Operator's Manual

Life Scope TR

Bedside Monitor

BSM-6301/BSM-6501/BSM-6701

BSM-6000 series
BSM-6301A
BSM-6301K
BSM-6501A
BSM-6501K
BSM-6701A
BSM-6701K

0614-900685R

NIHON KOHDEN

In order to use this product safely and fully understand all its functions, read this manual before using the product.

Keep this manual near the instrument or in the reach of the operator and refer to it whenever the operation is unclear.

This product stores personal patient information. Manage the information appropriately.

Patient names on the screen shots and recording examples in this manual are fictional and any resemblance to any person living or dead is purely coincidental.

The contents of this manual are subject to change without notice.

If you have any comments or suggestions on this manual, please contact us at: www.nihonkohden.com

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Trademark

The mark printed on the SD card that is used in this instrument is a trademark. The company name and model name are trademarks and registered trademarks of each company.

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Contents

About this Manual

This Operator's Manual describes the most common features and functions of the BSM-6301A/K, BSM-6501A/K and BSM-6701A/K bedside monitors.

Related Documentation

The BSM-6301A/K, BSM-6501A/K and BSM-6701A/K bedside monitors come with the following manuals in addition to the Operator's Manual.

Administrator's Guide

Describes how to install the bedside monitor. It also explains about the password protected settings on the SYSTEM SETUP window and SYSTEM CONFIGURATION screen which only an administrator can change.

User's Guide, Part I

Gives supplemental information on the operation of the bedside monitor.

User's Guide, Part II

Describes the features and settings of the monitoring parameters.

Service Manual

Describes information on servicing the bedside monitor. Only qualified service personnel can service the bedside monitor.

Intended Purpose

The Life Scope TR BSM-6301A/K, BSM-6501A/K and BSM-6701A/K bedside monitors are for one patient. The BSM-6301A/K bedside monitors have a 10.4 inch TFT color display, BSM-6501A/K have a 12.1 inch TFT color display, and BSM-6701A/K have a 15 inch TFT color display. All the monitors can display 15 waveforms on the screen.

The bedside monitors are to be installed near the patient. With the basic configuration of the system, ECG, respiration in impedance or thermistor method, SpO_2, NIBP, IBP, temperature, CO_2 and O_2 of all hospital patients can be monitored and alarms are generated.* The monitor is designed so the operator can directly touch the screen from the operator position.

* Essential performance in EMC standard.

The basic configuration of the system is the following units. This manual is based on this configuration.

- MU-631RA/RK, MU-651RA/RK, MU-671RA/RK main unit
- QI-631P, QI-632P, QI-634P, QI-671P, QI-672P interface
- AA-672P/AA-674P smart expansion unit
- WS-671P recorder module
- SB-671P battery pack
- AY series input unit or BSM-1700 series bedside monitor

Model	AY-631P	AY-633P	AY-651P	AY-653P	AY-660P*1	AY-661P*1 AY-671P	AY-663P*1 AY-673P	BSM-1733	BSM-1753	BSM-1763*1	BSM-1773
No. of MULTI sockets	1	3	1	3	1	1	3	3			
Available parameters using MULTI sockets	RESP (Thermistor), CO_2, SpO_2, IBP, TEMP, BIS, CO, O_2, CCO (APCO)				CO_2, IBP	RESP (Thermistor), CO_2, SpO_2, IBP, TEMP, BIS, CO, O_2, CCO (APCO)		ECG, respiration in impedance method, SpO_2, NIBP, temperature (up to 2 channels), IBP (up to 3 channels), $ETCO_2$, $FiCO_2$, cardiac output, SpO_2-2, BIS			
No. of TEMP sockets	2				1	2		2			
ECG measurement using 10 electrodes	Yes				No	Yes		Yes			
12 lead analysis	Yes				No	Yes		Yes			
SpO_2 probe	Masimo		Nellcor		Nihon Kohden*2			Masimo	Nellcor	Nihon Kohden	
Dual SpO_2	Yes*3		Yes*4		Yes*5	Yes*6		Yes*3	Yes*4	Yes*6	
NIBP PWTT measurement	No				Yes			No		Yes	
Smart expansion unit	Yes				No	Yes		No			
Analog ECG								Yes			
Analog BP								Yes			
HT output								Yes			

*1 These are not available for BSM-6000A series.

*2 When the probe is not connected to the SpO_2 socket, Masimo or Nellcor probe can be used with IF-925P or IF-919P communication cable.

*3 IF-925P communication cable is required.

*4 IF-919P communication cable is required.

*5 Dual SpO_2 is available when the MULTI socket on the JA-694PA data acquisition unit is used.

*6 JL-500P1 or JL-500P2 SpO_2 adapter is required.

For simplicity, the model number suffix A/G/K is omitted in this manual.

WARNING

Do not use the same monitor for more than one patient at the same time. Do not connect different sensors from different patients to the same monitor.

WARNING

Do not diagnose a patient based only on data acquired by the bedside monitor. Overall judgement must be performed by a physician who understands the features, limitations and characteristics of the bedside monitor and by reading the biomedical signals acquired by other instruments.

NOTE:

- This monitor must be used by qualified medical personnel with a full knowledge of operating this monitor.
- Upgrade the main unit and each optional unit to the Nihon Kohden recommended software version. Only use the specified configuration of units. If more than one BSM-6000 series bedside monitor is used in the same facility, make sure the bedside monitors have the same software version. If BSM-6000 series monitors with different software versions are used together, correct system operation cannot be guaranteed.
- The ALARM CAP function is available on the following bedside monitors, central monitors and multiple patient receivers.
  - BSM-6000A series software version 04-01 or later
  - BSM-9101A software version 13-03 or later
  - CNS-9701A software version 01-95 or later
  - ORG-9100A/ORG-9110A software version 03-06 or later
  - ORG-9700A software version 03-06 or later

  For details on ALARM CAP function, refer to manual for each instrument of the above and Section 3 of the BSM-6000 series Administrator's Guide.
- Only use Nihon Kohden parts and accessories to assure maximum performance from your instrument.

Indications for Use

The BSM-6000 series bedside monitor is intended to monitor, display and record physiological data to provide cardiac and vital signs monitoring within a medical facility. The device is intended to produce a visual record of the electrical signals produced by the heart and monitor the electrocardiogram to generate audible and/or visible alarms when an arrhythmia exists. The device is also intended to monitor heart rate, pulse rate, blood oxygen saturation (SpO_2), non-invasive blood pressure (NIBP), invasive blood pressure (IBP), body temperature, BIS, cardiac output (CO), oxygen concentration (FiO_2), carbon dioxide concentration (CO_2), $EtCO_2$, respiratory rate, and inspired and expired anesthetic agents and anesthetic gases including N_2O, Halothane, Isoflurane, Enflurane, Sevoflurane, and Desflurane. The device may generate an audible and/or visual alarm when a measured rate falls outside preset limits. The device may also be used to condition and transmit physiological signals via radio frequency. The device will be available for use by medical personnel on patients within a medical facility on all patient populations.

Precautions

General Handling Precautions

- This device is intended for use only by qualified medical personnel.
- Only use Nihon Kohden approved products with this device. Use of non-approved products or in a non-approved manner may affect the performance specifications of the device. This includes, but is not limited to, batteries, recording paper, extension cables, electrode leads, input units and AC power.
- This device must receive expert, professional attention for maintenance and repairs. When the device is not functioning properly, it should be clearly marked to avoid operation while it is out of order.
- This device must not be altered or modified in any way.
- The instrument and specified parts must undergo regular maintenance inspection at the interval which is specified after this "General Handling Precautions" section.

EMC Related Caution

This equipment and/or system complies with IEC 60601-1-2 International Standard for electromagnetic compatibility for medical electrical equipment and/or system. However, an electromagnetic environment that exceeds the limits or levels stipulated in IEC 60601-1-2, can cause harmful interference to the equipment and/or system or cause the equipment and/or system to fail to perform its intended function or degrade its intended performance. Therefore, during the operation of the equipment and/or system, if there is any undesired deviation from its intended operational performance, you must avoid, identify and resolve the adverse electromagnetic effect before continuing to use the equipment and/or system.

The following describes some common interference sources and remedial actions:

1. **Strong electromagnetic interference from a nearby emitter source such as an authorized radio station or cellular phone:**
   Install the equipment and/or system at another location. Keep the emitter source such as cellular phone away from the equipment and/or system, or turn off the cellular phone.

2. **Radio-frequency interference from other equipment through the AC power supply of the equipment and/or system:**
   Identify the cause of this interference and if possible remove this interference source. If this is not possible, use a different power supply.

3. **Effect of direct or indirect electrostatic discharge:**
   Make sure all users and patients in contact with the equipment and/or system are free from direct or indirect electrostatic energy before using it. A humid room can help lessen this problem.

4. **Electromagnetic interference with any radio wave receiver such as radio or television:**
   If the equipment and/or system interferes with any radio wave receiver, locate the equipment and/or system as far as possible from the radio wave receiver.

5. **Interference of lightning:**
   When lightning occurs near the location where the equipment and/or system is installed, it may induce an excessive voltage in the equipment and/or system. In such a case, disconnect the AC power cord from the equipment and/or system and operate the equipment and/or system by battery power, or use an uninterruptible power supply.

6. **Use with other equipment:**
   When the equipment and/or system is adjacent to or stacked with other equipment, the equipment and/or system may affect the other equipment. Before use, check that the equipment and/or system operates normally with the other equipment.

7. **Use of unspecified accessory, transducer and/or cable:**
   When an unspecified accessory, transducer and/or cable is connected to this equipment and/or system, it may cause increased electromagnetic emission or decreased electromagnetic immunity. The specified configuration of this equipment and/or system complies with the electromagnetic requirements with the specified configuration. Only use this equipment and/or system with the specified configuration.

