy, Brady, Ext Tachy, Ext Brady will continue to be displayed for 30 seconds after the alarm is resolved.
- ♦ When "LEAD OFF", "Check Electrodes" is displayed, HR alarm or arrhythmia alarm will not function. If this condition is left unresolved, a sudden change of the patient may not be noticed. Take prompt action when the lead-off condition is detected.
- ♦ When CO₂ is measured on the HC-120 Gas Unit I/F module and HC-110 CO₂ Gas module, the upper EtCO₂ alarm will not generate if the upper limit is set to 100 mmHg/13.4 kPa and above as the measurement range is 0 to 99 mmHg / 0 to 13.3 kPa.
- ♦ Whether to use the SpO₂ second alarm function and its threshold selection should be based on the patient's clinical indication/portent and medical evaluation.
- ♦ If the second alarm setup is set to [OFF], the second alarm integral value will be set to 0.
- ♦ Pay attention not to set the alarm volume too low to avoid missing any important alarms.
- ♦ On a wired network, the alarm generated on the bedside monitor will be output to the network with a maximum delay of 1 second, and to the central monitor with a maximum delay of 2.5 seconds.
- ♦ If the NIBP alarm is turned OFF under the Oxygenator Mode, NIBP auto mode measurement and NIBP measurement at alarm occurrence will not be performed.
- ♦ 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.
- ♦ To ensure that the alarm setup is appropriate for the patient being monitored, check the setup each time this device is used.

 **CAUTION**

Precautions about the System Setup

- ♦ When the waveform and numeric data display for each parameter is set to OFF, the alarm and trend input will be also suspended.

- ♦ If the HR/PR source is set to [BP], and if BP waveform/numeric data is set to [Disp. OFF], the PR value will not be displayed.
- ♦ If the HR/PR source is set to [SpO₂], and if SpO₂ waveform/numeric data is set to [Disp. OFF], the PR value will not be displayed.
- ♦ If the RR source is set to [CO₂/GAS], and if CO₂ waveform/numeric data is set to [Disp. OFF], the RR value will not be displayed.
- ♦ If the RR source is set to [CO₂/GAS], and if GAS waveform/numeric data is set to [Disp. OFF], the RR value will not be displayed.
- ♦ Do not set the same remote control ID to multiple monitors in the same floor. Otherwise, the remote control operation may control multiple monitors at the same time.
- ♦ After the remote control setup, check that the remote control unit is properly operating.
- ♦ If the time/date is not correctly set, or changed during monitoring, malfunction may occur with NIBP measurement, periodic printing, trend, NIBP list data, and age calculation from the birth date.
- ♦ If the time/date is changed, the time/date for all the saved patient data (trend, list, recall, etc.) will also change. The printed time/date before changing and the displayed time/date after changing will differ. Also, the data transmitted to the central monitor before the time/date is changed will be displayed on the central monitor with the previous time/date.

**CAUTION****Precautions about the Multigas Module Data Monitoring (MG-110/ MG-120)**

- ♦ The MG-110/MG-120 require warm up of about 10 minutes to correctly measure the data.
- ♦ If the power supply is interrupted due to power failure, etc., MG-110/ -120 multigas unit will initialize and enter into warm-up mode even if the power interruption is within 30 seconds.
- ♦ About the Gas Calibration

The zero calibration will automatically start when the MG-110/ MG-120 are connected.
After the warm-up completes, gas calibration will be performed every 4 hours during stable operation.
During warm-up, gas calibration interval will become shorter than during normal operation.
During gas calibration, measurement data will not be updated.
Calibration gas is not required during gas calibration.
- ♦ Dispose of calibration gas according to the regulation of each medical institution.
- ♦ Make sure the sampling line and flow sensor is securely connected to prevent any leakage.
- ♦ The gas leakage inside or outside the equipment will cause measurement error. Make sure to check for leakage before usage.
- ♦ An environment with alcoholic vapor may adversely affect the measurement readings.
- ♦ CO₂, N₂O or anesthetic agent in the atmosphere around the MG-110/ MG-120 may adversely affect the measurement readings.
- ♦ SPIRO and ventilator cannot be used simultaneously.
- ♦ During the warming up process, the date of the last measurement accuracy check cannot be updated. Perform the measurement accuracy check after the warming up process is completed.
- ♦ If the accuracy check is performed using a low pressure gas, the accuracy of gas measurement will be reduced. Make sure to perform the accuracy check using the specified calibration gas before its expiration date.
- ♦ If the error persists, refer to your nearest service representative.
- ♦ About the MG-110 Series
 - ♦ The adult flow sensor dead space is 6.9 mL and the flow resistance is 1.8 cmH₂O at 60 L/min.
The pediatric flow sensor dead space is 0.75 mL and the flow resistance is 0.9 cmH₂O at 10 L/min.
Adjust ventilation accordingly.
 - ♦ To prevent condensation, the patient breathing circuit, flow sensor and pressure tubing should not be directly exposed to cooling equipment such as fans or cooling blankets.
 - ♦ Leakage of gas from the patient breathing system may occur if the pressure or gas sampling lines are not

connected to the MG-110.

- ♦ The pressure tube and gas sampling lines of the flow sensor should always be routed from the patient circuit to the MG-110 such a way as to avoid kinking.
- ♦ Flow sensors that have suffered damage to sensor head, tubing or tubing connector must not be used.
- ♦ If liquid has entered the pressure tubes, it can be removed by gently tapping or shaking the flow sensor.

CAUTION Precautions about the Patient Admit/Discharge

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

CAUTION Precautions about the External Media

- ♦ Use only the specified external media.
- ♦ Use only the external media formatted on this device.
- ♦ Make sure to power cycle the system after the setup data is read from the USB memory. By power cycling the system, the read data will become effective.
- ♦ Reading the patient data from the USB memory will erase all previous patient data stored in the patient monitor.

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 (DS-LANIII)

WARNING

- ♦ Do not connect unspecified device to the wired network.
- ♦ Do not mix devices with DS-LANII and DS-LANIII setting in the same wired network. The network may cease and proper monitoring may not be possible.

CAUTION

- ♦ If performing wired network transmission, configure the display so that the numeric data corresponded to the waveform is displayed. If not, the displayed waveform or numeric data may not be transmitted.
- ♦ The default setting of bed ID is "000". If connected to a wired network with the bed ID unchanged, monitoring on the central monitor will not be possible.
- ♦ When connecting to a wired network, make sure that there are no other bedside monitors with the same ID. If there is more than one bedside monitor with the same bed ID, the duplicated bedside monitors cannot be monitored on the central monitor.
- ♦ When connected to the DS-LAN III network, set the bed ID in the range from "001" to "100" .
- ♦ The alarms that can be notified to the central monitor depend on the model type and software version of the central monitor. For details, refer to the operation manual of the central monitor.
- ♦ There are following restrictions when connecting the DS-1200 System to the wired network.
 - ♦ The BP measurement unit setting should be the same for all central monitors and bedside monitors. If the setting is different among the monitors, data such as BP waveform, BP numeric data, NIBP numeric data, NIBP list will not be transmitted. It will be treated as not measured data, and will not be displayed on the central monitor. The alarm limit setup from the central monitor cannot be performed either.
 - ♦ DS-1200 System cannot be connected to the DS-LAN II.
 - ♦ The PR_IBP alarm will not be transmitted to the central monitor.
 - ♦ If the "RR/APNEA alarm source" is other than [Impedance] (or, if [Auto] selects a setting other than [Impedance]), the RESP waveform will not be transmitted on a wired network.
 - ♦ If the "RR/APNEA alarm source" is other than [CO₂/GAS] (Or, if [Auto] selects a setting other than [CO₂/GAS]), the CO₂ waveform will not be transmitted on a wired network.
 - ♦ For the numeric data displayed as "xxx", maximum or minimum value of measurable range will be transmitted.
 - ♦ The numeric data displayed as "--- " will be treated as not measured data.
 - ♦ If the measurement unit of CO₂ concentration is mmHg and [99mmHg] is selected for "Upper Limit of CO₂ (mmHg) Transmission" ([Initial Settings]>[System]>[DS-LAN]), the CO₂ value of 100 mmHg or above will be transmitted as 99 mmHg.
- ♦ As the DS-1200 System does not have the 12-lead ST display function, waveforms and other data will not be displayed for these displays on the central monitor connected to the DS-LAN network.
- ♦ When connected to the wired network, the time/date will synchronize with the central monitor. Even if the time/date is changed on the DS-1200 System, it will be corrected to the time/date of the central monitor.
- ♦ The ST display will be distorted on the central monitor if the ECG lead (ECG1 or ECG 2) is changed on the DS-1200 System. Redrawing the ST display will return the display to normal.
- ♦ On the central monitor, the respiration waveform and RR value based on the RR/APNEA alarm source selected on the DS-1200 System will be displayed. The monitored RR and APNEA will be the same for the central monitor and the DS-1200 System.

Wireless Network System

DANGER

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

WARNING

- ♦ A password can be set to access the channel ID setup menu to allow only the telemetry channel administrator to change the channel ID.
- ♦ Some type of wireless combinations may generate interference with other telemetry.
- ♦ Before selecting a channel, verify it will not interfere with other channels.

- ◆ Inform the supervisor of the use of telemetry channels to avoid interference with other telemetry.
- ◆ If transmitters are used in a neighboring medical facility, your facility and the neighboring facility must make agreements on the setting of the telemetry channels to prevent telemetry interference.

CAUTION Precautions about the Telemetry

- ◆ When performing telemetry transmission, configure the display so that the numeric data corresponded to the waveform is displayed. If not, the displayed waveform or numeric data may not be transmitted.
- ◆ The setup of channel ID and group ID should be performed only by the telemetry channel administrator or our service representative. Users should not perform this procedure as malfunction may occur.
- ◆ When the measurement unit of BP is "kPa", corresponding waveform and numeric data will not be transmitted. When using a wireless network, use "mmHg" for the BP measurement unit.
- ◆ BP waveform with a scale above the set scale can not be properly transmitted. When transmitting the BP waveform, pay attention to the displayed BP scale.
- ◆ If the measurement unit of CO₂ concentration is mmHg and [99mmHg] is selected for "CO₂ (mmHg) Upper Limit of Transmission" ([Initial Settings]>[System]>[Telemeter]), the CO₂ value of 100mmHg or above will be transmitted as 99mmHg.

RTC and Data Backup

CAUTION

- ◆ This 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 primary battery. If incorrect time is displayed when turning ON the power, a low battery may be the cause. In such case, contact Fukuda Denshi service representative for replacing the battery.
- ◆ When the power is turned OFF, the data will not be protected.

Precautions about the Ventilator Monitoring

WARNING

- ◆ The ventilator alarm sound is set to OFF at factory default setting.
The alarm sound can be turned ON on the Tone/Volume setup screen.
- ◆ If the DS-1200 System does not generate an alarm even though the ventilator is generating an alarm, or if any other malfunction occurs, immediately check the ventilator, DS-1200 System, cable, and replace the cable if necessary. If the malfunction persists, stop using the equipment.
- ◆ The alarm generation on the DS-1200 System is not guaranteed if the alarm other than specified generates at the ventilator.
(☞ Maintenance Manual "Ventilator Measurement and Alarm Input" P4-1)

CAUTION

- ◆ The ventilator operation should be performed by well-trained and authorized personnel.
- ◆ When connecting this equipment and the ventilator, use only the specified connection cable.
- ◆ Verify that this equipment and the ventilator are properly connected.
- ◆ When connecting the cable, verify that the main power of this equipment and the ventilator is OFF.
- ◆ When Servo-i/s or SV-300 is connected, RESISTANCE (Insp, Exp), COMPLIANCE, P-V loop, F-V loop display function is not available.
- ◆ When FLOW-i is connected, P-V loop, F-V loop display function is not available.

Precautions about the SpO₂ Sensor

DANGER Danger of Burn Injury Caused by the SpO₂ Sensor

- ♦ When monitoring SpO₂, make sure to use only the specified sensor/relay cable. If any other sensor/relay cable is used, a high temperature rise of the sensor may place the patient in danger of burns. If there are any questions regarding the sensor/relay cable use for SpO₂ measurements of this device, please contact Fukuda Denshi service representative.

Precautions about the Masimo Model

CAUTION

- ♦ The purchase or possession of this product does not explicitly or implicitly permit the use of this product with replacement parts. Whether the device is used alone or in combination with other parts, it is protected by the patent rights of the related devices.

Precautions about the NIBP Cuff

CAUTION

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

Precautions about Disposing of the 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 this device, pack it with specified packing materials. Also, transport it under appropriate environment condition. (☞ Operation Manual "Specification" P14-1)

Monitoring after Power Failure

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

MG-110/120, HC-110/120 will start up from the warm-up mode. The warm-up time differs for each unit.

To Prepare for Emergency Use

Accessories/Optional Accessories

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

Battery Pack

- ♦ Even if the battery pack is not in use, the remaining capacity decreases due to self-discharge. Make sure to verify once a week that the battery pack is fully charged.
- ♦ To fully charge the empty battery pack, it takes 5 hours during operation, and 2.5 hours when the power is OFF and AC cable is connected.
- ♦ The performance of the battery deteriorates with repeated use. To ensure performance of the battery, it is recommended to replace it once a year.

Electromagnetic Compatibility

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.)

CAUTION

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

Precautions for Safe Operation under Electromagnetic Influence

If any sorts of electromagnetic wave, magnetic field, or static electricity exist around the device, noise interference or malfunction of the device may occur. If any unintended malfunction or noise occurs during monitoring, check the 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.

⚠ CAUTION

- ♦ 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

⚠ DANGER

- ♦ If portable transmitter or wireless LAN equipment is used in a place closer than 30 cm from the equipment, the electromagnetic influence may largely exceed the compliance level and may cause unexpected phenomenon such as noise interference on the waveform, etc.
- ♦ If this equipment is installed close to, or stacked with other equipment, malfunction may occur. Make sure to verify that the equipment operates properly in a used location.
- ♦ This equipment should be used in a location specified by each medical institution.

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

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

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

This equipment complies with IEC 60601-1-2: 2014 for the following system configuration.

- ♦ Main Unit: DS-1200
- ♦ Multigas Module: MG-110, MG-120
- ♦ CO₂ Module: HC-110
- ♦ Gas Unit I/F Module HC-120
- ♦ BISx Module: BISx
- ♦ Multi Module: HM-800
- ♦ SpO₂ Module: HG-810, HG-820
- ♦ Multiport Module: HP-800
- ♦ Lithium-ion Battery: BTO-005

Compliance to the Electromagnetic Emissions

The DS-1200 System is intended for use in the electromagnetic environment specified below. The customer or the user of the DS-1200 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-1200 System is intended for use in the electromagnetic environment specified below. The customer or the user of the DS-1200 System should assure that it is used in such an environment.

The EMC Standard or Test Level	Immunity Test Level
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	3V/m 80 MHz to 2.7 GHz 2 Hz 80%AM
Immunity test specifications for RF wireless communications IEC 61000-4-3	See below.
Electrical fast transient/burst IEC 61000-4-4	±2 kV AC Mains ±1 kV output lines Repetition frequency 100 kHz
Surge: IEC 61000-4-5	±0.5 kV, ±1 kV Normal mode (Phase Angle 0°, 90°, 180°, 270°) ±0.5 kV, ±1 kV, ±2 kV Common mode (Phase Angle 0°, 90°, 180°, 270°)
Conducted disturbances induced by RF fields IEC 61000-4-6	3 V 0.15 MHz to 80 MHz 2 Hz 80%AM 6 V 0.15 MHz to 80 MHz (ISM bands) 2 Hz 80%AM
Power Frequency Magnetic Field IEC 61000-4-8	30 A/m 50 Hz, 60 Hz
Voltage dips, Voltage Interruptions and Voltage Fluctuations 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 (Phase Angle 0°) 0% UT; 250 cycles

CAUTION

- In the electromagnetic disturbances test evoked from the radiated RF electromagnetic field and RF electromagnetic field is performed with 2 Hz modulation frequency which is close to the frequency component of the vital parameter.

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

 **CAUTION**

- ♦ 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.

Chapter 1 Installation of the Unit


Precautions for Installing the Device

This section describes the environmental condition to use this device.

 **CAUTION**

- ♦ The installation of this device should be performed by our service representative or a person who is well acquainted with this device.
 - ♦ Avoid stacking multiple devices or placing anything on the device during operation.
 - ♦ Install this device in a place where power supply cable can be easily disconnected.
 - ♦ If any abnormality is found on the device, immediately turn OFF the power, and disconnect the power supply cable from the outlet.
 - ♦ Do not soak or immerse the device in liquids.
-

Operating Environment

- ♦ The following environmental conditions should be observed when using the device.
 - ♦ Surrounding Temperature: 10°C to 40°C (10°C to 35°C for MG-110/MG-120)
 - ♦ Relative Humidity: 30% to 85% (non-condensing)
 - ♦ Atmospheric Pressure: 70 kPa to 106 kPa
- ♦ This device is intended for patient monitoring in NICU, ICU, CCU, surgery, emergency room and ward. Do not use in MRI environment or in a home-care setting.
- ♦ The power source should fulfill the following condition.
 - ♦ Use a hospital grade outlet (3-pin grounded outlet).
 - ♦ Verify power voltage and frequency before connecting to an AC power source.
 - ♦ Use the power source that can provide adequate power to the device.
Refer  Operation Manual "Specification" P14-1 for power voltage, frequency, and power consumption.
- ♦ Pay attention to install or store the device in proper location. Do not install or store in the following locations.
 - ♦ where chemicals are stored or gas may generate
 - ♦ where the device will be subject to splashing water or humidity from a nebulizer or vaporizer
 - ♦ where the device will be subject to direct sunlight
 - ♦ Unstable place with inclination, vibration, or shock
- ♦ Ensure proper ventilation to cool the device.
 - ♦ DS-1200 main unit and the wall. If the device is embedded in a wall or surrounded by a wall, a minimum space of 10 cm is required on the top side of the DS-1200 main unit.
- ♦ The device must be transversely installed. If installed in incorrect direction, water or chemicals may enter the device and cause damage. For the recorder unit, it may also cause paper jam.

⚠ WARNING

- If the device is used under an environment not fulfilling the above condition, not only that the device cannot deliver its maximum performance, the device may be damaged and safety cannot be ensured.
If using in an environment other than specified above, contact your nearest service representative.

⚠ CAUTION

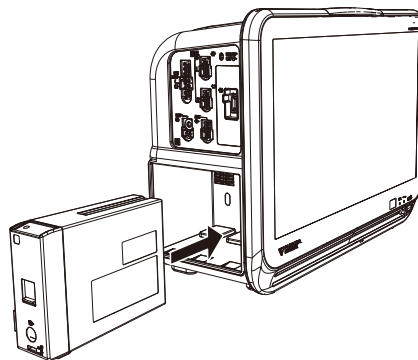
- Equipotential Grounding
 - When connecting multiple devices, electrical potential difference may be generated between the devices. This may result in electric shock to the patient connected to these devices. Pay special attention for use in operating room, ICU, CCU, cardiac catheter laboratory, and cardiovascular X-ray room. To avoid such electrical potential difference, use the ground cable to connect each device's potential equalization terminal to the same ground terminal. This is called equipotential grounding.

System Construction

This section describes the connection procedure of this device. The following units can be connected.

□ Connection of Expansion Module

- 1 Insert the expansion module.

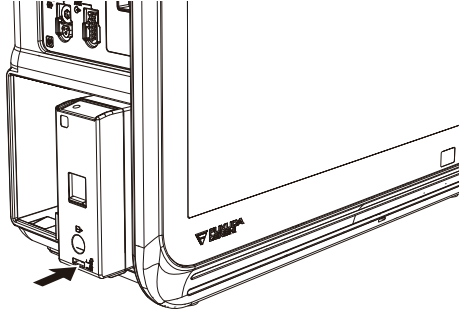
**NOTE**

- Insert the expansion module so that the "Δ" on the release button can be seen.

REFERENCE

- The inserted expansion module can be used by setting the parameters on the Unit Module Setup (Menu>Initial Settings>System>Unit Module). By performing this setup, the expansion module can be used regardless of the inserted slot position.

- 2** Press the release button until it becomes flat.

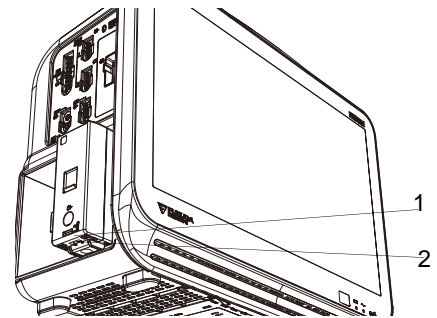


❑ Removing the Expansion Module

- 1** Pull the protruded part on the bottom of the expansion module.

1 Protruded Part on the Bottom

2 Lever



- 2** Pull out the expansion module by pushing up the lever while the "Δ" on the release button can be seen.

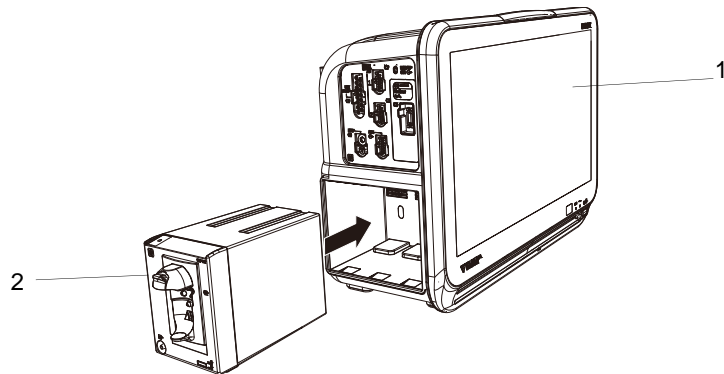
The expansion module can be connected/removed with the DS-1200 power turned ON.

Connecting the Multigas Module

Connect the DS-1200 main unit to the Multigas Module MG-110/MG-120.

1 Connect the MG-110/MG-120 to the DS-1200 main unit.

- 1 DS-1200 Main Unit
- 2 MG-110/MG-120

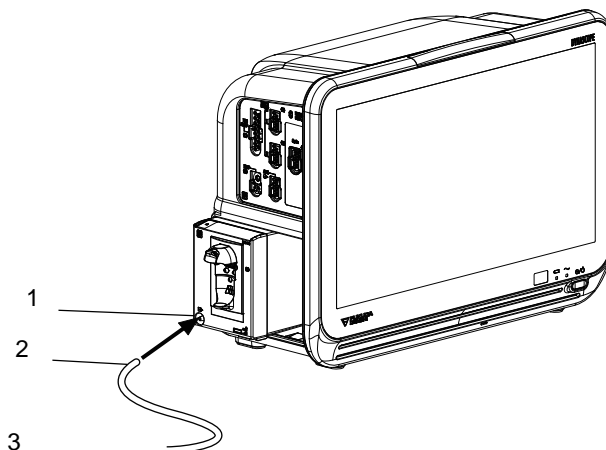


Connecting the Exhaust Tube

1 Connect the exhaust tube to the MG-110/MG-120.

- ▶ Connect one end of the exhaust tube (655-FD) to the outlet of the multigas module, and the other end to the gas exhaust system in the hospital.

- 1 Outlet
- 2 Exhaust Tube (655-FD)
- 3 To the gas exhaust system

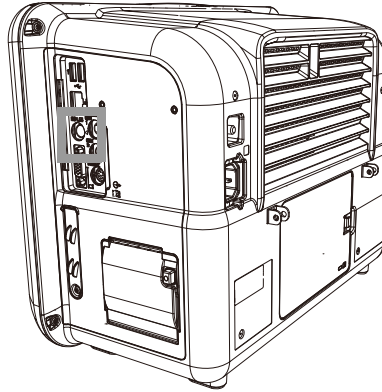


⚠ WARNING

- ♦ To protect the hospital staffs from unnecessary anesthetic agent, it is strongly recommended to connect the exhaust hole to the gas exhaust system in the hospital.

Connecting the External Monitor

The main unit of the DS-1200 is equipped with an analog output connector for an external monitor which allows connection of commercially available display unit by analog RGB connection. When connecting, contact our service representative.



⚠ WARNING

- ♦ The external monitor output of the main unit of the DS-1200 is not isolated. If connecting a commercially available display unit, it should comply with the JIS T 0601-1 standard.
 - ♦ If using a display that does not comply with the JIS T 0601-1 standard, make sure the display complies with IEC or ISO standards, and use additional protective earth or an isolation transformer that complies with JIS T 0601-1.
-

A display with the following specifications should be used.

The external monitor output resolution will be the same as the display unit.

Resolution	: WXGA (1366 dot x768 dot)
Horizontal Frequency	: 48.36kHz
Vertical Frequency	: 60.00Hz
Cable Length	: 10 m (max)*

*: If using a cable longer than 3 m, use a low-loss cable to maintain the performance.

Power Source and Ground Connection

This section explains about the power connection.

Power Connection of the Main Unit

⚠ WARNING

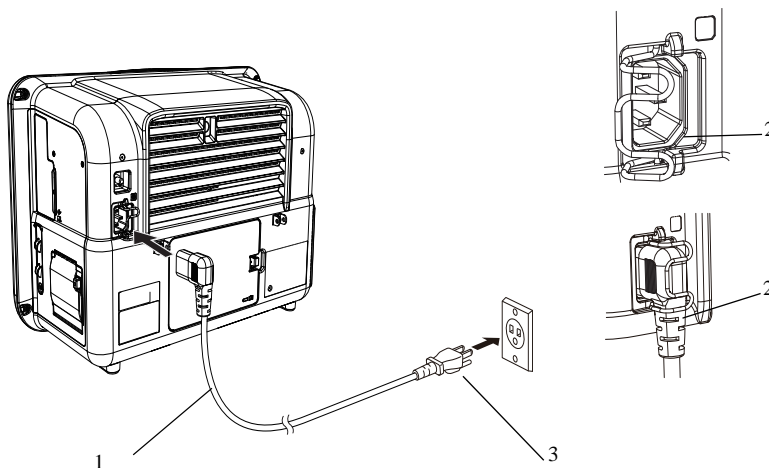
- Use only the supplied 3-way AC power cable. Use of other cables may result in electric shock to the patient and the operator.
- The power cable must be connected to a 100 V hospital grade outlet.
- When using multiple ME devices simultaneously, perform equipotential grounding to prevent potential difference between the devices. Even a small potential difference between the equipments may result in electric shock to the patient and the operator.

1 Connect the power supply cable to the main unit of the DS-1200.

1 Connect the power cable (CS-41) to the rear side of the main unit of the DS-1200.

2 Hook the cable lock on the power supply connector to lock.

3 Connect the power cable to a hospital grade outlet (3-pin grounded outlet).



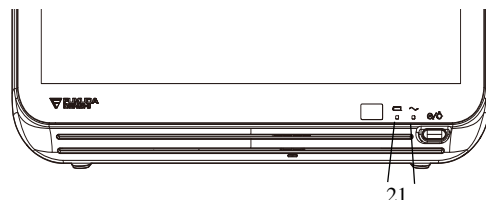
▶ To disconnect the power cable, unplug one end from the outlet, and the other end from the connector on the rear side of the main unit after releasing the hook of the cable lock.

2 Turn ON the power switch on the main unit of the DS-1200.

AC power will be supplied and the power supply LED on the front side of the main unit will light.

1 Power Supply LED
 Green: In normal operation
 Orange: Standby Mode
 Light Off: During battery operation

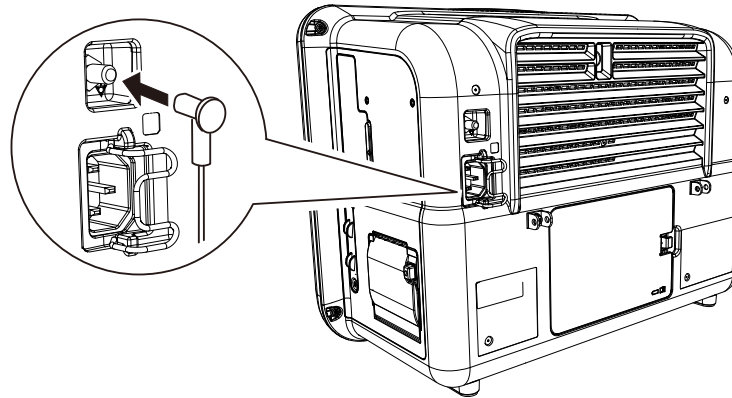
2 Battery Charging LED
 Green: Charging is complete
 Orange: Charging
 Light Off: During battery operation, or when battery is not installed, or when battery charging is ceased (due to temperature, etc.)



Equipotential Grounding

When connecting multiple devices, electrical potential difference may be generated between the devices. This may result in electric shock to the patient connected to these devices. Pay special attention for use in operating room, ICU, CCU, cardiac catheter laboratory, and cardiovascular X-ray room. To avoid such electrical potential difference, use the ground cable to connect each device's potential equalization terminal to the same ground terminal. This is called equipotential grounding.

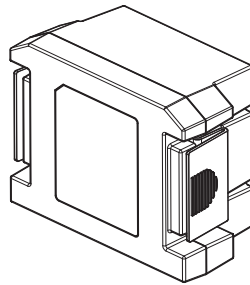
The ground cable is a connector which can be connected/disconnected manually without using tools.



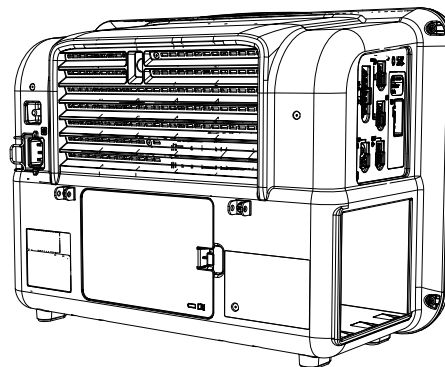
Installing the Battery Pack (BTO-005)

WARNING

- ♦ When replacing the battery while monitoring, make sure to supply power by connecting the power cable.

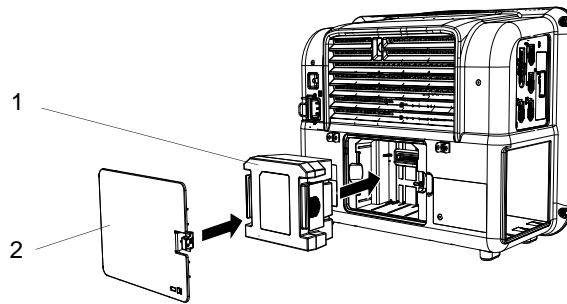


- 1** Turn the battery lever on the rear side of the main unit to right, and remove the battery cover. Remove the battery cover.



2 Insert the BTO-005 to the main unit and close the battery cover.

- 1 Battery
- 2 Battery Cover



NOTE

- ♦ Make sure to insert the battery in a correct direction.

Installing the attachment for Monitor (OAO-70A)

This procedure explains how to attach the OAO-70A to the DS-1200. Also refer to "ASSEMBLY INSTRUCTION OAO-70A GCX Attachment for Monitor".

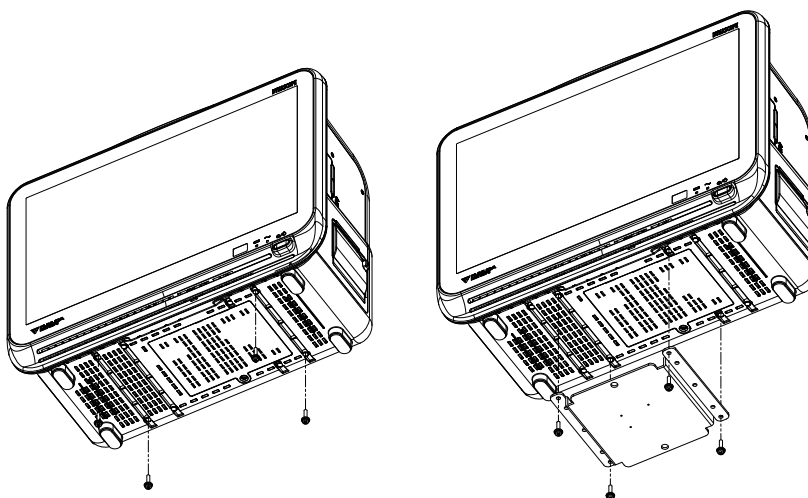
Prepare the following tools in advance.

- ♦ Phillips Screwdriver #2

CAUTION

- ♦ Attach this product to the equipment on a level surface following the procedure below.
- ♦ A Phillips screwdriver is required to complete the installation.
- ♦ Make sure that the screws are securely tightened.
- ♦ Also refer to the assembly instruction for the OAO-70A and the instruction manual for the arm to be used.

Remove the screws (4 locations) on the bottom side of the equipment as shown below.
Secure the OAO-70A with the screws on the bottom of the equipment.



Chapter 2 Network System Construction

CAUTION

- ◆ Configure the network as specified by Fukuda Denshi. If the device of different network type is connected, malfunction may occur to the whole network system.

Wired Network System

In this section, connection and setup procedure for wired network is explained.

A wired network system can be constructed by using the LAN cable. maximum of 100 beds for the DS-LANIII network can be connected. The central monitor corresponded to each wired network is required and the central monitor with the central ID "1" will function as the network administrator.

DS-LAN Connection

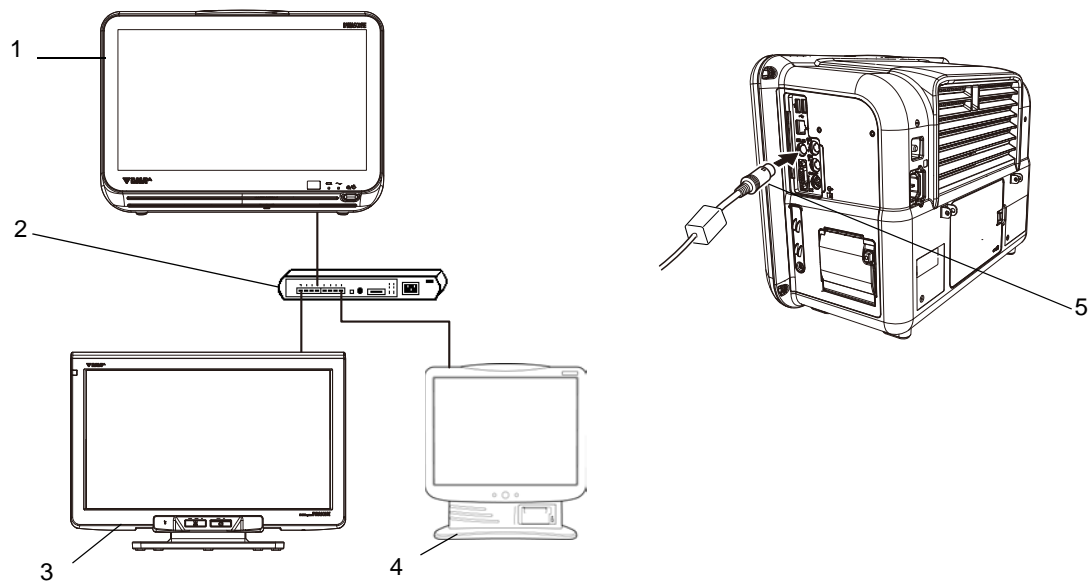
WARNING

- ◆ Do not connect unspecified device to the wired network.
- ◆ Do not mix devices with DS-LAN II and DS-LAN III setting in the same wired network. The network may cease and proper monitoring may not be performed.

CAUTION

- ◆ On a wired network, the alarm generated on the bedside monitor will be output to the network with a maximum delay of 1 second, and to the central monitor with a total delay of 2.5 seconds.
- ◆ Use a switching HUB for DS-LAN III network.
- ◆ The default setting of bed ID is "000". If connected to a wired network with the bed ID unchanged, monitoring on the central monitor will not be possible.
- ◆ When connecting to a wired network, make sure that there are no other bedside monitors with the same ID. If there is more than one bedside monitor with the same bed ID, the duplicated bedside monitors cannot be monitored on the central monitor.
- ◆ When connecting to the DS-LAN III network, set the ID in the range from 001 to 100.
- ◆ If the measurement unit of CO₂ concentration is mmHg and [99 mmHg] is selected for "Upper Limit of CO₂ (mmHg) Transmission" under [Initial Settings>System>DS-LAN], the CO₂ value of 100 mmHg or above will be transmitted as 99 mmHg.
- ◆ Configure the network as specified by Fukuda Denshi. If the device of different network type is connected, malfunction may occur to the whole network system.

By connecting a Ethernet branch cable to the DS-LAN connector on the Main Unit , a wired network system can be constructed.

Example of Wired Network Configuration

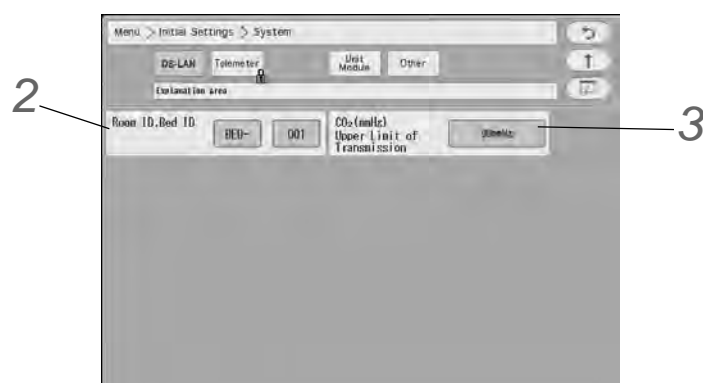
- 1 Bedside Monitor: DS-1200 System
- 2 HUB
- 3 Central Monitor: DS-8900 System (DS-LAN III only)
- 4 Central Monitor: DS-7600 System
- 5 Ethernet Branch Cable (CJ-522)

DS-LAN Setup

To connect to the central monitor using the wired network, DS-LAN, Room ID/Bed ID setup is necessary.

1 Press the [Menu], [Initial Settings], [System] keys.

▶ The DS-LAN menu will be displayed.



2 Set the Room ID/Bed ID.

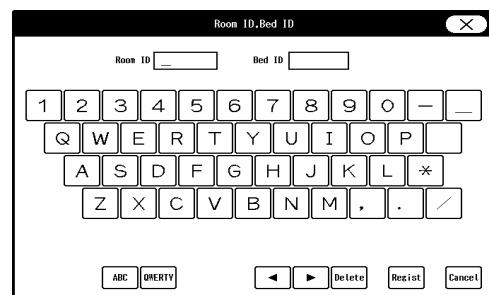
CAUTION

- ♦ The Bed ID is factory set to 000. If connected to the wired network with the ID unchanged, monitoring on the central monitor will not be possible.
- ♦ When connected to the wired network, make sure that there are no other bedside monitors with the same Bed ID. If the Bed ID is duplicated, monitoring on the central monitor is not possible.
- ♦ When connecting to the DS-LAN III network, set the ID in the range from 001 to 100.

NOTE

- ♦ Make sure to set the Room ID/Bed ID when connecting to the wired network. The set Room ID/Bed ID will be saved even after the power is turned OFF.

- 1 Press the key for "Room ID, Bed ID" to display the "Room ID, Bed ID" setup window.
- 2 Enter the Room ID, Bed ID using the alphanumeric keypad.
- 3 Press the [Regist] key.
 - ▶ The entered ID will be displayed on the upper left of the screen.



3 Set the "CO₂ (mmHg) Upper Limit of Transmission".

REFERENCE

- ♦ If the CO₂ measurement unit is "mmHg", and the CO₂ value is 100 mmHg or above, whether or not to limit the value for transmission to the central monitor can be set.
 - ▶ [No limit]: Actual CO₂ value will be transmitted to the central monitor even if the value is 100 mmHg or above.
 - ▶ [99mmHg]: 99 mmHg will be transmitted as the CO₂ value if the value is 100 mmHg or above.

Precautions about the DS-LAN

CAUTION

- ♦ Precautions for the DS-LAN III Network
 - ♦ If the "RR/APNEA Alarm Source" setting is other than [Impedance] (or, if [Auto] selects a setting other than [Impedance]), the RESP waveform will not be transmitted on a wired network.
 - ♦ If the "RR Alarm/APNEA Source" setting is other than [CO₂] (Or, if [Auto] selects a setting other than [CO₂]), the CO₂ waveform will not be transmitted on a wired network.
 - ♦ For the numeric data displayed as "xxx", maximum or minimum value of measurable range will be transmitted.
 - ♦ The numeric data displayed as "---" will be treated as not measured data.
 - ♦ If the measurement unit of CO₂ concentration is mmHg and [99 mmHg] is selected for "Upper Limit of CO₂ (mmHg) Transmission" under [Initial Settings>System>DS-LAN or Telemeter), the CO₂ value of 100 mmHg or above will be transmitted as 99 mmHg.
 - ♦ As this monitor do not have the arrhythmia template display and 12-lead ST display function, these display on the central monitor will not be corresponded.

- When connected to a wired network, the time/date will synchronize with the central monitor. In this case, the time/date cannot be changed on this monitor.
- On the central monitor, the respiration waveform and RR value based on the "RR/APNEA Alarm Source" selected on this monitor will be displayed. The same parameter for the RR and apnea will be monitored on this monitor and the central monitor.
- The alarms that can be notified to the central monitor depend on the model type and software version of the central monitor. For details, refer to the operation manual of the central monitor.

NOTE

- If the numeric data is displayed as "xxx" (out of measurement range) on this monitor, maximum or minimum value of measurable range will be transmitted to the central monitor.