8. **Use of unspecified configuration:**
   When the equipment and/or system is used with the unspecified system configuration different than the configuration of EMC testing, it may cause increased electromagnetic emission or decreased electromagnetic immunity. Only use this equipment and/or system with the specified configuration.

9. **Measurement with excessive sensitivity:**
   The equipment and/or system is designed to measure bioelectrical signals with a specified sensitivity. If the equipment and/or system is used with excessive sensitivity, artifact may appear by electromagnetic interference and this may cause mis-diagnosis. When unexpected artifact appears, inspect the surrounding electromagnetic conditions and remove this artifact source.

If the above suggested remedial actions do not solve the problem, consult your Nihon Kohden representative for additional suggestions.

The CE mark is a protected conformity mark of the European Community. Products with the CE mark comply with the requirements of the Medical Device Directive 93/42/EEC.

BSM-6301 and BSM-6501 (JA-690PA or JA-694PA data acquisition unit, QE-910P BIS processor, AE-918P neuro unit, JP-911P IBP interface isolation cable, QI-320PA or QI-420PA wireless LAN station and QI-670P interface are not connected) comply with International Standard IEC 60601-1-2: 2001 and Amendment 1: 2004 which requires CISPR11, Group 1, Class B. Class B EQUIPMENT is equipment suitable for use in domestic establishments and in establishments directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.

BSM-6301, BSM-6501 (JA-690PA or JA-694PA data acquisition unit, QE-910P BIS processor, AE-918P neuro unit, JP-911P IBP interface isolation cable, QI-320PA or QI-420PA wireless LAN station or QI-670P interface is connected) and BSM-6701 comply with International Standard IEC 60601-1-2: 2001 and Amendment 1: 2004 which requires CISPR11, Group 1, Class A. Class A EQUIPMENT is equipment suitable for use in industrial or light industrial establishments and commercial environment.

BSM-6301 and BSM-6501 (when ZS-900P is connected) are CLASS A equipment if the equipment complies with IEC 60601-1-2: 2001 36 201.1.5 in the countries which do not have national wireless rule.

Other Caution

United States law restricts this product to sale by or on the order of a physician.

Responsibility of the Manufacturer

Nihon Kohden Corporation (NKC) shall warrant its products against all defects in materials and workmanship for one year from the date of delivery. However, consumable materials such as recording paper, ink, stylus and battery are excluded from the warranty.

NKC or its authorized agents will repair or replace any products which prove to be defective during the warranty period, provided these products are used as prescribed by the operating instructions given in the user's guide, operator's and service manuals.

This warranty does not apply to products that have been modified, disassembled, reinstalled or repaired without Nihon Kohden approval or which have been subjected to neglect or accident, damage due to accident, fire, lightning, vandalism, water or other casualty, improper installation or application, or on which the original identification marks have been removed.

Conventions Used in this Manual and Instrument

Warnings, Cautions and Notes

Warnings, cautions and notes are used in this manual to alert or signal the reader to specific information.

WARNING

A warning alerts the user to possible injury or death associated with the use or misuse of the instrument.

CAUTION

A caution alerts the user to possible injury or problems with the instrument associated with its use or misuse such as instrument malfunction, instrument failure, damage to the instrument, or damage to other property.

NOTE: A note provides specific information, in the form of recommendations, prerequirements, alternative methods or supplemental information.

Text Conventions

- Names of hard keys on the bedside monitor are enclosed in square brackets: [Menu]
- Messages that are displayed on the screen are enclosed in quotation marks: “CHECK ELECTRODES”
- Names of items that are displayed on the screen are enclosed in angle brackets: <SENSITIVITY>

Explanations of the Symbols in this Manual and Instrument

MU-631R/MU-651R/MU-671R Main Unit

Symbol	Description	Symbol	Description
	"On" only for a part of instrument		Network socket
	"Off" only for a part of instrument		Output terminal
	Alternating current		Equipotential terminal
	Battery charging		Attention, consult operator's manual
	Out of paper	SN	Serial number
	Record		Date of manufacture
	Alarm silence		BIS READY label (QE-910P BIS processor/BISx processor can be connected)
	NIBP	1 2	Battery slot 1/Battery slot 2 (MU-631R only)
	NIBP interval	ZS	ZS socket
	NIBP start		CSA mark*
	NIBP stop		MR unsafe*
	Menu		The CE mark** is a protected conformity mark of the European Community. Products marked with this symbol comply with the requirements of the Medical Device Directive 93/42/EEC.
	Home		
	Data input/output		Products marked with this symbol** comply with the European WEEE directive 2002/96/EC and require separate waste collection. For Nihon Kohden products marked with this symbol, contact your Nihon Kohden representative for disposal.
	SD card slot		

* The CSA mark and MR unsafe mark only apply to the MU-631RA/MU-651RA/MU-671RA.
** The CE mark and WEEE mark only apply to the MU-631RK/MU-651RK/MU-671RK.

AY Series Input Unit

Symbol	Description	Symbol	Description
	Defibrillation-proof type CF applied part	SN	Serial number
	Output terminal		The CE mark is a protected conformity mark of the European Community. Products marked with this symbol comply with the requirements of the Medical Device Directive 93/42/EEC.
	Date of manufacture		
	Attention, consult operator's manual		

BSM-1700 Series Bedside Monitor

Refer to the BSM-1700 series bedside monitor operator's manual.

AA-672P/AA-674P Smart Expansion Unit

Symbol	Description	Symbol	Description
	Defibrillation-proof type CF applied part		Date of manufacture
	Attention, consult operator's manual		The CE mark is a protected conformity mark of the European Community. Products marked with this symbol comply with the requirements of the Medical Device Directive 93/42/EEC.
	Serial number		

QI-631P Interface

Symbol	Description	Symbol	Description
	Serial interface (RS-232C socket)		Attention, consult operator's manual
	External display (RGB socket)		

QI-632P Interface

Symbol	Description	Symbol	Description
	Input/output terminal (USB socket and Multi-link socket)		Attention, consult operator's manual
	Output terminal (Alarm socket)		

QI-634P Interface

Symbol	Description	Symbol	Description
	Input/output terminal (USB socket and Multi-link socket)		Attention, consult operator's manual

QI-671P Interface

Symbol	Description	Symbol	Description
	Input/output terminal (Multi-link socket)		External display (RGB socket)
	Serial interface (RS-232C socket)		Attention, consult operator's manual
	Output terminal (Alarm socket)		

QI-672P Interface

Symbol	Description	Symbol	Description
	Input/output terminal (USB socket and Multi-link socket)		Attention, consult operator's manual

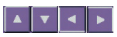
WS-671P Recorder Module

Symbol	Description	Symbol	Description
	Attention, consult operator's manual		The CE mark is a protected conformity mark of the European Community. Products marked with this symbol comply with the requirements of the Medical Device Directive 93/42/EEC.
	Serial number		
	Date of manufacture		

SB-671P Battery Pack

Symbol	Description	Symbol	Description
	Recycle mark		Products marked with this symbol require separate waste collection according to EU battery directive 2006/66/EC.
	The CE mark is a protected conformity mark of the European Community. Products marked with this symbol comply with the requirements of the Medical Device Directive 93/42/EEC.		Products marked with this symbol comply with environmental protection use period of 10 years according to the ST/J11364 "Marking for Control of Pollution Caused by Electronic Information Products" of the People's Republic of China Electronic Industry Standard.

On screen

Symbol	Description	Symbol	Description
	Alarm silence		Accessing to SD card
	Alarm suspended		Checking SD card
	All alarms off/Vital sign alarm limit off		SD card failure
	Non-paced		Adjust setting/Scroll data
	QRS/pulse sync mark		Zoom in/Zoom out
	Respiration sync mark		Left end/Right end
	Battery status	@	Touch panel calibration
	Cascade display		

General Safety Information

WARNING

Never use the monitor in the presence of any flammable anesthetic gas or high concentration oxygen atmosphere. Failure to follow this warning may cause explosion or fire.

WARNING

When the monitor is used with an electrosurgical unit (ESU), firmly attach the entire area of the ESU return plate. Otherwise, the current from the ESU flows into the electrodes of the monitor, causing electrical burn where the electrodes are attached. For details, refer to the ESU manual.

WARNING

Before defibrillation, all persons must keep clear of the bed and must not touch the patient or any equipment or cord connected to the patient. Failure to follow this warning may cause electrical shock or injury.

WARNING

Do not use this instrument system or components during MRI imaging.

WARNING

After attaching electrodes, probes and sensors on the patient and connecting cables to the bedside monitor, check that there is no error messages and the waveforms and numeric data are appropriately displayed on the screen. If there is an error message, or waveform or numeric data is not appropriate, check the electrodes, probes and sensor attachment, patient condition and settings on the bedside monitor and remove the cause.

WARNING

Never use the monitor in a hyperbaric oxygen chamber. Failure to follow this warning may cause explosion or fire.

WARNING

When performing defibrillation, discharge as far as possible from electrodes, patches and any gel, cream or medicine on the chest of the patient. If there is a possibility that the defibrillator paddle could touch these materials, remove them from the patient. If the defibrillator paddle directly contacts these materials, the discharged energy may cause skin burn to the patient.

WARNING

Do not perform defibrillation when the cables are located between the defibrillator paddles. The discharged energy may be insufficient.

WARNING

Do not allow the conductive part of the connector which is connected to the patient to contact other conductive parts including earth. This causes leakage current and incorrect measurement value and leads to wrong diagnosis.

WARNING

Do not use the same monitor for more than one patient at the same time. Do not connect different sensors from different patients to the same monitor.

WARNING

Do not leave the SD card near the patient or in reach of children.

CAUTION

Only use Nihon Kohden specified electrodes, probes, transducers, thermistors and catheters. Otherwise, the maximum performance from the monitor cannot be guaranteed.

CAUTION

Make sure that the electrodes and cords attached to the patient are properly connected to the monitor. Otherwise, incorrect data may be displayed and lead to wrong diagnosis.

CAUTION

Turn off the power of mobile phones, small wireless devices and other devices which produce strong electromagnetic interference around a patient (except for devices allowed by the hospital administrator). Radio waves from devices such as mobile phones or small wireless devices may be mistaken as pulse waves and the displayed data may be incorrect.

CAUTION

When the “CONNECTOR OFF” message appears on the screen, check that the connection cords are connected to the sockets properly. The patient cannot be monitored and the alarm does not function while this message is displayed.

CAUTION

The ZS-900P transmitter can only transmit temperature data from 5 to 45°C (41 to 113°F). Be careful when reading the value.

CAUTION

Do not reuse disposable parts and accessories.

For caution and usage of the electrode and transducer, refer to the manual of the electrode and transducer.

CAUTION

After the monitor power is turned on, parameter-related alarms do not function until the parameters are monitored.

CAUTION

When admitting a new patient, first delete all data of the previous patient. Otherwise, the data of the previous patient and new patient will be mixed together.

CAUTION

If fluids are accidentally spilled into the monitor, take the monitor out of service and contact your Nihon Kohden representative. The monitor must be disassembled, cleaned, dried and tested for safety and function.

CAUTION

When using a ZS-900P transmitter, the measurement values and displayed waveform on the bedside monitor and receiving monitor may differ due to timing delay of the display and other factors. Be careful when reading the value and waveform.

CAUTION

When transmitting CO_2 data through a ZS-900P transmitter to a receiving monitor, if the transmitted CO_2 data is out of the range of the receiving monitor, the maximum value of the receiving monitor is displayed instead. Be careful when reading the value.

NOTE: Operate the monitor on battery power if you cannot confirm the grounding or wiring in your facility.

Using External Instruments

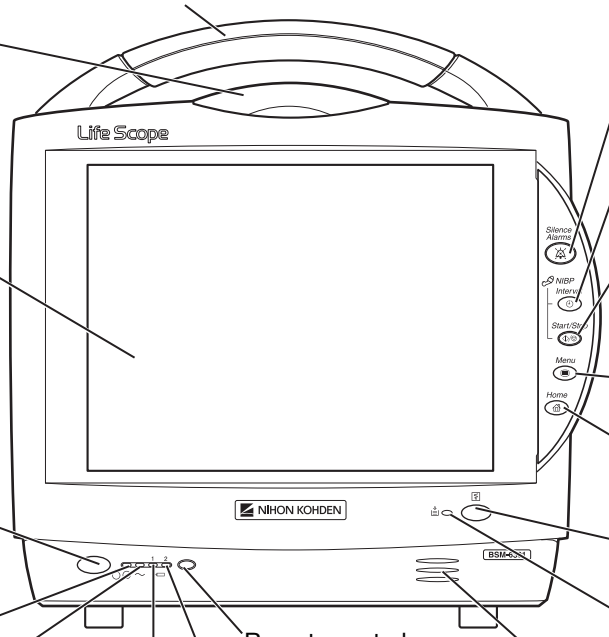
WARNING

When connecting an external instrument using an interface or communication cable to the monitor, some alarms and messages from the external instrument might not be displayed on the monitor. When the waveform or data is abnormal, check the alarm and message on the external instrument.

Panel Description

MU-631R Main Unit

Front Panel



Handle
For carrying the monitor.

Alarm indicator
Red or yellow lamp blinks, or yellow or cyan lamps lights according to the alarm settings. Green lamp blinks in synchronization with the patient's QRS or pulse.

Touch screen
Displays monitoring data. Touching a key or data on the screen changes the displayed screen and settings.

Power switch
Press to turn the monitor power on. When turning the monitor power off, press and hold for more than three seconds.

Power lamp
Lights when the monitor power is turned on.

AC power lamp
Lights when the power cord is connected between the AC SOURCE socket and AC outlet.

Battery lamp 1
Indicates a battery status of the battery in the battery slot 1.

Remote control sensor
Receives an infrared signal from the remote control.

Battery lamp 2
Indicates a battery status of the battery in the battery slot 2.

Silence Alarms key
Silences the alarm sound.

NIBP Interval key
Selects NIBP measurement mode. Pressing this key changes the mode.

NIBP Start/Stop key
Starts NIBP measurement in selected mode. Pressing the key during measurement stops measurement.

Menu key
Displays the MENU window.

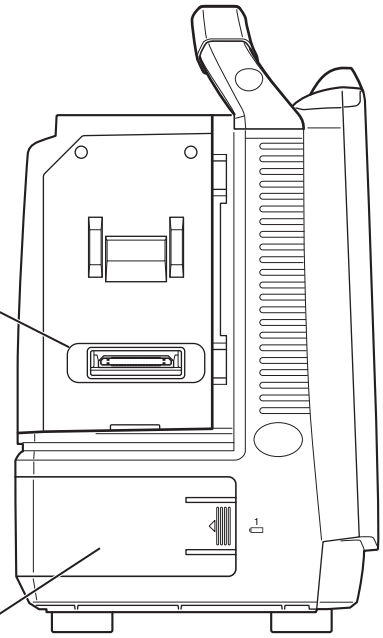
Home key
Closes all opened windows and displays the home screen.

Record/Stop key (option)
Press to start or stop recording.

Error lamp (option)
Blinks when out of paper. Lights when the recorder door is open.

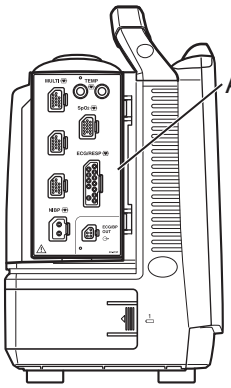
Speaker
For alarm and sync sound.

Left Side Panel

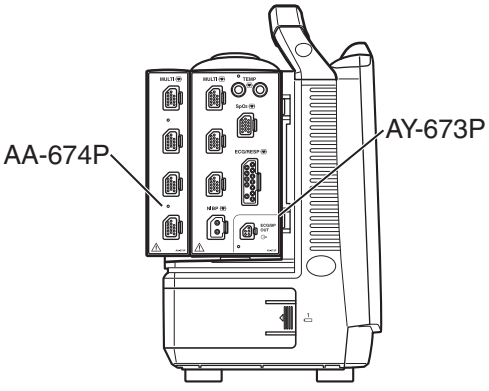


Input unit socket
Connects an AY series input unit or BSM-1700 series bedside monitor.

Battery pack holder 1 (Battery slot 1)
For an SB-671P battery pack.