	Value Outside the Measurement Range	Central Monitor Display
HR	301 bpm and above	300 bpm
Respiration Rate	151 Bpm and above	150 Bpm
Blood Pressure	-51 mmHg and below 301 mmHg and above	-50 mmHg 300 mmHg
Temperature	-0.1°C/31.8°F and below 45.1°C/113.2°F and above	0°C/32.0°F 45.0°C/113.0°F
Pulse Rate (Masimo Unit)	240 bpm and above 25 bpm and below	239 bpm 26bpm
Pulse Rate (Medtronic Unit)	251 bpm and above	300 bpm

Wireless Network

In this section, connection and setup procedure for wireless (telemetry) network is explained. By constructing a wireless network using the telemetry transmitter module, the data on this bedside monitor can be transmitted to the central monitor.

WARNING

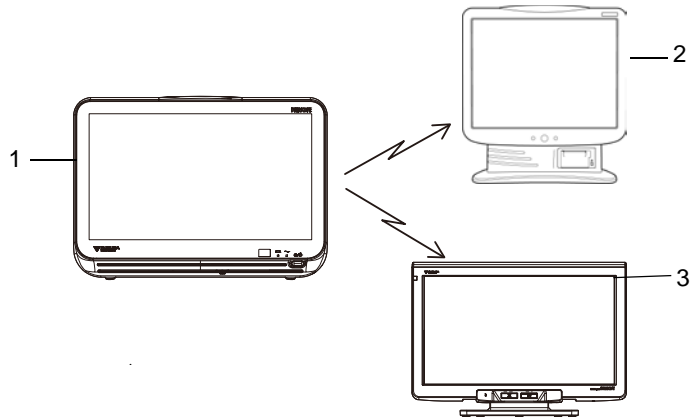
- Some wireless combinations of telemetry transmitters may generate interference with other devices.
- Before selecting the channel, verify it will not interfere with other channels.
- Make sure the telemetry manager of your system is aware of any changes to the telemetry channels.
- If transmitters are used in a neighboring medical facility, your facility and the neighboring facility must make agreements on the setting of the telemetry channels to prevent telemetry interference.

Example of Wireless Network Construction

CAUTION

- ♦ The setup of channel ID and group ID should be performed only by our service representative. Users should not perform this procedure as malfunction may occur.

- 1 Bedside Monitor: DS-1200 System
- 2 Central Monitor DS-7700 system
- 3 Central Monitor DS-8900 system



Channel ID and Telemetry Wave Setup

In this section, channel ID and telemetry wave setup is explained.

Once the transmitting channel ID and group ID are set, these will be retained even after the main power is turned OFF.

WARNING

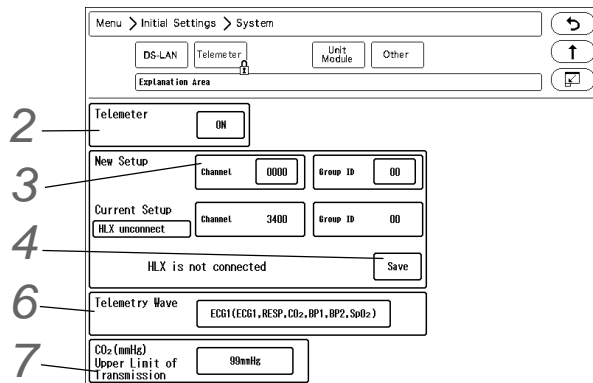
- ♦ A password can be set to restrict access to the channel ID setup menu so that only the telemetry channel administrator can change the channel ID.
- ♦ Some type of wireless combinations may generate interference with other telemetry.
- ♦ Before selecting the wireless channel, verify it does not cause interference.
- ♦ 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 neighboring facility must make agreements on the setting of telemetry channels to prevent telemetry interference.

NOTE

- ♦ To change the setting, enter the password.
(☞ "Administrator Setup" P5-2)

1 | Settings], [System], [Telemeter] keys.

▶ The "Telemeter" setup window will be displayed.

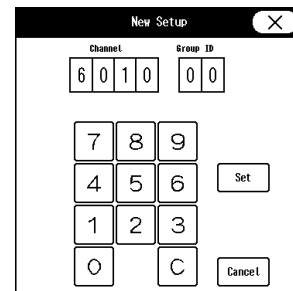


2 Perform setup for the telemetry transmission.

- ▶ [ON]: Telemetry transmission will be performed.
- ▶ [OFF]: Telemetry transmission will not be performed. In this case, channel ID will not be displayed on the home display.

3 Set the channel ID and group ID.

- 1 Press the key for "Channel" or "Group ID".
 - ▶ The "New Setup" window will be displayed. (shown on right)
- 2 Use the numeric keypad to enter the 4-digit medical telemetry channel ID.
- 3 Press the input area for the Group ID.
- 4 Use the numeric keypad to enter the group ID in the range of 00 to 63.
- 5 Press the [Set] key.



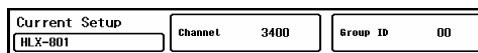
4 Press the [Save] key to save the channel ID and group ID.

- ▶ The channel ID and group ID will be saved.
- ▶ <Complete> will be displayed.
- ▶ The set channel ID will be displayed on the upper left of the home display.

REFERENCE

- ♦ If an error is found on the password, channel ID, or group ID, <Invalid Data> will be displayed. (Ex. The entered channel ID or group ID is outside the allowable range.) Enter the ID within the range and press the [Save] key.

5 Check the saved channel ID and group ID.



NOTE

- ♦ If the numeric data is displayed as "xxx" (out of measurement range) on this monitor, maximum or minimum value of measurable range will be transmitted to the central monitor.

	Value Outside the Measurement Range	Central Monitor Display
HR	301 bpm and above	Calculated on the central monitor based on ECG waveform.
Respiration Rate	151 Bpm and above	150 Bpm In case of impedance respiration, it is calculated on the central monitor.
Blood Pressure	-51 mmHg and below	-50 mmHg
	301 mmHg and above	300 mmHg
Temperature	-0.1°C and below	0°C
	45.1°C and above	45.0°C
PR (Masimo Unit)	240 bpm and above 25 bpm and below	239 bpm 26 bpm
PR (Medtronic Unit)	301 bpm and above	254 bpm

6 Select the transmitting waveform.

- ▶ [ECG1]: ECG1, RESP, CO₂, BP1, BP2, SpO₂ will be transmitted. However, RESP waveform will not be transmitted if the apnea source is CO₂.
- ▶ [ECG2]: ECG1, ECG2, RESP/CO₂, BP1, SpO₂ will be transmitted. One of either CO₂ or RESP waveform will be transmitted in accordance with the apnea source setting.

7 Set the "CO₂ (mmHg) Upper Limit of Transmission".

(☞ "DS-LAN Setup" P2-2)

CAUTION

- ♦ When the BP measurement unit is kPa, the corresponding waveform and numeric data will not be transmitted. When using the wireless network, the BP measurement unit should be set to "mmHg".
- ♦ The BP waveform with a scale above the set scale cannot be properly transmitted. When transmitting the BP waveform, pay attention to the displayed BP scale.
- ♦ If the measurement unit of CO₂ concentration is mmHg and [99 mmHg] is selected for "Upper Limit of CO₂ (mmHg) Transmission" under [Initial Settings>System>Telemeter], the CO₂ value of 100 mmHg or above will be transmitted as 99 mmHg.
- ♦ When using the Medtronic unit, the PR value of 255 bpm or above will be transmitted to the central monitor as 254 bpm.

REFERENCE

- ♦ The waveform not displayed on the home display can not be transmitted.

Chapter 3 Using the External Media

Formatting the Full Disclosure Waveform Card

In this section, formatting of SD card to be used for storing the full disclosure waveform is explained.

By formatting the specified SD card for full disclosure waveform, the card can be used for storing the full disclosure waveform data. By inserting the formatted SD card to the SD card slot, storing of the full disclosure waveform data will automatically start, and reviewing of the full disclosure waveform will become possible.

CAUTION

- ♦ The full disclosure waveform card formatted on other bedside monitors and central monitors cannot be used on this device.
- ♦ The full disclosure waveform SD card formatted on this device cannot be used on other bedside monitors and central monitors.
- ♦ Format the full disclosure waveform SD card in the SD card slot.
- ♦ Do not remove/insert the SD card while saving the full disclosure waveform to the SD card. Remove/insert the SD card while the main unit is in Perform this process while in standby or while the full disclosure waveform card is prepared for data transfer (while "Remove the card" is displayed).
- ♦ It will take about 5 minutes to format the full disclosure waveform SD card. During the format process, do not turn OFF the power, enter into standby mode, or remove the SD card. It may damage the SD card.

1 Press the [Menu], [Maintenance], [External Media] keys.



2 Format the full disclosure waveform card.

- 1 Make sure that the SD card is inserted, and that the SD card is unformatted or is for the full disclosure waveform data.
- 2 Press the [SD card HOLD 2 SEC] key for 2 seconds.
- 3 Wait until the format completes. The popup "SD Card Format: Formatting Full Disclosure Waveform Card" will be displayed during the format. It will take about 5 minutes to format. Do not remove the SD card or turn off the power during the format process. It may cause the SD card to malfunction.
- 4 When the format completes, the "Formatting Full Disclosure Waveform Card" will disappear and the name of the full disclosure waveform card will appear in the "SD" area.

Formatting the USB Memory

In this section, formatting of USB memory to be used for upgrades and data transfers is explained.

CAUTION

- It will take about 1 minute to format the USB memory. Do not format the card during monitoring as all operation will not be possible during the format process.
- During the format process, do not turn OFF the power, enter into standby condition, or remove the USB memory. It may damage the USB memory.

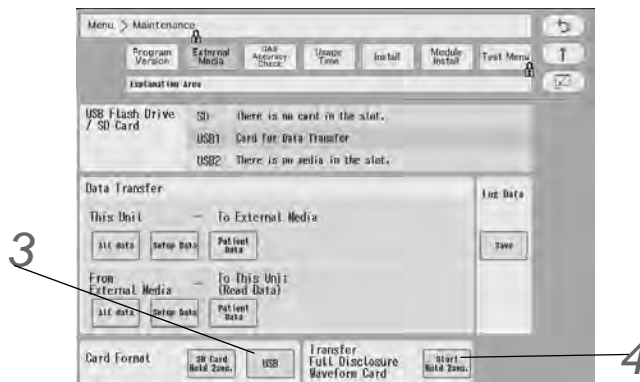
1 main unit, and that the USB memory is unformatted and is the specified card for data transfer.

2 Press the [Menu], [Maintenance], [External Media] keys.

The "External Media" menu will be displayed.

Two USB memories cannot be used simultaneously.

The USB memory that was connected first will be displayed in USB1 regardless of the position of the slot.



3 Format the USB memory.

1 Press the [SD Card Hold 2sec.] key for 2 seconds.
The USB Format screen will be displayed.

2 Make sure that the USB memory is unformatted or is the specified card for data transfer.

3 Press the [Format (HOLD 2 SEC)] key for the USB memory for 2 seconds.

4 Wait until the format completes. It will take about 1 minute to format.
During the process, do not remove the SD card or turn OFF the power.

5 When the format process is completed, the "SD Card Format" window will close.

4 Transfer Full Disclosure Waveform Card

1 Press the start button for 2 seconds.

2 <Remove the SD Card> will be displayed when the transfer preparation is complete.

3 Remove the SD card.

If you wish to write patient data such as admission and discharge dates and times and patient names to external media, write it to a USB memory.

Chapter 4 Connection to the External Devices

Ventilator Measurement and Alarm Input

A ventilator can be connected to the DS-1200 System using the Status II port on the DS-1200 Main or via Multiport Module (HP-800).

By connecting a ventilator, ventilator measurement data and alarm can be monitored on the patient monitor. Also, ventilator alarm can be notified to the central monitor via wireless, wired network.

This section describes the procedure to connect the DS-1200 System and ventilator, and to input the ventilator measurement and alarm.

Ventilator	Connection Cable
	DS-1200 Status II/HP-800
Servo Ventilator 300/300A	CJ-401RI-70SV3 (x1)
Servo Ventilator SERVO-i/SERVO-s/SERVO-U/SERVO-n/ SERVO-air	CJ-402RI-70SVi (x1)
PURITAN-BENNETT Ventilator 740/760	CJ-403RI-70PB (x1)
PURITAN-BENNETT Ventilator 840	CJ-403RI-70PB (x1)
Drager Medical Ventilator Evita 2dura/Evita 4/Evita XL	CJ-402RI-70SVi (x1)

When connecting a ventilator, check the corresponding software version of the ventilator.

Ventilator	Corresponding Software Version
Servo Ventilator 300/300A	Not specified
Servo Ventilator SERVO-i	v1.5/v2.0/v3.0
Servo Ventilator SERVO-s	v2.0/v3.0
Servo Ventilator SERVO-U/SERVO-n/SERVO-air	v1.0
PB740	M
PB760	H
PB840	K
Evita 2dura	04.14
Evita 4	04.14
Evita XL	05.10

WARNING

- ♦ If the DS-1200 System does not generate an alarm even though the ventilator is generating an alarm, or if any other malfunction occurs, immediately check the ventilator, this device, cable, and replace the cable if necessary.
- ♦ The alarm generation on this system is not guaranteed if the alarm other than the following generates at the ventilator.
 - ♦SV-300:
Airway pressure upper limit alarm, high continuous pressure alarm, O₂ concentration lower limit alarm, expiratory minute volume upper/lower limit alarm, apnea alarm, gas supply alarm, air supply alarm, O₂ supply alarm, battery alarm, limited battery alarm, no battery alarm, overrange alarm

- ◆SERVO-i:
Airway pressure upper limit alarm, high continuous pressure alarm, O₂ concentration lower limit alarm, expiratory minute volume upper/lower limit alarm, apnea alarm, gas supply (air supply) alarm, O₂ supply alarm, battery alarm, limited battery alarm, no battery alarm, overrange alarm, expiratory cassette disconnected alarm, backup ventilation alarm, regulation pressure limited alarm, respiratory rate alarm, PEEP low alarm, EtCO₂ upper limit alarm, EtCO₂ lower limit alarm
- ◆SERVO-s:
airway pressure upper limit alarm, high continuous pressure alarm, O₂ concentration lower limit alarm, expiratory minute volume upper/lower limit alarm, apnea alarm, gas supply alarm, air supply alarm, O₂ supply alarm, backup ventilation alarm, respiratory rate alarm, PEEP low alarm, battery operation alarm
- ◆SERVO-U/n/air: airway pressure upper limit alarm, expiratory minute volume upper/lower limit alarm, apnea alarm, gas supply alarm, O₂ supply alarm, overrange alarm, overrange alarm, PEEP low alarm
- ◆PB740/PB760/P 840:
The PB740/PB760/PB840 acquires alarm information from the nurse call port. The ventilator alarm that cannot be acquired from the nurse call port is not guaranteed. For corresponding alarm, refer to the service representative of the ventilator manufacturer.
- This device is not compatible to the following alarms generated on the Evita 2 dura/Evita 4/ Evita XL.
 - ◆ O₂ monitoring disabled alarm, CO₂ alarm disabled alarm, Oximeter alarm disabled alarm, Neo. volume measurement inoperable alarm, Minute volume alarm disabled alarm, Minute volume alarm low off alarm, Tidal volume alarm high off alarm, Apnea alarm off alarm, Nebulizer active alarm
- When the Evita 2 dura/Evita 4/Evita XL is connected, there is a communication delay of 3 seconds between the DS-1200 System and the Evita ventilator. Therefore, if the alarm generated at the ventilator is resolved within 3 seconds, the ventilator alarm may not be generated at the DS-1200 System.


CAUTION

- The ventilator operation should be performed by well-trained and authorized personnel.
 - When connecting the DS-1200 System and the ventilator, use only the specified connection cable.
 - Make sure that the ventilator is connected to the specified connector on the DS-1200 System. A confirmation window will be displayed when a ventilator cable is disconnected or when the power of the ventilator is turned OFF. (☞ Operation Manual "Ventilator Disconnected Confirmation Window" P3-19)
 - When connecting the cable, make sure that the main power of this system and the ventilator is OFF.
 - The external device parameters to be displayed on the graphic trend/tabular trend needs to be selected in advance. When the external device is connected, make sure to select the displaying parameters on the "Trend Data Setup" window ([Data Review>Graphic Trend or Tabular Trend] or [Initial Settings>External Device>Main Unit/HP-800]).
-

Ventilator Connection

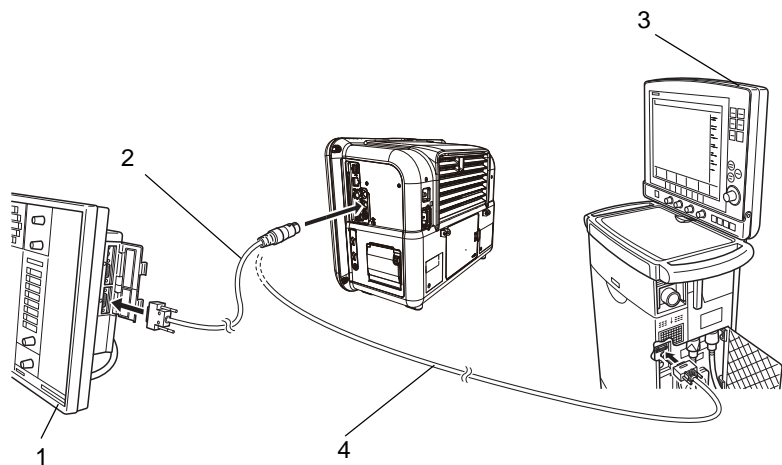
CAUTION

- ♦ Only one ventilator can be connected to each DS-1200 System. Do not connect more than one ventilator.
- ♦ The ventilator and anesthesia delivery system (FLOW-i) cannot be connected simultaneously.
- ♦ Ventilator and Multigas Module (MG-120) cannot be connected simultaneously.

□ In Case of SV-300, SERVO-i/s

- 1** Connect the SV-300 or SERVO-i/s to Status II connector on the DS-1200, or one of Status II connector A or Status II connector B on the HP-800.
(The illustration is example of connection with the HP-800.)

- 1 SV-300
- 2 CJ-401RI-70SV3
- 3 SERVO-i/ s
- 4 CJ-402RI-70SVi



□ In Case of SERVO-U/ SERVO-n/SERVO-air

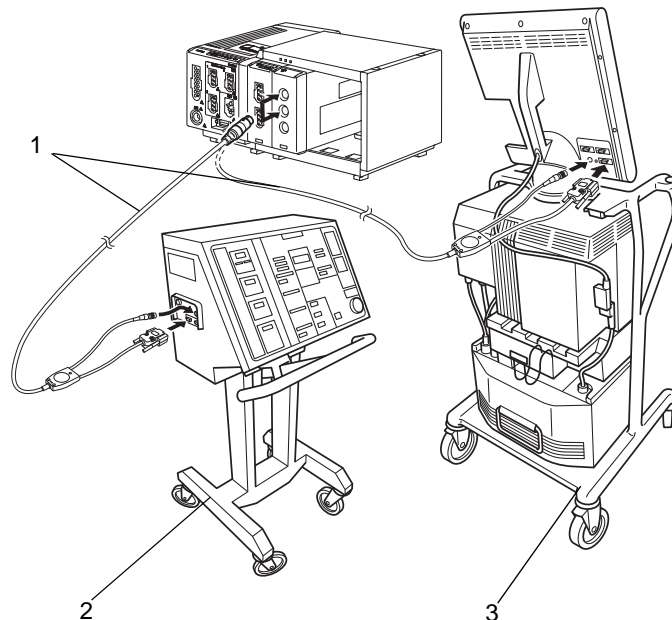
- 1** Connect the SERVO-U, SERVO-n, SERVO-air to the Status II connector on the DS-1200, or one of Status II connector A or Status II connector B on the HP-800.

In Case of PB740/760/840**CAUTION**

- When connecting the PURITAN-BENNETT ventilator, follow the precautions below. The serial port (RS-232C) of the ventilator should be set as follows. Refer to the service representative of the ventilator manufacturer.
Baud Rate: 9600 bps
Data Bit: 8bit
Parity Bit: None
(Stop Bit): (1bit)
- This system detects the "ventilator alarm" when the nurse call port on the ventilator outputs the alarm signal.
For details of ventilator setup and alarm signal output condition from the nurse call port, refer to the service representative of the ventilator manufacturer.

1 Connect the PB740/760/840 to Status II connector on the DS-1200, or one of Status II connector A or Status II connector B on the multiport module.
(The illustration is example of connection with the HP-800.)

- 1 CJ-403RI-70PB
- 2 PB740/760
- 3 PB840



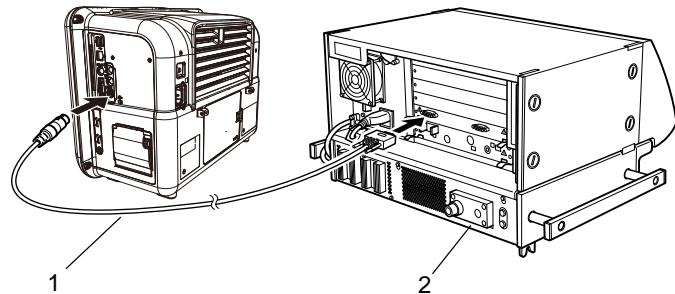
□ In Case of Evita

CAUTION

- When connecting the Evita 2 dura/Evita 4/Evita XL ventilator, the serial port (RS-232C) setup of the ventilator should be as follows. Refer to the service representative of the ventilator manufacturer.
- In Case of Evita 2 dura/Evita 4/Evita XL
Protocol: Modbus
Baud Rate: 19200 bps
Data Bit: 8bit
Parity Bit: Even
Stop Bit: 1bit

1 Connect the Evita 2 dura/Evita 4/Evita XL to Status II connector on the DS-1200, or one of Status II connector A or Status II connector B on the multiport module.
(The illustration is example of connection of Evita 2 dura and HP-800.)

- 1 CJ-402RI-70SVi
- 2 Evita 2dura



External Device Setup

To monitor the ventilator alarm, it is necessary to select the ventilator type to be connected.

REFERENCE

- Refer to the following procedure. (☞ "External Device Setup" P4-16)

SvO₂/CCO Monitor Connection

This section describes the procedure on how to connect the DS-1200 System to the oximeter manufactured by Edwards Lifescience, CCO measurement device (Vigilance, VigilanceCEDV, Vigilance II, Vigileo, EV-100), and Pulse index Continuous Cardiac Output (PiCCO) monitor.

By connecting the SvO₂/CCO Monitor to one of the following ports, SvO₂/CCO Monitor data can be centralized on the DS-1200 System.

COM1 to COM3 port on the DS-1200 Main (COM1 to 2 ports) Status II port on the DS-1200 Main
Multiport Module HP-800

SvO ₂ /CCO Monitor	Connection Cable	
	For Status II Connector	For Serial Connector
Vigilance	CJ-406RI-70Vigi (x1)	CJO-04RS4 (x1)
Vigilance CEDV	CJ-406RI-70Vigi (x1)	CJO-04RS4 (x1)
Vigilance II	CJ-402RI-70SVi (x1)	CJ-502 (x1)
Vigileo	CJ-402RI-70SVi (x1)	CJ-502 (x1)
EV1000	CJ-402RI-70SVi (x1)	CJ-502 (x1)
PiCCO	CJO-19RS5 (x1)	CJO-18RS5 (x1)
PulsioFlex	No	CJ-725 (x1) ^{*1}

*1: To connect the PulsioFlex PC4000, USB to RS-232C connector cable (UC-232A, ATEN) specified by PULSION Medical Systems is required.

*2: When connecting to EV1000, check whether the RS-232 output port connector is 9-pin male or 9-pin female. If the connector is 9-pin male, use CJ-406RI-70Vigi, or attach the female conversion connector supplied as standard accessory for EV1000.

Make sure that the network is set as follows.

For procedure to check the Vigilance/Vigileo network setting, refer to the operation manual for the Vigilance/Vigileo.

- Device: IFM Out
- Baud Rate: 19200 bps
- Parity Bit: None
- Stop Bit: 1
- Data Bit: 8
- Flow Control: 2 sec.

Make sure that the network is set as follows.

For procedure to check the PulsioFlex network setting, refer to the operation manual for the PulsioFlex.

- RS-232C Protocol: PulsioFlex V1.0

CAUTION

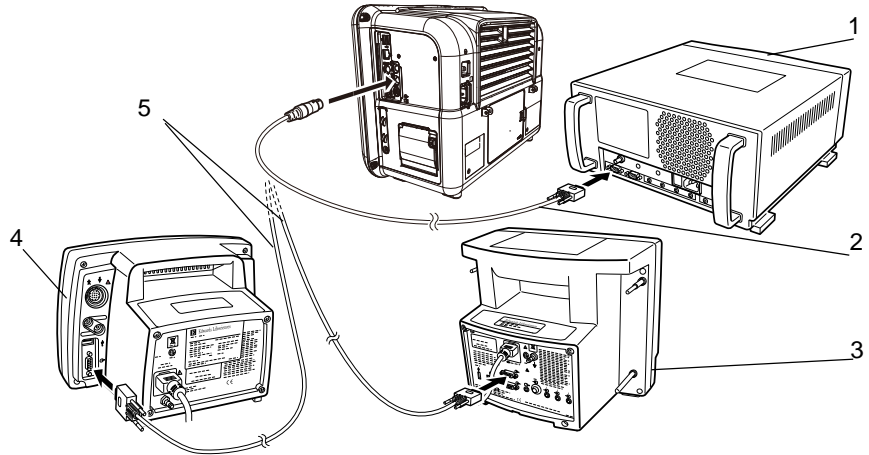
- When connecting this system and the SvO₂/CCO monitor, use only the specified connection cable.
- Make sure that the SvO₂/CCO monitor is connected to the specified connector on this system. When connecting the cable, make sure that the power of this system and the SvO₂/CCO monitor is turned OFF.

SvO₂/CCO Monitor Connection

□ In Case of Vigilance

1 Connect the Vigilance to the DS-1200 System. (The illustration is example of connection with the HP-800.)

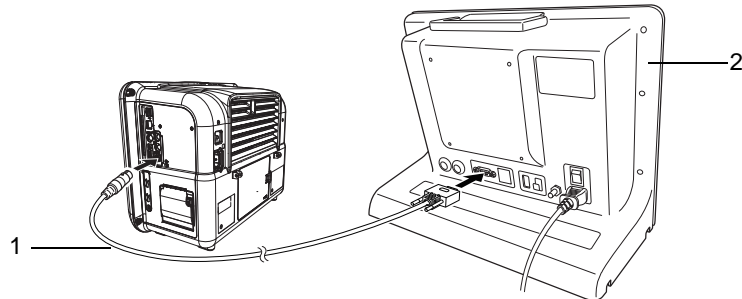
- 1 Vigilance
- 2 CJ-406RI-70Vigi
- 3 Vigilancell
- 4 Vigileo
- 5 CJ-402RI-70SVi



□ In Case of PiCCO

1 Connect the PiCCO to the DS-1200 System. (The illustration is example of connection with the HP-800.)

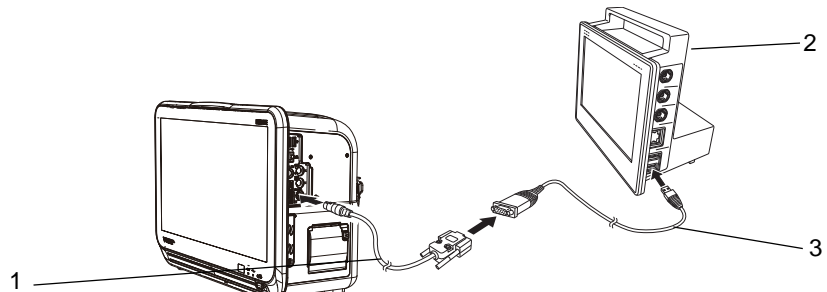
- 1 CJO-19RS5
- 2 PiCCO



□ In case of PulsioFlex

1 Connect the PulsioFlex to the DS-1200 System.

- 1 CJ-725
- 2 PulsioFlex
- 3 USB to RS-232C connector cable (UC-232A, ATEN)



External Device Setup

To display the measurement data, the connecting device type needs to be selected.

REFERENCE

- Refer to the following procedure. (☞ "External Device Setup" P4-16)

CO₂ Concentration Data Input

By connecting the Multigas Module (MG-110/MG-120), Gas Unit I/F Module (HC-120), or CO₂ Gas Module (HC-110), waveform and numeric data of CO₂ concentration can be monitored on the DS-1200 System.

Connecting the MG-110/ MG-120

The MG-110/MG-120 Multigas Unit Built-in Slot can be connected to the DS-1200 System via Module , spirometry measurement can be additionally monitored.

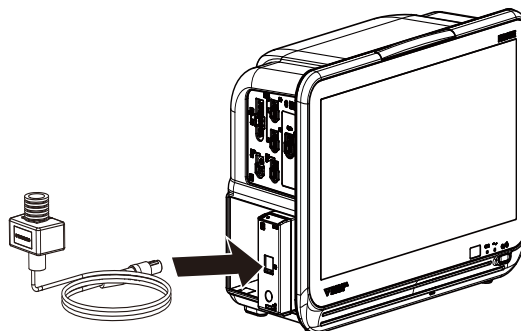
Multigas Unit	Unit Connection Cable
MGU-801P/MGU-811P	CJO-09SS0.3, CJO-09SS1.5, CJO-09SS5

CAUTION

- Ventilator and Multigas Unit Module (MG-120) cannot be connected simultaneously.
- The Anesthesia Delivery System (FLOW-i) and Multigas Unit Module (MG-110/MG-120) cannot be connected simultaneously.

Connecting the Capnostat 5

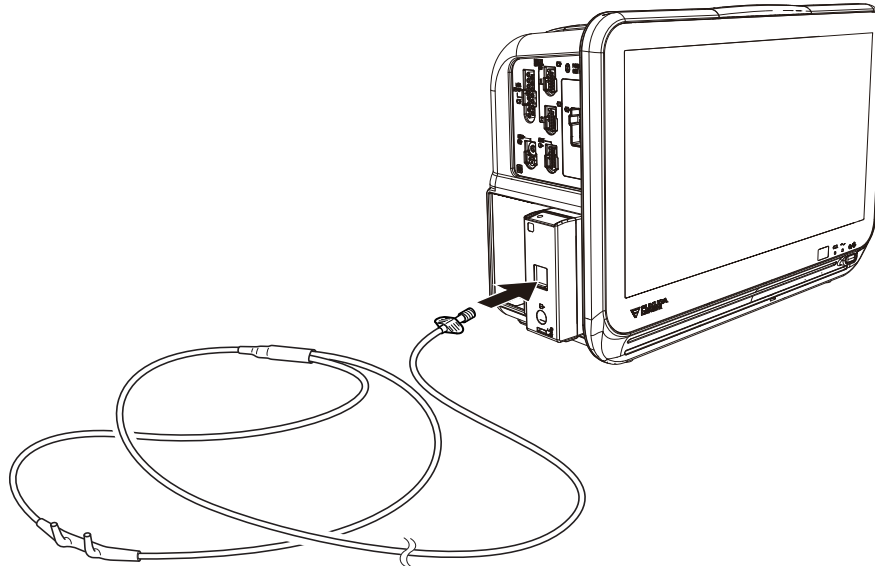
By connecting the Capnostat 5, CO₂ concentration measured by mainstream method can be monitored.



Mainstream Method
Capnostat 5 (Philips)

Connecting the Sampling Line (Medtronic)

By connecting the FilterLine CO₂ sampling line series using the CO₂ Gas Unit the HC-110, CO₂ concentration measured by intubation or non-intubation can be monitored.



*Sidestream Method
(Incorporates Microstream technology developed by Medtronic)*

BIS Data Input

By connecting the A-2000/A-3000 BIS monitor (Medtronic), the patient's recovery from anesthesia can be verified by BIS (Bispectral Index) value.

BIS Monitor	Connection Cable	
	For Status II Connector	For Serial Connector
A-2000	CJ-407RI-70BIS	CJO-03RS4
A-3000		

CAUTION

- ♦ Refer to the BIS monitor operation manual and set the SQI value above 15.
- ♦ ASCII should be set to communicate with the system. Make sure that ASCII is set on the BIS monitor communication setting. Refer to the BIS monitor operation manual for procedures.
- ♦ DS-1200 Main or the Status II connector of the HP-800.

Connecting the A-2000/A-3000 (Medtronic)

CAUTION

- When connecting this device and the BIS monitor, use only the specified connection cable.
 - Make sure that the BIS monitor is connected to the specified connector on this equipment. When connecting the cable, make sure that the power of this device and the BIS monitor is turned OFF.
-

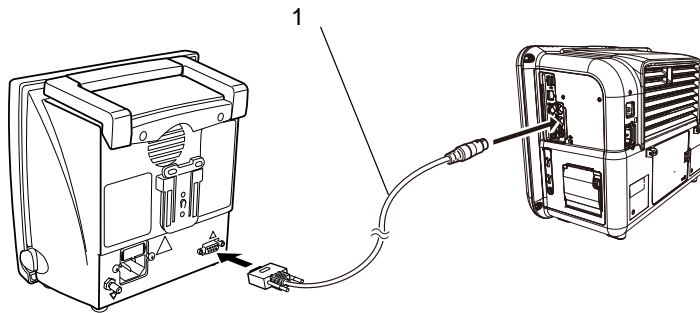
Connecting to the DS-1200 Main

- 1 DS-1200 Main and serial port on the BIS monitor.

Connecting to the Multiport Module:

- 1 Use the BIS connection cable (CJ-407RI-70BIS) to connect the Status II connector on the HP-800 and serial port on the BIS monitor.
(The illustration is example of connection with the HP-800.)

- 1 CJ-407RI-70BIS



External Device Setup

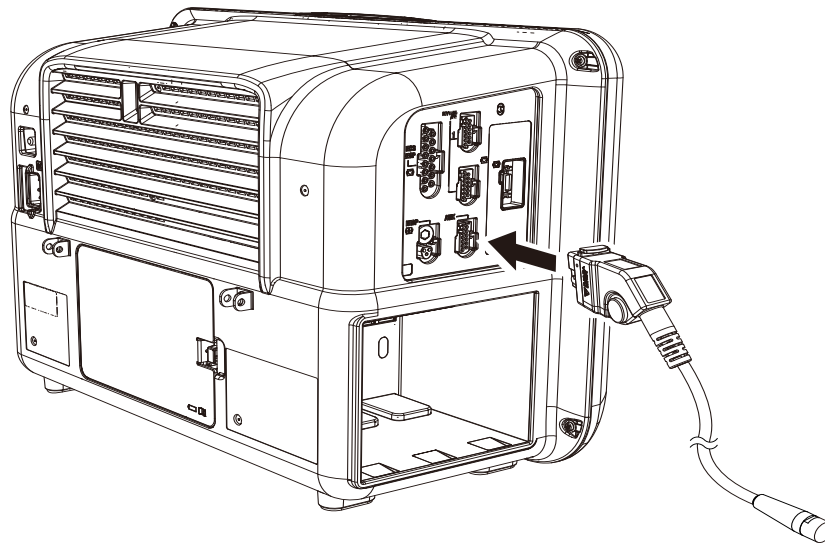
To display the BIS monitor data, external device setup is required.

REFERENCE

- Refer to the following procedure. (☞ "External Device Setup" P4-16)
-

Connecting the BISx (Medtronic)

BIS data can be measured by the BISx module (Medtronic).



INVOS Data Input

By connecting the INVOS 5100C Cerebral Oximeter (Medtronic), regional cerebral oxygen saturation data can be monitored.

Non-Invasive Cerebral Oximeter	Connection Cable	
	INVOS 5100C	For STATUS II Connector CJ-406RI-70Vigi

CAUTION

- When connecting this system and the INVOS 5100C, use only the specified connection cable.
- Make sure that the INVOS 5100C is connected to the specified connector on this system. When connecting the cable, verify that the main power of this system and the INVOS 5100C are OFF.

Connecting to the INVOS

- 1 Connect the INVOS 5100C to the serial connector or status connector on the left side of the DS-1200 or to the HP-800 using the connection cable.

External Device Setup

To display the INVOS 5100C data, "External Device" setup is required.

REFERENCE

- Refer to the following procedure. (☞ "External Device Setup" P4-16)

FLOW-i Data Input

By connecting the FLOW-i Anesthesia Delivery System (MAQUET) to the DS-1200 System, the numeric data, waveform data of the FLOW-i can be monitored.

Anesthesia Delivery System	Connection Cable	
	For Status II Connector	For Serial Connector
FLOW-i	CJ-402RI-70SVi (x1)	CJ-502 (x1)

The software version of FLOW-i that can be connected to the DS-1200 System is as follows.

- System Software Version 02 (FCI Protocol Version 0004)
- System Software Version 03 (FCI Protocol Version 0005)

⚠ WARNING

- The alarm data of FLOW-i cannot be monitored.
- The alarm will not be generated on the DS-1200 System.

⚠ CAUTION

- The operation of anesthesia delivery system should be performed by well-trained and authorized personnel.
- When connecting the DS-1200 System and the anesthesia delivery system, use only the specified connection cable.
- Make sure that the anesthesia delivery system is connected to the specified connector on the DS-1200 System.
- When connecting the cable, make sure that the main power of this equipment and the anesthesia delivery system is turned OFF.

Connection with the FLOW-i

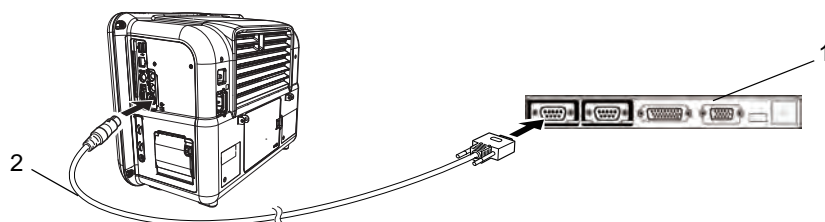
⚠ CAUTION

- Only one Anesthesia Delivery System can be connected to each DS-1200 System. Do not connect more than one Anesthesia Delivery System.
- The Anesthesia Delivery System and Multigas Module (MG-110/MG-120) cannot be connected simultaneously
- The anesthesia delivery system and ventilator cannot be connected simultaneously.

1 Connect the FLOW-i to Status II connector on the DS-1200 Main, or one of Status II connector A or Status II connector B on the HP-800. (The illustration is example of connection with the HP-800.)

1 Input/Output Port of FLOW-i

2 CJ-402RI-70SVi



External Device Setup

To monitor the anesthesia data, it is necessary to select the anesthesia delivery system to be connected.

REFERENCE

- ♦ Refer to the following procedure. (☞ "External Device Setup" P4-16)

Transcutaneous Blood Gas Monitor Data Input

By connecting the transcutaneous blood gas monitor, TCM4 or TCM 5 FLEX (Radiometer Medical ApS) to the DS-1200 System, transcutaneous blood gas data can be monitored.

Transcutaneous Blood Gas Monitor	Connection Cable	
	For Status II Connector	For Serial Connector
TCM4	(Connection not possible)	CJ-726 (x1)
TCM5 FLEX	(Connection not possible)	CJ-725 (x1)

The software version of the transcutaneous blood gas monitor that can be connected to the DS-1200 System is as follows.

- ♦ TCM4: 3.04
- ♦ TCM5 FLEX: 1.18, 1.40

CAUTION

- ♦ When connecting the DS-1200 System and the transcutaneous blood gas monitor, use only the specified connection cable.
- ♦ Make sure that the transcutaneous blood gas monitor is connected to the specified connector on the DS-1200 System.
- ♦ When connecting the cable, make sure that the main power of this device and the transcutaneous blood gas monitor is turned OFF.

Connecting the Transcutaneous Blood Gas Monitor

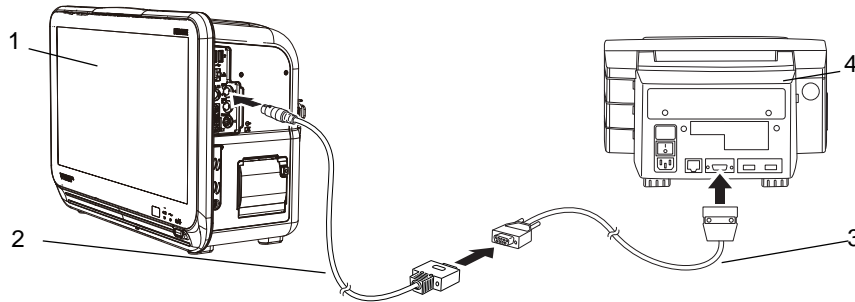
CAUTION

- Only one transcutaneous blood gas monitor can be connected to each DS-1200 System. Do not connect more than one transcutaneous blood gas monitors.

In case of TCM4:

1 Use the CJ-726 connection cable and the cable specified by Radiometer Medical ApS to connect the TCM4 to the serial connector on the DS-1200.

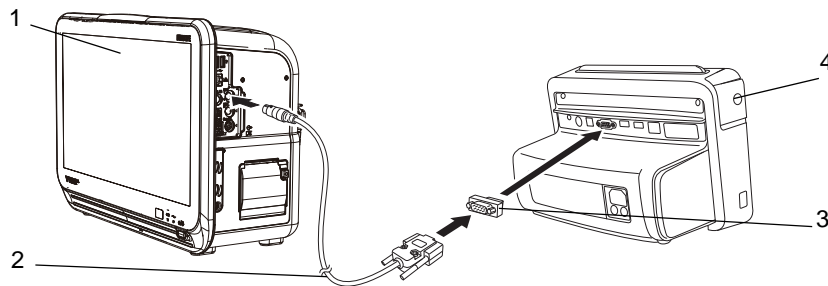
- 1 DS-1200
- 2 CJ-726
- 3 Cable specified by Radiometer Medical ApS
- 4 TCM4



In case of TCM5 FLEX:

1 Use the CJ-725 connection cable and the D-sub 9-pin male to male gender changer to connect the TCM5 FLEX to the serial connector on the DS-1200.