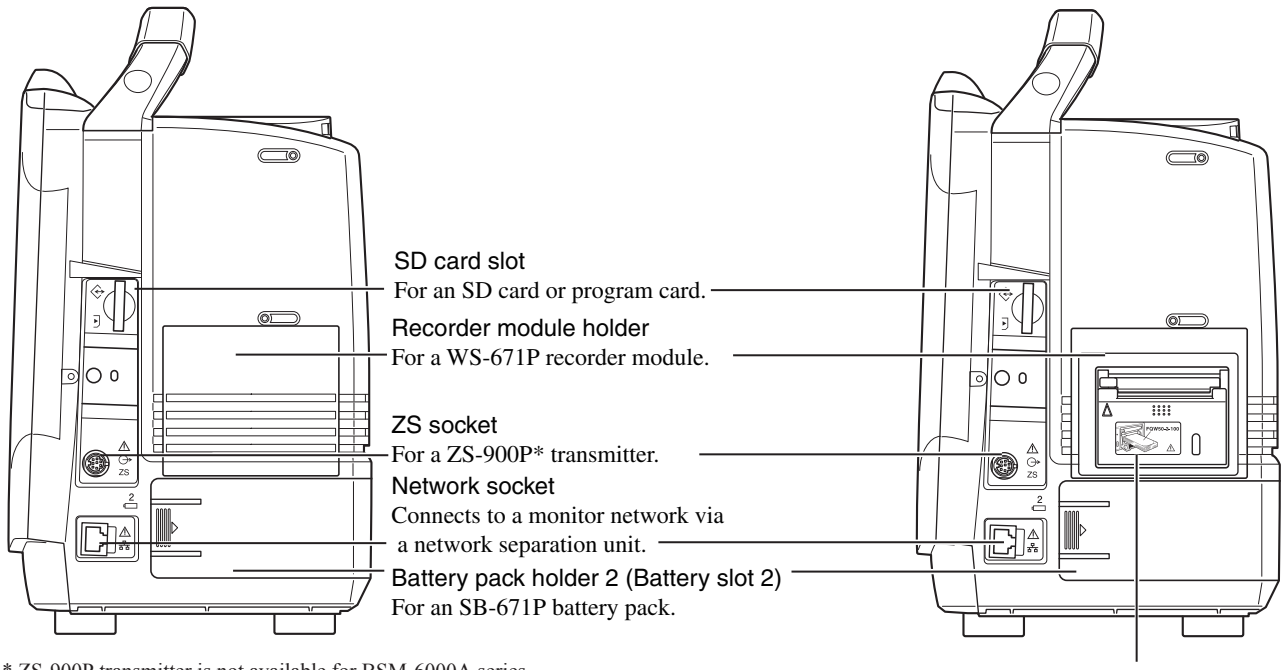


When an AY-673P input unit is installed



When an AY-673P input unit and AA-674P smart expansion unit are installed

Right Side Panel

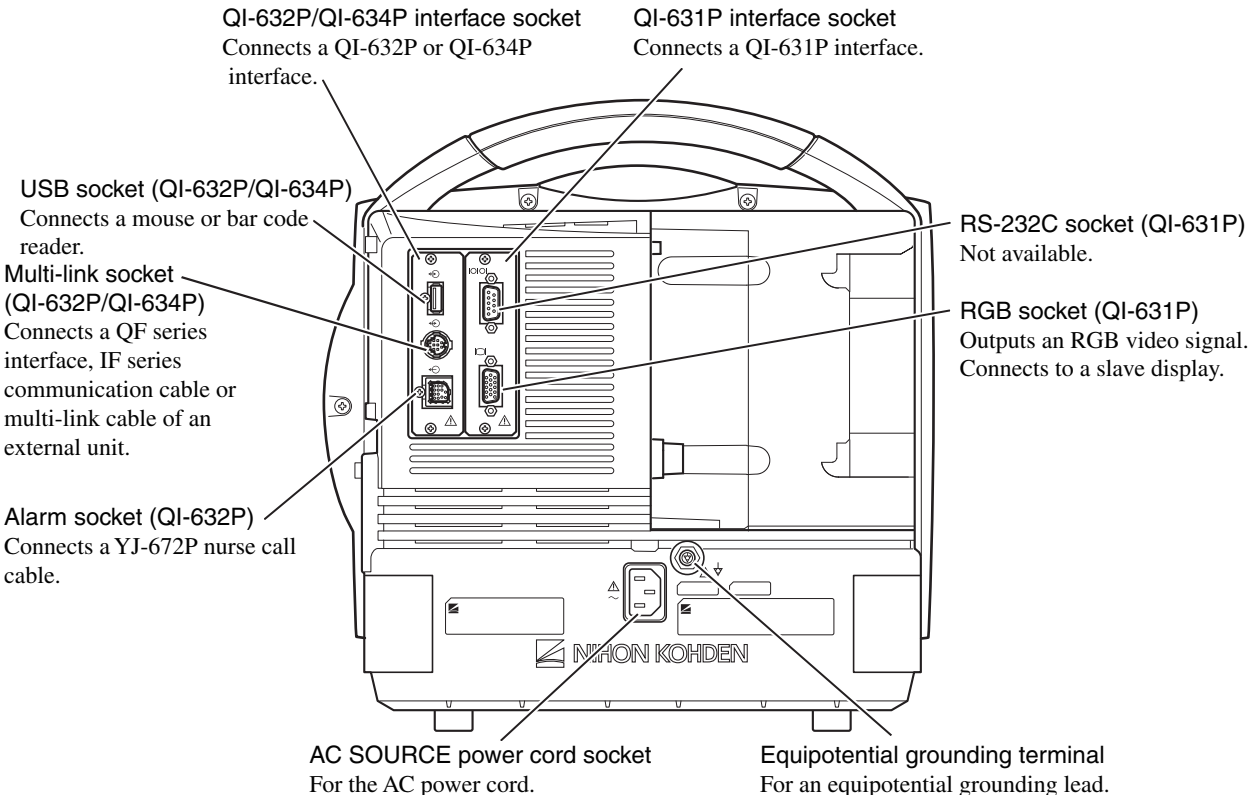


* ZS-900P transmitter is not available for BSM-6000A series.

When a WS-671P recorder module is installed

Rear Panel

Example shows QI-631P and QI-632P interfaces installed.



MU-651R/MU-671R Main Unit

Front Panel

Handle
For carrying the monitor.

Alarm indicator
Red or yellow lamp blinks, or yellow or cyan lamps lights according to the alarm settings. Green lamp blinks in synchronization with the patient's QRS or pulse.

Touch screen
Displays monitoring data. Touching a key or data on the screen changes the displayed screen and settings.

Power switch
Press to turn the monitor power on. When turning the monitor power off, press and hold for more than three seconds.

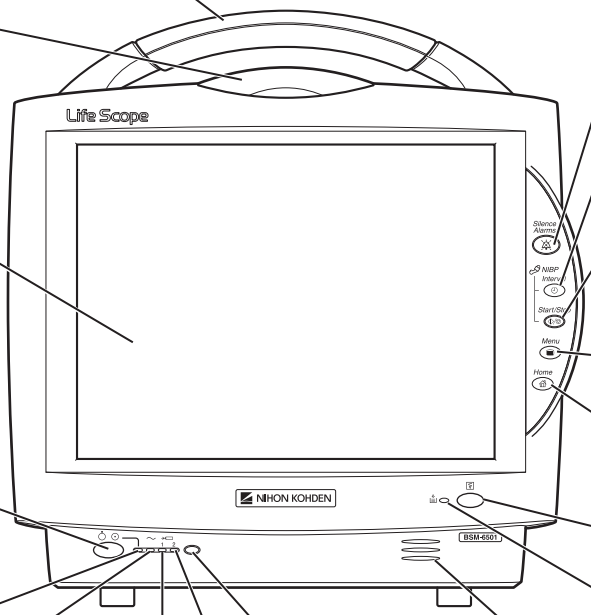
Power lamp
Lights when the monitor power is turned on.

AC power lamp
Lights when the power cord is connected between the AC SOURCE socket and AC outlet.

Battery lamp 1
Indicates a status of the battery in the battery slot 1.

Remote control sensor
Receives an infrared signal from the remote control.

Battery lamp 2
Indicates a status of the battery in the battery slot 2.



Silence Alarms key
Silences the alarm sound.

NIBP Interval key
Selects NIBP measurement mode. Pressing this key changes the mode.

NIBP Start/Stop key
Starts NIBP measurement in the selected mode. Pressing the key during measurement stops measurement.

Menu key
Displays the MENU window.

Home key
Closes all opened windows and displays the home screen.

Record/Stop key (option)
Press to start or stop recording.

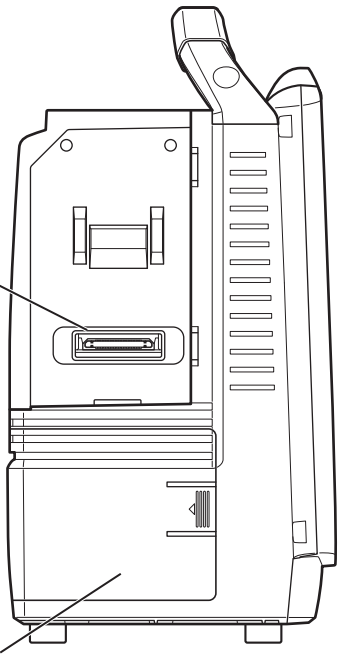
Error lamp (option)
Blinks when out of paper. Lights when the recorder door is open.

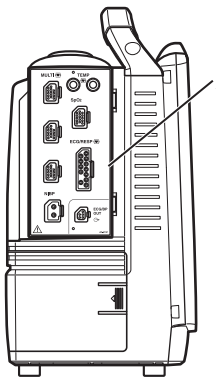
Speaker
For alarm and sync sound.

Left Side Panel

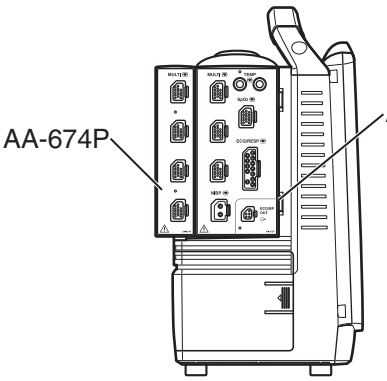
Input unit socket
Connects an AY series input unit or BSM-1700 series bedside monitor.

Battery pack holder
For an SB-671P battery pack.



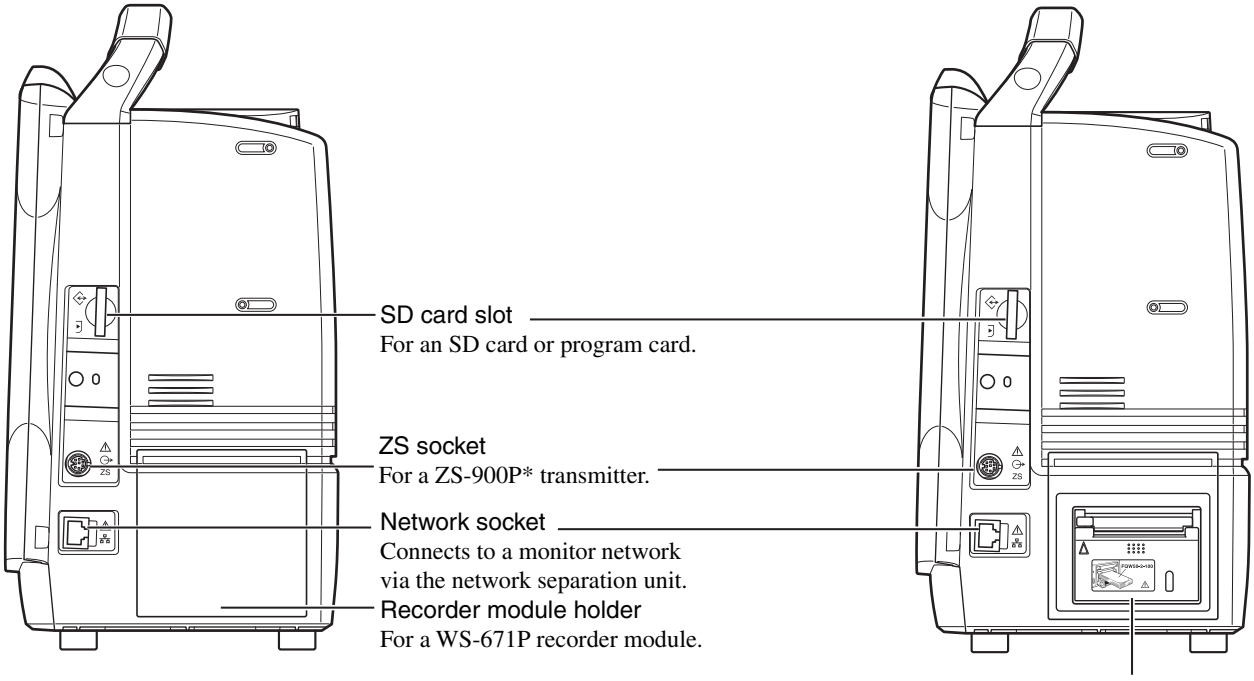


When an AY-673P input unit is installed



When an AY-673P input unit and AA-674P smart expansion unit are installed

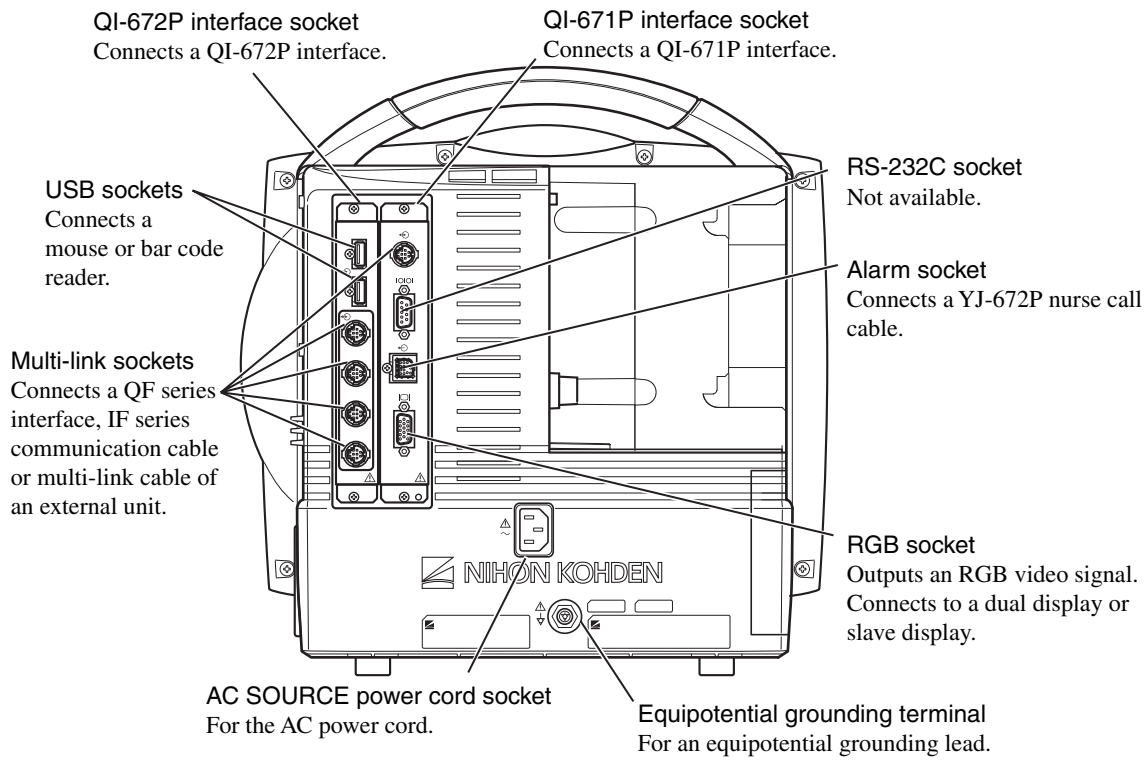
Right Side Panel



* ZS-900P transmitter is not available for BSM-6000A series.

When a WS-671P recorder module is installed

Rear Panel



AY-631P/AY-633P/AY-651P/AY-653P/AY-660P/AY-661P/AY-663P/AY-671P/AY-673P Input Unit

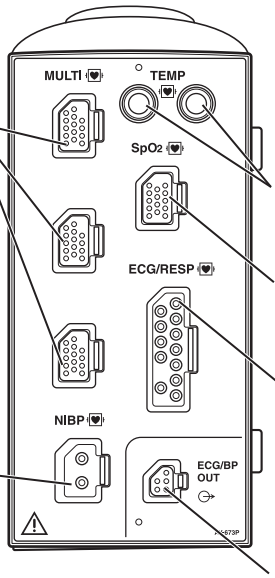
Front Panel

AY-660P: One TEMP socket, one MULTI socket, no ECG/BP OUT socket

AY-631P/AY-651P/AY-661P/AY-671P: Two TEMP sockets, one MULTI socket

AY-633P/AY-653P/AY-663P/AY-673P: Two TEMP sockets, three MULTI sockets

Example is AY-673P input unit.



MULTI socket
Connects to the connection cord of the parameter to be monitored (IBP, temperature, CO, CO_2, O_2, respiration by thermistor method, SpO_2-2 (AY-661P/663P/671P/673P only), BIS or CCO (APCO)). The type of parameter is automatically recognized.

NIBP socket
Connects to the air hose.

TEMP socket
Connects to the temperature probe cord.

SpO_2 socket
Connects to the SpO_2 connection cord.

ECG/RESP socket
Connects to the ECG connection cord.

ECG/BP OUT socket
Outputs 100 mmHg/V IBP waveform and 1 mV/V ECG waveform and heart rate trigger by using the YJ-910P or YJ-920P ECG/BP output cable. These analog signals can be used as the synchronization signal for other equipment, such as IABP.

WARNING

When performing defibrillation during cardiac output monitoring, never touch the CO connection cord. The discharged energy may cause electrical shock or injury.

CAUTION

When using the output signal from the monitor as the synchronization signal for other equipment such as an IABP (intra-aortic balloon pump) or defibrillator:

- Set the timing of the IABP by checking the waveform on the IABP screen.
- Check the condition of the bedside monitor at all times. The output signal may become unstable.
- Check that the delay time of the output signal is within the range of the connected equipment.

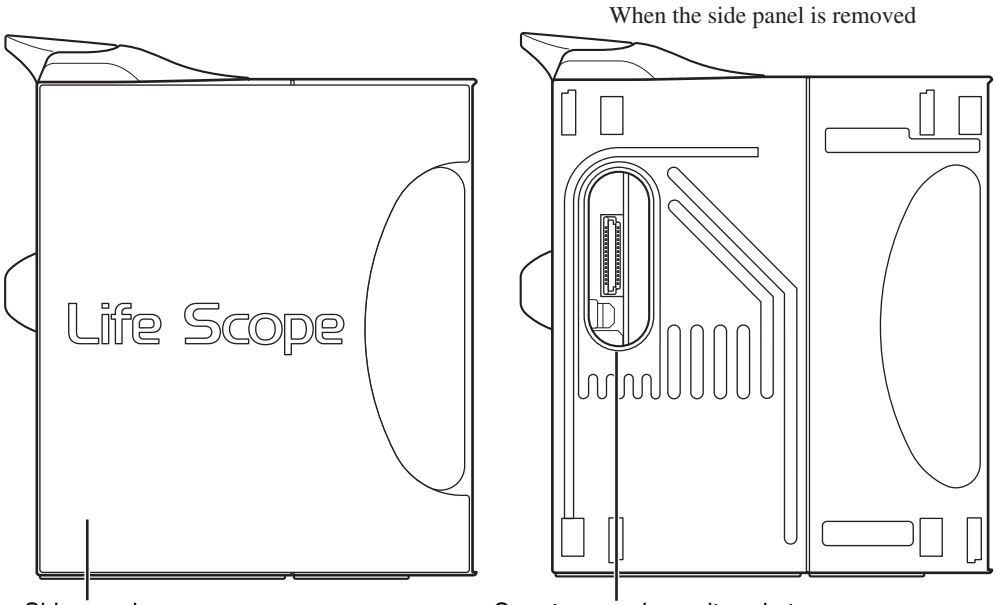
CAUTION

Only a Nihon Kohden defibrillator can use the output signal from the monitor as a synchronization signal. Check that the delay time of the output signal (heart rate trigger 20 ms maximum) is within the range of the connected defibrillator.

NOTE:

- When using an IBP waveform as a synchronization signal for other equipment, connect the IBP line to the MULTI socket on the input unit. The IBP waveform that is used for the synchronization signal depends on the “IBP ANALOG OUT” setting in the SYSTEM SETUP window.
  - When “IBP ANALOG OUT” is set to FIXED POSITION:
    The IBP line connected to the top MULTI socket on the input unit is used.
  - When “IBP ANALOG OUT” is set to HIGHEST PRIORITY LABEL:
    When more than one IBP waveform is acquired, the IBP waveform of the highest priority label is used.
    IBP label priority:
    ART > ART2 > RAD > DORS > AO > FEM > UA > LVP > P1 > P2 > P3 > P4 > P5 > P6 > P7
- Analog ECG, analog BP and heart rate trigger output are not available when an AY-660P input unit is used.
- The output signal from the ECG/BP OUT socket may become unstable in the following conditions.
  - Electrode is dry or detached.
  - Electrode lead is damaged or disconnected from the electrode.
  - Electrode lead is pulled.
  - AC interference or EMG noise superimposed.
  - Air bubbles or blood clog in the circuit for monitoring IBP.
  - Cord or cable is disconnected or damaged.
- All instruments which are to be connected to the ECG/BP OUTPUT socket must use a YJ-910P or YJ-920P ECG/BP output cable and comply with the IEC 60601-1 safety standard for medical equipment.

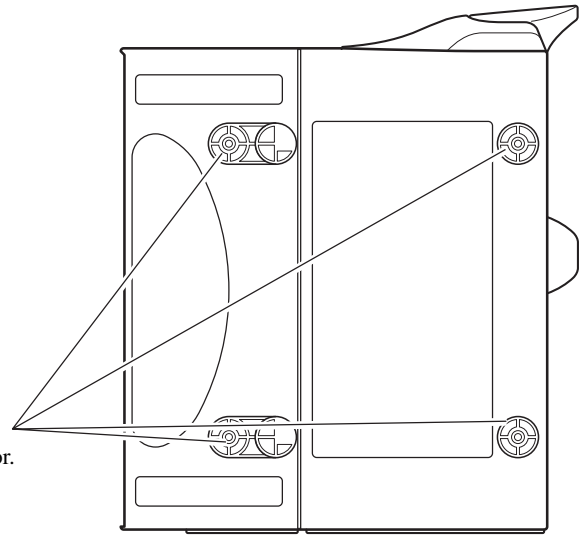
Left Side Panel



Side panel
Remove to attach an AA-672P or AA-674P smart expansion unit.