- 1 DS-1200
- 2 CJ-725
- 3 D-sub 9-pin male to male gender changer
- 4 TCM5 FLEX



External Device Setup

To monitor the transcutaneous blood gas monitor data, it is necessary to select the transcutaneous blood gas monitor to be connected.

REFERENCE

- Refer to the following procedure. (☞ "External Device Setup" P4-16)

Root Data Input

By connecting the Root (Masimo) to the DS-1200 System, SpO₂ data can be input.

	Connection Cable	
	For Status II Connector	For Serial Connector
Root	(Connection not possible)	CJ-502

CAUTION

- When connecting the DS-1200 System and the Root, use only the specified connection cable.
- Make sure that the Root is connected to the specified connector on the DS-1200 System.
- When connecting the cable, make sure that the main power of this device and the Root is turned OFF.
- Only one Root can be connected to each DS-1200 System. Do not connect more than one Root.

NIRO-200NX Data Input

By connecting the NIRO-200NX (Hamamatsu Photonics) to the DS-1200 System, TOI (tissue oxygenation index) data can be input.

	Connection Cable	
	For Status II Connector	For Serial Connector
NIRO-200NX	CJ-591	(Connection not possible)

CAUTION

- When connecting the DS-1200 System and the NIRO, use only the specified connection cable.
- Make sure that the NIRO-200NX is connected to the specified connector on the DS-1200 System.
- When connecting the cable, make sure that the main power of this device and the NIRO-200NX is turned OFF.
- Only one NIRO-200NX can be connected to each DS-1200 System. Do not connect more than one NIRO-200NX.

Setup for the External Device Connection

This section explains about the external device connection setup.

External Device Setup

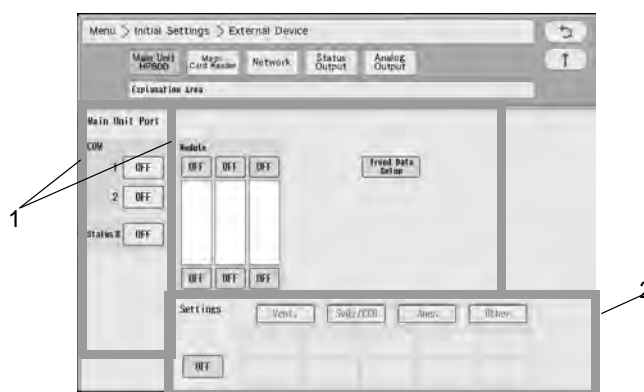
1 Press the [Menu], [Initial Settings], [External Device] keys.

▶ The "External Device" setup menu will be displayed.

1 Select the connecting port for main unit or HP-800.

2 Select the connecting device from the displayed selection.

By selecting Vent., SvO₂/CCO, Anes. or Other from the upper area, the corresponding selection will be displayed at the lower area.



Selectable External Device for Each Port

Port	Selectable External Device
COM1 to COM2	Vigilance, PiCCO, PulsioFlex, PC Comm., ORC, Barcode Reader, Magnetic Card Reader, BIS, INVOS, FLOW-i, PC Comm. (DS-5000), TCM4/TCM5, Root, NIRO
Status II	SV-300, SERVO-i/s, SERVO-U/n/air, PB, Evita, Vigilance, PiCCO, BIS, INVOS, FLOW-i, Root, NIRO
HP-800	SV-300, SERVO-i/s, SERVO-U/n/air, PB, Evita, Vigilance, PiCCO, BIS, INVOS, FLOW-i

NOTE

- When connecting the cable, make sure that the power of this system and the external device is turned OFF.
- When the external device setup is changed, make sure that this system and the external device is properly communicating.
- If communication with the external device is already established through the corresponding port, it is necessary to disconnect the communication in order to change the selection on this menu.
- The external devices other than Vigilance, BIS, INVOS cannot be set to multiple ports.
- If the same function is set to multiple ports, it may take time to identify the device.
- For the HP-800 and the main unit port, the setting needs to be different.
- Vigilance, PiCCO, and PulsioFlex cannot be used simultaneously.
- Anesthesia Delivery System and MG-110/MG-120 cannot be used simultaneously.
- Anesthesia Delivery System and ventilator cannot be used simultaneously.
- Ventilator and MG-120 cannot be used simultaneously.
- When MG-120 is selected, a ventilator cannot be assigned to Status II or HP-800.
- When MG-110/MG-120 is selected, the anesthesia delivery system (FLOW-i) cannot be assigned to Status II or HP-800.

- By performing the setting for the HP-800, the setting stored on the HP-800 can be used by inserting the HP-800 to other slot of the Input Box or connecting it to other DS-1200 System. Make sure to power cycle the DS-1200 Main when the HP-800 setting is changed.
- When [Magnetic Card] is selected, perform further settings on the "Magnetic Card Reader" setup menu. (☞ "Magnetic Card Reader Setup" P4-21)
- The external device parameters to be displayed on the graphic trend/tabular trend needs to be selected in advance on the "Trend Data Setup" window ([Data Review>Graphic Trend or Tabular Trend] or [Initial Settings>External Device>Main Unit/HP-800]).
- When [TCM4/TCM5] is selected, only TCM4, TCM5 FLEX can be connected. Other TCM series devices cannot be connected.

Unit Module Setup

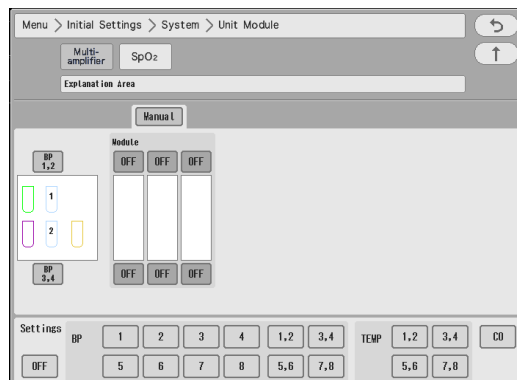
☐ Multiparameter Connector Setup

On the "Multiplier" setup menu, the parameter to measure on each multiparameter connector can be set. Connecting the relay cable to the multiparameter connector on the main unit will automatically set the measuring parameter.

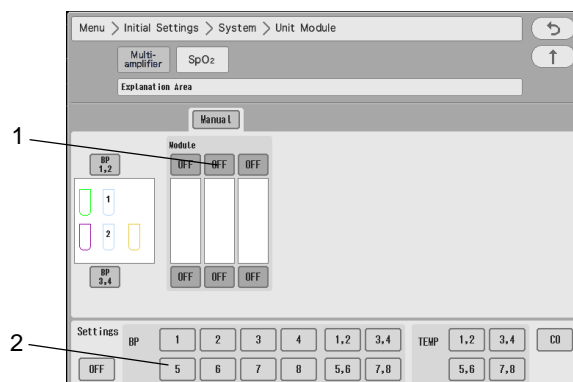
HM-800/HM-801 Multi Module, it is necessary to manually set the measuring parameter for each multiparameter connector.

1 Press the [Menu], [Initial Settings], [System], [Unit Module] keys.

▶ The "Multiplier" setup menu will be displayed.



Example:



- 1 Select the multiparameter connector location. The selected item will be displayed in blue.
- 2 Assign the parameter to the selected location. In this case, select [5] for "BP". The parameter will be assigned to the selected connector.

⚠ CAUTION

- The same parameter cannot be set to more than one connectors.
- By setting [OFF] for the unused connector, the parameter will become selectable on another connector.
- If the parameter assigned to the multiparameter connector and the connected relay cable does not match, the connector location will be displayed in red and the connected relay cable type will be displayed.

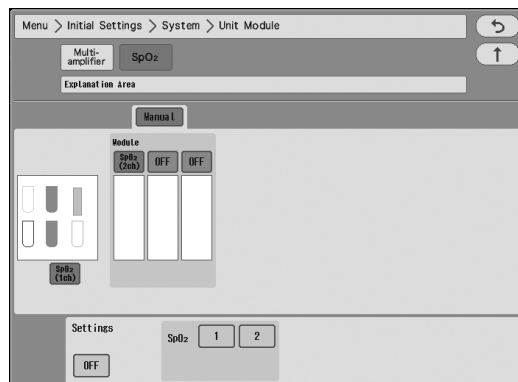
☐ SpO₂ Connector Setup

When using the SpO₂ Module (HG-810, HG-820), it is necessary to set the SpO₂ channel manually.

1 Press the [Menu], [Initial Settings], [System], [Unit Module], [SpO₂] keys.

- ▶ The SpO₂ setup menu will be displayed.

2 SpO₂ channel can be assigned to any module.



- 1 Press [OFF] in the HG-810/HG-820 slot location. The selected item will be displayed in blue.
- 2 Assign the channel to the selected location. In this case, select [2] for "SpO₂". 2 channels of SpO₂ will be assigned to the HG-810/HG-820.

⚠ CAUTION

- It is not possible to set only 2ch.
- If the channel setting is duplicated, one of the settings will be turned OFF.

☐ Software Upgrade for Unit/Module

The software of the unit or module can be upgraded on the "Module Install" menu.

1 Press the [Menu], [Maintenance], [Module Install] keys.

- ▶ The "Module Install" menu will be displayed.

NOTE

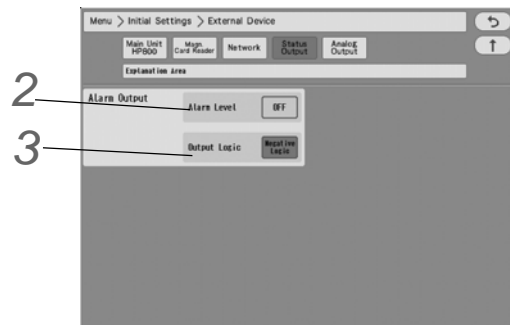
- Users should not perform the software update for the unit or module. To update the software, contact your nearest service representative.

Status Output Setup

The alarm can be output from the status input/output connector or I/O connector (optional) on the Main Unit .

1 Press the [Menu], [Initial Settings], [External Device], [Status Output] keys.

- ▶ The "Status Output" setup menu will be displayed.



2 Select the alarm to output.

- ▶ [Level H]: Level H alarm will be output.
- ▶ [Level H,M]: Level H, M alarm will be output.
- ▶ [Level H,M,L]: Level H, M, L alarm will be output.
- ▶ [APNEA]: Apnea alarm will be output.
- ▶ [OFF]: Alarm will not be output.

3 Set the Output Logic.

- ▶ [Positive Logic]: Positive synchronized signal will be output.
- ▶ [Negative Logic]: Negative synchronized signal will be output.
- ▶ [Pulse]: A square wave of 440 ms cycle will be output.

NOTE

- ♦ Refer to "Status I/O Signal (Status II Connector)" P6-35 for connector pin assignments of the alarm output.
- ♦ The device status alarm will be output as level L. To output the device status alarm, select [Level H,M,L].

Analog Output Setup

This equipment is capable to output the analog ECG and BP waveform.

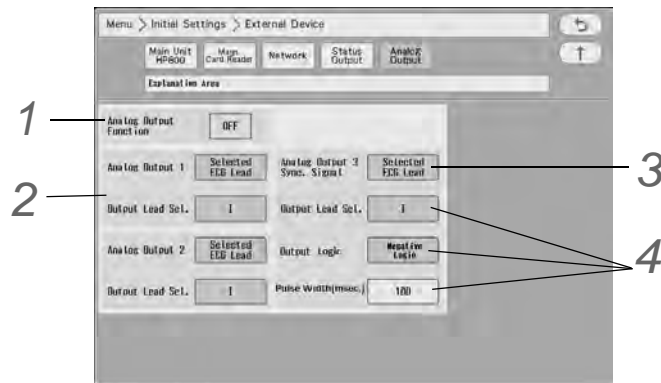
The BP waveform for analog output can be selected from the measured waveforms on the multiparameter connector.

1 Set the "Analog Output Function".

- ▶ Select from [ON]/[OFF].

2 Set the "Analog Output 1", "Analog Output 2".

- ▶ Select from [Selected ECG Lead]/[Displayed ECG Lead]/[Multiparameter Connector 1-1]/[Multiparameter Connector 1-2]/[Multiparameter Connector 2-1]/[Multiparameter Connector 2-2].
- ▶ When [Selected ECG Lead] is selected, press the key for "Output Lead Sel.". Select from [I]/[II]/[III]/[aVR]/[aVL]/[aVF]/[V1] to [V6].



3 Set the "Analog Output 3".

- ▶ Select from [Selected ECG Lead]/[Displayed ECG Lead]/[Multiparameter Connector 1-1]/[Multiparameter Connector 1-2]/[Multiparameter Connector 2-1]/[Multiparameter Connector 2-2]/[Sync. Signal].

4 When [Sync. Signal] Synchronized Signal Output is selected, select also the output signal.

- 1 Press the key for "Signal Output", and select from [HR]/[RR].
 - ▶ [HR]: Synchronized signal based on HR source (ECG) will be output.
 - ▶ [RR]: Synchronized signal based on RR source (impedance) will be output.
- 2 Select the Output Logic
 - ▶ [Positive Logic]: Positive synchronized signal will be output.
 - ▶ [Negative Logic]: Negative synchronized signal will be output.
- 3 Select the Pulse Width from [100]/[60]/[20] msec.
 - ▶ The synchronized signal will be output with the selected pulse width.

NOTE

- ♦ The QRS synchronized signal is a delay output (35 msec or less during Monitor/Diagnosis Mode). The delay time varies depending on the filter mode setting and input waveform type.
- ♦ When the QRS synchronized signal is input to the external device, make sure that the delay time is within the acceptable range of the connected device.

Using the Magnetic Card Reader

This section explains the connection and setup procedure for the magnetic card reader.

By using the magnetic card reader, patient information can be automatically entered from the magnetic card at patient admittance.

(☞ Operation Manual "Entering Patient Information from the Magnetic Card" P5-3)

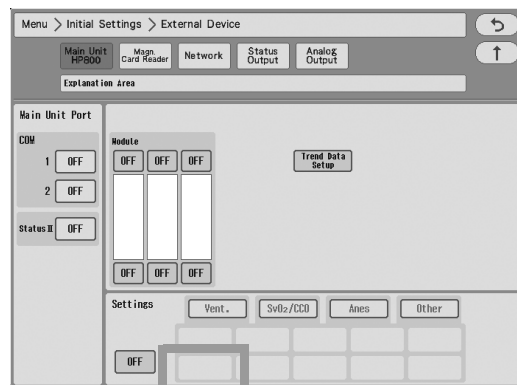
Connecting the Magnetic Card Reader

- 1 Connect the cable of the magnetic card reader to the conversion cable (CJ-756).
- 2 Connect the other end of the conversion cable to the serial connector (COM1 to 2) on the left side of the DS-1200 Main.

Magnetic Card Reader Setup

The initial settings for the magnetic card reader can be performed.

- 1 Press the [Menu], [Initial Settings], [External Device] keys.
 - ▶ The "External Device" setup menu will be displayed.
- 2 Select the port (COM1 to 2) for the magnetic card reader.
- 3 Select [Magnetic Card Reader] in the [Other] category.

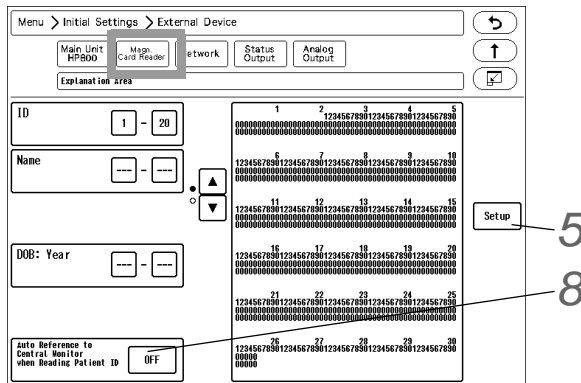


Since the data formats of magnetic card vary for each institution, it is necessary to set the digit location of each information.

For the items that needs to be read, perform the setup following the procedure 4 to 7. This setup is not necessary for the items not required to be read.

4 Press the [Magnetic Card Reader] key.

▶ The "Magnetic Card Reader" setup menu will be displayed.



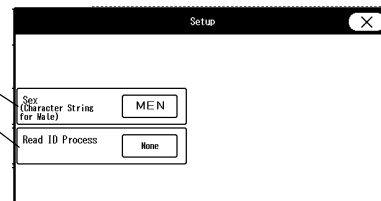
5 Press the [Setup] key to preconfigure the magnetic card reader.

The character strings to indicate birth date, sex, etc., can be set.

1 Press the key for "Sex" to display "Character String for Male" window. Enter the character string for male (max. 3 characters) used on the magnetic card.

2 Set the "Read ID Process".

- ▶ [None]: The whole patient ID will be read as the patient ID.
- ▶ [Numeric]: Only the numerics will be read as the patient ID.
- ▶ [Alphanumeric]: The numerics and alphabets will be read as the patient ID.



6 Analyze the starting and ending digit of the data (patient ID, etc.) read from a magnetic card.

NOTE

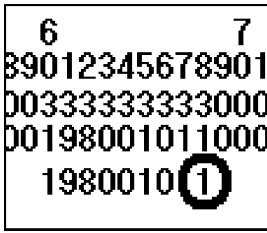
- ♦ The procedure to analyze the data read from the magnetic card is explained below.
- ♦ If not analyzing the data on the magnetic card, proceed to step 7.

REFERENCE

- ♦ On the "Magnetic Card Reader" setup menu, starting and ending digit of each data such as [ID], [DOB: Year] can be set.
- ♦ From: Starting digit number of the data to be read from the magnetic card
- ♦ To: Ending digit number of the data to be read from the magnetic card.

REFERENCE

- ♦ The analyzing procedure is explained using the example of patient data below.
 Patient ID: 0123456789
 Patient Name: FUKUDA DENSHI
 Date of Birth: Jan. 1, 1980
 Sex: Male



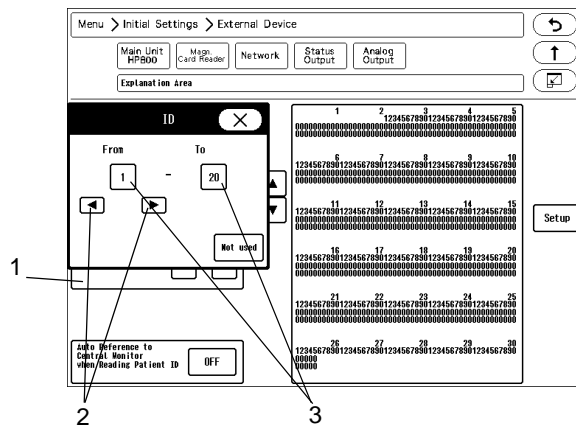
"1" which is displayed at the 68th digit can be estimated as the character string for male. It will be more definite if compared with the data of female.

3 The setup will be performed with the analyzed result.

NOTE

- After the setup, check if the data of other patient's card can be correctly read.

7 Enter the starting digit and ending digit for each data.



- Select the item to enter from the list displayed at left.
- Enter the starting digit or ending digit in the range of 1 to 255 using the left or right button.
- Press the [1] key for "From" or the [20] key for "To".

REFERENCE

- If the data is not present on the magnetic card, enter [Not Used] for both starting and ending digit.

4 Repeat step 1 to 3.

8 Set the "Auto Reference to Central Monitor when Reading Patient ID".

- [ON]: Patient information can be automatically acquired from the central monitor using the magnetic card. This function is available only when the DS-LAN III network is constructed.
- [OFF]: Patient information cannot be received.

NOTE

- To use this function, select [Enable] for "Search ID" under [Initial Settings>System>Other].

PC Communication

This section explains about the PC communication setup procedure.

By using the PC communication function, vital data measured on the bedside monitor can be transmitted to PC.

Connection with the System

- 1 Connect the accessory cable to the serial connector (COM1 to COM4) on the DS-1200 Main. When using the built-in telemeter, connect to COM1 to COM3.

External Device Setup

To transmit the data to PC, "External Device" setup is required.

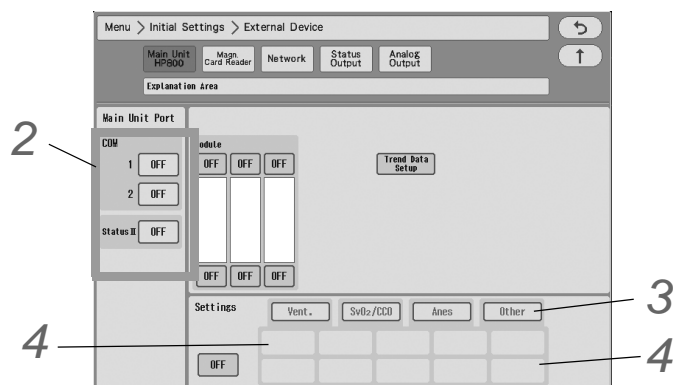
- 1 Press the [Menu], [Initial Settings], [External Device], [Main Unit/HP-800] keys.

▶ The screen to set the connecting device type for each port will be displayed.

- 2 Select the port (COM1 and COM2) which the system was connected.

- 3 Press the [Other] key.

- 4 Select [PC Comm.] or [PC Comm. (DS-5000)].



NOTE

- ♦ If the PC communication is disconnected, <Check System Conn.> will be displayed.

Connection with the Laser Printer

This section explains the setup procedure for the laser printer.

There are two ways to print on the laser printer.

- ♦ Printing on the laser printer connected to the TCP/IP network (Connects to the LAN (TCP/IP) Connector.)
- ♦ Printing on the laser printer connected to the central monitor (Only when connected to DS-LAN III network)

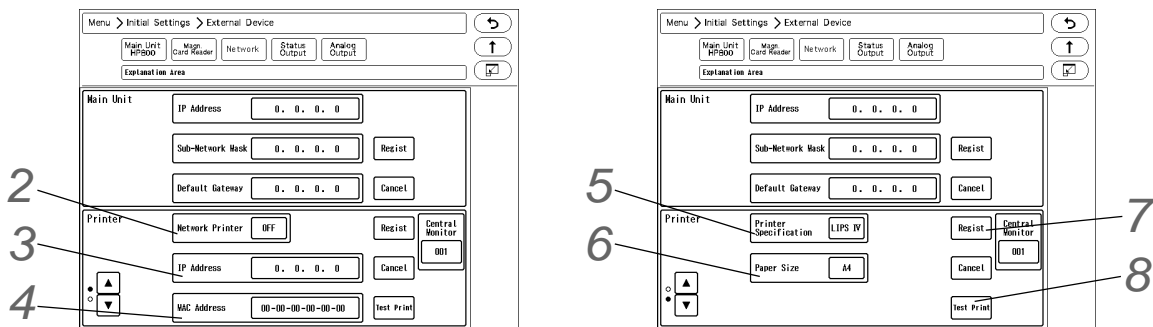
Laser Printer Setup

❑ To Output on the TCP/IP Network Printer

Set the IP address, MAC address, and printer specification for the laser printer.

1 Press the [Menu], [Initial Settings], [External Device], [Network] keys.

- ▶ The "Network" setup menu will be displayed.



2 Select ON/OFF for "Network Printer".

- ▶ [ON]: Laser printer will be enabled.
- ▶ [OFF]: Laser printer will be disabled.

REFERENCE

- ♦ Select [DS-LAN] to output on the laser printer of DS-7700 system central monitor connected to the DS-LAN III network.

3 Enter the IP address of the printer.

4 Enter the MAC address of the printer.

NOTE

- ♦ MAC (Media Access Control) address is an address assigned for each network device. Refer to the operation manual of the printer or printer network board.

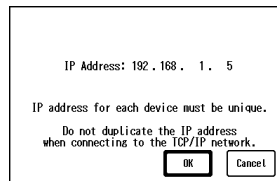
5 Select the printer specification.

- ▶ [LIPS IV]: Select when LIPS IV laser printer (Canon) is used.
- ▶ [ESC/page]: Select when ESC/page laser printer (EPSON) is used.
- ▶ [PCL5]: Select when PCL5 laser printer (HP) is used.

6 Select the paper size.

- ▶ [A4]: Select when using A4 size paper.
- ▶ [Letter]: Select when using letter size paper.

7 When [Regist] is pressed, a confirmation message will be displayed.



- ▶ [OK]: To register the setting, press this key.
- ▶ [Cancel]: To cancel registering, press this key.

8 Perform test printing.

Verify that the printing is properly performed.

CAUTION

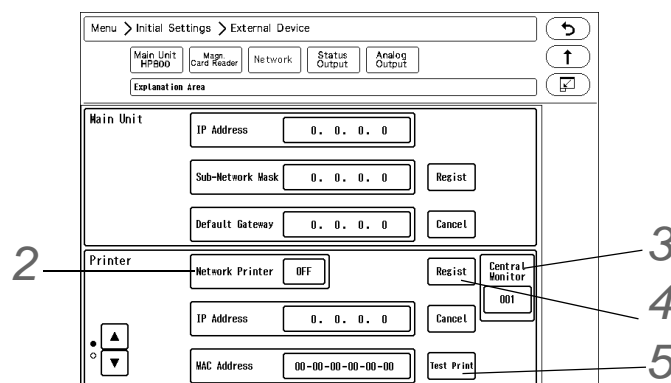
- ♦ If the output characters are garbled, printer specification may be incorrectly set. Refer to the operation manual of the printer and check the printer specification.

To Output on the DS-LAN Printer

Set the central ID of the central monitor which is connected to the laser printer.

1 Press the [Menu], [Initial Settings], [External Device], [Network] keys.

- ▶ The "Network" setup menu will be displayed.



2 Select [DS-LAN] for "Network Printer".

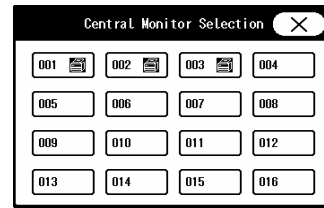
3 Press the key for "Central Monitor", and specify the central ID of the central monitor to perform the printing.

The central ID with the printer icon displayed can be selected.

4 Press [Regist] and then press [OK].

▶ It is necessary to press the [OK] key to validate the setting.

5 Perform test printing. Verify that the printing is properly performed.



CAUTION

- ♦ If the output characters are garbled, printer specification may be incorrectly set on the central monitor. Refer to the operation manual of the printer and check the printer specification.
- ♦ The bedside monitor printer output will be prioritized over the central monitor laser printer output. If the bedside monitor printer output is started during the laser printer output, the laser printer output will resume after the bedside monitor printer output.

Chapter 5 Initial Settings

Initial Settings

This section explains about the "Initial Settings" menu.

Under "Initial Settings" menu, there are 7 setup categories which are Alarm, Measurement, User I/F, External Device, System, User Mode Registration, and Administrator Setup.

Description for Each Category

Category	Subcategory	Description
Alarm	-	Alarm-related settings, alarm indicator settings, etc.
Measurement	User Label	User label settings for BP and TEMP
	Unit	Measurement unit settings for CO ₂ , BP, CVP, TEMP, ST, Height/Weight
	Other	Other settings such as arrhythmia analysis filter, etc.
User I/F	Display/Print	Display and print settings such as date format, BP alarm limit increment, etc.
	Power ON/ Discharge	Settings such as backup status at "Power ON" and "Discharge", etc.
	Menu	Key display settings for Menu screen
	Key Mask	Key mask settings for unnecessary keys
	Remote Control	Settings for remote control
	Operation	Settings for auto hide window.
External Device	Main Unit Port/HP-800	Settings for external device connectors such as serial port, Status II connector.
	Magnetic Card Reader	Settings for magnetic card reader
	Network	Network settings for laser printer.
	Status Output	Settings for alarm output.
	Analog Output	Settings for analog output, synchronized signal output.
System	DS-LAN	Wired network settings such as Room ID, Bed ID.
	Telemeter	Telemetry settings such as telemetry channel, transmitting waveform, etc.
	Unit/Module	Settings for multi-amplifier connector, SpO ₂ channel.
	Other	AC filter, Search Patient ID, Numeric Data External Output
User Mode Registration	-	Registration of 9 main modes and 6 sub modes for monitoring.
Administrator Setup	Key Lock	Settings of key lock level for display and setting
	Password Setup	Settings for password and administrator

Administrator Setup

This section explains about the "Administrator Setup" menu.
The "Administrator Setup" is composed of [Key Lock] and [Password Setup].

NOTE

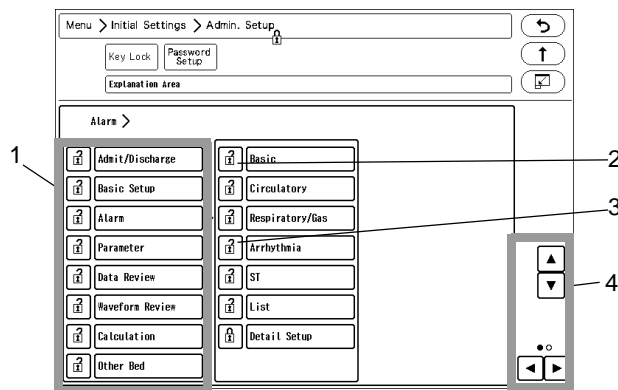
- To display the administrator setup menu, a password is required. There are 3 levels of password with different operation authorization. With higher level password, the lower level settings can be changed.
- For details of the password, contact Fukuda Denshi service representative.

Key Lock

1 Press the [Menu], [Initial Settings], [Admin. Setup] keys.

2 Enter the password.

▶ The "Key Lock" menu will be displayed.



- 1 The lower level items will be displayed.
- 2 This indicates unlocked item. It is displayed in white.
- 3 This indicates locked item. To change the setting, an authorized password is required. There are 3 levels of password which are distinguished by the color of the icon. The level is in the order of red>yellow>green. For example, the following operation is possible. Red: Manager > Yellow: Administrator > Green: User
- 4 The page will switch.

REFERENCE

- Maximum of 3 types of password can be set for the administrator which can individually lock the setting with each password.
- The items that can be protected by password will be displayed in a tree format.

Password Setup

This section explains how to change the password and how to enter the administrator name.

CAUTION

- Do not forget the password.
- The password should be strictly controlled.

NOTE

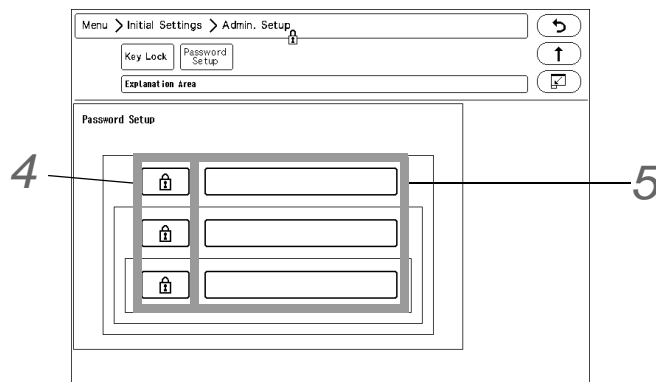
- The default passwords are set as follows.
Red Key: 11111111
Yellow Key: 22222222
Green Key: 33333333
- Before using the device, make sure to change the password.
- For details of the password, refer to your nearest service representative.

1 Press the [Menu], [Initial Settings], [Admin. Setup] keys.

2 Enter the password.

3 Press the [Password Setup] key.

- The password setup window will be displayed.



4 Enter the password.

Depending on the password, the operation authorization will differ. With higher level password, the lower level settings can be changed.

1 By pressing the key for the level to change the password, "Edit Password" window will be displayed.

2 Enter the current password using the numeric keys.

3 Press the [Set] key.

4 Enter the new password using the numeric keys. Maximum of 8 digits can be set for the password.



NOTE

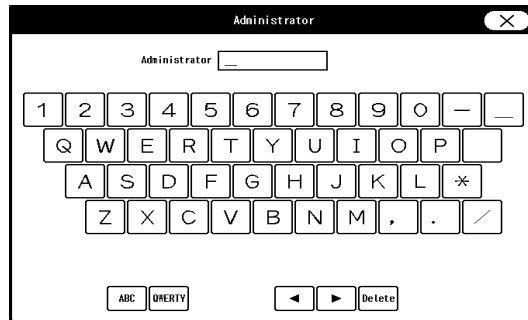
- As the authorization level is distinguished by the password, the password cannot be duplicated.

- 5 For confirmation, enter the new password again.
There are 3 levels of password which are distinguished by the color of the icon.
The level is in the order of red>yellow>green and are distinguished by the entered password to display the "Admin. Setup" menu.

5 Set the administrator name.

Depending on the password, the operation authorization will differ. With higher level password, the lower level settings can be changed.

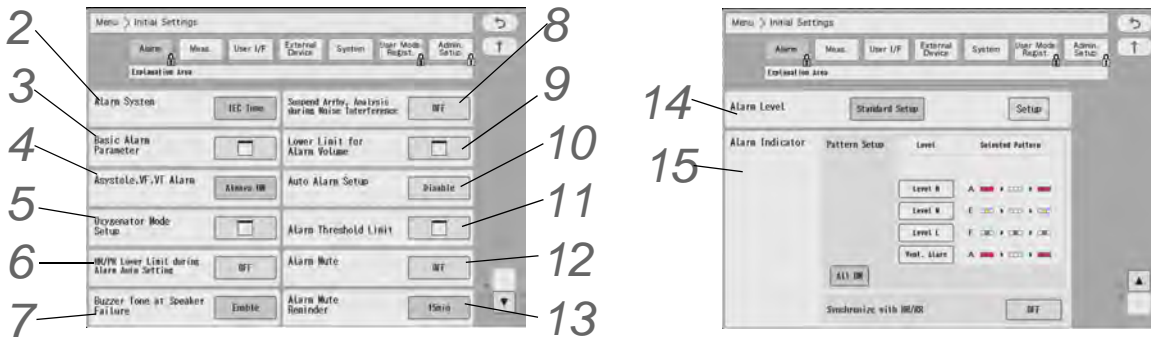
- 1 Press the key for the level to change the administrator name.
▶ The "Administrator" window will be displayed.
- 2 Enter the administrator name using the alphanumeric keys. Maximum of 8 characters can be set for the administrator name.



Alarm Related Setup

On the alarm setup menu, alarm related setup can be performed.

- 1 Press the [Menu], [Initial Settings] keys.
▶ The alarm setup menu will be displayed.



2 Set the "Alarm System".

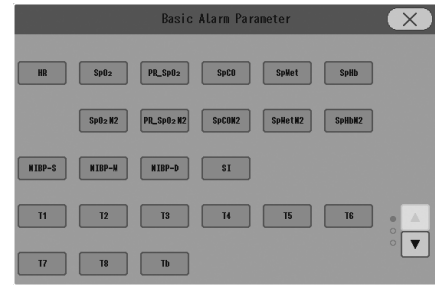
WARNING

- ♦ Changing the setting for "Alarm System" (Initial Settings > Alarm) will also change the alarm volume and tone setting. Make sure to check the volume and tone when the setting is changed.

- ▶ [Fukuda Tone]: The alarm tone common to DS-7000 series bedside monitor will be set.
- ▶ [Melodic Tone]: The alarm tone which the rhythm is the same with [IEC Tone] but a different melody will be set.
- ▶ [IEC Tone]: An alarm tone compliant with the IEC standard will be set.

3 Set the "Basic Alarm Parameter".

- ▶ Select the item to perform the setting.
The selected key will be displayed in blue.
- ▶ By pressing the selected key again, the selection will be canceled.



4 Set the "Asystole, VF, VT Alarm".

- ▶ [Always ON]: The alarms for asystole, VF, VT will be always ON and cannot be turned OFF.
(☞ Operation Manual "To Set the Arrhythmia Alarm" P6-1)
- ▶ [ON/OFF]: The alarms can be turned ON or OFF.
- ▶ [Check when OFF]: When turning OFF the arrhythmia alarms, a confirmation window will be displayed.

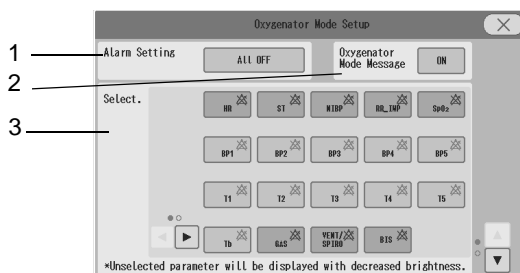
5 Set the "Oxygenator Mode Setup".

WARNING

- ♦ The oxygenator mode is intended to prevent alarms during cardiopulmonary bypass surgery. Pay special attention when using this mode as the alarm generation will not be the same as to the standard monitoring mode.
- ♦ If the "Alarm Setting" under the Oxygenator Mode Setup is set to [All OFF], all vital alarm will not generate regardless of the alarm setting of each parameter. Also, if [Sel. Parameter] is set, vital alarm for unselected parameter will not generate. Pay attention to not miss any significant change of the patient's vital signs.
- ♦ Once the cardiopulmonary bypass is finished, make sure to cancel the Oxygenator Mode and return to the standard monitoring mode.

CAUTION

- ♦ If the NIBP alarm is turned OFF under the Oxygenator Mode, NIBP auto mode measurement and NIBP measurement at alarm occurrence will not be performed.



Page 1



Page 2

- 1 Set the alarm operation during oxygenator mode.
 - ▶ [All OFF]: All parameter and arrhythmia alarm will be OFF regardless of the alarm setting.
 - ▶ [Sel. Parameter]: Only the alarms for the parameters selected on the "Select." window will generate.
 - ▶ [No Change]: The alarm operation will be the same with the standard monitoring mode.
- 2 Select whether or not to display messages on the waveform display area during the oxygenator mode.
 - ▶ ON: Messages will be displayed.
 - ▶ OFF: Messages will not be displayed.

NOTE

- ♦ The messages on the information display area will be displayed even if this setting is set to OFF.

- 3 Select the parameters to be monitored during Oxygenator Mode.
 - ▶ Unselected parameters will be displayed with decreased brightness on the home display.
 - ▶ If [Sel. Parameter] is set for "Alarm Setting", the alarm for unselected parameter will not be generated.
- 4 Set Sub Mode as the display mode during Oxygenator Mode.
 - ▶ If [OFF] is selected, the display mode will not switch during the oxygenator mode.
 - ▶ When returning to the standard monitoring mode, it will return to the display mode used before switching to the Oxygenator Mode.
- 5 Select whether to enable or disable the <ECG Check Electrodes> alarm and <SpO₂ Check Sensor Attach.> alarm during oxygenator mode.
 - ▶ If [Disable] is selected, alarms will not generate during the oxygenator mode.

6 Set the "HR/PR Lower Limit during Alarm Auto Setting".

- ▶ [OFF]: No limit will be set.
- ▶ [30 bpm]: When the auto alarm is set and the lower limit is below 30 bpm, the lower limit will be fixed to 30 bpm.
- ▶ [40 bpm]: When the auto alarm is set and the lower limit is below 40 bpm, the lower limit will be fixed to 40 bpm.

7 Set the "Buzzer Tone at Speaker Failure".

- ▶ [Enable]: A buzzer tone will be generated instead of an alarm sound under the following condition.
 - ♦ Speaker is malfunctioning.
 - ♦ Night mode volume is not set to [Silence].
 - ♦ Vital alarm (level S, H, M, L) or ventilator alarm is generating.
- ▶ A buzzer tone can be silenced by pressing the [Alarm Silence] key.
- ▶ [Disable]: A buzzer tone will not be generated even during speaker failure.

8 Set the "Suspend Arrhy. Analysis during Noise Interference" .

- ▶ [ON]: Arrhythmia analysis will be suspended for fixed duration (5 sec.) when a noise is continuously interfering.
- ▶ [OFF]: Arrhythmia analysis will not be suspended even when a noise is continuously interfering.

CAUTION

- ♦ If "Suspend Arrhy. Analysis during Noise Interference" is set to [ON], the <Cannot analyze> alarm will generate when analysis is suspended for 30 seconds and longer.

9 Set the "Lower Limit for Alarm Volume".

Set the lower limit of alarm volume for "Vital Alarm", "Ventilator Alarm", "Status Alarm".

WARNING

- ◆ Changing the setting for "Alarm System" (Initial Settings > Alarm) will also change the alarm volume and tone setting. As the "Lower Limit for Alarm Volume" may also change, make sure to check the volume and tone on the "Tone/Volume" setup menu.

- ▶ The lower limit of adjustable alarm volume range on the "Tone/Volume" setup menu will be set. It is limited in the order of Urgent> Caution> Status.
- ▶ [Test]: The test sound will be generated with the set volume.

10 Set the "Auto Alarm Setup".

- ▶ [Enable]: [Auto] key will be displayed on the alarm setup menu.
- ▶ [Disable]: [Auto] key will not be displayed on the alarm setup menu.

11 Set the "Alarm Threshold Limit".

- ▶ The alarm threshold range for each parameter can be set.
- ▶ For the parameter set to [Enable], the alarm threshold level outside the set range cannot be set.

NOTE

- ◆ If the alarm threshold set on the central monitor exceeds the threshold limit set on the DS-1200, the alarm threshold set on the central monitor will be applied. Make sure to check the alarm setting on the DS-1200 as the alarm threshold limit status will be changed to "Limit Deactivating Mode".
- ◆ If the alarm threshold of "Setup at Discharge" exceeds the alarm threshold limit, the exceeded alarm threshold will be applied. Make sure to check the alarm setting at admittance as the alarm threshold limit status will be changed to "Limit Deactivating Mode".
- ◆ If the monitor mode is changed, and the alarm threshold of the current monitor mode exceeds the threshold limit, this alarm setting will be applied. Make sure to check the alarm setting on the DS-1200 as the alarm threshold limit status will be changed to "Limit Deactivating Mode".
- ◆ Depending on the model type and software version of the network administrator connected with a wired network, the alarm threshold limit setting on the network administrator will be applied to this equipment.

12 Set "Alarm Mute".

- ▶ [ON]: The alarm mute function will turn ON.
- ▶ [OFF]: The alarm mute function will turn OFF.

13 Set "Alarm Mute Reminder".

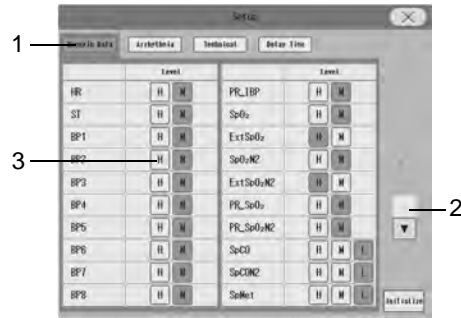
- ▶ A reminder message/sound can be displayed/generated after preprogrammed duration to remind the alarm mute condition.
- ▶ Select from [15 min.] / [30 min.] / [60 min.] / [120 min.].
- ▶ [OFF]: A reminder message/sound will not be displayed/generated.

14 Set the "Alarm Level".

Select the alarm level from [Standard Setup] or [User Setup].
 (☞ Operation Manual "Vital Alarm Message" P11-1)

The alarm level for numeric data alarm, arrhythmia alarm, technical alarm can be set. The alarm level can be selected from S, H, M, L, OFF according to the priority. ("S" is the highest priority alarm.)

Press the [Setup] key to display the alarm level setup window.



- 1 Select [Numeric Data]/[Arrhythmia]/[Technical] to set the alarm level.
- 2 ▲ Press / ▼ to switch the page.
- 3 Select the alarm level from [S] / [H] / [M] / [L] / [OFF] for each parameter.

NOTE

- ♦ Only the displayed alarm level can be selected.
- ♦ Press the [Initialize] key to initialize the alarm level setting.
- ♦ When [Standard Setup] is set, only the technical alarm level can be changed.

CAUTION

- ♦ If [OFF] is set for the alarm level, alarm will not be generated.

15 Set the alarm indicator operation.

NOTE

- ♦ The alarm indicator setting is to be performed for each alarm level.


REFERENCE

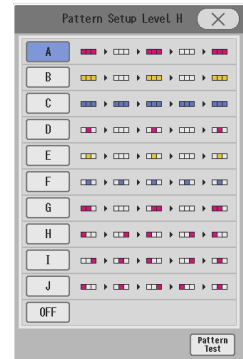
- ♦ The alarm indicator flashing pattern can be set according to the alarm level. The patient's condition can be checked from far distance by the difference of flashing pattern.

Alarm Indicator Flashing Pattern

Pattern	Flash Pattern
Pattern A	(Red, Red, Red), (xxx), (Red, Red, Red), (xxx), (Red, Red, Red)
Pattern B	(Yellow, Yellow, Yellow), (xxx), (Yellow, Yellow, Yellow), (xxx), (Yellow, Yellow, Yellow)
Pattern C	(Blue, Blue, Blue), (Blue, Blue, Blue), (Blue, Blue, Blue), (Blue, Blue, Blue), (Blue, Blue, Blue)
Pattern D	(x, Red, x), (xxx), (x, Red, x), (xxx), (x, Red, x)
Pattern E	(x, Yellow, x), (xxx), (x, Yellow, x), (xxx), (x, Yellow, x)
Pattern F	(x, Blue, x), (x, Blue, x), (x, Blue, x), (x, Blue, x), (x, Blue, x),
Pattern G	(Red, Red, x), (xxx), (x, Red, Red), (xxx), (Red, Red, x)
Pattern H	(Red, x, x), (x, x, Red), (Red, x, x), (x, x, Red), (Red, x, x)
Pattern I	(x, x, Red), (x, Red, x), (Red, x, x), (x, x, Red), (x, Red, x)
Pattern J	(Red, x, x), (x, Red, x), (x, x, Red), (Red, x, x), (x, Red, x)

* (xxx) indicates that the alarm indicator is not lit.

- 1 Press the key for the level to set the flash pattern.
 - ▶ The pattern setup window will be displayed. (Shown on Right: Display Example for Level H)
- 2 Select from [A] to [J].
When not using the alarm indicator function, select [OFF].
- 3 Press the [Pattern Test] key to test the flash pattern.
- 4  Press
- 5 Select from [All ON] or [All OFF].
 - ▶ [All OFF]: Alarm indicator function will be turned OFF for all levels.
 - ▶ [All ON]: Alarm indicator function will be turned ON for all levels with the current settings.
- 6 Set the "Synchronize with HR/RR".
 - ▶ [Sync. to HR]: The alarm indicator will be lit in green synchronizing to HR.
 - ▶ [Sync. to RR]: The alarm indicators will be lit in green synchronizing to RR.
 - ▶ [OFF]: The alarm indicator will not light.



NOTE

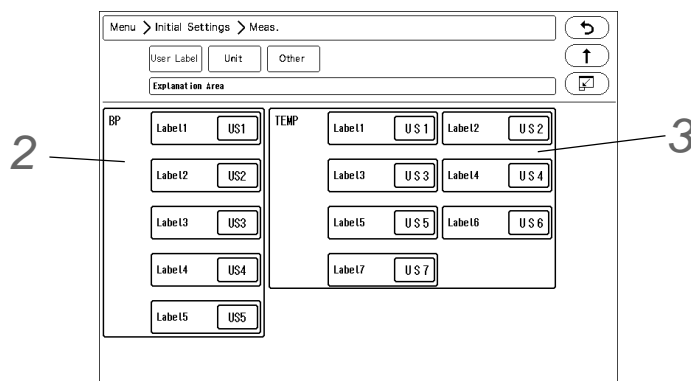
- If asystole alarm generates while [Sync. to HR] is selected, the green LED of the alarm indicator will remain lit. When PR synchronized mark is displayed, the LED on the alarm indicator will not flash.
- When [Sync. to RR] is selected and RR synchronized mark other than impedance is displayed, the alarm indicator will not flash.
- To turn OFF the alarm indicator operation all at once, press the [All OFF] key.

Measurement Related Setup

User Label Setup

On the "User Label" menu, the user labels for BP and TEMP can be set.

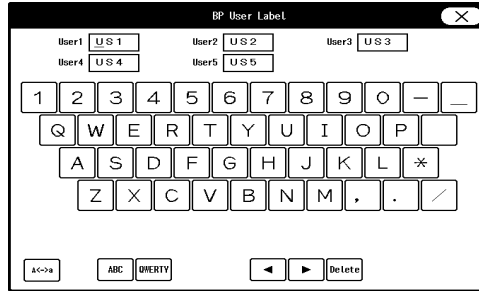
- 1 Press the [Menu], [Initial Settings], [Meas.] keys.
 - ▶ The "User Label" menu will be displayed.



2 Set the BP user label.

1 For "BP", select from [US1] to [US5].

▶ The "BP User Label" window will be displayed.



2 Use the alphanumeric keys to enter the user label up to 3 characters.

▶ The cursor position will be indicated by a red underline.

REFERENCE

- Press the display area for the user label to perform the setting.
- The key arrangement can be selected from [ABC] or [QWERTY].
- The upper case/lower case can be changed using the [A <-> a] key.

CAUTION

- When the system is connected to DS-LAN, TEMP label of US3 to US7 cannot be selected.

3 Set the TEMP label using the same procedure with step 2.

Measurement Unit

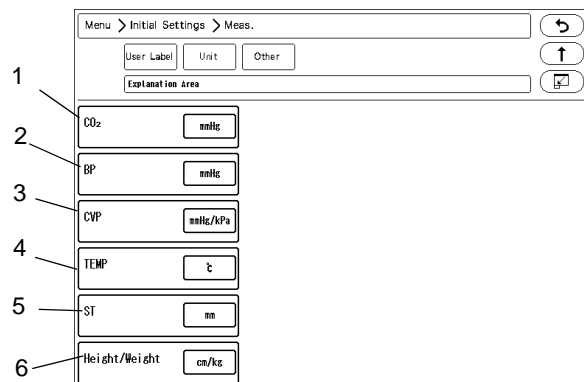
The measurement unit can be set on the "Unit" menu.

1 Press the [Menu], [Initial Settings], [Meas.], [Unit] keys.

▶ The "Unit" menu will be displayed.

2 Select the unit for each parameter.

- 1 Select the CO₂ measurement unit from [mmHg]/[kPa]/[%].
- 2 Blood pressure
Select the BP and NIBP measurement unit from [mmHg]/[kPa].
- 3 CVP
When the BP label is CVP (Central Venous Pressure), select the measurement unit from [mmHg/kPa]/[cmH₂O].
- 4 TEMP
Select the TEMP measurement unit from [°C] / [°F].
- 5 ST
Select the ST measurement unit from [mV]/[mm].



6 Height/Weight

Select the measurement unit for height and weight from [cm/kg]/[in/lb].

NOTE

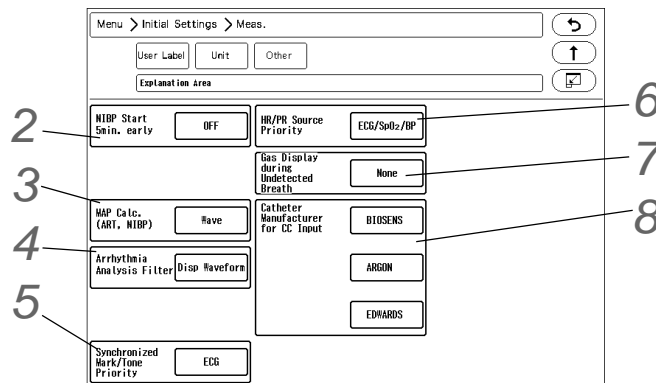
- When the BP, CVP unit is changed, the tabular/graphic trend data with the previous measurement unit will be deleted. Also, when the unit is changed, it is necessary to perform the alarm setup for the new measurement unit.
- The measurement unit of tcpO₂, tcpCO₂ can be set on the TCM4 or TCM5 FLEX. When the measurement unit is changed, the tabular trend data of tcpO₂ and tcpCO₂ on the bedside monitor will be deleted.

Other Setup

On the "Other" menu, other measurement related settings can be performed.

1 Press the [Menu], [Initial Settings], [Meas.], [Other] keys.

▶ The "Other" menu will be displayed.

**2** NIBP Start 5 min. early

If outputting the data to PC or other external device using the PC communication function of this system, an error may be generated to the NIBP measurement time depending on the input interval of the external device. This system outputs the data at completion of NIBP measurement, and if the external device inputs the data at 60 minutes interval, 60 minutes time lag will occur. By starting the measurement 5 minutes early, this time lag between the external device can be minimized.

[ON]: When [60min]/[120min] is selected for the measurement interval, the measurement will start 5 minutes before the set time.

NOTE

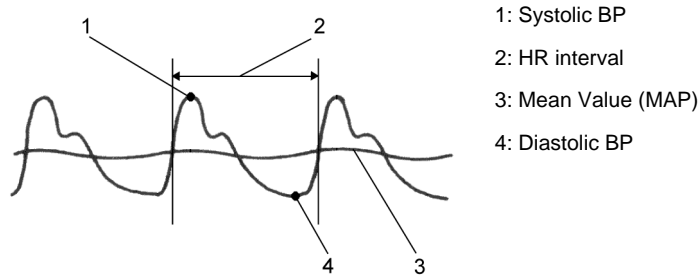
- This setting will be disabled when [Meas.] is set for "Periodic Measurement Starting Time" on the NIBP setup menu.

3 MAP Calculation (ART, NIBP)

The mean blood pressure (MAP) value of BP and NIBP can be selected to be measured from the waveform or from calculation.

[Calc.]: Calculates the mean BP from the following calculation. Mean BP (MAP) = (Systolic BP + Diastolic BP x 2) / 3

[Wave]: The following measurement will be performed.



4 Arrhythmia Analysis Filter

Set the Arrhythmia Analysis Filter.

[Disp. Waveform]: The filter selected on "Admit/Discharge" menu or "ECG" setup menu will be set.

[Fixed]: The filter will be fixed to 0.5 Hz to 40 Hz.

NOTE

- When [Disp. Waveform] is selected, the filter will be set according to the selection on [Menu > Parameter > ECG]. If [Diag.] is selected, the filter will be 0.5 Hz to 40 Hz which is the same with [Fixed].

5 Synchronized Mark/Tone

When [Auto] is selected for "Synchronized Mark/Tone", the priority of the synchronizing parameter can be set.

[ECG]: The priority of synchronizing mark/tone will be set in the order of ECG>SpO₂-1>SpO₂-2>BP.

[SpO₂]: The priority of synchronized mark/tone will be set in the order of SpO₂-1>SpO₂-2>ECG>BP.

6 HR/PR Source Priority

Set the display priority of the parameter to be displayed inside the HR/PR numeric data box.

This priority setting will be applied when [Auto] is selected for "HR/PR", or when [HR/PR] user key is used to switch the HR/PR source.

Select the priority order from the dropdown list.

For example, if [ECG/SpO₂/BP] is selected, HR/PR source will be set in the priority of ECG>SpO₂-1>SpO₂-2>BP.

7 GAS Display during Undetected Breath

▶ [None]: When a respiration is not detected, inspiratory and expiratory data will become invalid and the bar marks will be displayed instead.

▶ [Insp. Only]: When a respiration is not detected, only the inspiratory data display will become valid and the bar marks will be displayed for expiratory data.

8 Catheter Manufacturer for CC Input

Set the "Catheter Manufacturer for CC Input".

Press one of the keys, and enter the manufacturer name on the displayed window.

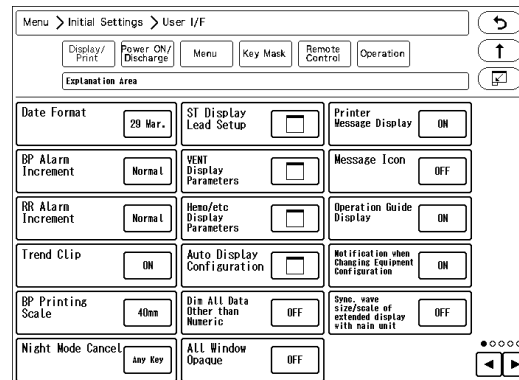
(Max. 8 characters)

User I/F

Display/Print Setup

On the "Display/Print" menu, initial settings for displaying/printing can be performed. Press the [Menu], [Initial Settings], [User I/F] keys to display the "Display/Print" menu.

- 1** Perform the setup on the first page.



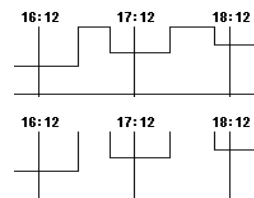
- 1 Date
The selected format will be applied to display and printing.
- 2 BP Alarm Increment
Select from [Normal]/[Small].

	[Normal]	[Small]
0 mmHg to 50 mmHg	2 mmHg increment	1 mmHg increment
55 mmHg to 300 mmHg	5 mmHg increment	
0 kPa to 7 kPa	0.2 kPa increment	0.1 kPa increment
7.5 kPa to 40.0 kPa	0.5 kPa increment	

- 3 RR Alarm Increment
[Normal]: 5 Bpm (Adult), 2 Bpm (Child, Neonate)
[Small]: 1 Bpm

- 4 Trend Clip
If the measurement on the graphic trend display exceeds the vertical axis scale, whether or not to display the exceeded portion can be selected.

- ▶ [ON]: The exceeded portion will be displayed in straight line at the upper or lower limit.
- ▶ [OFF]: The exceeded portion of the vertical axis scale will not be displayed.

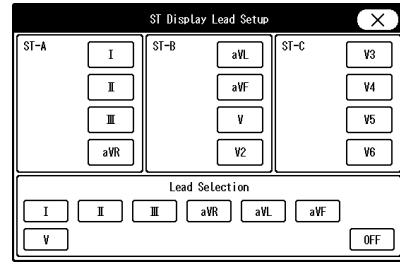


- 5 BP Printing Scale
Select the printing scale height for the BP1 to 8 waveform.

- 6 Night Mode Cancel
Select the procedure to cancel the night mode when [No Change]/[Darker]/[Dark] is set.
[Any Key]: The night mode can be canceled by pressing any key on the screen.
[Night Mode Key]: The night mode can be canceled by pressing the [Night Mode] key on the user key area or on the menu.

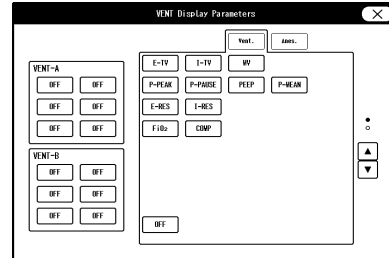
7 ST Display Lead

The ST lead to be displayed for ST-A to ST-C in the numeric data box can be set.
Set the lead to the key displayed in blue.



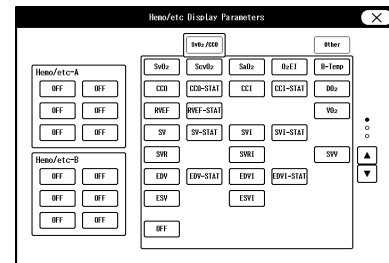
8 VENT Display Parameters

The parameters to be displayed for VENT-A, VENT-B numeric data box can be set.



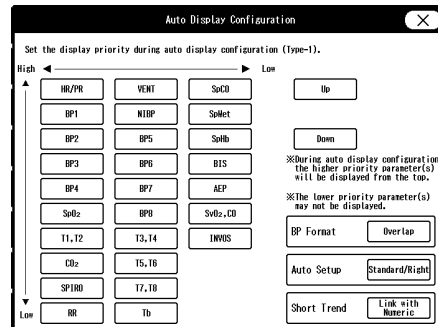
9 Hemo/etc Display Parameters

The parameters to be displayed for Hemo/etc-A, B numeric data box can be set.



10 Auto Display Configuration (shown on right)

"BP Format" ([Overlap] / [Separate]), "Auto Setup" ([Standard/Right] / [Standard/Left]), and "Short Trend" ([Link with Numeric] / [Link with Waveform]) for automatic display configuration can be set.



11 Dim All Data Other than Numeric

[ON]: The display brightness of measurement unit, alarm limit, etc. displayed inside the numeric data box will be dimmed.
[OFF]: The display brightness will not be dimmed.

12 All Window Opaque

[OFF]: The window will become translucent allowing to view the waveform displayed behind the window. However, the key display will not become translucent.
[ON]: The window will not become translucent.

13 Printer Message

[ON]: The printer status will be displayed on the home display.
[OFF]: The printer status will not be displayed.

14 Message Icon

When there are many numeric data display, the parameter key size will be reduced which may disable the message to be displayed inside the parameter key.
By selecting [ON], a message icon will be displayed instead to notify that a message is present.
(☞ Operation Manual "Numeric Data Box Display (for all parameters)" P3-7)

15 Operation Guide Display

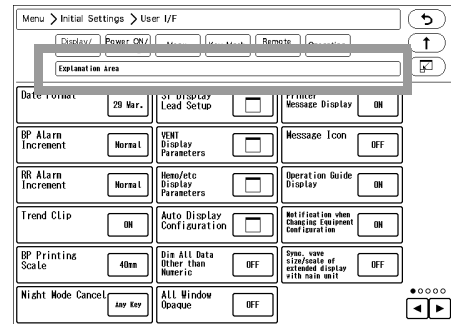
[ON]: Operation guide message will be displayed in the window message area. (shown on right)

[OFF]: Operation guide message will not be displayed.

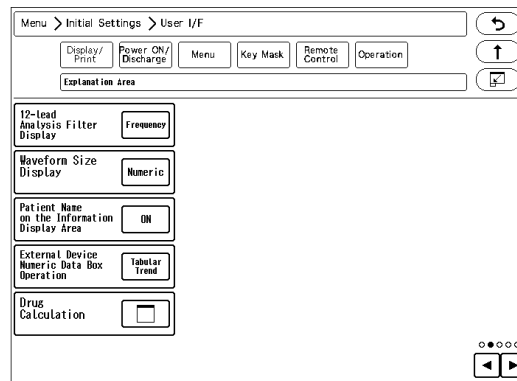
16 Notification when Changing Equipment Configuration

[ON]: A confirmation message will be displayed when equipment configuration is changed. (Connector ON/OFF, etc.)

[OFF]: A confirmation message will not be displayed even when equipment configuration is changed.



2 Perform the setup on the second page.



1 12-Lead Analysis Filter Display

Select the display type for the 12-lead analysis filter.

The filter display type on the 12-lead analysis display/printing will change with this selection.

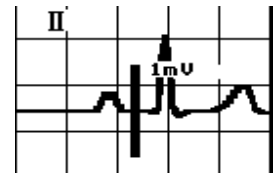
[Frequency]: The set frequency (ex. [25Hz]) will be displayed.

[Filter Type]: The filter type (ex. [MF_ST], [DF_WK]) will be displayed.

2 Select the display type of the waveform size.

[Numeric]: The waveform size for the ECG, RESP, SpO₂ will be displayed in numerics.[Bar (10mm)]: The waveform size will be indicated by a 10 mm bar.

The amplitude voltage value of the corresponding waveform size will be displayed beside the bar. (shown on right)



3 Patient Name on the Information Display Area

[ON] : Patient name will be displayed on the information display area.

[OFF] : Patient name will not be displayed on the information display area.

4 External Device Numeric Data Box Operation

[Tabular Trend]: The tabular trend will be displayed.

[Parameters]: The parameter setup menu will be displayed.

5 Drug Calculation (☞ "Drug Calculation" P5-26)

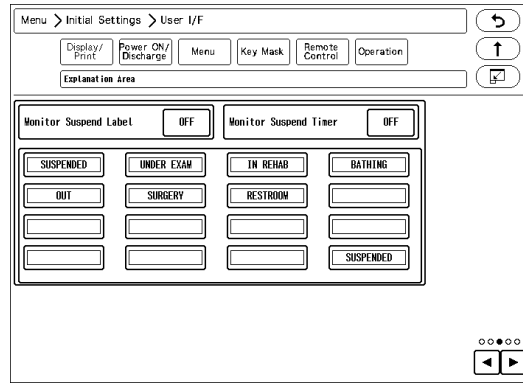
6 Zoom Wave

When the full disclosure waveform card (optional) is used, the review screen to be shifted can be changed on the recall waveform/ full disclosure waveform display.

[Zoom Wave]: Data reference of the recall/ full disclosure waveform will be set to the zoom waveform display.

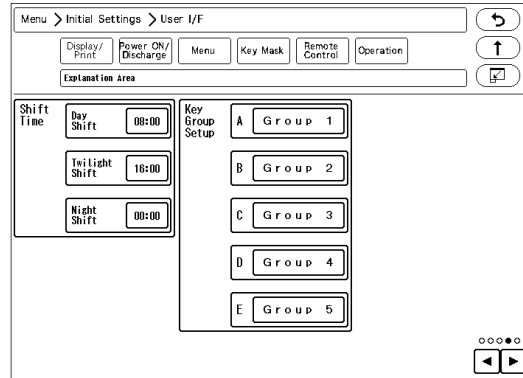
[OCRG]: Data reference of the recall/ full disclosure waveform will be set to the OCRG display.

3 Monitor Suspend Label Setup (☞ "Monitor Suspend Setup" P5-16)



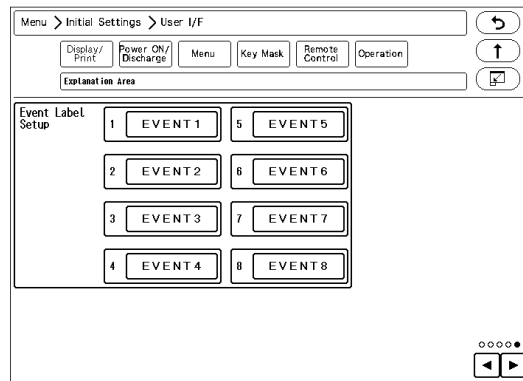
4 Perform the setup on the fourth page.

- 1 Time Shift
By setting the time for "Day Shift", "Twilight Shift", "Night Shift", the time bar displayed at the upper part on the data/waveform review screen will be displayed in different colors by each shift time.
Day Shift: Yellow
Twilight Shift: Green
Night Shift: Blue
- 2 Key Group Setup
8 user keys can be registered for each group. The label for the key group can be also set.



5 Perform the setup on the fifth page.

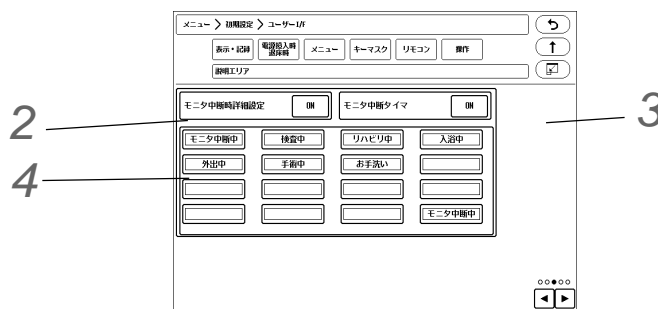
- 1 Event Label Setup
8 event labels (Surgery, etc.) can be registered. By setting [Event] on the user key, the registered event label can be printed at any time.



☐ Monitor Suspend Setup

During monitoring suspended status, different messages in different colors according to the patient's destination can be displayed. Suspend timer function can be also used. When using the monitoring 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 Display the "Monitor Suspend Label" screen. [Menu>Initial Settings>User I/F>Display/Print]



2 Select ON/OFF for "Monitor Suspend Label".

- ▶ [ON]: [Mon. Suspend Setup] key will be displayed when the monitoring is suspended to allow monitor suspend label setup.
- ▶ [OFF]: Monitor suspend label function will be ineffective.

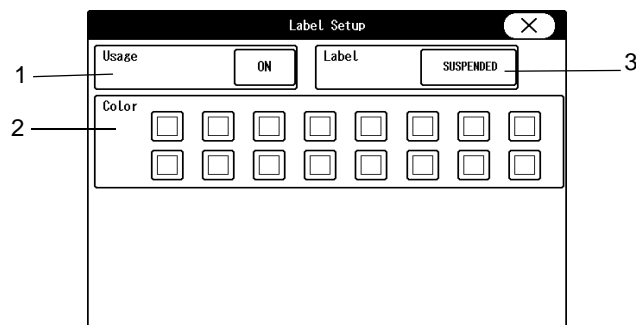
3 Set the "Monitor Suspend Timer".

- ▶ [ON] will turn ON the monitor suspend timer function, and timer will start when monitoring is suspended. (☞ Operation Manual "Suspend Monitoring" P5-11)
- ▶ By setting "Monitor Suspend Label" and "Monitor Suspend Timer" to [ON], an alarm sound can be generated after the set duration (15 min./30 min./1 hr./1.5 hr./2 hr.).

NOTE

- ♦ If "Monitor Suspend Label" is set to [OFF], "Monitor Suspend Timer" function cannot be used.
- ♦ If "Monitor Suspend Label" is set to [OFF], "Monitor Suspend Timer" function will also automatically set to [OFF].

4 Select the key to edit the monitor suspend label.



1 Usage

"Usage": Select whether or not to use this monitor suspend label.

2 Color Setup

Select the color for the label. The background of the monitor suspend label will be displayed with the selected color.

3 Label

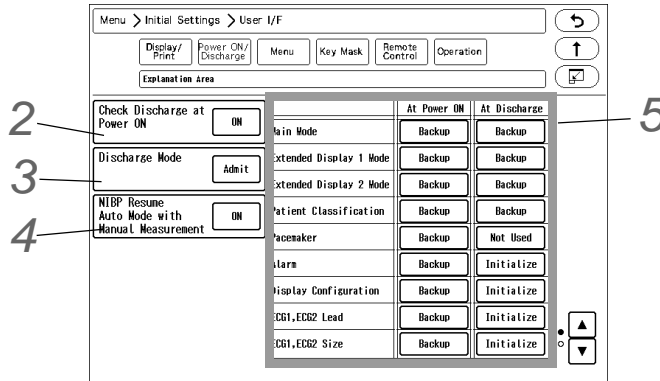
Set the label. Maximum of 14 alphanumeric characters can be entered.

Power ON/Discharge

On this menu, monitoring operation when the power is turned ON or when a patient is discharged can be performed.

1 Press the [Menu], [Initial Settings], [User I/F], [Power ON/Discharge] keys.

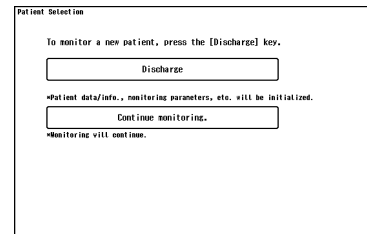
▶ The "Power ON/Discharge" setup menu will be displayed.



2 Check Discharge at Power ON

The trend data and tabular trend data will be stored even after the standby switch at the bottom right of the display is turned OFF. To start monitoring a new patient, it is necessary to perform discharge procedure on the "Admit/Discharge" menu, and clear the data of previous patient. When the power has been turned OFF for 30 seconds or more, whether or not to display the discharge confirmation window can be selected.

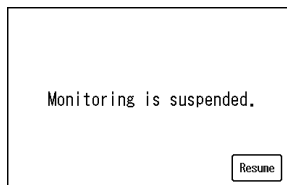
- [OFF]: The discharge confirmation window will not be displayed and monitoring will be immediately started.
- [ON]: The discharge confirmation window will be displayed at power ON if the power has been turned OFF for 30 seconds or more.



3 Discharge Mode

The monitoring condition after the patient has been discharged can be set.

- [Admit]: Monitoring will continue even after the discharge operation has been performed.
- [Monitor Suspend]: Monitoring will be suspended after the discharge operation. The numeric data display will be cleared, and alarm generation, NIBP periodic measurement, periodic printing will not be performed.
- [Standby]: When a patient is discharged, <Monitor will enter into standby mode.> message will be displayed for 10 seconds, and the system automatically enters into standby mode. Pressing the [Cancel] key will cancel the process to enter into standby mode.



Display during monitoring is suspended

4 NIBP Resume Auto Mode with Manual Measurement

- [OFF]: At power ON and at discharge, NIBP auto mode will continue even after the patient is discharged regardless of whether the next patient is admitted or not.
- [ON]: At power ON and at discharge, NIBP auto mode will resume by starting a manual measurement for the

newly admitted patient.

Until the NIBP auto mode is resumed or the interval is changed, "Standby" will be displayed inside the NIBP numeric data box.

5 The backup status when the power is turned ON and when the patient is discharged can be set for each item.

[Backup]: The setting will be backed up.

[Initialize]: Initializes the settings. The initialized settings are as follows.

Selection other than Backup

Item	Setup	Power ON/Discharge
Main Mode	Current Mode Main Mode 1 to 9	The setting will be initialized to the selected mode.
Patient Classification	Adult, Child, Neonate	The setting will be initialized to the selected patient classification.
Pacemaker	OFF	"Not Used" will be set for "Pacemaker".
Alarm Setup	Initialize	The setting will be initialized with the currently selected mode.
Display Configuration	Initialize	The setting will be initialized with the currently selected mode.
ECG1, ECG2 Lead	Initialize	The setting will be initialized with the currently selected mode.
ECG1, ECG2 Size	Initialize	The setting will be initialized with the currently selected mode.
Impedance Mode ON/ OFF	Initialize	The setting will be initialized with the currently selected mode.
CVA Detect	OFF	CVA detection will be set to OFF.
NIBP Auto Mode	OFF	NIBP auto mode will be turned OFF.
	OFF->2.5 min.	If NIBP Auto Mode is OFF, 2.5 min. interval will be set.
	OFF->5 min.	If NIBP Auto Mode is OFF, 5 min. interval will be set.
	2.5 min.	NIBP auto mode will be set to 2.5 min. interval.
	5 min.	NIBP auto mode will be set to 5 min. interval.
BP Scale	Initialize	The setting will be initialized with the currently selected mode.
SpO ₂ Averaging	Initialize	The setting will be initialized with the currently selected mode.
CO ₂ Scale	Initialize	The setting will be initialized with the currently selected mode.
EtCO ₂ Peak Duration	10 sec.	EtCO ₂ peak picking duration will be set to 10 sec.



CAUTION

- When the discharge process is performed, patient data such as recall and trend will be initialized. The parameter and alarm settings will be reset according to the settings made under [Menu>Initial Settings>User I/F>Power ON/Discharge].
When the discharge process is performed on the central monitor, alarm will be reset according to the setting on "Admit Setup" of the central monitor.

NOTE

- The operation after the power is turned ON will be according to the setting made on [Initial Settings] > [User I/F] > [Power ON/Discharge]. However, if the power was turned OFF for less than 30 seconds, the setting before the power was turned OFF will remain.
- If the "Main Mode" setting is other than [Backup], the following cannot be set.
Patient Classification, Alarm, Display Configuration, ECG1, ECG2 Lead, ECG1, ECG2

Size, Impedance Mode ON/OFF, CVA Detect, NIBP Auto Mode, BP Scale, SpO₂ Averaging, CO₂ Scale, EtCO₂ Peak Duration

- If the alarm threshold of "Setup at Discharge" exceeds the alarm threshold limit, the exceeded alarm threshold will be applied. Make sure to check the alarm setting at admittance as the alarm threshold limit status will be changed to "Limit Deactivating Mode."

6 When "Link with Patient Class." is set to [ON], the operation will differ depending on the "Monitor Mode" setting under "Power ON/Discharge". (☞ "To Program the User Mode" P5-29)

- ▶ If [Backup] is set for "Main Mode" under "Power ON/Discharge", the settings will be as follows. When "Link with Patient Class." is set to [ON], it is recommended to set [Initialize] for "Alarm" under "Power ON/Discharge".

Power ON/Discharge		Operation	
Patient Classification	Alarm Setup		
Backup	Backup	Patient Classification:	Current patient classification will be maintained.
	Initialize	Patient Classification:	Current patient classification will be maintained.
Adult	Backup	Patient Classification:	Patient classification will be set to "Adult".
	Initialize	Patient Classification:	Patient classification will be set to "Adult".
Child	Backup	Patient Classification:	Patient classification will be set to "Child".
	Initialize	Patient Classification:	Patient classification will be set to "Child".
Neonate	Backup	Patient Classification:	Patient classification will be set to "Neonate".
	Initialize	Patient Classification:	Patient classification will be set to "Neonate".

- ▶ If settings other than [Backup] is set for "Main Mode" under "Power ON/Discharge", the selected main mode settings will be applied regardless of the ON/OFF setting of "Link with Patient Class.".

Menu Setup

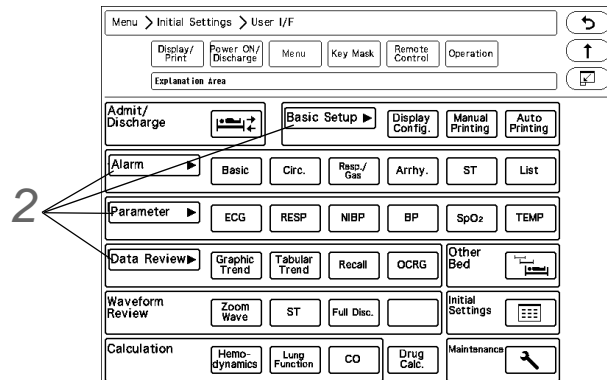
On the "Menu" setup, the keys displayed on the "Menu" screen can be customized.

The "Menu" screen is composed of 9 groups, which are "Admit/Discharge", "Basic Setup", "Alarm", "Parameter", "Data Review", "Waveform Review", "Calculation", "Initial Settings", "Maintenance".

The keys displayed for each group except "Initial Settings" and "Maintenance" can be customized.

1 Press the [Menu], [Initial Settings], [User I/F], [Menu] keys.

▶ The "Menu" setup screen will be displayed.



2 Press the group area to customize the keys.

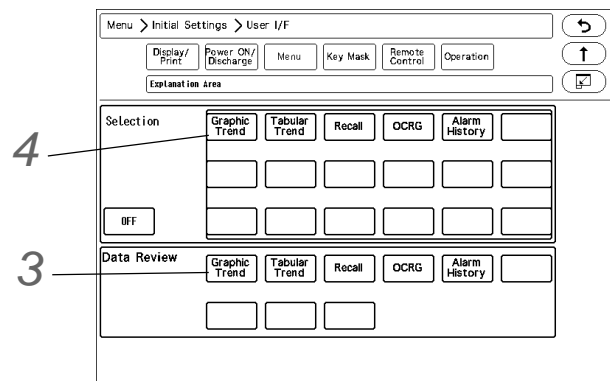
▶ The key selection for the selected group will be displayed.

3 Select the key position from the lower area.

▶ The selected key position will be displayed in blue.

4 Select the key from the upper area to be assigned to the selected key position.

The set key position will be automatically updated, but it can be also changed by pressing the key.



Key Mask

On the "Key Mask" setup, unnecessary keys and tabs can be masked.

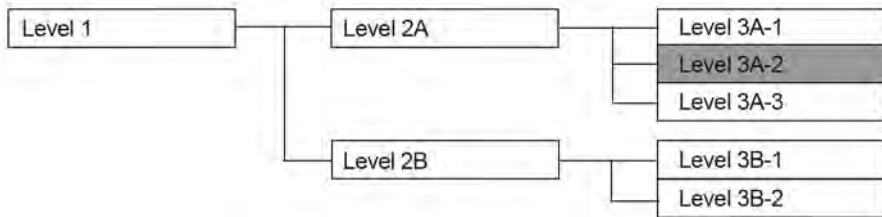
NOTE

- The masked key operation will be disabled on this system, but it will not affect the key operation from the central monitor. The setting can be changed from the central monitor even when the corresponding key is masked on this system.

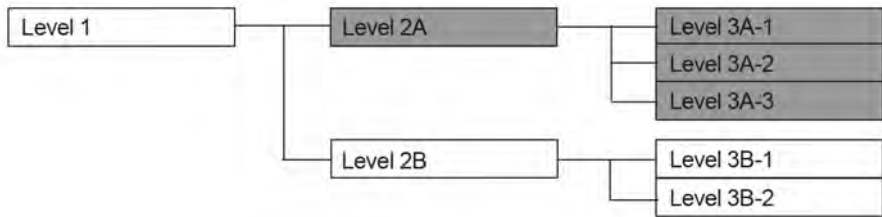
The setup items are in tree structure.

If the upper level key is masked, the lower level key will be also masked.

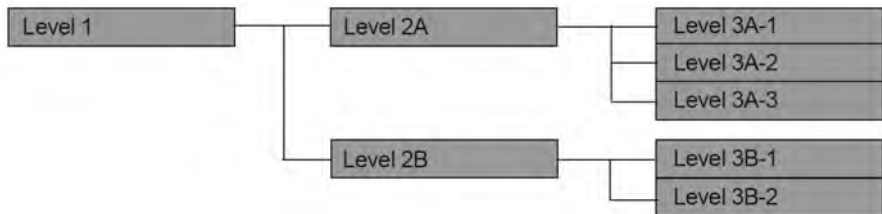
For the following tree structure, if "Level 3A-2" is masked, only this item will be masked.



If "Level 2A" is masked, the masked items will be as follows.

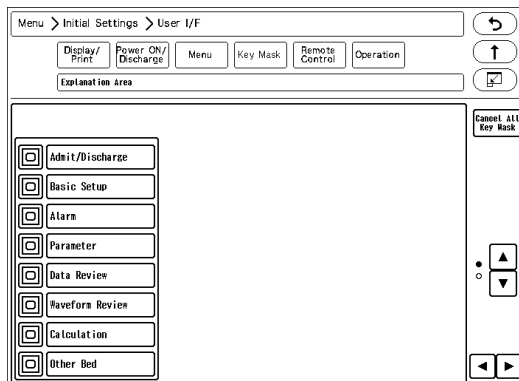


If "Level 1" is masked, the masked items will be as follows.



1 Press the [Menu], [Initial Settings], [User I/F], [Key Mask] keys.

▶ The "Key Mask" menu will be displayed.

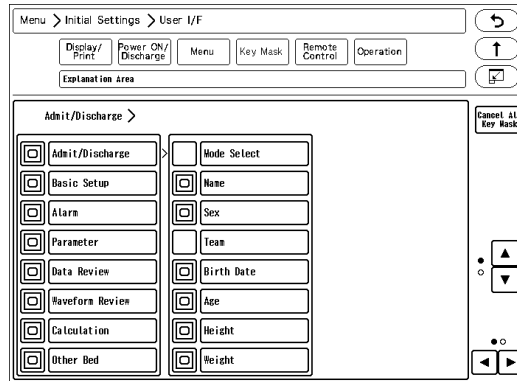


2 Select the item to perform the setting.

NOTE

- ♦ If there are no lower level items for the selected item, the display will not change.

▶ The lower level items will be displayed.



3 Press for the item to mask.

NOTE

- ♦ Only the items with displayed with blue frame can be masked. For the items with white frame, display the lower items to perform the mask setting.
- ♦ Even if the key mask setting is performed for the "Initial Setting", the [Key Mask] key cannot be masked.

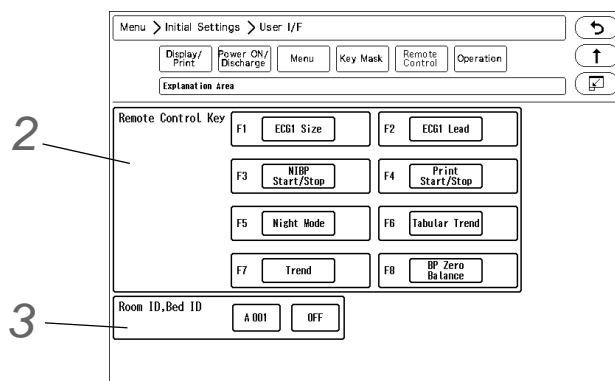
4 Press for the item to display.