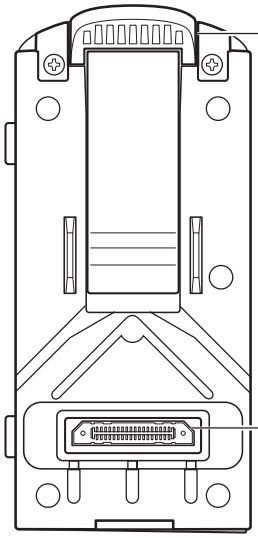
Smart expansion unit socket
Connects an AA-672P or AA-674P smart expansion unit.

Right Side Panel



Tabs
Match the tabs on the input unit to the slots on the bedside monitor.

Rear Panel



Lock release lever
Lift up the lever to remove the input unit from the bedside monitor.

Input unit socket
For connecting a bedside monitor.

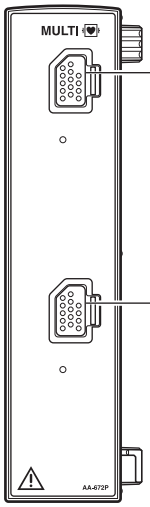
BSM-1700 series Bedside Monitor

Refer to the BSM-1700 series bedside monitor operator's manual.

AA-672P/AA-674P Smart Expansion Unit

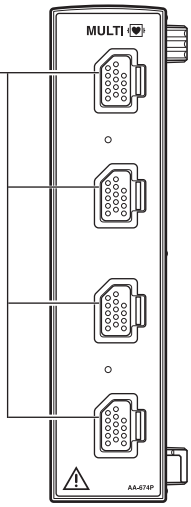
Front Panel

AA-672P

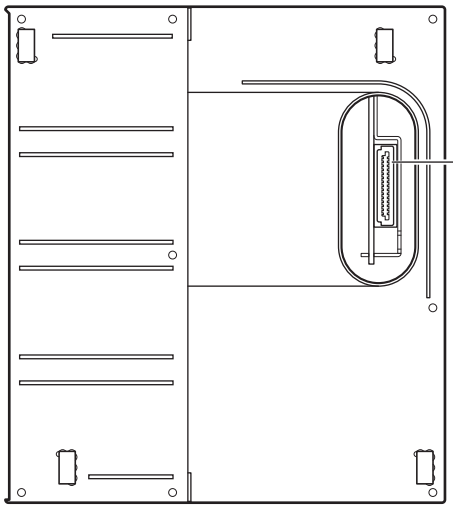


MULTI socket
Connects to the connection cord of the parameter to be monitored (IBP, temperature, CO, CO_2, O_2, respiration by thermistor method, SpO_2-2 (AY-661P/663P/671P/673P only), BIS or CCO (APCO)). The type of parameter is automatically recognized.

AA-674P



Right Side Panel



Connector
Connects an AY-631P, AY-633P, AY-651P, AY-653P, AY-661P, AY-663P, AY-671P or AY-673P input unit.

Installation

General

The monitor must be installed by qualified personnel. Details are in the Administrator's Guide.

WARNING

Only use the provided power cord. Using other power cords may result in electrical shock or injury to the patient and operator.

WARNING

When several medical instruments are used together, ground all instruments to the same one-point ground. Any potential difference between instruments may cause electrical shock to the patient and operator.

WARNING

Connect only the specified instrument to the monitor and follow the specified procedure. Failure to follow this warning may result in electrical shock or injury to the patient and operator, and cause fire or instrument malfunction.

WARNING

- Do not install the monitor and optional units above the patient.
- Only use the specified tools or equipment when installing the monitor and units. Failure to follow this warning may result in the monitor or unit falling and injuring the patient.

CAUTION

Only use the specified stand, cart or equipment for installing the monitor and instruments. Using non-specified equipment may result in the instruments falling and causing injury.

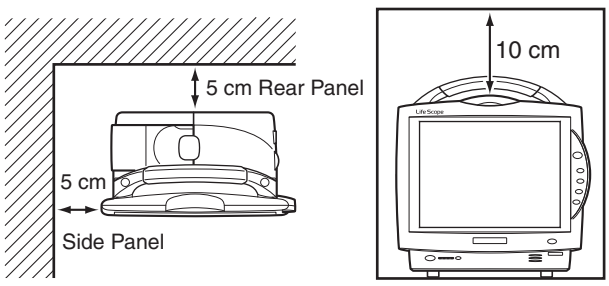
CAUTION

When not using the specified cart, carefully set the monitor to prevent it from falling off or tipping over.

CAUTION

Before connecting or disconnecting instruments, make sure that each instrument is turned off and the power cord is disconnected from the AC socket. Otherwise, the patient or operator may receive electrical shock or injury.

Make sure that there is more than 5 cm of space between the monitor and the wall for adequate ventilation. When the monitor is surrounded, make sure that there is about 10 cm of space above the monitor for ventilation so that the operating temperature does not exceed 40°C (104°F).



Grounding the Monitor

When more than one electrical instrument is used, there may be electrical potential difference between the instruments. The potential difference between the instruments may cause current to flow to the patient connected to the instruments, resulting in electrical shock.

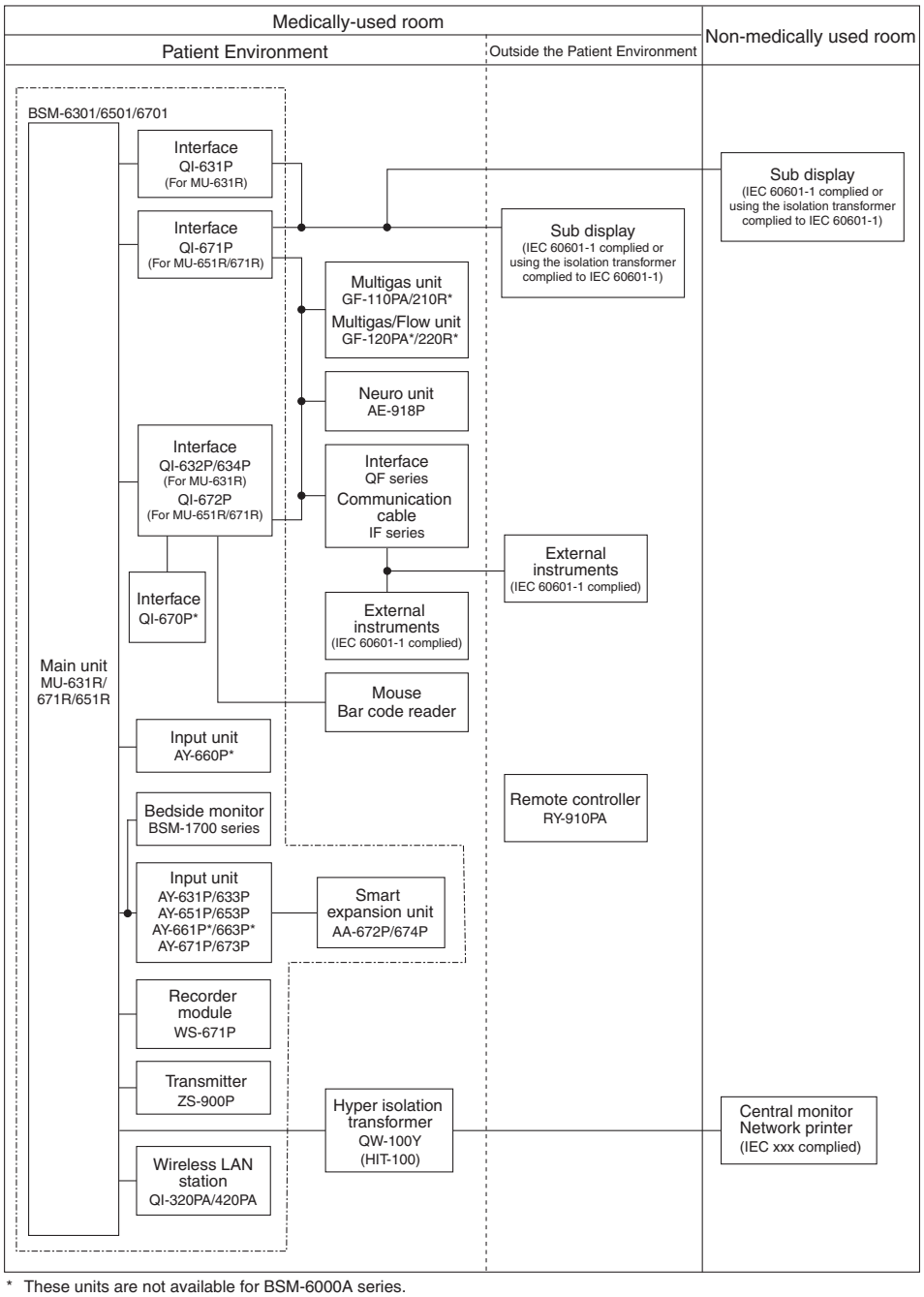
When equipotential grounding is required, connect the equipotential ground terminal on the instrument to the equipotential ground terminal on the wall (equipotential grounding system) with the equipotential grounding lead (potential equalization conductor).

NOTE:

- For details on connecting an external instrument to the monitor, contact your Nihon Kohden representative.
- Leakage current may increase when interconnecting many medical instruments to the monitor.

Environment for External Instruments

Use external instruments in the following environment.



* These units are not available for BSM-6000A series.

Warnings and Cautions for Connecting the Monitor to a Network

WARNING

Install all network devices, including printer and hubs, outside the patient environment (IEC 60601-1-1). If they are installed inside the patient environment, the patient or operator may receive electrical shock or injury. For installation, contact your Nihon Kohden representative.