Remote Control Setup

The initial settings for the remote control can be performed.

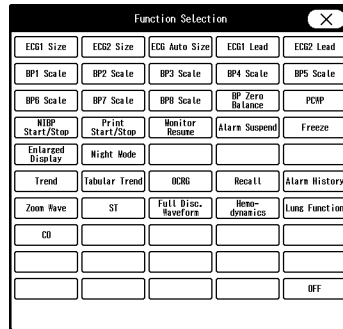
1 Press the [Menu], [Initial Settings], [User I/F], [Remote Control] keys.

▶ The "Remote Control" menu will be displayed.



2 Set the remote control function.

- 1 Press the key for F1 to F8 to change the remote control function.
 - ▶ The function selection window will be displayed.



- 2 Press the key for the assigning function.
- 3 Press (X).

Functions that can be assigned to the User Keys

Function	Key Operation
ECG1 Size ECG2 Size	Switches the ECG1 (ECG2) size each time the key is pressed. x1/4, x1/2, x1, x2, x4, x1/4
ECG1 Lead ECG2 Lead	Switches the ECG1 (ECG2) lead each time the key is pressed. 3-electrode: I, II, III, I 4-electrode: I, II, III, aVR, aVL, aVF, I 5-electrode: I, II, III, aVR, aVL, aVF, V, I 10-electrode: I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5, V6, I
ECG Auto Size	Automatically adjusts the ECG amplitude to 10 mm. The automatic adjustment is effective only when the key is pressed.
BP1 (to BP8) Scale	Switches the BP1 to BP8 scale each time the key is pressed. The switching scale will differ depending on the BP label. (☞ Operation Manual "BP Parameter Setup" P7-27)
BP Zero Balance	Starts zeroing for all BP. It will not function unless the transducers for all BP is opened to air.
PAWP	If the BP label is PAP, PCWP input screen will be displayed.
NIBP Start/Stop	Starts/stops the NIBP measurement. Pressing this key will display a message on the monitor to press the "Check" key. When the "Check" key is pressed, the measurement will start. Pressing this key during the measurement will stop the measurement.
Print Start/Stop	Starts/stops the manual printing. The printing duration set on the "Manual Printing" menu will be applied.
Monitor Resume	Resumes monitoring when the monitoring is suspended.
Alarm Suspend	Suspends the alarm. The alarm function will resume after the set duration.
Freeze	The waveform trace will cease at the point when the key is pressed. By pressing the key again, the waveform trace will resume.
Enlarged Display	The home display layout will switch between "Standard" and "Large".
Night Mode	Turns ON/OFF the Night Mode.
Graphic Trend	The graphic trend will be displayed.
Tabular Trend	The tabular trend will be displayed.
OCRG	OCRG screen will be displayed.
Recall	Recall screen will be displayed.
Zoom Wave	The "Zoom Wave" window will be displayed.
ST	ST screen will be displayed.

Functions that can be assigned to the User Keys

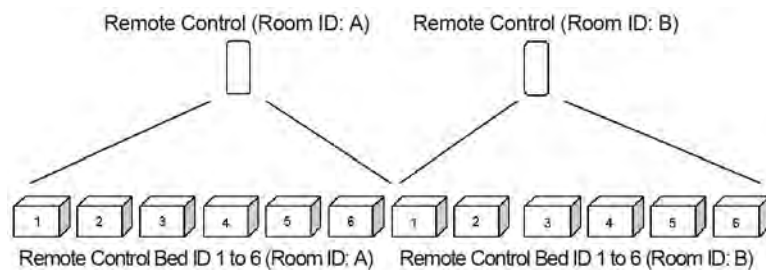
Function	Key Operation
Full Disclosure Waveform	Full disclosure waveform will be displayed.
Hemodynamics	Hemodynamics screen will be displayed.
Lung Function	Lung Function screen will be displayed.
CO	CO measurement screen will be displayed. CO measurement will not be started.
OFF	Turns OFF the key operation.

3 Set the Room ID/Bed ID.**CAUTION**

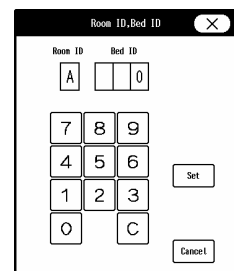
- Do not set the same remote control bed ID to multiple monitors on the same floor. Otherwise, it may cause to remote control multiple monitors at the same time.
- After the remote control setup, check that the remote control unit is properly operating.

REFERENCE

- For the CF-820 IR Remote Control Unit, if [P] is set for Room ID, the ID will be linked with the Room/Bed ID used on the DS-LAN (ID displayed on the upper left of the home display). If [A] to [H] is set, it will be a different ID for the remote control unit.
- One remote control unit can control maximum of 100 monitors for the Room ID [P], and maximum of 32 monitors for Room ID [A] to [H].
- For procedure to set the Room/Bed ID on the remote control unit, refer to the operation manual of the remote control unit.



- Press the key for "Room ID, Bed ID".
 - [ON]: The Room ID/Bed ID setup will be enabled.
 - [OFF]: The Room ID/Bed ID setup will be disabled.
- Press the [A 000] key.
 - The "Room ID, Bed ID" window will be displayed. (shown on right)
- Select from [A] to [H] / [P].
 - [A] to [H]: The keys to enter the Bed ID will be displayed.
 - [P]: DS-LAN setting will be applied for the Bed ID.
- Use the numeric keys to enter the Bed ID. Set the Bed ID in the range from 1 to 32.
- Press the [Set] / [Cancel] key.
 - [Set]: The entered Room ID/Bed ID will be set.
 - [Cancel]: The entered Room ID/Bed ID will be canceled.



Operation Related Setup

The initial settings for the operation can be performed.

1 Press the [Menu], [Initial Settings], [User I/F], [Operation] keys.

▶ The "Operation" menu will be displayed.



2 The window can be automatically closed after fixed duration.

[OFF]: The window will not automatically close.

[5] to [60]: If no operation was performed for the set duration, the window will automatically close. However, the windows for "Data Review", "Waveform Review", "Calculation", "Initial Settings" will not automatically close.

Drug Calculation

The following initial settings can be performed for the drug calculation.

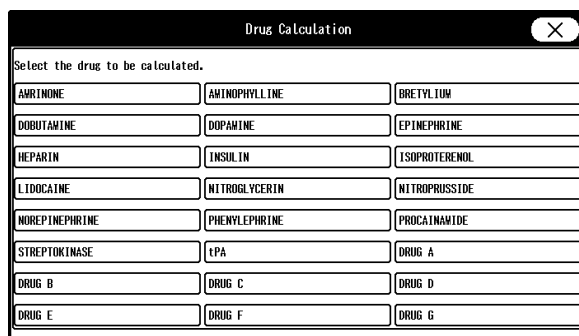
*Drug Name

*Initial value to be entered when a drug is selected on the drug calculation menu (drug amount, drug amount unit, diluent amount, dosing rate, dosing rate unit)

*Display ON/OFF for each drug

1 Press the [Menu], [Initial Settings], [User I/F], [Drug Calculation] keys.

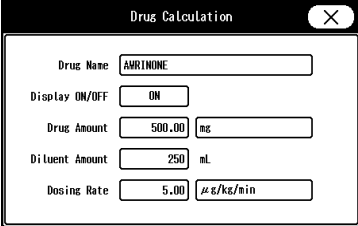
▶ Select the drug to change the initial settings.



2 Set the initial value for the drug.

- ▶ If [OFF] is selected for "Display ON/OFF", the corresponding drug will not be displayed on the drug selection list.
- ▶ When the unit for the dosing rate is set, the unit for the drug amount will be automatically set.

Dosing Rate Unit	Drug Amount Unit
units/h	units
IU/h	IU
Other than above	mg



System Setup

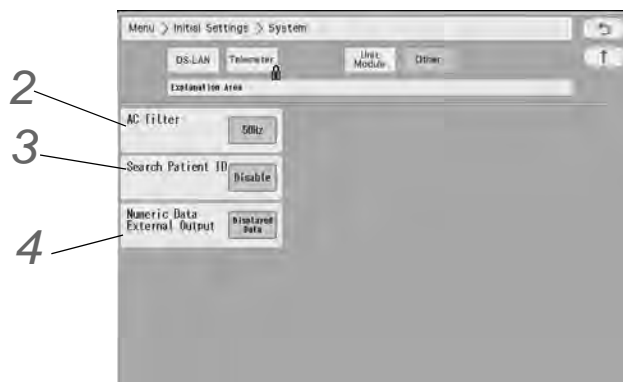
On the "System" menu, system related setup can be performed.

REFERENCE

- ♦ For unit module of the setup procedures of DS-LAN and unit module setup, refer to the corresponding chapters in this manual.
 - (☞ "Network System Construction" P2-1)
 - (☞ "Connection to the External Devices" P4-1)

1 Press the [Menu], [Initial Settings], [System], [Other] keys.

- ▶ The system setup menu will be displayed.



2 Select [50Hz]/[60Hz] for "AC Filter".

3 Set the "Search Patient ID".

- ▶ [Enable]: Patient data can be searched on the patient data server using the patient ID.
 - (☞ Operation Manual "Entering Patient Information from the Patient Data Server (When DS-LANIII is used)" P5-7)
- ▶ [Disable]: Patient data will not be searched on the patient data server.

4 Select the numeric data to be output to the central monitor.

The output method for the numeric data to be output during DS-LAN, PC communication can also be changed with this selection. The method for storing numeric data for trend data will also change with this selection.

- ▶ [Displayed Data]: Only the displayed data on the home display will be output.
- ▶ [All Data]: All data will be output.

WARNING

- When [All Data] is selected, the measurement will be displayed on the central monitor but an alarm will not generate if the corresponding parameter is not displayed on the display part.
For the parameters which requires alarm monitoring on the central monitor, make sure to display those on the display unit.

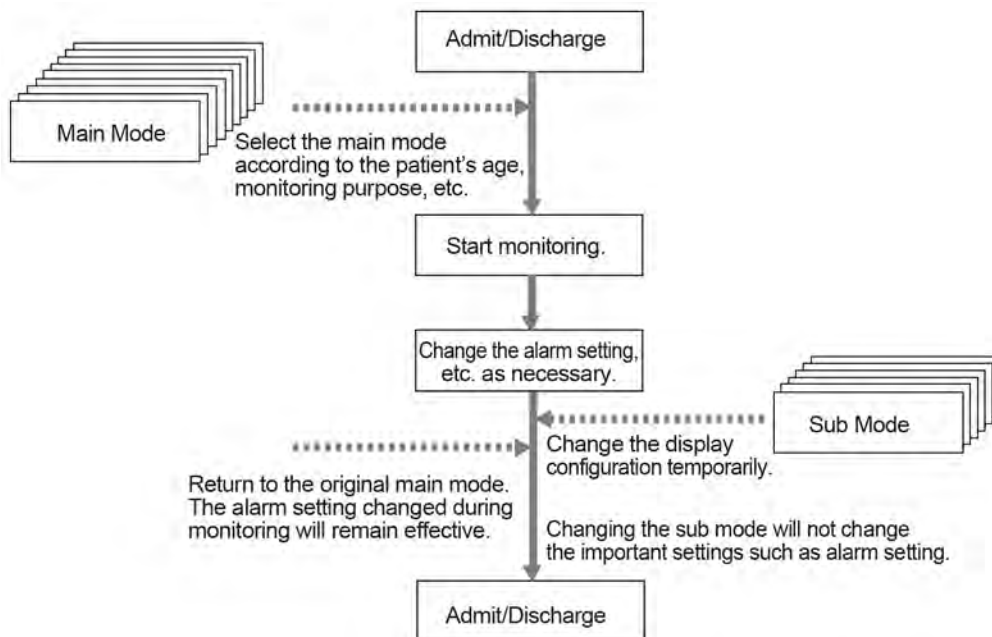
User Mode Registration

This section explains about the user mode registration.

About the User Mode

For the user mode, up to 9 main modes of display configuration and alarm settings can be registered according to the patient's age and monitoring purpose. Also, for temporarily changing the display configuration, 6 sub modes of display configuration can be registered.

By programming the main mode, the alarm setups and display configuration setups at admittance of patient can be simplified by just selecting one of the modes. It is recommended to program the mode in rough classification such as patient's age, monitoring purpose (ICU or surgery), and if necessary, perform unique setup for each patient. The sub modes can be used when temporarily changing the display configuration such as when checking the 12-lead ECG, etc.



☐ Items that can be registered for the Main Mode

The following items can be registered for the main mode.

- Mode Name
- Patient Classification
- Alarm
- Display Configuration
- Manual Printing
- Auto Printing
- Sound

- ♦ Color
- ♦ Brightness
- ♦ Night Mode
- ♦ Parameter
- ♦ Graphic/Tabular Trend Display
- ♦ Synchronized Mark/Tone
- ♦ RR Alarm/Apnea Source

☐ Items that can be registered for the Sub Mode

The following items can be registered for the sub mode.

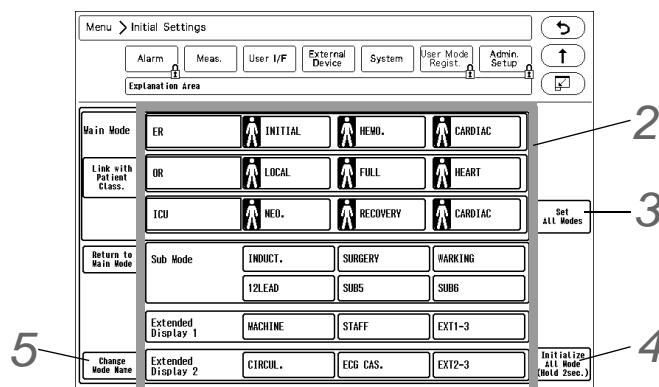
- ♦ Mode Name
- ♦ Display Configuration

To Program the User Mode

This section explains how to register/change the user mode.

1 Press the [Menu], [Initial Settings], [User Mode Regist.] keys.

- ▶ The "User Mode Regist." menu will be displayed.



2 By pressing the key for each user mode, the operation selection window will be displayed.

- ▶ [Register]: The current monitoring settings will be registered to the selected key.
- ▶ [Change]: The user mode settings can be changed.
The user mode setting window background will be displayed in pink.
- ▶ [Initialize]: The settings for the selected key will be initialized.



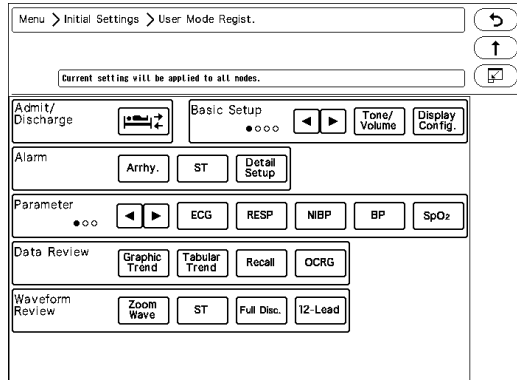
NOTE

- ♦ When a user mode is registered, changed, or initialized, the monitoring mode will change to the selected user mode. The alarm settings of the selected alarm system will be applied.

3 The item to set the same settings for all modes can be selected.

1 Press the [Set All Modes] key.

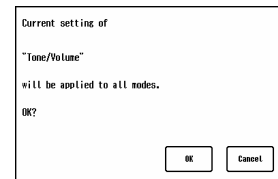
▶ The screen to select the setting item will be displayed.



2 Press the key for the setting item.

▶ The confirmation window to apply the current setting to all modes will be displayed. (shown on right)

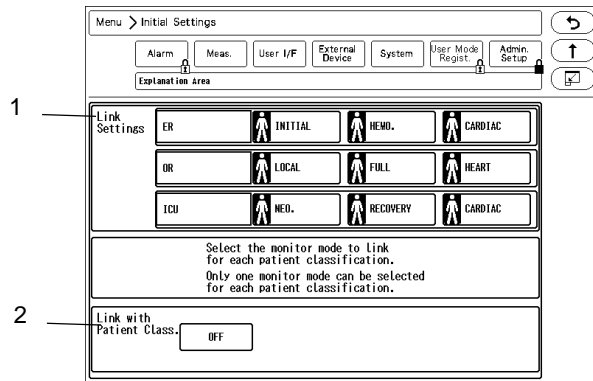
3 Press [OK] to apply the current setting to all modes.



4 All user modes will be initialized.

5 To change the user mode name, press the [Change Mode Name] key, and then select the key for the corresponding user mode.

6 By pressing the [Link with Patient Class.], the main mode to link with the patient classification can be set.



▶ The patient icon indicates the patient classification registered for each main mode.
When the main mode is linked with the patient classification, the patient icon will change to blue.



1 Link Settings

▶ Select the main mode to link with each patient classification. One main mode per each patient classification can be set.

NOTE

- ♦ When [Regist] or [Initialize] key is pressed on the main mode setup window, the link setting for that main mode will be canceled.
- ♦ When patient classification is changed by pressing the [Set All Modes] key, link settings for all main modes will be canceled.
- ♦ When [Initialize All Modes] key is pressed, link settings for all main modes will be canceled, and "Link with Patient Class." will be set to OFF.

2 ON/OFF of "Link with Patient Class."

- ▶ [ON]: The monitor mode will change when the patient classification is changed.
- ▶ [OFF]: The monitor mode will not change when the patient classification is changed.

NOTE

- ♦ When selecting [ON] for "Link with Patient Class.", set the following in advance.
 - *On the "Link Settings", select the main mode to link with each patient classification.
 - *Set the appropriate alarm limits for the linked main mode.
 - *Check the settings for "Power ON/Discharge". (☞ "Power ON/Discharge" P5-18)

Chapter 6 Setup Item/Default Value

Setup Item

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.

Initial Settings

□ Initial Settings (Alarm)

Item		Description	Default	Backup
Alarm System		Fukuda Tone, Melodic Tone, IEC Tone	IEC Tone	Yes
Basic Alarm Parameter		Each Parameter (S, D, M can be specified for BP)	HR, SpO ₂ , NIBP-S, EtCO ₂	Yes
Asystole, VF, VT Alarm		Always ON, ON/OFF	Always ON	Yes
HR/PR Lower Limit during Alarm Auto Setting		OFF, 30 bpm, 40 bpm	None	Yes
Buzzer Tone at Speaker Failure		Enable, Disable	Enable	Yes
Suspend Arrhythmia Analysis during Noise Interference		ON, OFF	OFF	Yes
Oxygenator Mode	Alarm	All OFF, Sel. Parameter, No Change	All OFF	Yes
	Oxygenator Mode Message	ON, OFF	ON	Yes
	Numeric Data		BP1 to BP8, T1 to T8, Tb	Yes
	MODE: Sub Mode	OFF, INDUCT., SURGERY, WAKING, 12LEAD, SUB5, SUB6	OFF	Yes
	Alarm Sound: Check Electrodes	Enable, Disable	Enable	Yes
	Alarm Sound: SpO ₂ Check Sensor Attach.	Enable, Disable	Enable	Yes
Lower Limit for Alarm Volume	Vital Alarm Sound: Urgent	11 levels	1	Yes
	Vital Alarm Sound: Caution		1	
	Vital Alarm Sound: Status		1	
	Ventilator Alarm		1	
	Status Alarm: Urgent		1	
	Status Alarm: Caution		1	
	Status Alarm: Status		1	

Item		Description	Default	Backup	
Alarm Indicator Setting	Level S ^{*1}	Pattern A to J, OFF	Pattern A	Yes	
	Level H		Pattern A	Yes	
	Level M		Pattern E	Yes	
	Level L		Pattern F	Yes	
	Ventilator Alarm		Pattern A	Yes	
	Synchronize with HR/RR	Sync. to HR, Sync. to RR, OFF	OFF	Yes	
Alarm Level ^{*2}		Standard Setup, User Setup	Standard Setup	Yes	
Numeric Data	HR	S, H, M	M	Yes	
	ST	H, M	M	Yes	
	BP1 to 8	H, M	M	Yes	
	PR_IBP	H, M	M	Yes	
	SpO ₂	H, M	M	Yes	
	PR_SpO ₂	H, M	M	Yes	
	NIBP	H, M	M	Yes	
	TEMP1 to 8	H, M, L	L	Yes	
	Tb	H, M, L	L	Yes	
	RR	H, M, L	M	Yes	
	Apnea	H, M, L	H	Yes	
	CO ₂ In ^{*4}	H, M	M	Yes	
	CO ₂ Et ^{*4}	H, M	M	Yes	
	O ₂ In ^{*4}	H, M	M	Yes	
	O ₂ -Exp ^{*4}	H, M	M	Yes	
	N ₂ O In ^{*4}	H, M	M	Yes	
	N ₂ O Exp ^{*4}	H, M	M	Yes	
	Agent In ^{*4}	H, M	M	Yes	
	Agent Exp ^{*4}	H, M	M	Yes	
	MAC ^{*4}	H, M	M	Yes	
	SpCO1, 2	H, M, L	L	Yes	
	SpMet1, 2	H, M, L	L	Yes	
	SpHb1, 2	H, M, L	L	Yes	
	PEAK ^{*4}	H, M, L	L	Yes	
	PEEP ^{*4}	H, M, L	L	Yes	
	MV ^{*4}	H, M, L	M	Yes	
	BIS ^{*3}	H, M, L	M	Yes	
	Arrhythmia	Asystole	S, H	H	Yes
		VF	S, H	H	Yes
		VT	S, H	H	Yes
Ext Tachy		S, H	H	Yes	
Ext Brady		S, H	H	Yes	
Slow VT		H	H	Yes	
Tachy		S, H	H	Yes	
Brady		S, H	H	Yes	

Item	Description	Default	Backup	
	Run	H, M	H	Yes
	Pause	H, M, L	M	Yes
	Triplet	H, M, L	M	Yes
	Couplet	H, M, L	M	Yes
	R on T	H, M, L	M	Yes
	Multiform	H, M, L	M	Yes
	Vent Rhythm	H, M, L	M	Yes
	Bigeminy	H, M, L	M	Yes
	Trigeminy	H, M, L	M	Yes
	Frequent	H, M, L	M	Yes
	SVT	H, M, L	M	Yes
	Irregular RR	H, M, L	M	Yes
	Prolonged RR	H, M, L	M	Yes
	S Frequent	H, M, L	M	Yes
	S Couplet	H, M, L	M	Yes
	VPC	L	M	Yes
	SVPC	L	M	Yes
	Pacer Not Capture	H, M, L	M	Yes
	Pacer Not Pacing	H, M, L	M	Yes
	AFib	H, M, L	M	Yes
Technical	GAS Mixed Agents Detection	M, L, N	N	Yes
	<SpO ₂ Low Perfusion>	L, N	L	Yes
	Check NIBP cuff, hose	M, L, N	L	Yes
	NIBP meas. failed.(*****)	M, L, N	M	Yes
	Check System Conn.	L, N	N	Yes
	Check DS-LAN Comm	L, N	L	Yes
	Some parameters are not displayed due to the display layout setting.	L, N, OFF	N	Yes
	Check Electrodes	H, M, L	L	Yes
	SpO ₂ Check Sensor Attach.	H, M, L	L	Yes
	BP Transducer OFF	M, L	L	Yes

*1: This setting is selectable only when [Fukuda Tone] is set for "Alarm System".

*2: Set the Alarm Level to [User Setup] before setting the alarm level for each parameter.

*3: BIS alarm can be set only when the BISx is connected.

*4: When the numeric data acquired from is displayed, alarms cannot be set. Also, alarm will not generate.

Initial Settings (Measurement)

Item		Description	Default	Backup
NIBP Start 5 min. early		ON, OFF	OFF	Yes
MAP Calculation		Wave, Calc.	Waveform	Yes
Arrhythmia Analysis Filter		Disp Waveform, Fixed	Disp Waveform	Yes
Synchronized Mark/Tone		ECG, SpO ₂	ECG	Yes
HR/PR Source Priority		ECG/SpO ₂ /BP, ECG/BP/SpO ₂ , SpO ₂ /ECG/BP, SpO ₂ /BP/ECG, BP/ ECG/SpO ₂ , BP/SpO ₂ /ECG,	ECG/SpO ₂ /BP	Yes
GAS Display during Undetected Breath		None, Insp. Only	Disable	Yes
BP User Label	Label 1	3 alphanumeric characters	US1	Yes
	Label 2		US2	
	Label 3		US3	
	Label 4		US4	
	Label 5		US5	
TEMP User Label	Label 1	3 alphanumeric characters	US1	Yes
	Label 2		US2	
	Label 3		US3	
	Label 4		US4	
	Label 5		US5	
	Label 6		US6	
	Label 7		US7	
Measurement Unit	CO ₂	mmHg, kPa, %	mmHg	Yes
	BP	mmHg, kPa	mmHg	
	CVP	mmHg/ kpa, cmH ₂ O	mmHg/ kPa	
	ST	mm, mV	mm	
Catheter Manufacturer for CC Input	Manufacturer 1	8 alphanumeric characters	BIOSENS	Yes
	Manufacturer 2		ARGON	
	Manufacturer 3		EDWARDS	

 Initial Settings (User I/F)

Display/Print

Item	Description	Default	Backup
Date Format	07/19, Jul.19, 19 Jul	07/19	Yes
BP Alarm Increment	Normal, Small	Normal	Yes
RR Alarm Increment	Normal, Small	Normal	Yes
Trend Clip	ON, OFF	ON	Yes
BP Printing Scale	20 mm, 40 mm	40mm	Yes
Night Mode Cancel	Any Key, Night Mode Key	Any Key	Yes
ST Display Lead Setup (A to C)	4 leads for each pattern of A to C I to V6, OFF	ST-A: I, II, III, aVR ST-B: aVL, aVF, V1, V2 ST-C: V3, V4, V5, V6	Yes

Display/Print

Item	Description	Default	Backup	
VENT Display Parameters	OFF [Ventilator] E-VT, I-VT, MV, P-PEAK, P-PAUSE, PEEP, P-MEAN, E-RES, I-RES, FiO ₂ , COMP [Anes.] Flowee, Ti, Ti/Ttot, Sup.Air, Sup.O ₂ , Sup.N ₂ O	VENT-A: All OFF VENT-B: All OFF	Yes	
Hemo/etc Display Parameters	OFF [Hemodynamics] SvO ₂ , ScvO ₂ , SaO ₂ , O ₂ El, B-Temp, CCO, CCO-STAT, CCI, CCI-STAT, DO ₂ , RVEF, RVEF-STAT, VO ₂ , SV, SV-STAT, SVI, SVI-STAT, SVR, SVRI, SVV, EDV, EDV- STAT, EDVI, EDVI-STAT, ESV, ESVI, dPmx [Other] tcpO ₂ , tcpCO ₂	Hemo/etc-A: All OFF Hemo/etc-B: All OFF	Yes	
Auto Display Configuration	BP Format	Overlap, Separate	Overlap	Yes
	Automatic Setup	Standard/Right, Standard/Left	Standard/Right	Yes
	Short Trend	Link with Numeric, Link with Waveform	Link with Numeric	Yes
	Display Priority	HR/PR, VENT, SpCO, BP1, NIBP, SpMet, BP2, BP5, SpHb, BP3, BP6, BIS, BP4, BP7, SpO ₂ , BP8, SpO ₂ CO, T1, T2, T3, T4, INVOS, CO ₂ , T5, T6, SPIRO, T7, T8, RR, Tb	HR/PR, BP1, BP2, BP3, BP4, SpO ₂ , T1, T2, CO ₂ , SPIRO, RR, VENT, NIBP, BP5, BP6, BP7, BP8, T3, T4, T5, T6, T7, T8, Tb, SpCO, SpMet, SpHb, BIS, SvO ₂ , CO, INVOS	Yes
Dim All Data Other than Numeric	ON, OFF	OFF	Yes	
All Window Opaque	ON, OFF	OFF	Yes	
Printer Message	ON, OFF	ON	Yes	
Message Icon	ON, OFF	OFF	Yes	
Operation Guide Display	ON, OFF	ON	Yes	
Notification when Changing Equipment Configuration	ON, OFF	ON	Yes	
scale of extended display with main unit	ON, OFF	OFF	Yes	
12-Lead Analysis Filter Display	Frequency, Filter Type	Frequency	Yes	
Waveform Size Display	Numeric	Numeric	Yes	
Patient Name on the Information Display Area	ON, OFF	ON	Yes	
External Device Numeric Data Box Operation	Tabular Trend, Parameter	Tabular Trend	Yes	

Display/Print

Item		Description	Default	Backup
Drug Calculation (Drug Amount)	AMRINONE	0.01 to 1500000.00	500mg	Yes
	AMINOPHYLLINE		500mg	
	BRETYLIUM		2000mg	
	DOBUTAMINE		250mg	
	DOPAMINE		800mg	
	EPINEPHRINE		4mg	
	HEPARIN		25000units	
	INSULIN		100units	
	ISOPROTERENOL		2mg	
	LIDOCAINE		2000mg	
	NITROGLYCERIN		50mg	
	NITROPRUSSIDE		50mg	
	NOREPINEPHRINE		4mg	
	PHENYLEPHRINE		300mg	
	PROCAINAMIDE		2000mg	
	STREPTOKINASE		750000IU	
	tPA		100mg	
DRUG A-G	500mg			
Drug Calculation (Diluent Amount)	AMRINONE	1 to 1000	250mL	Yes
	AMINOPHYLLINE			
	BRETYLIUM			
	DOBUTAMINE			
	DOPAMINE			
	EPINEPHRINE			
	HEPARIN			
	INSULIN		100mL	
	ISOPROTERENOL		250mL	
	LIDOCAINE			
	NITROGLYCERIN			
	NITROPRUSSIDE			
	NOREPINEPHRINE			
	PHENYLEPHRINE			
	PROCAINAMIDE			
	STREPTOKINASE			
	tPA		200mL	
DRUG A-G	250mL			

Display/Print

	Item	Description	Default	Backup
Drug Calculation (Dosing Rate)	AMRINONE	0.01 to 1500000.00	5.00µg/kg/min	Yes
	AMINOPHYLLINE		0.10mg/kg/h	
	BRETYLIUM		1.00mg/min	
	DOBUTAMINE		2.50µg/kg/min	
	DOPAMINE		2.00µg/kg/min	
	EPINEPHRINE		1.00µg/min	
	HEPARIN		1000.00units/h	
	INSULIN		1.00units/h	
	ISOPROTERENOL		1.00µg/kg/min	
	LIDOCAINE		2.00mg/min	
	NITROGLYCERIN		100.00µg/min	
	NITROPRUSSIDE		0.50µg/kg/min	
	NOREPINEPHRINE		2.00µg/min	
	PHENYLEPHRINE		100.00µg/min	
	PROCAINAMIDE		2.00mg/min	
	STREPTOKINASE		30000.00IU/h	
tPA	20.00mg/h			
DRUG A-G	1.00µg/kg/min			
Monitor Suspend Setup	Monitor Suspend Label	ON, OFF	OFF	Yes
	Monitor Suspend Timer	ON, OFF	OFF	Yes
	Label 1	ON/OFF Name: 7 characters Color: 16 colors	ON (SUSPENDED/Red)	Yes
	Label 2		ON (UNDER EXAM/Pink)	Yes
	Label 3		ON (IN REHAB/Green)	Yes
	Label 4		ON (BATHING/Orange)	Yes
	Label 5		ON (OUT/Light Orange)	Yes
	Label 6		ON (SURGERY/Violet)	Yes
	Label 7		ON (RESTROOM/Light Blue)	Yes
Label 8 to Label 15	Not Used		Yes	
Shift Time	Day Shift	Selectable Time	08:00	Yes
	Twilight Shift		16:00	Yes
	Night Shift		00:00	Yes

Display/Print

Item		Description	Default	Backup
Key Group Setup	Label A to E	8 alphanumeric characters	Blank*	Yes
Event Label Setup	A to E	Up to 8 user keys can be registered to each group (Home, Key Lock, Menu, Mode Select, Alarm Silence, Admit/Disch., Alarm Suspend, Rapid Discharge, NIBP Start/Stop, HR/PR Source, NIBP Cont., BP Zero, Print Start/Stop, Scale, Monitor Suspend, SpO ₂ Display ON/OFF, Night Mode, CO ₂ Display ON/OFF, Freeze, GAS Display ON/OFF, Auto Display Config., ST, Enlarged Display, Cardiac Output, Short Trend ON/OFF, PAWP, Transparent Window ON/OFF, Hemodynamics, Change Palette, Lung Function, Trend, Full Disc. Wave, Tabular Trend, Tone/Volume, NIBP List, NIBP Auto Mode, Recall, Alarm Setup, OCRG, Manual Printing, Display Config., Time/Date, Stopwatch)	None	Yes
Event 1	Event 1	Yes		
Event 2	Event 2	Yes		
Event 3	Event 3	Yes		
Event 4	Event 4	Yes		
Event 5	Event 5	Yes		
Event 6	Event 6	Yes		
Event 7	Event 7	Yes		
Event 8	Event 8	Yes		

*: When blank, "Group n" will be displayed.

Power ON/ Discharge

Item		Description	Default	Backup
Check Discharge at Power ON		ON, OFF	ON	Yes
Discharge Mode		Admit, Monitor Suspend, Standby	Admit	Yes
NIBP Resume Auto Mode with Manual Measurement		ON, OFF	ON	Yes
At Power ON Backup/Initialize	Patient Classification	Backup, Adult, Child, Neonate	Backup	Yes
	Mode	Backup, Current Mode, Mode 1 to 9	Backup	Yes
	Pacemaker	Backup, Not Used	Backup	Yes
	Alarm Setup	Backup, Initialize	Backup	Yes
	Display Configuration	Backup, Initialize	Backup	Yes
	ECG1, ECG2 Lead	Backup, Initialize	Backup	Yes
	ECG1, ECG2 Size	Backup, Initialize	Backup	Yes
	Impedance Mode ON/OFF	Backup, Initialize	Backup	Yes
	CVA Detect	Backup, OFF	Backup	Yes
	NIBP Auto Mode	Backup, OFF, OFF->2.5 min., OFF->5 min., 2.5 min., 5 min.	Backup	Yes
	BP Scale	Backup, Initialize	Backup	Yes
	SpO ₂ Averaging	Backup, Initialize	Backup	Yes
	CO ₂ Scale	Backup, Initialize	Backup	Yes
EtCO ₂ Peak Duration	Backup, 10 sec.	Backup	Yes	
At Discharge Backup/Initialize	Patient Classification	Backup, Adult, Child, Neonate	Backup	Yes

Power ON/ Discharge

Item	Description	Default	Backup
Mode	Backup, Current Mode, Mode 1 to 9	Backup	Yes
Pacemaker	Backup, Not Used	OFF	Yes
Alarm Setup	Backup, Initialize	Initialize	Yes
Display Configuration	Backup, Initialize	Initialize	Yes
ECG1, ECG2 Lead	Backup, Initialize	Initialize	Yes
ECG1, ECG2 Size	Backup, Initialize	Initialize	Yes
Impedance Mode ON/OFF	Backup, Initialize	Initialize	Yes
CVA Detect	Backup, OFF	OFF	Yes
NIBP Auto Mode	Backup, OFF, OFF->2.5 min., OFF->5 min., 2.5 min., 5 min.	OFF	Yes
BP Scale	Backup, Initialize	Initialize	Yes
SpO ₂ Averaging	Backup, Initialize	Initialize	Yes
CO ₂ Scale	Backup, Initialize	Initialize	Yes
EtCO ₂ Peak Duration	Backup, 10 sec.	10 sec.	Yes

Menu

Item	Description	Default	Backup
Menu Setup	Admit/Discharge	OFF, Admit/Discharge	Admit/Discharge
	Basic Setup	OFF, Tone/Volume, Display Config., Manual Printing, Auto Printing, Color, Brightness, Night Mode, Time/Date	Display Config., Manual Printing, Auto Printing, Tone/Volume, Time/Date, Color, Brightness, Night Mode
	Alarm	OFF, Basic, Circ., Resp/Gas, Arrhy., ST, List, Detail Setup	Basic, Circ., Resp/Gas, Arrhy., ST, List, Detail Setup
	Parameter	OFF, ECG, RESP, NIBP, BP, SpO ₂ , TEMP, GAS, CO ₂ , BIS, External Device	ECG, RESP, NIBP, BP, SpO ₂ , TEMP, GAS, CO ₂ , BIS, External Device
	Data Review	OFF, Trend, Tabular Trend, Recall, OCRG, Alarm History	Trend, Tabular Trend, Recall, OCRG, Alarm History
	Waveform Review	OFF, Zoom, ST	Zoom, ST
	Calculation	OFF, Hemodynamics, Lung Function, CO, Drug Calc.	Hemodynamics, Lung Function, CO, Drug Calc.
	Initial Settings	Initial Settings	Initial Settings
	Maintenance	Maintenance	Maintenance

Key Mask

Item	Description	Default	Backup
Key Mask	Menu Items	ON/OFF	All ON
	Admit/Discharge Items	ON/OFF	All ON
	Alarm>Circulatory Items	ON/OFF	All ON
	Alarm>Respiratory/Gas Items	ON/OFF	All ON
	Alarm>Arrhythmia Items	ON/OFF	All ON

Remote Control

Item		Description	Default	Backup
Remote Control	Remote Control Key	ECG1/ECG2 Size ECG1 Lead, ECG2 Lead ECG Auto Size BP1 to 8 scale, PCWP, BP Zero Balance, NIBP Start/Stop, Print Start/Stop, Monitor Resume, Alarm Suspend, Freeze, Trend, Tabular Trend, OCRG, Recall, Zoom Wave, ST, CO, Hemodynamics, Lung Function, Night Mode, Enlarged Display, OFF	F1: ECG1 Size F2: ECG1 Lead F3: NIBP Start/Stop F4: Print Start/Stop F5: Night Mode F6: Tabular Trend F7: Trend F8: BP Zero Balance	Yes
	Room ID/Bed ID*	Room ID: A,B,C,D,E,F,G,H,P Bed ID: 1 to 32	A001 OFF	Yes

*: Select [ON] for "Room ID, Bed ID" before entering the ID.

Operation (Touch Panel, etc.)

Item	Description	Default	Backup
Auto Hide Window	OFF, 5, 10, 20, 30, 60 sec.	60 sec.	Yes

 Initial Settings (External Device)

Item		Description	Default	Backup	
Main Unit Port, HP-800	COM1	OFF, SV-300, SERVO-i/s, SERVO-U/n/air, PB, Evita, Vigilance, PiCCO, PulsioFlex, PC Comm., Barcode, Magnetic Card, BIS, INVOS, FLOW-i, PC Comm. (DS-5000), TCM4/TCM5*	OFF	Yes	
Network	Main Unit	COM2	OFF	Yes	
		Status II	OFF	Yes	
		IP Address	Numeric (0 to 9)	0.0.0.0	Yes
	Printer	Subnet Mask		0.0.0.0	Yes
		Default Gateway		0.0.0.0	Yes
		Network Printer	ON, OFF, DS-LAN	OFF	Yes
		IP Address	Numeric (0 to 9)	0.0.0.0	Yes
		MAC Address	Alphanumeric (0 to 9, A to F)	00.00.00.00.00.00	Yes
		Printer Specification	LIPS IV, ESC/page, PCL 5	PCL 5	Yes
		Paper Size	A4, Letter	A4	Yes
Status Output Setup	Alarm Output Setup	Central Monitor	001 to 016	001	Yes
		Alarm to Output	OFF, APNEA, Level H, Level H,M, Level H,M,L	OFF	Yes
		Output Logic	Positive Logic, Negative Logic, Pulse	Negative Logic	Yes

Item		Description	Default	Backup	
Analog Output Setup	Analog Output Function	ON, OFF	OFF	Yes	
	Analog Output 1	Selected ECG Lead, Displayed ECG Lead, Multiparameter Connector 1-1, Multiparameter Connector 1-2, Multiparameter Connector 2-1, Multiparameter Connector 2-2	Displayed ECG Lead	Yes	
	Analog Output 2	Selected ECG Lead, Displayed ECG Lead, Multiparameter Connector 1-1, Multiparameter Connector 1-2, Multiparameter Connector 2-1, Multiparameter Connector 2-2	Multiparameter Connector 1-1	Yes	
	Analog Output 3	Selected ECG Lead, Displayed ECG Lead, Multiparameter Connector 1-1, Multiparameter Connector 1-2, Multiparameter Connector 2-1, Multiparameter Connector 2-2, Sync. Signal	Synchronized Signal	Yes	
	Output Signal	HR, RR	OFF	Yes	
	Output Logic	Positive Logic, Negative Logic	Negative Logic	Yes	
	Pulse Width	100, 60, 20	100	Yes	
Magnetic Card Reader Setup	Starting Digit / Ending Digit	Patient ID	Entering using numeric keys	1- 20	Yes
		?no translation?		OFF-OFF	Yes
		Patient Name		OFF-OFF	Yes
		Birth Year		OFF-OFF	Yes
		Birth Month		OFF-OFF	Yes
		Birth Day		OFF-OFF	Yes
		Age		OFF-OFF	Yes
		Gender		OFF-OFF	Yes
	Auto Reference to Central Monitor when Reading Patient ID	ON, OFF	OFF	Yes	

*: The external device that can be connected differs depending on the port.

□ Initial Settings (System)

Item		Description	Default	Backup
DS-LAN	Room ID	4 alphanumeric characters	BED-	Yes
	Bed ID	3 numerics	000	Yes
	CO ₂ (mmHg) Upper Limit of Transmission	No limit, 99mmHg	99mmHg	Yes
Telemeter	Usage	ON, OFF	ON	Yes
	Channel	1001 to 1080, 2001 to 2120 3001 to 3040, 4001 to 4080 5001 to 5080, 6001 to 6080	Depends on the telemeter	Yes
	Group ID	00 to 63	00	Yes
	Transmitting Waveform	ECG1(ECG1, RESP, CO ₂ , BP1, BP2, SpO ₂), ECG2 (ECG1, ECG2, RESP/ CO ₂ , BP1, SpO ₂)	ECG1(ECG1, RESP, CO ₂ , BP1, BP2, SpO ₂)	Yes
CO ₂ (mmHg) Upper Limit of Transmission		No limit, 99mmHg	99mmHg	Yes
Unit Module	Multiparameter	Manual	Manual 1: BP1,2,TEMP5,6 , CO 2: BP5,6, TEMP1,2 , CO 3: BP3,4, TEMP3,4 , CO	Yes
	SpO ₂	Setting for 1ch, 2ch	1ch: HS, 2ch: OFF	Yes
Other	AC Frequency	50Hz, 60Hz	50 Hz	Yes
	Search Patient ID	Enable, Disable	Disable	Yes

Item		Description	Default	Backup
	Numeric Data External Output	Displayed Data, All Data	Displayed Data	Yes

Initial Settings (User Mode Registration)

Item		Description	Default	Backup
Main Mode ^{*1}	Site Name	8 characters	Group 1	Yes
			Group 2	
			Group 3	
	Mode Name	8 characters	Adult	Yes
			Child	
			Neonate	
			Initial_Adult	
			Initial_Child	
			Initial_Neonate	
			Cardiac	
		Graphic/Tabular Trend		
		OCRG		
Sub Mode ^{*2}	Mode Name	8 characters	Display Config. 1	Yes
			Display Config. 2	
			Display Config. 3	
			Display Config. 4	
			Display Config. 5	
			Display Config. 6	

*1: The following settings can be registered for the main mode. Other than display configuration setting, the default settings will be applied to all modes.

- ◆ Patient Classification
- ◆ Display Configuration
- ◆ Manual Printing
- ◆ Auto Printing
- ◆ Time/Date
- ◆ Brightness
- ◆ Tone/Volume
- ◆ Color Setup
- ◆ Night Mode Setup
- ◆ Alarm Setup
- ◆ Settings for Each Parameter
- ◆ Settings for Review Data (Graphic Trend, Tabular Trend, Recall, OCRG, ST, Zoom Wave)

*2: For Sub Mode, , the following settings can be registered.

- ◆ Display Configuration
Refer to the section on "Basic Setup" for the settings of each mode.

Main Mode (Mode 1)

Item		Default	Backup
Item		Adult	Yes
Patient Classification		Adult	
Layout		Numeric Data/Bottom 5 rows	
		User Key/Right 2 columns	
Numeric Data		HR, SpO ₂ , CO ₂ , NIBP, BP1, RR_IMP	
Waveform		ECG1, SpO ₂ , BP1, CO ₂ , RESP	
User Key		Home, Menu, Alarm Silence, Admit/Disch., BP Zero, NIBP Start/Stop, NIBP Auto Mode, Alarm Setup (All), NIBP Cont., Alarm History, NIBP List, Recall, Tabular Trend, Graphic Trend, Print Start/Stop, Key Lock, Night Mode	
Short Graphic Trend	Display	OFF	
	Display Duration	15 min.	
Detail Setup (Numeric Data)	Alarm Limit Display	Graph	
	At Alarm Occurrence	Reversed	
Detail Setup (Waveform)	Grid	Normal	
	Scale	Normal	
	Thickness	Normal	
	Clip	ON	
	Fill CO ₂ Waveform	ON	
	Fill O ₂ Waveform	OFF	
	Fill Agent Waveform	OFF	
	BP Overlap 1	BP1-4	
	BP Overlap 2, 3	N/A	
	RR Overlap 1	CO ₂ , O ₂ , Agent	
	RR Overlap 2, 3	N/A	
	12-Lead ST Wave	Ref.	
	12-Lead ST Short Trend	Fill	
	ST/VPC/Arrhy. Alarm Display	ON	
	Block Cascade	Waveform Quantity: 2 Waveform: ECG1, ECG2	
	Home Review	OFF	
	Home Review Size	Small	
OCRG Update Time	1 sec.		
Detail Setup (Short Trend)	Short Trend	Link with Numeric	
	Short Trend Scale	Graphic Trend	
	Display Parameter	OFF	
	Reference Line Function	Disable	
	Cursor Function	Disable	
	Cursor Linkage	Tabular Trend	
	Short Trend Overlap	All OFF	
	Data Resolution	5 sec.	
Display Interval	15 min.		

Main Mode (Mode 2)

Item		Default	Backup
Item		Child	Yes
Patient Classification		Child	
Layout		Numeric Data/Right 2 columns	
		User Key/Right 2 columns	
Numeric Data		HR, SpO ₂ , NIBP, BP1, CO ₂ , RR_IMP, RR_GAS	
Waveform		ECG1, SpO ₂ , BP1, CO ₂ , RESP	
User Key		Home, Menu, Alarm Silence, Admit/Disch., BP Zero, NIBP Start/Stop, NIBP Auto Mode, Alarm Setup (All), NIBP Cont., Alarm History, NIBP List, Recall, Tabular Trend, Graphic Trend, Print Start/Stop, Key Lock, Night Mode	
Short Trend		(Same as Main Mode 1)	
Detail Setup (Numeric Data)	Alarm Limit Display	Graph	
	At Alarm Occurrence	Reversed	
Detail Setup (Waveform)	Grid	Normal	
	Scale	Normal	
	Thickness	Normal	
	Clip	ON	
	Fill CO ₂ Waveform	ON	
	Fill O ₂ Waveform	OFF	
	Fill Agent Waveform	OFF	
	BP Overlap 1	BP1-4	
	BP Overlap 2, 3	N/A	
	RR Overlap 1	CO ₂ , O ₂ , Agent	
	RR Overlap 2, 3	N/A	
	12-Lead ST Wave	Ref.	
	12-Lead ST Short Trend	Fill	
	ST/VPC/Arrhy. Alarm Display	ON	
	Block Cascade	Waveform Quantity: 2 Waveform: ECG1, ECG2	
	Home Review	OFF	
Home Review Size	Small		
OCRG Update Time	1 sec.		
Detail Setup (Short Trend)		(Same as Main Mode 1)	

Main Mode (Mode 3)

Item		Default	Backup
Item		Neonate	Yes
Patient Classification		Neonate	
Layout		Numeric Data/Right 1 column	
		User Key/Right 1 column	
Numeric Data		HR, SpO ₂ , NIBP, BP1, CO ₂ , RR_IMP	

Main Mode (Mode 3)

Item	Default	Backup	
Waveform	ECG, SpO ₂ , RESP, CO ₂ , BP1		
User Key	Right Side of Display 1/2 Home, Menu, Alarm Silence, Admit/Disch., BP Zero, NIBP Start/Stop, NIBP Auto Mode, NIBP Cont., Alarm Setup (All), Print Start/Stop, User Key Up/Down Right Side of Display 2/2 Home, Menu, Alarm Silence, Alarm History, Recall, Tabular Trend, Graphic Trend, Key Lock, Night Mode, Print Start/Stop, User Key Up/Down		
Short Trend	(Same as Main Mode 1)		
Detail Setup (Numeric Data)	Alarm Limit Display		Graph
	At Alarm Occurrence		Reversed
Detail Setup (Waveform)	Grid		Normal
	Scale		Normal
	Thickness		Normal
	Clip		ON
	Fill CO ₂ Waveform		ON
	Fill O ₂ Waveform		OFF
	Fill Agent Waveform		OFF
	BP Overlap 1		BP1-4
	BP Overlap 2, 3		N/A
	RR Overlap 1		CO ₂ , O ₂ , Agent
	RR Overlap 2, 3		N/A
	12-Lead ST Wave		Ref.
	12-Lead ST Short Trend		Fill
	ST/VPC/Arrhy. Alarm Display		ON
	Block Cascade		Waveform Quantity: 2 Waveform: ECG1, ECG2
Home Review	OFF		
Home Review Size	Small		
OCRG Update Time	1 sec.		
Detail Setup (Short Trend)	(Same as Main Mode 1)		

Main Mode (Mode 4)

Item	Default	Backup
Item	Initial_Adult	Yes
Patient Classification	Adult	
Layout	Numeric Data/Right 2 columns	
	User Key/Right 2 columns	
Numeric Data	HR, SpO ₂ , NIBP, BP1, GAS, CO/SV/SVV, BIS, TEMP1/2, Extended Function-A	
Waveform	ECG1, ECG2, SpO ₂ , BP1, CO ₂ , EEG1, EEG2	
User Key	Home, Menu, Alarm Silence, Admit/Disch., BP Zero, NIBP Start/Stop, NIBP Auto Mode, Alarm Setup (All), NIBP Cont., Alarm History, NIBP List, Recall, Tabular Trend, Graphic Trend, Print Start/Stop, Key Lock	
Short Trend	(Same as Main Mode 1)	

Main Mode (Mode 4)

Item		Default	Backup
Detail Setup (Numeric Data)	Alarm Limit Display	Graph	
	At Alarm Occurrence	3D	
Detail Setup (Waveform)	Grid	Normal	
	Scale	Normal	
	Thickness	Normal	
	Clip	ON	
	Fill CO ₂ Waveform	ON	
	Fill O ₂ Waveform	OFF	
	Fill Agent Waveform	OFF	
	BP Overlap 1	BP1-4	
	BP Overlap 2, 3	N/A	
	RR Overlap 1	CO ₂ , O ₂ , Agent	
	RR Overlap 2, 3	N/A	
	12-Lead ST Wave	Ref.	
	12-Lead ST Short Trend	Fill	
	ST/VPC/Arrhy. Alarm Display	ON	
	Block Cascade	Waveform Quantity: 2 Waveform: ECG1, ECG2	
Home Review	OFF		
Home Review Size	Small		
OCRG Update Time	1 sec.		
Detail Setup (Short Trend)		(Same as Main Mode 1)	

Main Mode (Mode 5)

Item		Default	Backup
Item		Initial_Child	Yes
Patient Classification		Child	
Layout		Numeric Data/Right 2 columns & Bottom	
		User Key/Right 2 columns	
Numeric Data		Right: HR, SpO ₂ , NIBP, BP1, BP2, GAS, SvO ₂ /CO Bottom: BIS, QTc, TEMP1/2	
Waveform		ECG1, SpO ₂ , BP1, CO ₂ , EEG1, EEG2	
User Key		Home, Menu, Alarm Silence, Admit/Disch., BP Zero, NIBP Start/Stop, NIBP Auto Mode, Alarm Setup (All), NIBP Cont., Alarm History, NIBP List, Recall, Tabular Trend, Graphic Trend, Print Start/Stop, Key Lock, Night Mode	
Short Trend		(Same as Main Mode 1)	
Detail Setup (Numeric Data)	Alarm Limit Display	Graph	
	At Alarm Occurrence	3D	
Detail Setup (Waveform)	Grid	Normal	
	Scale	Normal	
	Thickness	Normal	
	Clip	ON	

Main Mode (Mode 5)

Item	Default	Backup
Fill CO ₂ Waveform	ON	
Fill O ₂ Waveform	OFF	
Fill Agent Waveform	OFF	
BP Overlap 1	BP2 to 4	
BP Overlap 2, 3	N/A	
RR Overlap 1	CO ₂ , O ₂ , Agent	
RR Overlap 2, 3	N/A	
12-Lead ST Wave	Ref.	
12-Lead ST Short Trend	Fill	
ST/VPC/Arrhy. Alarm Display	ON	
Block Cascade	Waveform Quantity: 2 Waveform: ECG1, ECG2	
Home Review	OFF	
Home Review Size	Small	
OCRG Update Time	1 sec.	
Detail Setup (Short Trend)	(Same as Main Mode 1)	

Main Mode (Mode 6)

Item	Default	Backup	
Item	Initial_Neonate	Yes	
Patient Classification	Neonate		
Layout	Numeric Data/Right 2 columns		
	User Key/Right 2 columns		
Numeric Data	HR, SpO ₂ /PR_SpO ₂ , SpO ₂ -2, RR_IMP, NIBP		
Waveform	ECG1, SpO ₂ , SpO ₂ -2, RESP		
User Key	Home, Menu, Alarm Silence, Admit/Disch., BP Zero, NIBP Start/Stop, NIBP Auto Mode, Alarm Setup (All), NIBP Cont., Alarm History, NIBP List, Recall, Tabular Trend, Graphic Trend, Print Start/Stop, Key Lock, Night Mode		
Short Trend	(Same as Main Mode 1)		
Detail Setup (Numeric Data)	Alarm Limit Display		Graph
	At Alarm Occurrence		3D
Detail Setup (Waveform)	Grid		Normal
	Scale		Normal
	Thickness		Normal
	Clip		ON
	Fill CO ₂ Waveform	ON	
	Fill O ₂ Waveform	OFF	
	Fill Agent Waveform	OFF	
	BP Overlap 1	BP2 to 4	
	BP Overlap 2, 3	N/A	
	RR Overlap 1	CO ₂ , O ₂ , Agent	
RR Overlap 2, 3	N/A		

Main Mode (Mode 6)

Item		Default	Backup
	12-Lead ST Wave	Ref.	
	12-Lead ST Short Trend	Fill	
	ST/VPC/Arrhy. Alarm Display	ON	
	Block Cascade	Waveform Quantity: 2 Waveform: ECG1, ECG2	
	Home Review	OFF	
	Home Review Size	Small	
	OCRG Update Time	1 sec.	
Detail Setup (Short Trend)		(Same as Main Mode 1)	

Main Mode (Mode 7)

Item		Default	Backup
Item		Cardiac	Yes
Patient Classification		Adult	
Layout		Numeric Data/Right 1 column	
		User Key/Right 1 column	
Numeric Data		HR, SpO ₂ , TEMP1/2, NIBP, BP1, CO ₂ , RR_IMP	
Waveform		ECG 12-Lead, BP1	
User Key		Below HR: 12-Lead Print, Print Cancel, 12L Analysis Right Side of Display 1/2 Home, Menu, Alarm Silence, Admit/Disch., BP Zero, NIBP Start/Stop, NIBP Auto Mode, NIBP Cont., Alarm Setup (All), Print Start/Stop, User Key Up/Down Right Side of Display 2/2 Home, Menu, Alarm Silence, Alarm History, Recall, Tabular Trend, Graphic Trend, Key Lock, Night Mode, Print Start/Stop, User Key Up/Down	
Short Trend		(Same as Main Mode 1)	
Detail Setup (Numeric Data)	Alarm Limit Display	Graph	
	At Alarm Occurrence	Reversed	
Detail Setup (Waveform)	Grid	Normal	
	Scale	Normal	
	Thickness	Normal	
	Clip	ON	
	Fill CO ₂ Waveform	ON	
	Fill O ₂ Waveform	OFF	
	Fill Agent Waveform	OFF	
	BP Overlap 1	BP1 to 4	
	BP Overlap 2, 3	N/A	
	RR Overlap 1	CO ₂ , O ₂ , Agent	
	RR Overlap 2, 3	N/A	
	12-Lead ST Wave	Ref.	
12-Lead ST Short Trend	Fill		
ST/VPC/Arrhy. Alarm Display		ON	

Main Mode (Mode 7)

Item		Default	Backup
	Block Cascade	Waveform Quantity: 2 Waveform: ECG1, ECG2	
	Home Review	OFF	
	Home Review Size	Small	
	OCRG Update Time	1 sec.	
Detail Setup (Short Trend)		(Same as Main Mode 1)	

Main Mode (Mode 8)

Item		Default	Backup
Item		Graphic/Tabular Trend	Yes
Patient Classification		Child	
Layout		Numeric Data/Right 2 columns & Bottom	
		User Key/Right 2 columns	
Numeric Data		Right: HR, SpO ₂ , NIBP, BP1, BP2, BP3, GAS, SvO ₂ /CO Bottom: BIS, QTc, TEMP1/2	
Waveform		ECG1, SpO ₂ , Home Review	
User Key		Home, Menu, Alarm Silence, Admit/Disch., BP Zero, NIBP Start/Stop, NIBP Auto Mode, Alarm Setup (All), NIBP Cont., Alarm History, NIBP List, Recall, Tabular Trend, Graphic Trend, Home Review/Graphic/Tabular Trend, Print Start/Stop, Key Lock, Night Mode	
Short Trend		(Same as Main Mode 1)	
Detail Setup (Numeric Data)	Alarm Limit Display	Graph	
	At Alarm Occurrence	Reversed	
Detail Setup (Waveform)	Grid	Normal	
	Scale	Normal	
	Thickness	Normal	
	Clip	ON	
	Fill CO ₂ Waveform	ON	
	Fill O ₂ Waveform	OFF	
	Fill Agent Waveform	OFF	
	BP Overlap 1	BP2 to 4	
	BP Overlap 2, 3	N/A	
	RR Overlap 1	CO ₂ , O ₂ , Agent	
	RR Overlap 2, 3	N/A	
	12-Lead ST Wave	Ref.	
	12-Lead ST Short Trend	Fill	
	ST/VPC/Arrhy. Alarm Display	ON	
Detail Setup (Short Trend)		(Same as Main Mode 1)	

Main Mode (Mode 9)

Item		Default	Backup
Item		OCRG	Yes
Patient Classification		Neonate	
Layout		Numeric Data/Right 2 columns	
		User Key/Right 2 columns	
Numeric Data		HR, NIBP, SpO ₂ , CO ₂ , SpO ₂ -2, RR_IMP, TEMP1/2	
Waveform		ECG, SpO ₂ , RESP, Home Review	
User Key		Home, Menu, Alarm Silence, Admit/Disch., BP Zero, NIBP Start/Stop, NIBP Auto Mode, Alarm Setup (All), NIBP Cont., Alarm History, NIBP List, Recall, Tabular Trend, Graphic Trend, Home Review/OCRG, Print Start/Stop, Key Lock, Night Mode	
Short Trend		(Same as Main Mode 1)	
Detail Setup (Numeric Data)	Alarm Limit Display	Graph	
	At Alarm Occurrence	Reversed	
Detail Setup (Waveform)	Grid	Normal	
	Scale	Normal	
	Thickness	Normal	
	Clip	ON	
	Fill CO ₂ Waveform	ON	
	Fill O ₂ Waveform	OFF	
	Fill Agent Waveform	OFF	
	BP Overlap 1	BP1 to 4	
	BP Overlap 2, 3	N/A	
	RR Overlap 1	CO ₂ , O ₂ , Agent	
	RR Overlap 2, 3	N/A	
	12-Lead ST Wave	Ref.	
	12-Lead ST Short Trend	Fill	
	ST/VPC/Arrhy. Alarm Display	ON	
	Block Cascade	Waveform Quantity: 2 Waveform: ECG1, ECG2	
	Home Review	OFF	
	Home Review Size	Small	
OCRG Update Time	1 second (grayed out)		
Detail Setup (Short Trend)		(Same as Main Mode 1)	

User Mode Regist.
Alarm Setup (Adult)

Alarm Setup		ON/OFF (All, Upper, Lower Limit)			Upper Limit	Lower Limit	Backup
Circ./ BIS	HR	ON	ON	ON	120	40	Yes
	Ext Tachy/Brady	-	OFF	OFF	150	30	Yes
	SpO ₂ (1ch)	ON	OFF	ON	-	90	Yes
	ExtSpO ₂ (1ch)	ON	-	ON	-	80	Yes
	PR_SpO ₂ (1ch)	ON	ON	ON	120	40	Yes
	SpCO(1ch)	OFF	OFF	-	-	-	Yes
	SpMet(1ch)	OFF	OFF	-	-	-	Yes
	SpHb(1ch)(g/dL)	OFF	OFF	OFF	-	-	Yes
	SpHb(1ch)(mmol/L)	OFF	OFF	OFF	-	-	Yes
	SpO ₂ (2ch)	ON	OFF	OFF	-	90	Yes
	ExtSpO ₂ (2ch)	ON	-	ON	-	80	Yes
	PR_SpO ₂ (2ch)	ON	ON	ON	120	40	Yes
	SpCO(2ch)	OFF	OFF	-	-	-	Yes
	SpMet(2ch)	OFF	OFF	-	-	-	Yes
	SpHb(2ch)(g/dL)	OFF	OFF	OFF	-	-	Yes
	SpHb(2ch)(mmol/L)	OFF	OFF	OFF	-	-	Yes
	NIBP(mmHg)(S)	ON	ON	ON	180	80	Yes
	NIBP(mmHg)(M)	ON	OFF	OFF	-	-	Yes
	NIBP(mmHg)(D)	ON	OFF	OFF	-	-	Yes
	NIBP(kPa)(S)	ON	ON	ON	24.0	10.0	Yes
	NIBP(kPa)(M)	ON	OFF	OFF	-	-	Yes
	NIBP(kPa)(D)	ON	OFF	OFF	-	-	Yes
	PR_IBP	ON	ON	ON	120	40	Yes
	BP1(mmHg)(S)	ON	ON	ON	180	80	Yes
	BP1(mmHg)(M)	ON	OFF	OFF	-	-	Yes
	BP1(mmHg)(D)	ON	OFF	OFF	-	-	Yes
	BP1(kPa)(S)	ON	ON	ON	24.0	10.0	Yes
	BP1(kPa)(M)	ON	OFF	OFF	-	-	Yes
	BP1(kPa)(D)	ON	OFF	OFF	-	-	Yes
	CVP (cmH ₂ O)	OFF	OFF	OFF	-	-	Yes
	BP2-8(mmHg)(S)	OFF	OFF	OFF	-	-	Yes
	BP2-8(mmHg)(M)	OFF	OFF	OFF	-	-	Yes
	BP2-8(mmHg)(D)	OFF	OFF	OFF	-	-	Yes
	BP2-8(kPa)(S)	OFF	OFF	OFF	-	-	Yes
BP2-8(kPa)(M)	OFF	OFF	OFF	-	-	Yes	
BP2-8(kPa)(D)	OFF	OFF	OFF	-	-	Yes	
BP2-8(cmH ₂ O)	OFF	OFF	OFF	-	-	Yes	
T1-8 (°C)	OFF	OFF	OFF	-	-	Yes	
T1-8 (°F)	OFF	OFF	OFF	-	-	Yes	
Tb (°C)	OFF	OFF	OFF	-	-	Yes	

Alarm Setup		ON/OFF (All, Upper, Lower Limit)			Upper Limit	Lower Limit	Backup
	Tb (°F)	OFF	OFF	OFF	-	-	Yes
	SI	OFF	OFF	OFF	-	-	Yes
	BIS	ON	ON	ON	-	40	Yes
ST/QT	QTc	OFF	ON	ON	500	300	Yes
	ST	OFF	OFF	OFF	-	-	Yes
	ΔST	OFF	OFF	OFF	-	-	Yes
Respirator y/Gas	RR	ON	ON	ON	15	-	Yes
	Apnea	ON	ON	-	-	-	Yes
	EtCO ₂ (mmHg)	OFF	OFF	OFF	-	-	Yes
	InspCO ₂ (mmHg)	OFF	OFF	-	-	-	Yes
	EtCO ₂ (kPa)	OFF	OFF	OFF	-	-	Yes
	InspCO ₂ (kPa)	OFF	OFF	-	-	-	Yes
	InspO ₂	OFF	OFF	ON	-	180	Yes
	ExpO ₂	OFF	OFF	OFF	-	-	Yes
	InspN ₂ O	OFF	OFF	OFF	-	-	Yes
	ExpN ₂ O	OFF	OFF	OFF	-	-	Yes
	InspISO	OFF	OFF	OFF	-	-	Yes
	ExpISO	OFF	OFF	OFF	-	-	Yes
	InspHAL	OFF	OFF	OFF	-	-	Yes
	ExpHAL	OFF	OFF	OFF	-	-	Yes
	InspENF	OFF	OFF	OFF	-	-	Yes
	ExpENF	OFF	OFF	OFF	-	-	Yes
	InspSEV	OFF	OFF	OFF	-	-	Yes
	ExpSEV	OFF	OFF	OFF	-	-	Yes
	InspDES	OFF	OFF	OFF	-	-	Yes
	ExpDES	OFF	OFF	OFF	-	-	Yes
	MAC	OFF	ON	-	3.0	-	Yes
	PEAK	OFF	ON	ON	26	8	Yes
	PEEP	OFF	ON	ON	10	2	Yes
ExpMV (adult)	OFF	ON	ON	10.0	5.0	Yes	
ExpMV (infant)	OFF	ON	ON	5.0	2.0	Yes	
Arrhythmia	Asystole	ON	-	-	5 sec.	-	Yes
	VF	ON	-	-	-	-	Yes
	VT	ON	-	-	-	120 bpm	Yes
	ExtTachy	OFF	-	-	150 bpm	-	Yes
	ExtBrady	OFF	-	-	30 bpm	-	Yes
	Slow VT	ON	-	-	-	100 bpm	Yes
	Tachy	ON	-	-	-	-	Yes
	Brady	ON	-	-	-	-	Yes
	Run	ON	-	-	3 beats	40 bpm	Yes
	Pause	OFF	-	-	3.0 sec.	-	Yes
	Triplet	OFF	-	-	-	-	Yes

Alarm Setup		ON/OFF (All, Upper, Lower Limit)			Upper Limit	Lower Limit	Backup
	Couplet	OFF	-	-	-	-	Yes
	R on T	OFF	-	-	320ms	-	Yes
	Multiform	OFF	-	-	-	-	Yes
	Vent Rhythm	OFF	-	-	-	-	Yes
	Bigeminy	OFF	-	-	-	-	Yes
	Trigeminy	OFF	-	-	-	-	Yes
	Frequent	OFF	-	-	10 bpm	-	Yes
	SVT	OFF	-	-	6 beats	150 bpm	Yes
	AFib	OFF	-	-	10%	-	Yes
	Irregular RR	OFF	-	-	10%	-	Yes
	Prolonged RR	OFF	-	-	-	-	Yes
	S-Frequent	OFF	-	-	10 bpm	-	Yes
	S Couplet	OFF	-	-	-	-	Yes
	VPC	OFF	-	-	-	-	Yes
	SVPC	OFF	-	-	-	-	Yes
	Pacer Not Capture	OFF	-	-	320ms	-	Yes
	Pacer Not Pacing	OFF	-	-	50 bpm	-	Yes

User Mode Regist.
Alarm Setup (Child)

Alarm Setup		ON/OFF (All, Upper, Lower Limit)			Upper Limit	Lower Limit	Backup
Circ./ BIS	HR	ON	ON	ON	120	40	Yes
	Ext Tachy/Brady	-	OFF	OFF	150	30	Yes
	SpO ₂ (1ch)	ON	OFF	ON	-	90	Yes
	ExtSpO ₂ (1ch)	ON	-	ON	-	80	Yes
	PR_SpO ₂ (1ch)	ON	ON	ON	120	40	Yes
	SpCO(1ch)	OFF	OFF	-	-	-	Yes
	SpMet(1ch)	OFF	OFF	-	-	-	Yes
	SpHb(1ch)(g/dL)	OFF	OFF	OFF	-	-	Yes
	SpHb(1ch)(mmol/L)	OFF	OFF	OFF	-	-	Yes
	SpO ₂ (2ch)	ON	OFF	OFF	-	90	Yes
	ExtSpO ₂ (2ch)	ON	-	ON	-	80	Yes
	PR_SpO ₂ (2ch)	ON	ON	ON	120	40	Yes
	SpCO(2ch)	OFF	OFF	-	-	-	Yes
	SpMet(2ch)	OFF	OFF	-	-	-	Yes
	SpHb(2ch)(g/dL)	OFF	OFF	OFF	-	-	Yes
	SpHb(2ch)(mmol/L)	OFF	OFF	OFF	-	-	Yes
	NIBP(mmHg)(S)	ON	ON	ON	180	80	Yes
	NIBP(mmHg)(M)	ON	OFF	OFF	-	-	Yes
	NIBP(mmHg)(D)	ON	OFF	OFF	-	-	Yes
	NIBP(kPa)(S)	ON	ON	ON	24.0	10.0	Yes
NIBP(kPa)(M)	ON	OFF	OFF	-	-	Yes	

Alarm Setup		ON/OFF (All, Upper, Lower Limit)			Upper Limit	Lower Limit	Backup
	NIBP(kPa)(D)	ON	OFF	OFF	-	-	Yes
	PR_IBP	ON	ON	ON	120	40	Yes
	BP1(mmHg)(S)	ON	ON	ON	180	80	Yes
	BP1(mmHg)(M)	ON	OFF	OFF	-	-	Yes
	BP1(mmHg)(D)	ON	OFF	OFF	-	-	Yes
	BP1(kPa)(S)	ON	ON	ON	24.0	10.0	Yes
	BP1(kPa)(M)	ON	OFF	OFF	-	-	Yes
	BP1(kPa)(D)	ON	OFF	OFF	-	-	Yes
	CVP (cmH ₂ O)	OFF	OFF	OFF	-	-	Yes
	BP2-8(mmHg)(S)	OFF	OFF	OFF	-	-	Yes
	BP2-8(mmHg)(M)	OFF	OFF	OFF	-	-	Yes
	BP2-8(mmHg)(D)	OFF	OFF	OFF	-	-	Yes
	BP2-8(kPa)(S)	OFF	OFF	OFF	-	-	Yes
	BP2-8(kPa)(M)	OFF	OFF	OFF	-	-	Yes
	BP2-8(kPa)(D)	OFF	OFF	OFF	-	-	Yes
	BP2-8(cmH ₂ O)	OFF	OFF	OFF	-	-	Yes
	T1-8 (°C)	OFF	OFF	OFF	-	-	Yes
	T1-8 (°F)	OFF	OFF	OFF	-	-	Yes
	Tb (°C)	OFF	OFF	OFF	-	-	Yes
	Tb (°F)	OFF	OFF	OFF	-	-	Yes
	SI	OFF	OFF	OFF	-	-	Yes
BIS	ON	ON	ON	-	40	Yes	
ST/QT	QTc	OFF	ON	ON	500	300	Yes
	ST	OFF	OFF	OFF	-	-	Yes
	ΔST	OFF	OFF	OFF	-	-	Yes
Respiratory /Gas	RR	ON	ON	ON	15	-	Yes
	Apnea	ON	ON	-	-	-	Yes
	EtCO ₂ (mmHg)	OFF	OFF	OFF	-	-	Yes
	InspCO ₂ (mmHg)	OFF	OFF	-	-	-	Yes
	EtCO ₂ (kPa)	OFF	OFF	OFF	-	-	Yes
	InspCO ₂ (kPa)	OFF	OFF	-	-	-	Yes
	InspO ₂	OFF	OFF	ON	-	180	Yes
	ExpO ₂	OFF	OFF	OFF	-	-	Yes
	InspN ₂ O	OFF	OFF	OFF	-	-	Yes
	ExpN ₂ O	OFF	OFF	OFF	-	-	Yes
	InspISO	OFF	OFF	OFF	-	-	Yes
	ExpISO	OFF	OFF	OFF	-	-	Yes
	InspHAL	OFF	OFF	OFF	-	-	Yes
	ExpHAL	OFF	OFF	OFF	-	-	Yes
	InspENF	OFF	OFF	OFF	-	-	Yes
	ExpENF	OFF	OFF	OFF	-	-	Yes
InspSEV	OFF	OFF	OFF	-	-	Yes	

Alarm Setup		ON/OFF (All, Upper, Lower Limit)			Upper Limit	Lower Limit	Backup
	ExpSEV	OFF	OFF	OFF	-	-	Yes
	InspDES	OFF	OFF	OFF	-	-	Yes
	ExpDES	OFF	OFF	OFF	-	-	Yes
	MAC	OFF	ON	-	3.0	-	Yes
	PEAK	OFF	ON	ON	26	8	Yes
	PEEP	OFF	ON	ON	10	2	Yes
	ExpMV (adult)	OFF	ON	ON	10.0	5.0	Yes
	ExpMV (infant)	OFF	ON	ON	5.0	2.0	Yes
Arrhythmia	Asystole	ON	-	-	5 sec.	-	Yes
	VF	ON	-	-	-	-	Yes
	VT	ON	-	-	-	120 bpm	Yes
	ExtTachy	OFF	-	-	150 bpm	-	Yes
	ExtBrady	OFF	-	-	30 bpm	-	Yes
	Slow VT	ON	-	-	-	100 bpm	Yes
	Tachy	ON	-	-	-	-	Yes
	Brady	ON	-	-	-	-	Yes
	Run	ON	-	-	3 beats	40 bpm	Yes
	Pause	OFF	-	-	3.0 sec.	-	Yes
	Triplet	OFF	-	-	-	-	Yes
	Couplet	OFF	-	-	-	-	Yes
	R on T	OFF	-	-	320ms	-	Yes
	Multiform	OFF	-	-	-	-	Yes
	Vent Rhythm	OFF	-	-	-	-	Yes
	Bigeminy	OFF	-	-	-	-	Yes
	Trigeminy	OFF	-	-	-	-	Yes
	Frequent	OFF	-	-	10 bpm	-	Yes
	SVT	OFF	-	-	6 beats	150 bpm	Yes
	AFib	OFF	-	-	10%	-	Yes
	Irregular RR	OFF	-	-	10%	-	Yes
	Prolonged RR	OFF	-	-	-	-	Yes
	S Frequent	OFF	-	-	10 bpm	-	Yes
	S Couplet	OFF	-	-	-	-	Yes
	VPC	OFF	-	-	-	-	Yes
	SVPC	OFF	-	-	-	-	Yes
Pacer Not Capture	OFF	-	-	320ms	-	Yes	
Pacer Not Pacing	OFF	-	-	50 bpm	-	Yes	

User Mode Regist.
Alarm Setup (Neo)

Alarm Setup		ON/OFF (All, Upper, Lower Limit)			Upper Limit	Lower Limit	Backup
Circ./ BIS	HR	ON	ON	ON	200	90	Yes
	Ext Tachy/Brady	-	OFF	OFF	230	60	Yes
	SpO ₂ (1ch)	ON	OFF	ON	-	90	Yes
	ExtSpO ₂ (1ch)	ON	-	ON	-	85	Yes
	PR_SpO ₂ (1ch)	ON	ON	ON	200	90	Yes
	SpCO(1ch)	OFF	OFF	-	-	-	Yes
	SpMet(1ch)	OFF	OFF	-	-	-	Yes
	SpHb(1ch)(g/dL)	OFF	OFF	OFF	-	-	Yes
	SpHb(1ch)(mmol/L)	OFF	OFF	OFF	-	-	Yes
	SpO ₂ (2ch)	ON	OFF	OFF	-	90	Yes
	ExtSpO ₂ (2ch)	ON	-	ON	-	85	Yes
	PR_SpO ₂ (2ch)	ON	ON	ON	200	90	Yes
	SpCO(2ch)	OFF	OFF	-	-	-	Yes
	SpMet(2ch)	OFF	OFF	-	-	-	Yes
	SpHb(2ch)(g/dL)	OFF	OFF	OFF	-	-	Yes
	SpHb(2ch)(mmol/L)	OFF	OFF	OFF	-	-	Yes
	NIBP(mmHg)(S)	ON	ON	ON	110	50	Yes
	NIBP(mmHg)(M)	ON	OFF	OFF	-	-	Yes
	NIBP(mmHg)(D)	ON	OFF	OFF	-	-	Yes
	NIBP(kPa)(S)	ON	ON	ON	15.0	7.0	Yes
	NIBP(kPa)(M)	ON	OFF	OFF	-	-	Yes
	NIBP(kPa)(D)	ON	OFF	OFF	-	-	Yes
	PR_IBP	ON	ON	ON	200	90	Yes
	BP1(mmHg)(S)	ON	ON	ON	110	50	Yes
	BP1(mmHg)(M)	ON	OFF	OFF	-	-	Yes
	BP1(mmHg)(D)	ON	OFF	OFF	-	-	Yes
	BP1(kPa)(S)	ON	ON	ON	15.0	7.0	Yes
	BP1(kPa)(M)	ON	OFF	OFF	-	-	Yes
	BP1(kPa)(D)	ON	OFF	OFF	-	-	Yes
	CVP (cmH ₂ O)	OFF	OFF	OFF	-	-	Yes
	BP2-8(mmHg)(S)	OFF	OFF	OFF	-	-	Yes
	BP2-8(mmHg)(M)	OFF	OFF	OFF	-	-	Yes
	BP2-8(mmHg)(D)	OFF	OFF	OFF	-	-	Yes
	BP2-8(kPa)(S)	OFF	OFF	OFF	-	-	Yes
BP2-8(kPa)(M)	OFF	OFF	OFF	-	-	Yes	
BP2-8(kPa)(D)	OFF	OFF	OFF	-	-	Yes	
BP2-8(cmH ₂ O)	OFF	OFF	OFF	-	-	Yes	
T1-8 (°C)	OFF	OFF	OFF	-	-	Yes	
T1-8 (°F)	OFF	OFF	OFF	-	-	Yes	
Tb (°C)	OFF	OFF	OFF	-	-	Yes	

Alarm Setup		ON/OFF (All, Upper, Lower Limit)			Upper Limit	Lower Limit	Backup
	Tb (°F)	OFF	OFF	OFF	-	-	Yes
	SI	OFF	OFF	OFF	-	-	Yes
	BIS	ON	ON	ON	-	40	Yes
ST/QT	QTc	OFF	ON	ON	500	300	Yes
	ST	OFF	OFF	OFF	-	-	Yes
	ΔST	OFF	OFF	OFF	-	-	Yes
Respiratory/ Gas	RR	ON	ON	ON	80	20	Yes
	Apnea	ON	ON	-	10	-	Yes
	EtCO ₂ (mmHg)	OFF	OFF	OFF	-	-	Yes
	InspCO ₂ (mmHg)	OFF	OFF	-	-	-	Yes
	EtCO ₂ (kPa)	OFF	OFF	OFF	-	-	Yes
	InspCO ₂ (kPa)	OFF	OFF	-	-	-	Yes
	InspO ₂	OFF	OFF	ON	-	180	Yes
	ExpO ₂	OFF	OFF	OFF	-	-	Yes
	InspN ₂ O	OFF	OFF	OFF	-	-	Yes
	ExpN ₂ O	OFF	OFF	OFF	-	-	Yes
	InspISO	OFF	OFF	OFF	-	-	Yes
	ExpISO	OFF	OFF	OFF	-	-	Yes
	InspHAL	OFF	OFF	OFF	-	-	Yes
	ExpHAL	OFF	OFF	OFF	-	-	Yes
	InspENF	OFF	OFF	OFF	-	-	Yes
	ExpENF	OFF	OFF	OFF	-	-	Yes
	InspSEV	OFF	OFF	OFF	-	-	Yes
	ExpSEV	OFF	OFF	OFF	-	-	Yes
	InspDES	OFF	OFF	OFF	-	-	Yes
	ExpDES	OFF	OFF	OFF	-	-	Yes
	MAC	OFF	ON	-	3.0	-	Yes
	PEAK	OFF	ON	ON	26	8	Yes
	PEEP	OFF	ON	ON	10	2	Yes
	ExpMV (adult)	OFF	ON	ON	10.0	5.0	Yes
	ExpMV (infant)	OFF	ON	ON	5.0	2.0	Yes
	Arrhythmia	Asystole	ON	-	-	3 sec.	-
VF		ON	-	-	-	-	Yes
VT		ON	-	-	-	140 bpm	Yes
ExtTachy		OFF	-	-	230 bpm	-	Yes
ExtBrady		OFF	-	-	60 bpm	-	Yes
Slow VT		ON	-	-	-	100 bpm	Yes
Tachy		ON	-	-	-	-	Yes
Brady		ON	-	-	-	-	Yes
Run		ON	-	-	3 beats	100 bpm	Yes
Pause		OFF	-	-	1.5 sec.	-	Yes
Triplet		OFF	-	-	-	-	Yes

Alarm Setup		ON/OFF (All, Upper, Lower Limit)			Upper Limit	Lower Limit	Backup
	Couplet	OFF	-	-	-	-	Yes
	R on T	OFF	-	-	320ms	-	Yes
	Multiform	OFF	-	-	-	-	Yes
	Vent Rhythm	OFF	-	-	-	-	Yes
	Bigeminy	OFF	-	-	-	-	Yes
	Trigeminy	OFF	-	-	-	-	Yes
	Frequent	OFF	-	-	10 bpm	-	Yes
	SVT	OFF	-	-	6 beats	220 bpm	Yes
	AFib	OFF	-	-	10%	-	Yes
	Irregular RR	OFF	-	-	10%	-	Yes
	Prolonged RR	OFF	-	-	-	-	Yes
	S Frequent	OFF	-	-	10 bpm	-	Yes
	S Couplet	OFF	-	-	-	-	Yes
	VPC	OFF	-	-	-	-	Yes
	SVPC	OFF	-	-	-	-	Yes
	Pacer Not Capture	OFF	-	-	320ms	-	Yes
	Pacer Not Pacing	OFF	-	-	50 bpm	-	Yes

Sub Mode (Mode 1)

Item		Default	Backup
Item		Display Config. 1	Yes
Layout		Numeric Data/Bottom 5 rows User Key/Right 2 columns	
Numeric Data		HR, SpO ₂ , CO ₂ , NIBP, BP1, RR_IMP	
Waveform		ECG1, SpO ₂ , BP1, CO ₂ , RESP	
User Key		Home, Menu, Alarm Silence, Admit/Disch., BP Zero, NIBP Start/Stop, NIBP Auto Mode, Alarm Setup (All), NIBP Cont., Alarm History, NIBP List, Recall, Tabular Trend, Graphic Trend, Print Start/Stop, Key Lock, Night Mode	
Short Trend	Display	OFF	
	Display Duration	15 min.	
Detail Setup (Numeric Data)	Alarm Limit Display	Graph	
	At Alarm Occurrence	Reversed	
Detail Setup (Waveform)	Grid	Normal	
	Scale	Normal	
	Thickness	Normal	
	Clip	ON	
	Fill CO ₂ Waveform	ON	
	Fill O ₂ Waveform	OFF	
	Fill Agent Waveform	OFF	
	BP Overlap 1	BP1 to 4	
	BP Overlap 2, 3	N/A	
RR Overlap 1	CO ₂ , O ₂ , Agent		

Sub Mode (Mode 1)

Item		Default	Backup
	RR Overlap 2, 3	N/A	
	12-Lead ST Wave	Ref.	
	12-Lead ST Short Trend	Fill	
	ST/VP/Arrhy. Alarm Display	ON	
	Block Cascade	Waveform Quantity: 2 Waveform: ECG1, ECG2	
	Home Review	OFF	
	Home Review Size	Small	
	OCRG Update Time	1 sec.	
Detail Setup (Short Trend)	Short Trend	Link with Numeric	
	Short Trend Scale	Graphic Trend	
	Display Parameter	OFF	
	Reference Line Function	Disable	
	Cursor Function	Disable	
	Cursor Linkage	Tabular Trend	
	Short Trend Overlap	All OFF	
	Data Resolution	5 sec.	
	Display Interval	15 min.	