WARNING

Check the software version number of the monitor before connecting it to the network. Different software versions have different communication methods. More than one communication method in a network may cause communication failure. For details, refer to the Network and System Installation Guide.

WARNING

Connect the monitor to network as specified. Otherwise the patient and operator may receive electrical shock or injury. To connect the network, contact your Nihon Kohden representative.

WARNING

In a network where this monitor is connected, connect only the specified instruments. Unspecified instruments may cause electrical shock or injury to the patient and operator or cause instrument malfunction, instrument stop, or data loss.

WARNING

Do not use a damaged network cable. The patient or operator may receive electrical shock when the damaged part is touched.

CAUTION

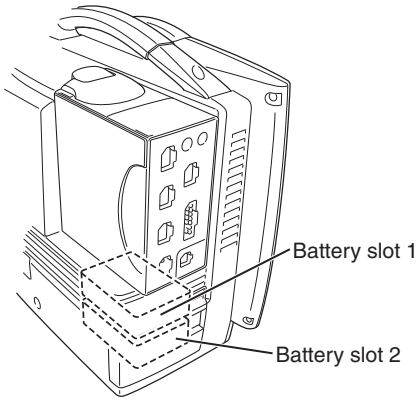
When the monitor is connected to a central monitor network, set the Bed Name (Bed ID) and Group Name on the monitor. Otherwise, the default settings are used for the bed name and group name and the bed may be incorrectly identified on the central monitor.

CAUTION

The network must be managed by the network administrator. Make sure that each monitor in the network has a different IP address. Otherwise, data communication cannot be performed properly. When adding a monitor to an already operating network, set the IP address on the monitor before connecting the monitor to the network.

Inserting and Removing the Battery Packs

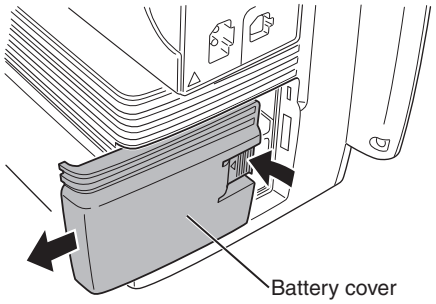
This monitor can hold two battery packs. Insert the battery pack to the battery slot 1 or/and battery slot 2.



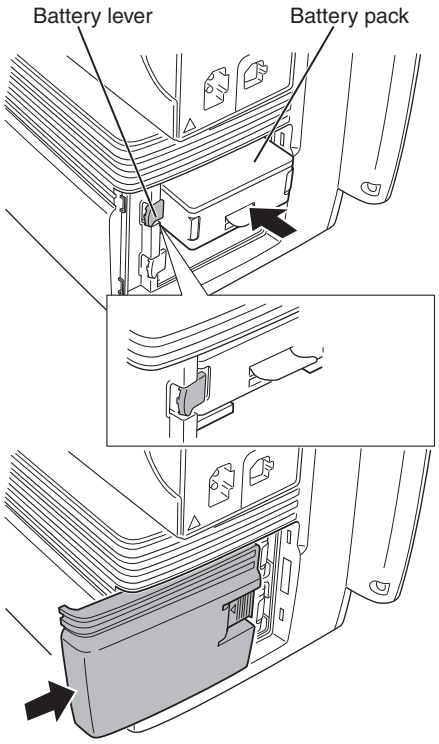
NOTE:

- Only use the SB-671P battery pack.
- The procedure for inserting and removing the battery packs is the same for BSM-6301 and BSM-6501/BSM-6701 bedside monitors even though the battery slot positions and battery cover shapes are different.

Inserting the Battery Pack



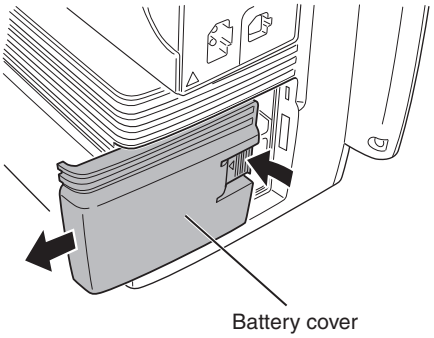
1. Remove the battery cover by pressing the tab on the battery cover and slide the cover off.



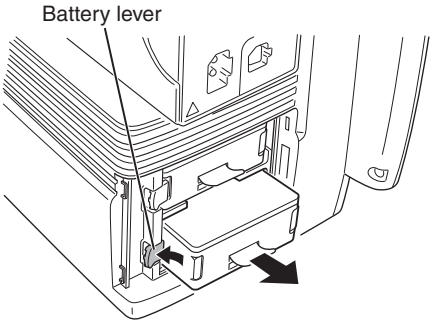
2. Insert the battery pack with the label (black) facing up in the battery slot.

3. Attach the battery cover.

Removing the Battery Pack

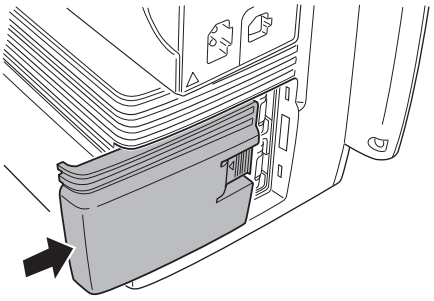


1. Remove the battery cover by pressing the tab on the battery cover and slide the cover off.



2. Press the battery lever to release the lock.

3. Pull out the battery pack from the battery slot.



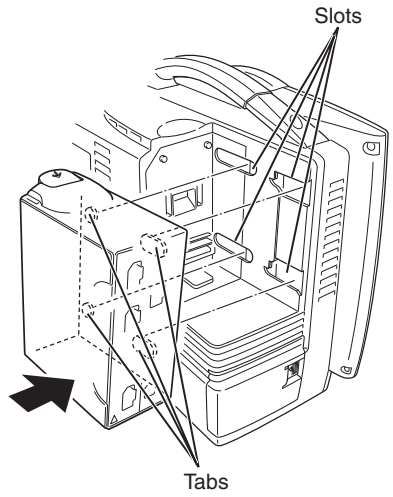
4. Attach the battery cover.

Inserting and Removing the AY-600P series Input Unit or BSM-1700 series Bedside Monitor

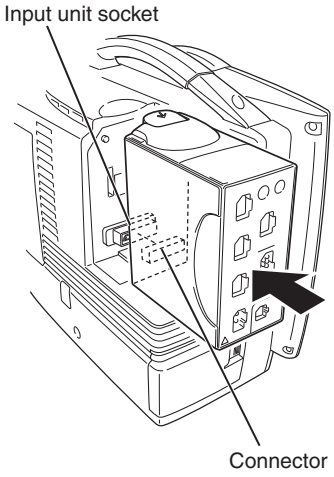
The AY-600P series input unit or BSM-1700 series bedside monitor can be inserted to or removed from the monitor. When the patient is changed or moved to a different location, insert or remove the input unit or BSM-1700 series bedside monitor.

The following procedure is for the AY-600P series input unit. For details on inserting and removing the BSM-1700 series bedside monitor, refer to the BSM-1700 series bedside monitor operator's manual.

Inserting the Input Unit

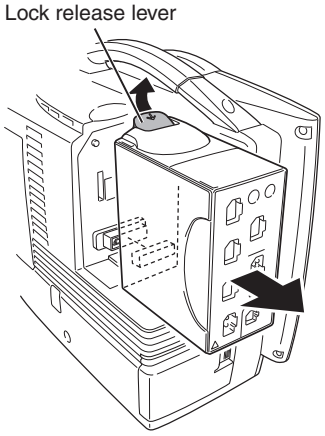


1. Put the input unit into the rear of the monitor so that the four tabs go into the four slots.



2. Slide the input unit all the way into the monitor until it clicks into place.

Removing the Input Unit



CAUTION

When inserting or removing the input unit from the monitor, be careful not to drop it.

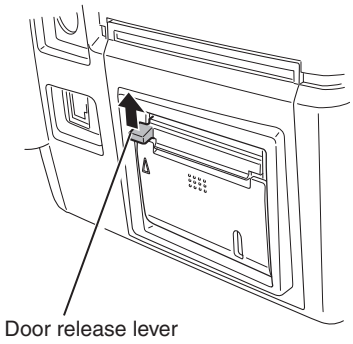
Slide out the input unit while pulling up the lock release lever.

Loading Recording Paper

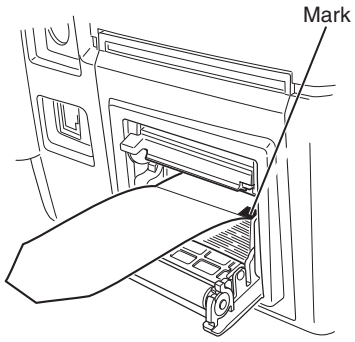
When using the WS-671P recorder module, load recording paper as follows.

CAUTION

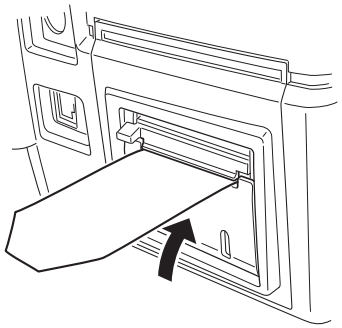
Do not touch the thermal head inside the recorder module. The thermal head may be damaged by static electricity or become dirty and cause printing failure.



1. Move the door release lever in the direction of the arrow (△) to release the lock.



2. Open the recorder door. Set the recording paper (FQW50-2-100) inside the recorder module so that the detection mark (small black square on corner) of the paper is on the right side.



3. Draw out one page of paper toward you and close the recorder door.

   If the out of paper lamp is still lit, the recorder door is not closed properly.