Sub Mode (Mode 2)

Item		Default	Backup
Item		Display Config. 2	Yes
Layout	Numeric Data/Right 2 columns & Bottom		
	User Key/Right 2 columns		
Numeric Data		Right: HR, SpO ₂ /PR, NIBP, BP1, BP2, BP3, GAS, SvO ₂ /CO Bottom: BIS, SI, TEMP1/2	
Waveform		ECG1, SpO ₂ , BP1, CO ₂ , EEG1, EEG2	
User Key		Home, Menu, Alarm Silence, Admit/Disch., BP Zero, NIBP Start/Stop, NIBP Auto Mode, Alarm Setup (All), NIBP Cont., Alarm History, NIBP List, Recall, Tabular Trend, Graphic Trend, Print Start/Stop, Key Lock	
Short Trend		(Same as Sub Mode 1)	
Detail Setup (Numeric Data)	Alarm Limit Display	Graph	
	At Alarm Occurrence	Reversed	
Detail Setup (Waveform)	Grid	Normal	
	Scale	Normal	
	Thickness	Normal	
	Clip	ON	
	Fill CO ₂ Waveform	ON	
	Fill O ₂ Waveform	OFF	
	Fill Agent Waveform	OFF	
	BP Overlap 1	BP1 to 4	
BP Overlap 2, 3	N/A		

Sub Mode (Mode 2)

Item		Default	Backup
	RR Overlap 1	CO ₂ , O ₂ , Agent	
	RR Overlap 2, 3	N/A	
	12-Lead ST Wave	Ref.	
	12-Lead ST Short Trend	Fill	
	ST/VPC/Arrhy. Alarm Display	ON	
	Block Cascade	Waveform Quantity: 2 Waveform: ECG1, ECG2	
	Home Review	OFF	
	Home Review Size	Small	
	OCRG Update Time	1 sec.	
Detail Setup (Short Trend)		(Same as Main Mode 1)	

Sub Mode (Mode 3)

Item		Default	Backup
Item		Display Config. 3	Yes
Layout	Numeric Data/Right 2 columns		
	User Key/Right 2 columns		
Numeric Data		HR, SpO ₂ /PR, NIBP, BP1, BP2, RR_IMP, TEMP1/2	
Waveform		ECG1, SpO ₂ , BP Overlap 1, RESP	
User Key		Home, Menu, Alarm Silence, Admit/Disch., BP Zero, NIBP Start/Stop, NIBP Auto Mode, Alarm Setup (All), NIBP Cont., Alarm History, NIBP List, Recall, Tabular Trend, Graphic Trend, Print Start/Stop, Key Lock	
Short Trend		(Same as Sub Mode 1)	
Detail Setup (Numeric Data)	Alarm Limit Display	Graph	
	At Alarm Occurrence	Reversed	
Detail Setup (Waveform)	Grid	Normal	
	Scale	Normal	
	Thickness	Normal	
	Clip	ON	
	Fill CO ₂ Waveform	ON	
	Fill O ₂ Waveform	OFF	
	Fill Agent Waveform	OFF	
	BP Overlap 1	BP1 to 4	
	BP Overlap 2, 3	N/A	
	RR Overlap 1	CO ₂ , O ₂ , Agent	
	RR Overlap 2, 3	N/A	
	12-Lead ST Wave	Ref.	
	12-Lead ST Short Trend	Fill	
	ST/VPC/Arrhy. Alarm Display	ON	
Block Cascade	Waveform Quantity: 2 Waveform: ECG1, ECG2		
Home Review	OFF		

Sub Mode (Mode 3)

Item	Default	Backup
Home Review Size	Small	
OCRG Update Time	1 sec.	
Detail Setup (Short Trend)		

Sub Mode (Mode 2)

Item	Default	Backup	
Item	Display Config. 4	Yes	
Layout	Numeric Data/Right 1 column		
	User Key/Right 1 column		
Numeric Data	HR, SpO ₂ , TEMP1/2, NIBP, BP1, CO ₂ , RR_IMP		
Waveform	ECG 12-Lead, BP1		
User Key	Below HR: 12-Lead Print, Print Cancel, 12L Analysis Right Side of Display 1/2 Home, Menu, Alarm Silence, Admit/Disch., BP Zero, NIBP Start/Stop, NIBP Auto Mode, NIBP Cont., Alarm Setup (All), Print Start/Stop, User Key Up/Down Right Side of Display 2/2 Home, Menu, Alarm Silence, Alarm History, Recall, Tabular Trend, Graphic Trend, Key Lock, Night Mode, Print Start/Stop, User Key Up/Down		
Short Trend	(Same as Sub Mode 1)		
Detail Setup (Numeric Data)	Alarm Limit Display		Graph
	At Alarm Occurrence		Reversed
Detail Setup (Waveform)	Grid		Normal
	Scale		Normal
	Thickness		Normal
	Clip		ON
	Fill CO ₂ Waveform		ON
	Fill O ₂ Waveform		OFF
	Fill Agent Waveform		OFF
	BP Overlap 1		BP1 to 4
	BP Overlap 2, 3		N/A
	RR Overlap 1		CO ₂ , O ₂ , Agent
	RR Overlap 2, 3		N/A
	12-Lead ST Wave		Ref.
	12-Lead ST Short Trend		Fill
	ST/VPC/Arrhy. Alarm Display		ON
	Block Cascade	Waveform Quantity: 2 Waveform: ECG1, ECG2	
Home Review	OFF		
Home Review Size	Small		
OCRG Update Time	1 sec.		
Detail Setup (Short Trend)		(Same as Main Mode 1)	

Sub Mode (Mode 5)

Item		Default	Backup
Item		Display Config. 5	Yes
Layout		Numeric Data/Right 2 columns User Key/Right 2 columns	
Numeric Data		HR, SpO ₂ /PR, BP1, BP2, NIBP, BIS, TEMP1/2, GAS, SvO ₂ /CO	
Waveform		ECG1, SpO ₂ , BP1, BP2, Home Review	
User Key		Home, Menu, Alarm Silence, Admit/Disch., BP Zero, NIBP Start/Stop, NIBP Auto Mode, Alarm Setup (All), NIBP Cont., Alarm History, NIBP List, Recall, Tabular Trend, Graphic Trend, Print Start/Stop, Short Trend ON/ OFF, Home Review ON/OFF	
Short Trend	Display	ON	
	Display Duration	15 min.	
Detail Setup (Numeric Data)	Alarm Limit Display	Graph	
	At Alarm Occurrence	Reversed	
Detail Setup (Waveform)	Grid	Normal	
	Scale	Normal	
	Thickness	Normal	
	Clip	ON	
	Fill CO ₂ Waveform	ON	
	Fill O ₂ Waveform	OFF	
	Fill Agent Waveform	OFF	
	BP Overlap 1	BP1 to 4	
	BP Overlap 2, 3	N/A	
	RR Overlap 1	CO ₂ , O ₂ , Agent	
	RR Overlap 2, 3	N/A	
	12-Lead ST Wave	Ref.	
	12-Lead ST Short Trend	Fill	
	ST/VPC/Arrhy. Alarm Display	ON	
	Block Cascade	Waveform Quantity: 2 Waveform: ECG1, ECG2	
	Home Review	Graphic/Tabular Trend	
	Home Review Size	Small	
OCRG Update Time	1 sec.		
Detail Setup (Short Trend)	Short Trend	User Setup	
	Short Trend Scale	Graphic Trend	
	Display Parameter	OFF	
	Reference Line Function	Enable	
	Cursor Function	Enable	
	Cursor Linkage	Tabular Trend	
	Short Trend Overlap 1	HR/PR, SpO ₂ , NIBP	
	Short Trend Overlap 2	BP1, 2	
	Short Trend Overlap 3	(No setting)	
	Data Resolution	5 sec.	

Sub Mode (Mode 5)

Item	Default	Backup
Display Interval	15 min.	

Sub Mode (Mode 6)

Item	Default	Backup	
Item	Display Config. 6	Yes	
Layout	Numeric Data/Right 2 columns User Key/Right 1 column		
Numeric Data	HR, Recall List, SpO ₂ , NIBP, CO ₂ , TEMP1, VENT, SvO ₂ /CO, P-V Loop, F-V Loop		
Waveform	ECG1, SpO ₂ , CO ₂ , Home Review		
User Key	Right Side of Display 1/2 Home, Menu, Alarm Silence, Admit/Disch., BP Zero, NIBP Start/Stop, NIBP Auto Mode, NIBP Cont., Alarm Setup (All), Print Start/Stop, User Key Up/Down Right Side of Display 2/2 Home, Menu, Alarm Silence, Alarm History, Recall, Tabular Trend, Graphic Trend, Home Review/Graphic/Tabular Trend, Night Mode, Print Start/Stop, User Key Up/Down		
Short Trend	(Same as Sub Mode 1)		
Detail Setup (Numeric Data)	Alarm Limit Display		Graph
	At Alarm Occurrence		Reversed
Detail Setup (Waveform)	Grid		Normal
	Scale		Normal
	Thickness		Normal
	Clip		ON
	Fill CO ₂ Waveform		ON
	Fill O ₂ Waveform		OFF
	Fill Agent Waveform		OFF
	BP Overlap 1		BP1 to 4
	BP Overlap 2, 3		N/A
	RR Overlap 1		CO ₂ , O ₂ , Agent
	RR Overlap 2, 3		N/A
	12-Lead ST Wave		Ref.
	12-Lead ST Short Trend	Fill	
	ST/VPC/Arrhy. Alarm Display	ON	
	Block Cascade	Waveform Quantity: 2 Waveform: ECG1, ECG2	
Home Review	Graphic/Tabular Trend		
Home Review Size	Small		
OCRG Update Time	1 sec.		
Detail Setup (Short Trend)	(Same as Main Mode 1)		

Administrator Setup

Item	Description	Default	Backup
Key Lock	OFF, red key, yellow key, green key for each item	Red key for the following items Initial Settings > System > Telemeter Maintenance Other settings: OFF	Yes
Password Setup	Administrator name: 8 characters each	Blank	Yes
	Password: 8 characters each	Red Key: 11111111 Yellow Key: 22222222 Green Key: 33333333	

External Connection (Pin Assignments)

This section lists the connector pin assignments.

RS-232C Connector Output Signal

□ COM1 Connector

No.	Signal Type	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	

□ COM2 Connector

No.	Signal Type	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	

Status I/O Signal (Status II Connector)

No.	Signal Type	Note	Signal Level
1	ALARM_OUT1	Alarm Output1	Logic TTL
2	ALARM_OUT2+	Alarm Output2+ (Isolation)	Photo MOS Relay Contact
3	TxD	Serial Transmission Data Output	RS232C*
4	RxD/ALARM1	Serial Reception Data Input/ALARM1 Input	RS232C* / Logic
5	ALARM2_IN+	Alarm Input 2 (Isolation)	Logic Input
6	ALARM2_IN-	Alarm Input 2 Return (Isolation)	
7	+5V	+5V Power Supply Input	+5V Power Supply (150mA)
8	ALARM_OUT2-	Alarm Output2- (Isolation)	Photo MOS Relay Contact
9	GND_ISO	Isolation Ground	

*:If isolation is necessary for RS-232C and status connector, use alarm input 2 and output 2.

Chapter 7 Replacement Parts

Periodic Replacement

To ensure reliability of safety, function, and performance of this device, the following parts must be replaced periodically.

When replacing, contact your nearest service representative.

CAUTION

- ◆ Replace the periodic replacement parts periodically as specified.
- ◆ The display unit utilizes LED for the backlight. Since this LED deteriorates by the life cycle, the display may become dark or may not light by the long term use. In such case, contact your nearest service representative.

Periodic Replacement Parts	Periodic Replacement Period
DS-1200	
Lithium-Ion Battery Pack: BTO-005	300 times of charge/discharge or 1 year of usage whichever earlier
NIBP Unit	100,000 times of measurement or 6 years, whichever earlier
HC-110	
CO ₂ Unit	30,000 hours
MG-110/MG-120	
Water Trap	1 month
DRYLINE Receptacle	1 years

To Check the Periodic Replacement Period

The usage hours for the part which requires periodic replacement can be displayed.

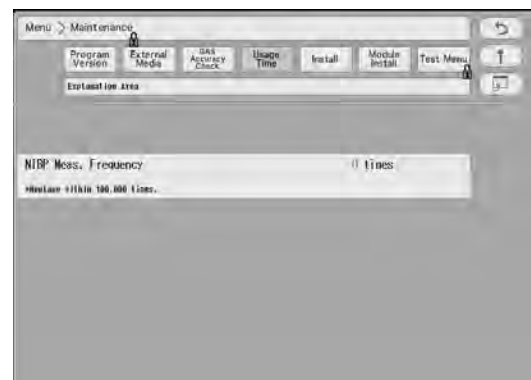
It can be used as an indication of replacement period for each part.

1 Press the [Menu], [Maintenance], [Usage Time] keys.

- ▶ The Usage Time window will be displayed.
- ▶ The usage period or NIBP measurement frequency for each part will be displayed.

2 After the part is replaced, press the [Reset] key.

- ▶ The displayed value will reset.



CAUTION

- ◆ To replace the parts, contact your nearest service representative.

Disposing the Device

⚠ CAUTION

- When disposing of the device, accessories, follow the regulations of local authority or each institution. Do not dispose of as ordinary waste.
 - When disposing of the battery, separate it from other wastes and contact your nearest service representative.
 - If there is risk of infection, dispose of as infectious waste according to the regulations of local authority or each institution.
-

Chapter 8 Cleaning/Disinfecting/Storing

After Usage/Handling the Device

This section explains about how to handle the device.

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 device, accessories, and cables, and keep them together in one place for next use.
- ♦ Always check for adequate supply of ECG electrodes, and other disposable accessories. If any shortage is found, contact your nearest service representative.

Display

- ♦ display part utilizes LED for the backlight. This LED light deteriorates with its life cycle. If the display gets extremely dark, scintillates, or does not light, contact your nearest service representative.
- ♦ display part utilizes highly accurate picture elements, occasionally, there may be few pixels which does not light or constantly lights. However, this will not affect monitoring operation.
- ♦ As the touch panel is vulnerable, do not scratch or rub it with a hard item.

Storing the Device and Recording Paper

This section explains how to store the device and recording paper.

Device

- ♦ Store in a place where the device will not be exposed to splashing water.
- ♦ Store in an area where the environmental conditions, such as atmospheric pressure, temperature, sunlight, dust, sodium, sulfur, will not adversely affect the system.
- ♦ Store in a level area where the device is not exposed to vibration and shock (including during transportation).
- ♦ Store in an area which meets the following environmental conditions.
 - ♦ Storage Temperature: -10°C to 60°C/14°F to 140°F
 - ♦ Storage Humidity: 10% to 95% (at 40°C/104°F, non-condensing)
 - ♦ Atmospheric Pressure: 70 kPa to 106 kPa

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 expose the paper to alcohol, hydrochloric acid, or ester ketone.
- ◆ Avoid using adhesive agents other than water based glue.

Cleaning the Device and Sensors

This section explains how to clean/disinfect the device and sensors.

CAUTION

- ◆ Do not sterilize the device.
- ◆ Do not disinfect the device while monitoring patient.

Touch Panel

Since the display unit display part of the DS-1200 System incorporates a touch panel, finger prints and other stains are likely to appear on the touch panel. Follow the procedure below to clean the touch panel. For disinfecting procedure, refer to the next section, "Housing".

CAUTION

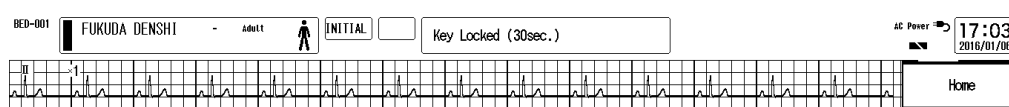
- ◆ Never use strong-acidic cleaning solution.
- ◆ To clean the touch panel, use an optional cleaning cloth, eyeglass cleaning cloth, soft cotton cloth, or non-woven cloth (pulp, rayon, polyethylene, etc.).

- 1 Press the [Key Lock] key on the Home Display for more than 2 seconds.

NOTE

- ◆ Assign the [Key Lock] key to the user key area in advance.
(☞ Operation Manual "To Configure the Display" P10-4)
- ◆ If the touch panel is not touched for 30 seconds, the key lock condition will be automatically canceled. When the key lock condition is canceled, press the [Key Lock] key again.

- ▶ <Key Locked> will be displayed.
- ▶ While this message is displayed, the touch panel key will be deactivated.
- ▶ If <LEAD OFF> or other message is displayed, the key lock message will not be displayed.



- 2 Wipe the touch panel using a cleaning cloth.

3 Press again the [Key Lock] key for more than 2 seconds.

- ▶ The message will disappear, and the key locked condition will be canceled.

Housing

□ Cleaning

Wipe using a tightly squeezed gauze or an absorbent cotton dampened with alcohol (ethanol, isopropyl alcohol). Then wipe with a dry cloth.

Usable Cloth:

- *Soft cloth (cotton)
- Soft non-woven cloth (pulp, rayon, polyethylene, etc.)

CAUTION

- ♦ If cleaning solution is left on the device, wipe with a dry cloth. It may damage the surface resin coating, resulting in discoloration, scratches, malfunction, and deterioration.
 - ♦ Do not wipe the metal part inside the connector.
-

□ Disinfection

Wipe with a cloth dampened with one of the following chemicals. Then, wipe off with dry cloth.

Chemicals:

- *Glutaral 2%
- *Disinfectant Alcohol (ethanol, isopropyl alcohol)
- *Benzalkonium Chloride 0.2%
- *Benzethonium Chloride 0.2%
- *Alkyldiaminoethylglycine Hydrochloride 0.5%

Usable Cloth:

- *Soft cloth (cotton)
- Soft non-woven cloth (pulp, rayon, polyethylene, etc.)

CAUTION

- ♦ Clean the device frequently so stains can be removed easily.
 - ♦ To prevent injury, it is recommended to wear gloves when cleaning the device.
 - ♦ When cleaning or disinfecting, do not 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, chemical cleaner, alkaline or acidic detergent. The surface resin coating may damage, resulting in discoloration, scratches, and malfunction.
 - ♦ For the precautions for storing and handling the chemicals, refer to the instruction manual for the respective chemical.
-

NIBP Cuff and Air Hose

To clean the cuff shell, remove the bladder and wash it using neutral detergent. Make sure that the cuff is dry before placing back the bladder inside.

For procedure to clean/disinfect the reusable cuff, refer to the instruction manual for the respective cuff.

Do not reuse/resterilize the disposable cuff.

 **CAUTION**

- ♦ After washing, ensure the size indication on the bladder and cuff shell match. Make sure that the cuff hose is threaded through one of the hose openings in the cuff.
-

BP Transducer

Disinfect the blood pressure transducers according to the manufacturer's guidelines.

Do not reuse / re-sterilize the disposable type transducers.

SpO₂ Sensor

Disinfect the SpO₂ sensor according to the manufacturer's guidelines. Do not reuse/resterilize the disposable SpO₂ sensor.

Medtronic Sensor

- ♦ Do not soak the sensor in water or antiseptic solution.
- ♦ Wipe the DURASENSOR with disinfectant such as 70% alcohol. Do not sterilize by irradiation, steam, or ethylene oxide.
- ♦ OxiMax is a single-patient use type sensor. Do not reuse or resterilize.

Masimo Sensor

- ♦ Do not soak the sensor or patient cable in water or antiseptic solution. (Sensors and connectors are not water-proof.)
- ♦ Do not sterilize the sensors and cables by irradiation, steam, or ethylene oxide.
- ♦ The Masimo disposable sensor can be reused on the same patient if the light emitting and receiving part is clean, and if it is still adhesive to the skin.
For most of the sensors, the adhesiveness will return by cleaning the sensor with alcohol and completely drying it before applying it to the patient. For details of the cleaning procedure, refer to the instruction manual of the sensor.
- ♦ Disinfect the Masimo reusable sensor and patient cable according to the manufacturer's guidelines.
- ♦ When cleaning the Masimo reusable sensor and patient cable, disconnect them from the main unit, and follow the procedure below.

1 Wipe the sensor and cable using 70% isopropyl alcohol cotton.

2 Dry it completely with air before reusing.

Temperature Probe

- ♦ Disinfect the temperature probe according to the manufacturer's guidelines.
- ♦ When cleaning the relay cable, follow the procedure below.

1 Wipe the cable using 70% isopropyl alcohol cotton.

2 Dry it completely with air before reusing.

Cardiac Output Relay Cable

- ♦ Do not reuse / resterilize the cardiac output catheter.
- ♦ When cleaning, follow the procedure below.

1 Wipe the cable using 70% isopropyl alcohol cotton.

2 Dry it completely with air before reusing.

Airway Adapter for Capnostat 5

- ♦ Sterilize the airway adapter according to the manufacturer's guidelines.
- ♦ Disposable the airway adapter cannot reuse/resterilize.

Water Trap (Multigas Module)

- ♦ The water trap on the MG-110/120 receives fluids from the sampling line connected to the patient.
- ♦ When the sampling line or water trap gets completely occluded with water, <GAS Check Sample Line> will be displayed.
- ♦ No parts of the water trap are intended to be cleaned.
- ♦ Under environment of 37°C temperature and 100% humidity, the emptying interval of water trap is as follows.
 - ♦ Adult/ Pediatric
 - 17 hours (@200 mL/min.)
 - 26 hours (@120 mL/min.)
 - ♦ Neonate
 - 26 hours (@120 mL/min.)
 - 45 hours (@70 mL/min.)

- 1 Remove the water trap by pressing and holding the release button on the holder part.



- 2 Unscrew the reservoir from the filter to separate them.



- 3 Empty the reservoir.

⚠ WARNING

- ♦ The contents of the water trap should be handled as a potential infection hazard.

- 4 Screw back the reservoir and reattach the water trap.



BISx

- ♦ Clean any spillage of blood or solutions on BISx as soon as possible.
- ♦ Use lint-free absorbent towels for spill cleanups.
- ♦ Dampen the towel with detergent and lukewarm water to aid in cleaning.
- ♦ After cleaning, wipe the PIC connector ends with alcohol and allow to dry completely.
- ♦ Residual moisture inside the connector may affect BISx performance.
- ♦ Use lint-free absorbent towels dampened with a 10% bleach solution, or a commercial disinfectant.

**CAUTION**

- ♦ BIS sensor is disposable. Do not reuse it.
 - ♦ Do not reuse the BIS sensor to other patients. It may cause cross-infection.
 - ♦ The duration for one usage should be within 24 hours.
-

Chapter 9 Maintenance Check

Daily and Periodic Check

Maintenance Check

Periodic check must be performed. When reusing the device which was left unused for a while, always check that the device operates properly and safely before use.

In this section, the maintenance check items that must be performed for this device are explained. Make sure to perform "Daily Check" and "Periodic Check" described in this section to maintain functionality, performance and reliability. Fukuda Denshi is not liable for any accidents arising from lack of maintenance.

Contact your nearest service representative for information on basic performance.

For additional information required by the service and technical engineers to service the device, refer to your nearest service representative. For setup procedure for Manometer test mode, refer to your nearest service representative.

 **CAUTION**

- ◆ Do not open the housing.
 - ◆ Do not allow alcohol or other liquids to enter the device.
-

Daily Check

Perform the daily check according to the procedure described in this section.

Periodic Check

Periodic check of medical device is mandatory to prevent failures and accidents and to ensure safety and reliability. Periodic check may be performed by the medical institution or by a third party by concluding a "Maintenance Contract".

For more details, contact your nearest service representative.

Daily Check Items and Procedures

Make sure to perform the daily check.

- ♦ If the equipment fails any check item on the daily check list, the general judgment will be "Fail". Repair the equipment so that it passes all the check items.
- ♦ Use the equipment only if the judgments for all the items are "OK".

No.	Check Items	Check Procedure	Criteria
1. Cleanliness, Cleaning (Note: Turn OFF the power, and disconnect the power cable and battery before cleaning.)			
01	Cleanness	If contamination is found, perform proper disinfection before the daily check.	No contamination should be found.
02	Cleaning	Visually check the exterior, and perform proper cleaning. For details, refer to "Chapter 8 Cleaning/Disinfecting/Storing" of Maintenance Manual.	It should be clean.

No.	Check Items	Check Procedure	Criteria
2. External Appearance			
01	External Appearance	Visually check the exterior for scratches, cracks, and rust.	No abnormality should be found.
02	Cables	Check that the cables are intact and firmly connected.	The cables should be intact and firmly connected.
03	Installation	Check whether the equipment is installed on a level surface.	The installation area must be level and free from vibration and shock.
04	Installation	Check whether the equipment is installed in a place susceptible to adverse environment.	The temperature and humidity of the installation area must be as specified. The equipment should not be subjected to splashing water or chemicals.

No.	Check Items	Check Procedure	Criteria
3. Operation			
01	Function	Turn ON the power, and check that the device operates normally.	The home display should appear, and the power supply LED should light.
			The date and time should be correct.
02	Function	Turn ON the power, and check that the device operates normally.	With the BP relay cable and BP transducer connected, pressing the BP zero balance switch should start the zero balance.
			Pressing the NIBP Start/Stop key should inflate the NIBP cuff.
			Connecting the SpO ₂ sensor should light the sensor LED.
03	Function	(When HC -110/ HC -120 is used)	The home display should appear, and the power supply LED should light in green.
			When the sampling tube is connected, "0" should be displayed in the numeric data box.
04	CO ₂ Calibration (When HC-110 is used)	Check the date of the previous calibration. (Refer to the following caution.)	Should be within one year.
		Check the remaining time until the next calibration. [Menu] > [Parameter] > [CO ₂] > [CO ₂ Cal.]	Should not be 0 hrs.
05	Alarm Indicator	Check the alarm indicator operation by pressing the [Indicator Test] key.	It should light with the set pattern.

No.	Check Items	Check Procedure	Criteria
06	Alarm Sound	Check the alarm sound by pressing the [Test] key.	The alarm sound should be properly generated from the speaker.
07	Recorder	Visually check the installed condition of the paper.	The paper should be correctly installed. Neither damage nor discoloration should be found.
		Check if the printing operation is smooth, and no abnormal sound is occurring.	The operation should be smooth and no abnormal sound should occur.

No.	Check Items	Check Procedure	Criteria
4. Other Items			
01	Periodic Replacement Parts	Check the number of measurements or date of first usage.	It should not exceed 100,000 times, or six (6) years from the first usage.
		Check the number of charging/discharging times or the first usage date of the BTO-005 Lithium-Ion Battery Pack.	The number of charging/discharging times should not exceed 300 times, or usage duration should not exceed one year.
		Check the operation hours of the CO ₂ unit (HC-110).	It should not exceed 30,000 hours.
		Check the last replaced date of the water trap reservoir.	Should be within 1 years.
		When HC -110/ HC -120 is used, DRYLINE Check the last replaced date of the receptacle.	Should be within 1 years.
02	Periodic Inspection	Check the date of the previous periodic inspection.	Should be within one year.
03	Operation Manual	Check that accompanying documents (operation manual, etc.) are stored in specified location.	Should be stored in specified location.

 **CAUTION**

- ♦ If the CO₂ gas calibration is not performed at a specified interval, CO₂ measurement accuracy may be affected and also subsequent gas calibration may not be possible.

Periodic Check Items and Procedures

Perform the periodic check according to the following list.

- ♦ The periodic check should be performed once a year.
- ♦ If the equipment fails any check item on the periodic check list, the general judgment will be "Fail". Repair the equipment so that it passes all the check items.
- ♦ Use the equipment only if the judgments for all the items are "OK".
- ♦ Check the damage, earth impedance, leakage current, and accuracy for all cables, devices, and accessories.

 **CAUTION**

- ♦ Before the check procedure, back up the setup data and patient data on an external media.
- ♦ Some models of commercially available bench top functional testers and patient simulators can be used to verify the proper functionality of SpO₂ monitoring system, sensors, cables, but they are incapable of properly evaluating the SpO₂ measurement accuracy. SpO₂ measurement accuracy can only be evaluated by comparing measurement data with SaO₂ measurements obtained from simultaneously sampled arterial blood using a laboratory Co-oximeter.

No.	Check Items	Check Procedure	Criteria
1. Preparation, Cleaning			
01	Data Backup, etc.	Before the check procedure, back up the setup data and patient data on an external media. If backup is not possible, write down the setting information, etc. before the check procedure, and restore the settings to original state after the check procedure.	The data should be properly backed up. Or, the setting information, etc. should be written down.
02	Cleanness	If contamination is found, perform proper disinfection before the daily check.	No contamination should be found.
03	Cleaning	Visually check the exterior, and perform proper cleaning. For details, refer to "Chapter 8 Cleaning/Disinfecting/Storing" of Maintenance Manual.	It should be clean.

No.	Check Items	Check Procedure	Criteria
2. External Appearance/Accessories			
01	External Appearance	Visually check the exterior for scratches, cracks, deformation, and rust.	No scratches, cracks, deformation, and rust should be found on the exterior.
02	Label	Visually check the rating label and caution label of the equipment.	Should be neither peeled nor stained nor unclear.
03	Cables	Check that neither damage nor broken wire is found in all cables. Check that the connection is smooth and secure.	Neither damaged nor broken wire should be found. Should be securely connected.
04	Printing Paper	Visually check the installed condition. Check that extra printing paper is stored.	The paper should be correctly installed. No discoloration should be found. Extra printing paper should be stored.
05	Operation Manual	Check that accompanying documents (operation manual, etc.) are stored in specified location.	Should be stored in specified location.

No.	Check Items	Check Procedure	Criteria
3. Power Supply			
01	Standby Switch	Check by connecting the power cable to AC and turning the power ON/OFF using a standby switch.	Check that the power supply LED lights. ON: Green, OFF: Orange
02	Battery-Charging Operation (When a battery is installed)	Install the battery, and check the charging operation.	Check that the battery charging LED lights. While charging: Orange, Fully charged: Green, No battery: Light Off
03	Battery Operation (When a battery is connected)	After charging the battery, unplug the power cable, and change to battery operation.	Check that the battery-operating condition is as specified on the operation manual.
04	Battery Replacement (When a battery is connected)	Check the battery replacement date.	Should be within one year from start of usage.

No.	Check Items	Check Procedure	Criteria
4. Display/Operation/Print			
01	Operation, Switch	Check by operating the control switches and keys on the touch panel.	Should operate correctly.
02	LCD	Check that the home display is displayed on the LCD.	Characters and waveform should be clear. The display should be clearly displayed with sufficient brightness.
03	Alarm Indicator	Check if the alarm indicator lights when the power is turned ON.	Should light when the power is turned ON.
04	Alarm Sound/ Operating Sound	On the "Tone/Volume" menu, check the alarm sound.	Alarm sound should generate with proper volume. There should be no beat noise.
05	Date/Time	Check the year, month, day, and time on the display.	The year, month, day, and time should be correctly displayed.
06	Printing Status	Perform test printing on the maintenance menu. Visually check the printing condition and also if there are thin or missing points.	The printed characters should be clear and legible.
07	Printing Speed	Perform test printing on the maintenance menu. Check by measuring the length of printed grid.	Error should be within $\pm 3\%$ for 25 mm/sec and 50 mm/sec waveform traces.
08	Telemetry Transmission	Perform telemetry transmission, and check the reception condition and waveform on the receiver side.	Correct waveforms and numeric data should be displayed and receiving condition should be stable.

No.	Check Items	Check Procedure	Criteria
5. ECG			
01	ECG Display Size	Input square wave of 1 mV amplitude from the simulator, and check the displayed waveform on the monitor with a waveform size of x1.	The amplitude of the displayed waveform should be within 10 mm \pm 1 mm.
02	Heart Rate Display Accuracy	Set the heart rate to 60 bpm on the simulator, and check the displayed heart rate on the monitor.	The displayed heart rate should be within 60 bpm \pm 3 bpm.
03	Lead OFF	Remove each electrode from the simulator and check that "Lead OFF" message is displayed.	The "Lead OFF" message for the removed electrode should be displayed.

No.	Check Items	Check Procedure	Criteria
6. Respiration (Impedance Measurement)			
01	Respiration Rate Display Accuracy	Input the respiration signal of 20 Bpm with the following setting from the simulator, and check the displayed RR value on the monitor. Baseline Impedance: 1500 Ω Detection Lead: II (LL), Respiration Waveform: Normal, Amplitude: 1 Ω	The displayed RR should be within 20 Bpm \pm 3 Bpm.

No.	Check Items	Check Procedure	Criteria
7. Invasive Blood Pressure			
01	BP Zero	Input the blood pressure of 0 mmHg from the simulator, perform zero balance, and check the BP value on the monitor.	Zero balance should be properly performed, and the displayed BP value should be within 0 mmHg \pm 1 mmHg.
02	BP value display accuracy	Set the BP value to 250 mmHg on the simulator, and check the displayed BP value on the monitor.	The displayed BP value should be within 250 mmHg \pm 5 mmHg.
8. SpO ₂			
01	Oxygen Saturation Display Accuracy	Input the oxygen saturation signal of 90%SpO ₂ from the simulator, and check the displayed oxygen saturation value on the monitor.	The displayed oxygen saturation value should be within 90%SpO ₂ \pm 2%.
02	Pulse Rate Display Accuracy	Input the pulse rate signal of 60 bpm from the simulator, and check the displayed HR value on the monitor.	The displayed heart rate should be within 60 bpm \pm 3 bpm.
9. NIBP			
01	NIBP Test	Connect the 500 ml tank, and perform the NIBP test under the test menu.	All the test results should be "OK".
02	BP Measurement Error	Set the simulator to 120 mmHg for SYS, 80 mmHg for DIA, 90 mmHg for MAP, and perform the NIBP measurement.	The displayed BP value should be within 120 mmHg \pm 10 mmHg for SYS, 80 mmHg \pm 10 mmHg for DIA, 90 mmHg \pm 10 mmHg for MAP.
03	Pulse Rate Measurement Error	Set the pulse rate to 60 bpm on the simulator, and perform the NIBP measurement.	The displayed pulse rate should be within 60 bpm \pm 3 bpm.
10. Temperature			
01	Temperature display error	Input the signal of 37°C/98.6°F from the simulator, and check the displayed temperature value on the monitor.	The displayed temperature value should be within 37°C \pm 0.2°C/98.6°F \pm 0.4°F.
11. Cardiac Output (Blood Temperature, Injectate Temperature)			
01	Blood Temperature Measurement	Input the blood temperature signal of 37°C/98.6°F from the simulator, and check the displayed blood temperature value on the monitor.	The displayed blood temperature value should be within 37°C \pm 0.3°C/98.6°F \pm 0.5°F.
02	Injectate Temperature Measurement	Input the injectate temperature signal of 15°C/59.0°F from the simulator, and check the displayed injectate temperature value on the monitor.	The displayed injectate temperature value should be within 15°C \pm 0.5°C/59.0°F \pm 0.9°F.
12. CO ₂ Concentration (Optional)			
01	CO ₂ Gas Calibration (HC-110)	In the CO ₂ calibration screen, perform CO ₂ gas calibration with 5% calibration gas.	Make sure the calibration is successful.
02	Check calibration and replacement dates	Check the calibration date and replacement date for the CO ₂ gas module in the Parts Usage Time screen.	Remaining Time until Next Calibration/Replacement should be greater than 0.
03	CO ₂ Concentration Display	Measure CO ₂ Gas Concentration using 5% calibration gas.	Should be within 38 \pm 2mmHg.
04	Detect disconnected sampling line	Remove the sampling line or CO ₂ sensor from the module.	< CO ₂ Disconnected > should be displayed.

No.	Check Items	Check Procedure	Criteria
13. Multi gas (Optional)			
01	Gas Concentration display	Measure CO ₂ Gas Concentration error using calibration gas.	Error should be within the below range. CO ₂ : 5.0±1.1% O ₂ : 45.0±5.7% N ₂ O: 45.0 ±5.3% Agent: 5.0 ±0.7%
02	Water trap detection	Remove the water trap.	<GAS Check Water Trap> should be displayed.
03	Sample line detection	Block one side (transducer side) of the sampling tube.	<GAS Check Sample Line> is displayed.

No.	Check Items	Check Procedure	Criteria
14. BIS (Optional)			
01	Sensor Detection	Connect the signal generator and BIS sensor simulator, and check that EEG is displayed.	EEG should be displayed on the monitor.

No.	Check Items	Check Procedure	Criteria
15. Analog Output			
01	ECG Output Accuracy	Input 10 Hz sine-wave signal of 1mV (2mVp-p) amplitude from the simulator, connect the oscilloscope to the output, and check the displayed waveform.	The displayed waveform amplitude should be within 1 V ± 0.1 V (2 Vp-p ± 0.2 Vp-p).
02	BP output accuracy	Input BP signal of 0 mmHg, 100 mmHg, 250 mmHg from the simulator, connect the oscilloscope to the output, and check the displayed waveform.	The displayed output voltage should be within 0 V ± 0.1 V at 0 mmHg, The displayed output voltage should be within 1 V ± 0.1 V at 100 mmHg

No.	Check Items	Check Procedure	Criteria
16. Periodic Replacement Parts, Aftertreatment			
01	NIBP Unit	Check the number of measurements or date of first usage.	It should not exceed 100,000 times, or six (6) years from the first usage.
02	Lithium-Ion Battery Pack BTO-005	Check the number of charging/discharging times or the first usage date.	The number of charging/discharging times should not exceed 300 times, or usage duration should not exceed one year.
03	CO ₂ Unit (When HC -110/ HC -120 is used)	Check the usage hours.	It should not exceed 30,000 hours.
04	Restore Backup Data	After the check procedure, restore the setup data from the external media. If the settings have been written down, restore the settings to original state as written.	The settings should be properly restored to original state.

No.	Check Items	Check Procedure	Criteria
Electrical Safety			
01	Earth Leakage Current (NC)	Measure the earth leakage current under normal condition using a leak measurement safety tester. Test according to the test method of IEC 60601-1.	Earth Leakage Current (NC) should be 5 mA or less.
02	Earth Leakage Current (SFC)	Measure the earth leakage current under single fault condition using a leak measurement safety tester. Test according to the test method of IEC 60601-1.	Earth Leakage Current (SFC) should be 10 mA or less.
03	Contact Current (NC)	Measure the contact current under normal condition using a leak measurement safety tester. Test according to the test method of IEC 60601-1.	Contact Current (NC) Should be 100µA or less
04	Contact Current (SFC)	Measure the contact current under single fault condition using a leak measurement safety tester. Test according to the test method of IEC 60601-1.	Contact Current (NC) Should be 500µA or less

05	Patient Leakage Current (NC)	Measure the patient leakage current under normal condition using a leak measurement safety tester. Test according to the test method of IEC 60601- 1.	[AC/DC] Type CF Applied Part Patient Leakage Current (NC) Should be 10µA or less
06	Patient Leakage Current (SFC)	Measure the patient leakage current under single fault condition using a leak measurement safety tester. Test according to the test method of IEC 60601- 1.	[AC/DC] Type CF Applied Part Patient Leakage Current (SFC) Should be 50 µA or less
07	Total Patient Leakage Current (NC)	Measure the total patient leakage current under normal condition using a leak measurement safety tester. Test according to the test method of IEC 60601- 1.	[AC/DC] Type CF Applied Part Patient Leakage Current (NC) Should be 50µA or less
08	Total Patient Leakage Current (SFC)	Measure the total patient leakage current under single fault condition using a leak measurement safety tester. Test according to the test method of IEC 60601- 1.	[AC/DC] Type CF Applied Part Patient Leakage Current (SFC) Should be 100 µA or less
09	Patient Auxiliary Current (NC)	Measure the patient auxiliary current (NC) under normal condition using a leak measurement safety tester. Test according to the test method of IEC 60601- 1.	Patient Auxiliary Current (NC) Should be 10 µA or less
10	Patient Auxiliary Current (SFC)	Measure the patient auxiliary current (SFC) under single fault condition using a leak measurement safety tester. Test according to the test method of IEC 60601- 1.	Patient Auxiliary Current (SFC) Should be 50 µA or less

Handling the Lithium-Ion Battery Pack (BTO-005)

This section describes the handling and storage of the BTO-005 Battery Pack. Refer also to the BTO-005 Operation Manual.

□ Handling the Battery

- ♦ For uninterrupted monitoring, charge the battery when the battery level is low.
- ♦ When the battery operation time becomes short even after it is fully charged, the battery needs to be replaced.
- ♦ The battery should be charged at room temperature (10°C to 30°C).
- ♦ The lithium-ion battery can only be charged in the specified operational temperatures of the device. Refer to the operation manual of the lithium-ion battery (BTO-005) for details.
- ♦ When using the battery for the first time, or using after leaving it for a while, make sure to fully charge the battery before use.

□ Storing

To take advantage of the characteristic of the battery pack, pay attention to the following when storing.

Storage Temperature and Humidity for the Battery

- ♦ Store in an environment specified below without corrosive gas.

Storage Period	Storage Temperature	Storage Humidity
Within 30 days	-20°C to 50°C	20% to 85% (non-condensing)
Within 90 days	-20°C to 40°C	
Within 1 year	-20°C to 20°C	

- ♦ Do not store in an environment outside the specified temperature range or excessive high humidity. This may result in leakage caused by expansion/contraction inside the battery or rusting of the metal part.

□ Long-Term Storage

- ♦ If the battery is left installed in the monitor without use for a long period of time, the capacity recovery after storage may be degraded.

When storing the monitor for a long period, remove the battery from the monitor.

Gas Measurement Accuracy Check Procedure (MG -110/ MG -120)

This section describes about the procedure of gas measurement accuracy check.

CAUTION

- ♦ Perform the gas measurement accuracy check when the multigas module is connected.
- ♦ Warm up the multigas module sufficiently before updating the checked date of gas measurement accuracy. To acquire maximum measurement accuracy, 10 minutes of warm up is required after the power is turned ON.
- ♦ If the accuracy check is performed using a low pressure gas, the accuracy of gas measurement will be reduced. Make sure to perform the accuracy check using the specified calibration gas before its expiration date.

NOTE

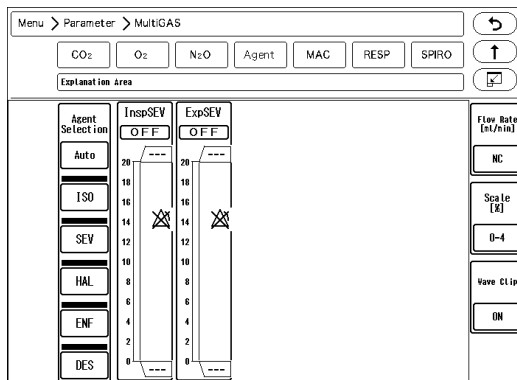
- ♦ The gas measurement accuracy of the multigas module should be checked every year. The

date of the last measurement check will be displayed on the "GAS Calibration" screen. During the accuracy check, gas measurement and other gas function cannot be used.

- To correct the gas measurement drift, zero calibration is necessary. The automatic zeroing is performed periodically, but perform it manually as necessary.
- Zeroing should be performed with the transducers opened to air.
- During accuracy check, the pressure display on the calibration gas regulator should be in the range displayed in green.

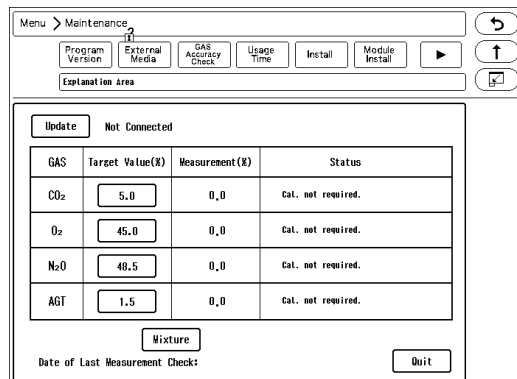
1 Attach the water trap for adult/pediatric to the MG -110/120, and set the "Flow Rate" to 200 mL/min.

- ▶ Press the [Menu], [Gas]("Parameter"), [Agent] keys to display the "Agent" setup screen, and select [200 mL/min] for the "Flow Rate".
- ▶ The "Flow Rate" can be set on the CO₂, O₂, N₂O, Agent setup screen.



2 Press the [Menu], [Maintenance], [Gas Calibration] keys.

- ▶ The "Gas Calibration" screen will be displayed.



- ▶ If the multigas module is not connected, "Not connected" will be displayed.
- ▶ While the multigas module is in process of warming up, "Warming Up" message will be displayed, and the gas measurement accuracy check cannot be started.

NOTE

- The warming up process will take about 10 minutes from start-up of the multigas module.

- ▶ When the warming up process completes, "Supply calibration gas" message will be displayed.

3 Connect the calibration gas cylinder to the multigas module.

4 Supply the calibration gas, and wait for 30 seconds until the gas measurement value becomes stable.

5 Check the measurement accuracy of each gas.

- ▶ The measurement accuracy criteria of each gas are as follows.

CO₂: 5.0±1.1%

O₂: 45.0±5.7%

N₂O: 45.0± 5.3%

ISO: 5.0±0.7%

6 When the measurement accuracy of each gas is within the acceptance criteria, press the [Update] key.

- ▶ The message, <Date of last measurement check updated> will be displayed.
- ▶ Verify that the date under "Date of Last Measurement Check" was updated.

GAS	Target Value(%)	Measurement(%)	Status
CO ₂	5.0	5.0	
O ₂	45.0	40.0	
N ₂ O	40.5	40.0	
AGI	1.5	1.5	

Date of Last Measurement Check: 17/ 1/20

7 Set the "Flow Rate" to initial value.

CO₂ Calibration (HC -110)

This section describes about the procedure of CO₂ gas calibration.

Perform calibration when 1 year has elapsed from the last calibration, or accumulated EtCO₂ measurement time exceeds 4,000 hours, or any measurement error is found.

1 Press the [Menu], [CO₂] ("Parameter"), [CO₂ Calibration] to display the CO₂ calibration screen.

CO₂ calibration

CO₂ 50

Calibration Start Cal Calibration Ready

Time remaining: 12000 hours
Last Cal Date: 2016 01/01 08:06

2 Press the [Start Cal] key and conduct calibration according to the displayed messages.

3 The message, <Feed CAL. GAS> will be displayed. Press the injection button and inject the calibration gas.

4 The message, <Cal. Gas can be removed> will be displayed. Stop pressing the injection button to cease the injection.

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

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

6 Press the [Cal Complete] key to end the calibration.

CAUTION

- ◆ Perform the calibration 5 minutes after turning ON the power on the HC-110.
- ◆ Do not disconnect the sampling tube during calibration. If the sampling tube is disconnected, calibration will cease.
- ◆ Conduct CO₂ calibration for the following case.
If the CO₂ gas calibration is not performed at a specified interval, CO₂ measurement accuracy may be affected and also subsequent gas calibration may not be possible.
 - ◆ When the accumulated measurement time exceeds 1,200 hours from the first use.
However, if the first calibration was performed before the accumulated measurement time reaches 720 hours, another calibration is required when the accumulated measurement time exceeds 1,200 hours from the first calibration.
 - ◆ When 12 months has elapsed or the accumulated measurement time has exceeded 4,000 hours from the previous calibration.
 - ◆ When EtCO₂ measurement is not stable or accuracy is degraded compared with other measuring device.
 - ◆ When the patient monitor was not used for a while, or when EtCO₂ was not measured for a while.
 - ◆ When a message, < HC-110 Calibration> is displayed at power ON.
- ◆ Dispose of calibration gas according to the regulation of each medical institution.

Self-Diagnosis Function

This section explains about the self-diagnosis function of this equipment.

This equipment is provided with the following self-diagnosis function (including the assistance function).

- ◆ Failure judgment, message display based on the voltage and temperature monitoring.
- ◆ Calibration, replacement message display based on the usage duration/frequency judgment
- ◆ Touch Panel Detection Test
- ◆ VRAM Test (Display Test)
- ◆ Printer Output Test
- ◆ Module status display
- ◆ Operation log
- ◆ Error log
- ◆ Power switch ON log
- ◆ Watchdog timer test

Program Version

On the program version screen, software version of the main unit and modules can be verified.

1 Press the [Menu], [Maintenance] keys.

- ▶ The software version screen will be displayed.



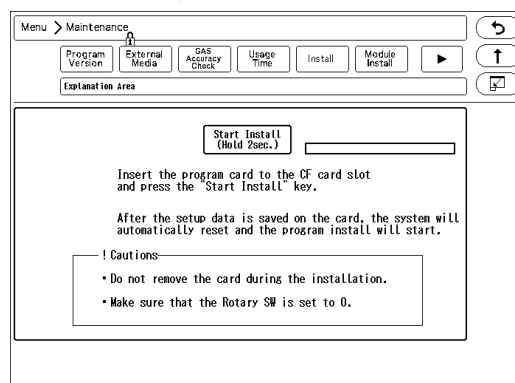
- ▶ The software version, boot version, date, comment required for the DS-1200 System will be displayed.
 - ♦ DS-1200 Main Unit Software
 - ♦ MG -110/120 Multigas Unit Module, Spiro Unit Module Software
- ▶ [Serial]: The information of the device connected to the serial connector of the main unit will be displayed.
- ▶ [Built-in]: The expansion module installed to the internal slot will be used.

Software Install

The software can be updated on the install screen.

1 Press the [Menu], [Maintenance], [Install] keys.

- ▶ The software install screen will be displayed.



NOTE

- ♦ Users cannot perform the software update process. Refer to your nearest service representative.

Open source software is used for this product.

The following are the license agreements for each open source software.

bsd-2-clause

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

- 1 Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
- 2 Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.

THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT OWNER OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

bsd-3-clause

Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

- 1 Redistributions of source code must retain the above copyright notice, this list of conditions, and the following disclaimer, without modification.
- 2 Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials provided with the distribution.
- 3 The names of the above-listed copyright holders may not be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT OWNER OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

eCos-2.0

Note that this license is not endorsed by the Free Software Foundation.
It is available here as a convenience to readers of the license list.

The eCos license version 2.0

This file is part of eCos, the Embedded Configurable Operating System.
Copyright (C) 1998, 1999, 2000, 2001, 2002 Red Hat, Inc.

eCos is free software; you can redistribute it and/or modify it under the terms of the GNU General Public License as published by the Free Software Foundation; either version 2 or (at your option) any later version.

eCos is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU General Public License for more details.

You should have received a copy of the GNU General Public License along with eCos; if not, write to the Free Software Foundation, Inc., 51 Franklin St, Fifth Floor, Boston, MA 02110-1301 USA.

As a special exception, if other files instantiate templates or use macros or inline functions from this file, or you compile this file and link it with other works to produce a work based on this file, this file does not by itself cause the resulting work to be covered by the GNU General Public License. However the source code for this file must still be made available in accordance with section (3) of the GNU General Public License.

This exception does not invalidate any other reasons why a work based on this file might be covered by the GNU General Public License.

Alternative licenses for eCos may be arranged by contacting Red Hat, Inc. at <http://sources.redhat.com/ecos/ecos-license/>

#####ECOSGPLCOPYRIGHTEND#####

References

1. <http://www.gnu.org/licenses/license-list.html>

gpl-2.0

GNU GENERAL PUBLIC LICENSE
Version 2, June 1991

Copyright (C) 1989, 1991 Free Software Foundation, Inc.,
51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA

Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed.

Preamble

The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public License is intended to guarantee your freedom to share and change free software--to make sure the software is free for all its users. This General Public License applies to most of the Free Software Foundation's software and to any other program whose authors commit to using it. (Some other Free Software Foundation

software is covered by the GNU Lesser General Public License instead.) You can apply it to your programs, too.

When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish), that you receive source code or can get it if you want it, that you can change the software or use pieces of it in new free programs; and that you know you can do these things.

To protect your rights, we need to make restrictions that forbid anyone to deny you these rights or to ask you to surrender the rights. These restrictions translate to certain responsibilities for you if you distribute copies of the software, or if you modify it.

For example, if you distribute copies of such a program, whether gratis or for a fee, you must give the recipients all the rights that you have. You must make sure that they, too, receive or can get the source code. And you must show them these terms so they know their rights.

We protect your rights with two steps: (1) copyright the software, and (2) offer you this license which gives you legal permission to copy, distribute and/or modify the software.

Also, for each author's protection and ours, we want to make certain that everyone understands that there is no warranty for this free software. If the software is modified by someone else and passed on, we want its recipients to know that what they have is not the original, so that any problems introduced by others will not reflect on the original authors' reputations.

Finally, any free program is threatened constantly by software patents. We wish to avoid the danger that redistributors of a free program will individually obtain patent licenses, in effect making the program proprietary. To prevent this, we have made it clear that any patent must be licensed for everyone's free use or not licensed at all.

The precise terms and conditions for copying, distribution and modification follow.

GNU GENERAL PUBLIC LICENSE

TERMS AND CONDITIONS FOR COPYING, DISTRIBUTION AND MODIFICATION

0. This License applies to any program or other work which contains a notice placed by the copyright holder saying it may be distributed under the terms of this General Public License. The "Program", below, refers to any such program or work, and a "work based on the Program" means either the Program or any derivative work under copyright law: that is to say, a work containing the Program or a portion of it, either verbatim or with modifications and/or translated into another language. (Hereinafter, translation is included without limitation in the term "modification".) Each licensee is addressed as "you".

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running the Program is not restricted, and the output from the Program is covered only if its contents constitute a work based on the Program (independent of having been made by running the Program). Whether that is true depends on what the Program does.

1. You may copy and distribute verbatim copies of the Program's source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and give any other recipients of the Program a copy of this License along with the Program.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Program or any portion of it, thus forming a work based on the Program, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

- a) You must cause the modified files to carry prominent notices stating that you changed the files and the date of any change.
- b) You must cause any work that you distribute or publish, that in whole or in part contains or is derived from the Program or any part thereof, to be licensed as a whole at no charge to all third parties under the terms of this License.
- c) If the modified program normally reads commands interactively when run, you must cause it, when started running for such interactive use in the most ordinary way, to print or display an announcement including an appropriate copyright notice and a notice that there is no warranty (or else, saying that you provide a warranty) and that users may redistribute the program under these conditions, and telling the user how to view a copy of this License. (Exception: if the Program itself is interactive but does not normally print such an announcement, your work based on the Program is not required to print an announcement.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Program, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Program, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Program.

In addition, mere aggregation of another work not based on the Program with the Program (or with a work based on the Program) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may copy and distribute the Program (or a work based on it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you also do one of the following:

- a) Accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange; or,
- b) Accompany it with a written offer, valid for at least three years, to give any third party, for a charge no more than your cost of physically performing source distribution, a complete machine-readable copy of the corresponding source code, to be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange; or,
- c) Accompany it with the information you received as to the offer to distribute corresponding source code. (This alternative is allowed only for noncommercial distribution and only if you received the program in object code or executable form with such an offer, in accord with Subsection b above.)

The source code for a work means the preferred form of the work for making modifications to it. For an executable work, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the executable. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

If distribution of executable or object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place counts as distribution of the source code, even though third parties are not compelled to copy the source along with the object code.

4. You may not copy, modify, sublicense, or distribute the Program except as expressly provided under this License.

Any attempt otherwise to copy, modify, sublicense or distribute the Program is void, and will automatically terminate your rights under this License. However, parties who have received copies, or rights, from you under this License will not have their licenses terminated so long as such parties remain in full compliance.

5. You are not required to accept this License, since you have not signed it. However, nothing else grants you permission to modify or distribute the Program or its derivative works. These actions are prohibited by law if you do not accept this License. Therefore, by modifying or distributing the Program (or any work based on the Program), you indicate your acceptance of this License to do so, and all its terms and conditions for copying, distributing or modifying the Program or works based on it.

6. Each time you redistribute the Program (or any work based on the Program), the recipient automatically receives a license from the original licensor to copy, distribute or modify the Program subject to these terms and conditions. You may not impose any further restrictions on the recipients' exercise of the rights granted herein. You are not responsible for enforcing compliance by third parties to this License.

7. If, as a consequence of a court judgment or allegation of patent infringement or for any other reason (not limited to patent issues), conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot distribute so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not distribute the Program at all. For example, if a patent license would not permit royalty-free redistribution of the Program by all those who receive copies directly or indirectly through you, then the only way you could satisfy both it and this License would be to refrain entirely from distribution of the Program.

If any portion of this section is held invalid or unenforceable under any particular circumstance, the balance of the section is intended to apply and the section as a whole is intended to apply in other circumstances.

It is not the purpose of this section to induce you to infringe any patents or other property right claims or to contest validity of any such claims; this section has the sole purpose of protecting the integrity of the free software distribution system, which is implemented by public license practices. Many people have made generous contributions to the wide range of software distributed through that system in reliance on consistent application of that system; it is up to the author/donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice.

This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License.

8. If the distribution and/or use of the Program is restricted in certain countries either by patents or by copyrighted interfaces, the original copyright holder who places the Program under this License may add an explicit geographical distribution limitation excluding those countries, so that distribution is permitted only in or among countries not thus excluded. In such case, this License incorporates the limitation as if written in the body of this License.

9. The Free Software Foundation may publish revised and/or new versions of the General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns.

Each version is given a distinguishing version number. If the Program specifies a version number of this License which applies to it and "any later version", you have the option of following the terms and conditions either of that version or of any later version published by the Free Software Foundation. If the Program does not specify a version number of this License, you may choose any version ever published by the Free Software Foundation.

10. If you wish to incorporate parts of the Program into other free programs whose distribution conditions are different, write to the author to ask for permission. For software which is copyrighted by the Free Software Foundation, write to the Free Software Foundation; we sometimes make exceptions for this. Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally.

NO WARRANTY

11. BECAUSE THE PROGRAM IS LICENSED FREE OF CHARGE, THERE IS NO WARRANTY FOR THE PROGRAM, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE PROGRAM "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE PROGRAM IS WITH YOU. SHOULD THE PROGRAM PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

12. IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY WHO MAY MODIFY AND/OR REDISTRIBUTE THE PROGRAM AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PROGRAM (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE PROGRAM TO OPERATE WITH ANY OTHER PROGRAMS), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

END OF TERMS AND CONDITIONS**How to Apply These Terms to Your New Programs**

If you develop a new program, and you want it to be of the greatest possible use to the public, the best way to achieve this is to make it free software which everyone can redistribute and change under these terms.

To do so, attach the following notices to the program. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

```
<one line to give the program's name and a brief idea of what it does.>
Copyright (C) <year> <name of author>
```

This program is free software; you can redistribute it and/or modify it under the terms of the GNU General Public License as published by the Free Software Foundation; either version 2 of the License, or (at your option) any later version.

This program is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU General Public License for more details.

You should have received a copy of the GNU General Public License along with this program; if not, write to the Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA.

Also add information on how to contact you by electronic and paper mail.

If the program is interactive, make it output a short notice like this when it starts in an interactive mode:

```
Gnomovision version 69, Copyright (C) year name of author
Gnomovision comes with ABSOLUTELY NO WARRANTY;
for details type `show w'. This is free software, and you are
welcome to redistribute it under certain conditions; type `show c'
for details.
```

The hypothetical commands `show w' and `show c' should show the appropriate parts of the General Public License. Of course, the commands you use may be called something other than `show w' and `show c'; they could even be mouse-clicks or menu items--whatever suits your program.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the program, if necessary. Here is a sample; alter the names:

Yoyodyne, Inc., hereby disclaims all copyright interest in the program `Gnomovision' (which makes passes at compilers) written by James Hacker.

<signature of Ty Coon>, 1 April 1989

Ty Coon, President of Vice

This General Public License does not permit incorporating your program into proprietary programs. If your program is a subroutine library, you may consider it more useful to permit linking proprietary applications with the library. If this is what you want to do, use the GNU Lesser General Public License instead of this License.

ibm-pibs

This source code has been made available to you by IBM on an AS-IS basis. Anyone receiving this source is licensed under IBM copyrights to use it in any way he or she deems fit, including copying it, modifying it, compiling it, and redistributing it either with or without modifications. No license under IBM patents or patent applications is to be implied by the copyright license.

Any user of this software should understand that IBM cannot provide technical support for this software and will not be responsible for any consequences resulting from the use of this software.

Any person who transfers this source code or any derivative work must include the IBM copyright notice, this paragraph, and the preceding two paragraphs in the transferred software.

COPYRIGHT IBM CORPORATION 1995
LICENSED MATERIAL PROGRAM PROPERTY OF IBM

isc

ISC License:

Copyright (c) 2004-2010 by Internet Systems Consortium, Inc. ("ISC")

Copyright (c) 1995-2003 by Internet Software Consortium

Permission to use, copy, modify, and/or distribute this software for any purpose with or without fee is hereby granted, provided that the above copyright notice and this permission notice appear in all copies.

THE SOFTWARE IS PROVIDED "AS IS" AND ISC DISCLAIMS ALL WARRANTIES WITH REGARD TO THIS SOFTWARE INCLUDING ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS. IN NO EVENT SHALL ISC BE LIABLE FOR ANY SPECIAL, DIRECT, INDIRECT, OR CONSEQUENTIAL DAMAGES OR ANY DAMAGES WHATSOEVER RESULTING FROM LOSS OF USE, DATA OR PROFITS, WHETHER IN AN ACTION OF CONTRACT, NEGLIGENCE OR OTHER TORTIOUS ACTION, ARISING OUT OF OR IN CONNECTION WITH THE USE OR PERFORMANCE OF THIS SOFTWARE.

lgpl-2.0

GNU LIBRARY GENERAL PUBLIC LICENSE

Version 2, June 1991

Copyright (C) 1991 Free Software Foundation, Inc.

51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA

Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed.

[This is the first released version of the library GPL. It is numbered 2 because it goes with version 2 of the ordinary GPL.]

Preamble

The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public Licenses are intended to guarantee your freedom to share and change free software--to make sure the software is free for all its users.

This license, the Library General Public License, applies to some specially designated Free Software Foundation software, and to any other libraries whose authors decide to use it. You can use it for your libraries, too.

When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish), that you receive source code or can get it if you want it, that you can change the software or use pieces of it in new free programs; and that you know you can do these things.

To protect your rights, we need to make restrictions that forbid anyone to deny you these rights or to ask you to surrender the rights.

These restrictions translate to certain responsibilities for you if you distribute copies of the library, or if you modify it.

For example, if you distribute copies of the library, whether gratis or for a fee, you must give the recipients all the rights that we gave you. You must make sure that they, too, receive or can get the source code. If you link a program with the library, you must provide complete object files to the recipients so that they can relink them with the library, after making changes to the library and recompiling it. And you must show them these terms so they know their rights.

Our method of protecting your rights has two steps: (1) copyright the library, and (2) offer you this license which gives you legal permission to copy, distribute and/or modify the library.

Also, for each distributor's protection, we want to make certain that everyone understands that there is no warranty for this free library. If the library is modified by someone else and passed on, we want its recipients to know that what they have is not the original version, so that any problems introduced by others will not reflect on the original authors' reputations.

Finally, any free program is threatened constantly by software patents. We wish to avoid the danger that companies distributing free software will individually obtain patent licenses, thus in effect transforming the program into proprietary software. To prevent this, we have made it clear that any patent must be licensed for everyone's free use or not licensed at all.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License, which was designed for utility programs. This license, the GNU Library General Public License, applies to certain designated libraries. This license is quite different from the ordinary one; be sure to read it in full, and don't assume that anything in it is the same as in the ordinary license.

The reason we have a separate public license for some libraries is that they blur the distinction we usually make between modifying or adding to a program and simply using it. Linking a program with a library, without changing the library, is in some sense simply using the library, and is analogous to running a utility program or application program. However, in a textual and legal sense, the linked executable is a combined work, a derivative of the original library, and the ordinary General Public License treats it as such.

Because of this blurred distinction, using the ordinary General Public License for libraries did not effectively promote software sharing, because most developers did not use the libraries. We concluded that weaker conditions might promote sharing better.

However, unrestricted linking of non-free programs would deprive the users of those programs of all benefit from the free status of the libraries themselves. This Library General Public License is intended to permit developers of non-free programs to use free libraries, while preserving your freedom as a user of such programs to change the free libraries that are incorporated in them. (We have not seen how to achieve this as regards changes in header files, but we have achieved it as regards changes in the actual functions of the Library.) The hope is that this will lead to faster development of free libraries.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, while the latter only works together with the library.

Note that it is possible for a library to be covered by the ordinary General Public License rather than by this special one.

GNU LIBRARY GENERAL PUBLIC LICENSE

TERMS AND CONDITIONS FOR COPYING, DISTRIBUTION AND MODIFICATION

0. This License Agreement applies to any software library which contains a notice placed by the copyright holder or other authorized party saying it may be distributed under the terms of this Library General Public License (also called "this License"). Each licensee is addressed as "you".

A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

1. You may copy and distribute verbatim copies of the Library's complete source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and distribute a copy of this License along with the Library.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

- a) The modified work must itself be a software library.
- b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.
- c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.
- d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even

though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also compile or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

c) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

d) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

7. You may place library facilities that are a work based on the Library side-by-side in a single library together with other library facilities not covered by this License, and distribute such a combined library, provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise permitted, and provided that you do these two things:

a) Accompany the combined library with a copy of the same work based on the Library, uncombined with any other library facilities. This must be distributed under the terms of the Sections above.

b) Give prominent notice with the combined library of the fact that part of it is a work based on the Library, and explaining where to find the accompanying uncombined form of the same work.

8. You may not copy, modify, sublicense, link with, or distribute the Library except as expressly provided under this License. Any attempt otherwise to copy, modify, sublicense, link with, or distribute the Library is void, and will automatically terminate your rights under this License. However, parties who have received copies, or rights, from you under this License will not have their licenses terminated so long as such parties remain in full compliance.

9. You are not required to accept this License, since you have not signed it. However, nothing else grants you permission to modify or distribute the Library or its derivative works. These actions are prohibited by law if you do not accept this License. Therefore, by modifying or distributing the Library (or any work based on the Library), you indicate your acceptance of this License to do so, and all its terms and conditions for copying, distributing or modifying the Library or works based on it.

10. Each time you redistribute the Library (or any work based on the Library), the recipient automatically receives a license from the original licensor to copy, distribute, link with or modify the Library subject to these terms and conditions. You may not impose any further restrictions on the recipients' exercise of the rights granted herein. You are not responsible for enforcing compliance by third parties to this License.

11. If, as a consequence of a court judgment or allegation of patent infringement or for any other reason (not limited to patent issues), conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot distribute so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not distribute the Library at all. For example, if a patent license would not permit royalty-free redistribution of the Library by all those who receive copies directly or indirectly through you, then the only way you could satisfy both it and this License would be to refrain entirely from distribution of the Library.

If any portion of this section is held invalid or unenforceable under any particular circumstance, the balance of the section is intended to apply, and the section as a whole is intended to apply in other circumstances.

It is not the purpose of this section to induce you to infringe any patents or other property right claims or to contest validity of any such claims; this section has the sole purpose of protecting the integrity of the free software distribution system which is implemented by public license practices. Many people have made generous contributions to the wide range of software distributed through that system in reliance on consistent application of that system; it is up to the author/donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice.

This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License.

12. If the distribution and/or use of the Library is restricted in certain countries either by patents or by copyrighted interfaces, the original copyright holder who places the Library under this License may add an explicit geographical distribution limitation excluding those countries, so that distribution is permitted only in or among countries not thus excluded. In such case, this License incorporates the limitation as if written in the body of this License.

13. The Free Software Foundation may publish revised and/or new versions of the Library General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns.

Each version is given a distinguishing version number. If the Library specifies a version number of this License which applies to it and "any later version", you have the option of following the terms and conditions either of that version or of any later version published by the Free Software Foundation. If the Library does not specify a license version number, you may choose any version ever published by the Free Software Foundation.

14. If you wish to incorporate parts of the Library into other free programs whose distribution conditions are incompatible with these, write to the author to ask for permission. For software which is copyrighted by the Free Software Foundation, write to the Free Software Foundation; we sometimes make exceptions for this. Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally.

NO WARRANTY

15. BECAUSE THE LIBRARY IS LICENSED FREE OF CHARGE, THERE IS NO WARRANTY FOR THE LIBRARY, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE LIBRARY "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE LIBRARY IS WITH YOU. SHOULD THE LIBRARY PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

16. IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY WHO MAY MODIFY AND/OR REDISTRIBUTE THE LIBRARY AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE LIBRARY (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE LIBRARY TO OPERATE WITH ANY OTHER SOFTWARE), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

END OF TERMS AND CONDITIONS

How to Apply These Terms to Your New Libraries

If you develop a new library, and you want it to be of the greatest possible use to the public, we recommend making it free software that everyone can redistribute and change. You can do so by permitting redistribution under these terms (or, alternatively, under the terms of the ordinary General Public License).

To apply these terms, attach the following notices to the library. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

```
<one line to give the library's name and a brief idea of what it does.>
Copyright (C) <year> <name of author>
```

This library is free software; you can redistribute it and/or modify it under the terms of the GNU Library General Public License as published by the Free Software Foundation; either version 2 of the License, or (at your option) any later version.

This library is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU Library General Public License for more details.

You should have received a copy of the GNU Library General Public License along with this library; if not, write to the Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA

Also add information on how to contact you by electronic and paper mail.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the library, if necessary. Here is a sample; alter the names:

Yoyodyne, Inc., hereby disclaims all copyright interest in the library `Frob' (a library for tweaking knobs) written by James Random Hacker.

<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice

That's all there is to it!

lgpl-2.1

GNU LIBRARY GENERAL PUBLIC LICENSE

Version 2.1, February 1999

Copyright (C) 1991, 1999 Free Software Foundation, Inc.
51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA

Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed.

[This is the first released version of the Lesser GPL. It also counts as the successor of the GNU Library Public License, version 2, hence the version number 2.1.]

Preamble

The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public Licenses are intended to guarantee your freedom to share and change free software--to make sure the software is free for all its users.

This license, the Lesser General Public License, applies to some specially designated software packages--typically libraries--of the Free Software Foundation and other authors who decide to use it. You can use it too, but we suggest you first think carefully about whether this license or the ordinary General Public License is the better strategy to use in any particular case, based on the explanations below.

When we speak of free software, we are referring to freedom of use, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish); that you receive source code or can get it if you want it; that you can change the software and use pieces of it in new free programs; and that you are informed that you can do these things.

To protect your rights, we need to make restrictions that forbid anyone to deny you these rights or to ask you to surrender the rights.

These restrictions translate to certain responsibilities for you if you distribute copies of the library, or if you modify it.

For example, if you distribute copies of the library, whether gratis or for a fee, you must give the recipients all the rights that we gave you. You must make sure that they, too, receive or can get the source code. If you link other code with the library, you must provide complete object files to the recipients, so that they can relink them with the library

after making changes to the library and recompiling it. And you must show them these terms so they know their rights.

We protect your rights with a two-step method: (1) we copyright the library, and (2) we offer you this license, which gives you legal permission to copy, distribute and/or modify the library.

To protect each distributor, we want to make it very clear that there is no warranty for the free library. Also, if the library is modified by someone else and passed on, the recipients should know that what they have is not the original version, so that the original author's reputation will not be affected by problems that might be introduced by others.

Finally, software patents pose a constant threat to the existence of any free program. We wish to make sure that a company cannot effectively restrict the users of a free program by obtaining a restrictive license from a patent holder. Therefore, we insist that any patent license obtained for a version of the library must be consistent with the full freedom of use specified in this license.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License. This license, the GNU Lesser General Public License, applies to certain designated libraries, and is quite different from the ordinary General Public License. We use this license for certain libraries in order to permit linking those libraries into non-free programs.

When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library. The ordinary General Public License therefore permits such linking only if the entire combination fits its criteria of freedom. The Lesser General Public License permits more lax criteria for linking other code with the library.

We call this license the "Lesser" General Public License because it does Less to protect the user's freedom than the ordinary General Public License. It also provides other free software developers Less of an advantage over competing non-free programs. These disadvantages are the reason we use the ordinary General Public License for many libraries. However, the Lesser license provides advantages in certain special circumstances.

For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

Although the Lesser General Public License is Less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, whereas the latter must be combined with the library in order to run.

GNU LESSER GENERAL PUBLIC LICENSE

TERMS AND CONDITIONS FOR COPYING, DISTRIBUTION AND MODIFICATION

0. This License Agreement applies to any software library or other program which contains a notice placed by the copyright holder or other authorized party saying it may be distributed under the terms of this Lesser General Public License (also called "this License"). Each licensee is addressed as "you".

A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

1. You may copy and distribute verbatim copies of the Library's complete source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and distribute a copy of this License along with the Library.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

- a) The modified work must itself be a software library.
- b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.
- c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.
- d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work that uses the Library" with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer's own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

- a) Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable "work that uses the Library", as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)
- b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user's computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.
- c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.
- d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.
- e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

7. You may place library facilities that are a work based on the Library side-by-side in a single library together with other library facilities not covered by this License, and distribute such a combined library, provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise permitted, and provided that you do these two things:

- a) Accompany the combined library with a copy of the same work based on the Library, uncombined with any other library facilities. This must be distributed under the terms of the Sections above.
- b) Give prominent notice with the combined library of the fact that part of it is a work based on the Library, and explaining where to find the accompanying uncombined form of the same work.

8. You may not copy, modify, sublicense, link with, or distribute the Library except as expressly provided under this License. Any attempt otherwise to copy, modify, sublicense, link with, or distribute the Library is void, and will automatically terminate your rights under this License. However, parties who have received copies, or rights, from you under this License will not have their licenses terminated so long as such parties remain in full compliance.

9. You are not required to accept this License, since you have not signed it. However, nothing else grants you permission to modify or distribute the Library or its derivative works. These actions are prohibited by law if you do not accept this License. Therefore, by modifying or distributing the Library (or any work based on the Library), you indicate your acceptance of this License to do so, and all its terms and conditions for copying, distributing or

modifying the Library or works based on it.

10. Each time you redistribute the Library (or any work based on the Library), the recipient automatically receives a license from the original licensor to copy, distribute, link with or modify the Library subject to these terms and conditions. You may not impose any further restrictions on the recipients' exercise of the rights granted herein. You are not responsible for enforcing compliance by third parties with this License.

11. If, as a consequence of a court judgment or allegation of patent infringement or for any other reason (not limited to patent issues), conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot distribute so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not distribute the Library at all. For example, if a patent license would not permit royalty-free redistribution of the Library by all those who receive copies directly or indirectly through you, then the only way you could satisfy both it and this License would be to refrain entirely from distribution of the Library.

If any portion of this section is held invalid or unenforceable under any particular circumstance, the balance of the section is intended to apply, and the section as a whole is intended to apply in other circumstances.

It is not the purpose of this section to induce you to infringe any patents or other property right claims or to contest validity of any such claims; this section has the sole purpose of protecting the integrity of the free software distribution system which is implemented by public license practices. Many people have made generous contributions to the wide range of software distributed through that system in reliance on consistent application of that system; it is up to the author/donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice.

This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License.

12. If the distribution and/or use of the Library is restricted in certain countries either by patents or by copyrighted interfaces, the original copyright holder who places the Library under this License may add an explicit geographical distribution limitation excluding those countries, so that distribution is permitted only in or among countries not thus excluded. In such case, this License incorporates the limitation as if written in the body of this License.

13. The Free Software Foundation may publish revised and/or new versions of the Lesser General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns.

Each version is given a distinguishing version number. If the Library specifies a version number of this License which applies to it and "any later version", you have the option of following the terms and conditions either of that version or of any later version published by the Free Software Foundation. If the Library does not specify a license version number, you may choose any version ever published by the Free Software Foundation.

14. If you wish to incorporate parts of the Library into other free programs whose distribution conditions are incompatible with these, write to the author to ask for permission. For software which is copyrighted by the Free Software Foundation, write to the Free Software Foundation; we sometimes make exceptions for this. Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally.

NO WARRANTY

15. BECAUSE THE LIBRARY IS LICENSED FREE OF CHARGE, THERE IS NO WARRANTY FOR THE LIBRARY, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE LIBRARY "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE LIBRARY IS WITH YOU. SHOULD THE LIBRARY PROVE DEFECTIVE, YOU ASSUME THE COST OF

ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

16. IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY WHO MAY MODIFY AND/OR REDISTRIBUTE THE LIBRARY AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE LIBRARY (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE LIBRARY TO OPERATE WITH ANY OTHER SOFTWARE), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

END OF TERMS AND CONDITIONS

How to Apply These Terms to Your New Libraries

If you develop a new library, and you want it to be of the greatest possible use to the public, we recommend making it free software that everyone can redistribute and change. You can do so by permitting redistribution under these terms (or, alternatively, under the terms of the ordinary General Public License).

To apply these terms, attach the following notices to the library. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

<one line to give the library's name and a brief idea of what it does.>

Copyright (C) <year> <name of author>

This library is free software; you can redistribute it and/or modify it under the terms of the GNU Lesser General Public License as published by the Free Software Foundation; either version 2.1 of the License, or (at your option) any later version.

You should have received a copy of the GNU Lesser General Public License along with this library; if not, write to the Free Software Foundation, Inc., 51 Franklin Street, Fifth Floor, Boston, MA 02110-1301 USA

Also add information on how to contact you by electronic and paper mail.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the library, if necessary. Here is a sample; alter the names:

Yoyodyne, Inc., hereby disclaims all copyright interest in the library `Frob' (a library for tweaking knobs) written by James Random Hacker.

<signature of Ty Coon>, 1 April 1990

Ty Coon, President of Vice

That's all there is to it!

OFL

Copyright (c) 2010, Andrey Makarov (makarov@bmstu.ru, mka-at-mailru@mail.ru),
with Reserved Font Name Anka/Coder Narrow.

Copyright (c) 2011, Pablo Impallari (www.impallari.com|impallari@gmail.com),
Rodrigo Fuenzalida (www.rfuenzalida.com) with Reserved Font Name Cantora.

This Font Software is licensed under the SIL Open Font License, Version 1.1.

This license is copied below, and is also available with a FAQ at: <http://scripts.sil.org/OFL>

SIL OPEN FONT LICENSE Version 1.1 - 26 February 2007

PREAMBLE

The goals of the Open Font License (OFL) are to stimulate worldwide development of collaborative font projects, to support the font creation efforts of academic and linguistic communities, and to provide a free and open framework in which fonts may be shared and improved in partnership with others.

The OFL allows the licensed fonts to be used, studied, modified and redistributed freely as long as they are not sold by themselves. The fonts, including any derivative works, can be bundled, embedded, redistributed and/or sold with any software provided that any reserved names are not used by derivative works. The fonts and derivatives, however, cannot be released under any other type of license. The requirement for fonts to remain under this license does not apply to any document created using the fonts or their derivatives.

DEFINITIONS

"Font Software" refers to the set of files released by the Copyright Holder(s) under this license and clearly marked as such. This may include source files, build scripts and documentation.

"Reserved Font Name" refers to any names specified as such after the copyright statement(s).

"Original Version" refers to the collection of Font Software components as distributed by the Copyright Holder(s).

"Modified Version" refers to any derivative made by adding to, deleting, or substituting -- in part or in whole -- any of the components of the Original Version, by changing formats or by porting the Font Software to a new environment.

"Author" refers to any designer, engineer, programmer, technical writer or other person who contributed to the Font Software.

PERMISSION & CONDITIONS

Permission is hereby granted, free of charge, to any person obtaining a copy of the Font Software, to use, study, copy, merge, embed, modify, redistribute, and sell modified and unmodified copies of the Font Software, subject to the following conditions:

- 1) Neither the Font Software nor any of its individual components, in Original or Modified Versions, may be sold by itself.
- 2) Original or Modified Versions of the Font Software may be bundled, redistributed and/or sold with any software, provided that each copy contains the above copyright notice and this license. These can be included either as stand-alone text files, human-readable headers or in the appropriate machine-readable metadata fields within text or binary

files as long as those fields can be easily viewed by the user.

3) No Modified Version of the Font Software may use the Reserved Font Name(s) unless explicit written permission is granted by the corresponding Copyright Holder. This restriction only applies to the primary font name as presented to the users.

4) The name(s) of the Copyright Holder(s) or the Author(s) of the Font Software shall not be used to promote, endorse or advertise any Modified Version, except to acknowledge the contribution(s) of the Copyright Holder(s) and the Author(s) or with their explicit written permission.

5) The Font Software, modified or unmodified, in part or in whole, must be distributed entirely under this license, and must not be distributed under any other license. The requirement for fonts to remain under this license does not apply to any document created using the Font Software.

TERMINATION

This license becomes null and void if any of the above conditions are not met.

DISCLAIMER

THE FONT SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT OF COPYRIGHT, PATENT, TRADEMARK, OR OTHER RIGHT. IN NO EVENT SHALL THE COPYRIGHT HOLDER BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, INCLUDING ANY GENERAL, SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF THE USE OR INABILITY TO USE THE FONT SOFTWARE OR FROM OTHER DEALINGS IN THE FONT SOFTWARE.

x11

X11 License

Copyright (C) 1996 X Consortium

Permission is hereby granted, free of charge, to any person obtaining a copy of this software and associated documentation files (the "Software"), to deal in the Software without restriction, including without limitation the rights to use, copy, modify, merge, publish, distribute, sublicense, and/or sell copies of the Software, and to permit persons to whom the Software is furnished to do so, subject to the following conditions:

The above copyright notice and this permission notice shall be included in all copies or substantial portions of the Software.

THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE X CONSORTIUM BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.

Except as contained in this notice, the name of the X Consortium shall not be used in advertising or otherwise to promote the sale, use or other dealings in this Software without prior written authorization from the X Consortium.

X Window System is a trademark of X Consortium, Inc.

SD : SD Logo is a trademark of SD-3C, LLC.

The company and product names used in this manual are trademarks or registered trademarks of respective companies.

FUKUDA DENSHI CO.,LTD.

3-39-4 Hongo, Bunkyo-ku, Tokyo, Japan
Tel: +81-3-5684-1455 Fax: +81-3-3814-1222
<https://fukuda.com/>

Printed in Japan 4L0119150 202207