Turning the Monitor On or Off

Turning the Monitor On

The monitor can operate on either battery or AC power. When the monitor is installed and the power cord is connected, the AC power lamp lights. When a battery pack is installed and the power cord is disconnected or there is a sudden power failure, the monitor automatically switches to battery power. The monitor can operate for about 90 minutes (BSM-6301/BSM-6501) or 60 minutes (BSM-6701) with a new fully charged battery pack when:

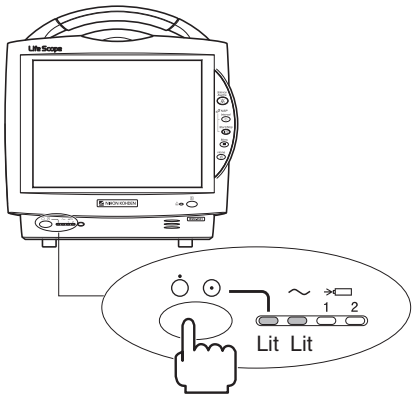
- Used in normal temperature.
- Recorder is stopped.
- No alarm occurs.
- Monitoring ECG, respiration (impedance) and SpO_2.
- <POWER SAVING MODE> on the SYSTEM SETUP window is set to ON.
- <SYNC SOUND VOLUME> on the VOLUME window is set to OFF.
- NIBP measurement interval is 15 minutes.
- QI-671P and QI-672P interfaces or QI-631P and QI-632P or QI-634P interfaces are installed in the monitor.
- The input unit is an AY-600P series input unit and not a BSM-1700 series bedside monitor.

Check Before Turning On the Power

Check the following items before turning on the power.

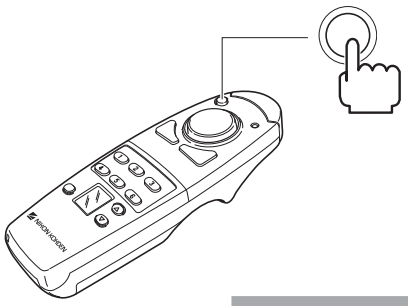
- Enough electrodes and electrode leads are ready.
- Cleaned and sterilized sensors and transducers are ready.
- Power cord is connected properly.
- Equipotential grounding lead is connected properly when equipotential grounding is required.
- All cables are connected properly.
- Enough recording paper in the recorder (when using an optional recorder).
- Fully charged battery pack is installed in the monitor in case of a sudden power failure.
- No scratches, damage or dirt on the monitor.
- No damage to the keys and panels.
- No damage to the power cord.
- No damage to the electrode leads, transducers, probes and cables.
- The monitor is not in a wet place.

NOTE: When the AC power lamp is not lit, check the power cord connection. The AC power lamp does not light when there is not enough current to each unit.



When the power cord is connected between the bedside monitor and AC outlet and the AC power lamp lights, press the [Power] switch on the front panel to turn the power on. The power lamp and the AC power lamp light and self check starts. When the check is complete, the home screen appears.

NOTE: Even though the position of symbol marks for the lamps are different on BSM-6301 and BSM-6501/BSM-6701 bedside monitors, the function and the position of lamps are the same.



The power can also be turned on by pressing the [POWER] button on the remote control.

CAUTION

When the monitor is turned on, check that a single beep sounds and the red, yellow, cyan and green alarm indicator lamps blink once. This shows that the alarm is functioning properly.

NOTE: The sound volume when the monitor power is turned on is the volume set on <ALARM VOLUME> of the VOLUME window.

When the monitor power is turned on, alarms are suspended while the monitor is waiting for the electrodes and probe to be attached to the patient. The monitoring starts when the connection cord is connected to the socket on the monitor and the electrodes or probe are attached to the patient. The alarm activates when one of the following occurs:

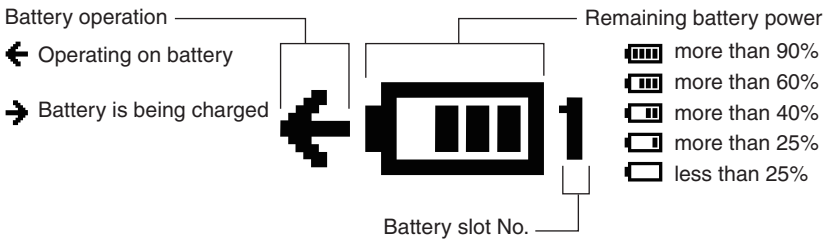
- ECG, SpO_2 or IBP is monitored or NIBP is measured and a value is displayed (when AUTO is selected for <ALARM ACTIVATION DELAY> on the ALARM window of the SYSTEM SETUP window).
- ECG, SpO_2 or IBP is continuously monitored for the selected time (when 1 min, 2 min or 3 min is selected for <ALARM ACTIVATION DELAY>).
- NIBP is measured (when 1 min, 2 min or 3 min is selected for <ALARM ACTIVATION DELAY>).

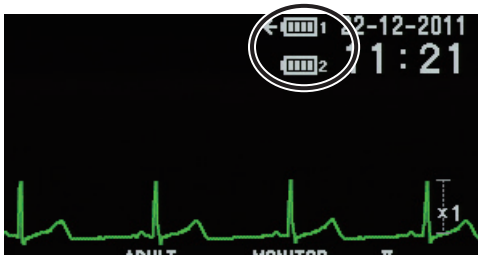
Check After Turning On the Power and During Monitoring

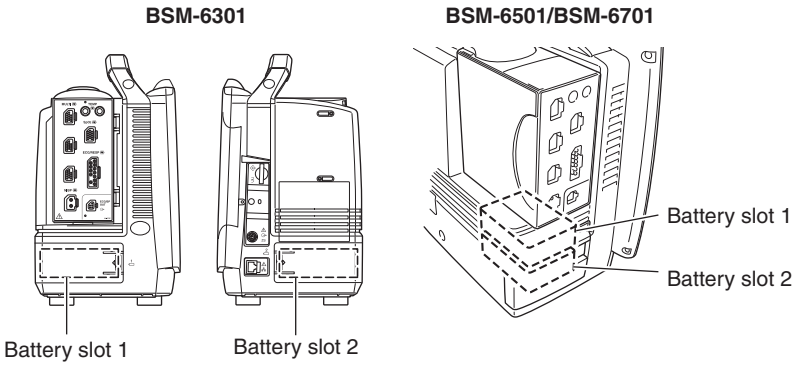
To start monitoring safely and properly, check the following items after turning on the power. If any problem is detected, take the proper countermeasure according to the troubleshooting and maintenance sections.

- There is no fire, smoke or smell.
- The monitor is not too hot.
- The power lamp and other lamps light.
- Alarm indicators (red, yellow, cyan and green lamps) blink once and a beep sounds.
- The start up screen and the home screen appears.
- No error message is displayed on the screen.
- The time on the screen is correct.
- The monitor does not affect surrounding equipment.
- The data and waveforms are displayed properly.
- Keys and switches operate properly.
- The touch keys function properly and the key clicking sound is generated.
- Alarm functions properly.
- Alarm sound can be heard.
- Alarm sound volume setting is appropriate.
- There is no trouble in recording (when using an optional recorder).
- Sound can be heard from the monitor.

Power and Battery Status Indications



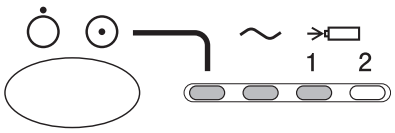




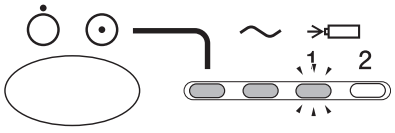
Power and battery status are indicated by four lamps on the bedside monitor. A discharged battery is also indicated by battery marks, screen message and alarm.

NOTE:

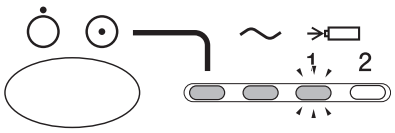
- When charging the battery pack with the monitor power turned off, check that the power lamp and battery charging lamp light. If the lamps do not light even when the power cord is connected and the battery pack is inserted, turn the power on, check that the battery charging lamp is blinking or lit, then turn the power off.
- Even though the position of symbol marks for the lamps are different on BSM-6301 and BSM-6501/BSM-6701 bedside monitors, the function and the position of lamps are the same.



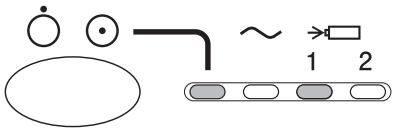
- Operating on AC power and battery pack is fully charged or there is no battery
  Power lamp: Lit
  AC power lamp: Lit
  Battery lamp 1: Lit or off
  Battery lamp 2: Lit or off



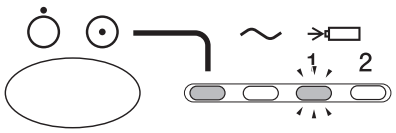
- Operating on AC power and battery pack is being charged
  Power lamp: Lit
  AC power lamp: Lit
  Battery lamp 1: Slow blinking (once every 2 seconds) or off
  Battery lamp 2: Slow blinking (once every 2 seconds) or off



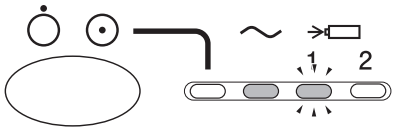
- Operating on AC power when battery pack is damaged
  Power lamp: Lit
  AC power lamp: Lit
  Battery lamp 1: Rapid blinking (4 times per second) or off
  Battery lamp 2: Rapid blinking (4 times per second) or off
  Screen indication: “BATTERY ERROR” message
  Alarm indication: Continuous “bing bong” sound (when NK1 is selected for <ALARM SOUND TYPE> on the ALARM window of the SYSTEM SETUP window) and blinking yellow alarm indicator lamp



- Operating on battery power
  Power lamp: Lit
  AC power lamp: Off
  Battery lamp 1: Lit* or off
  Battery lamp 2: Lit* or off
  * When two battery packs are used and when the battery pack which is not used is fully charged



- Operating on battery power and battery pack is damaged
  Power lamp: Lit
  AC power lamp: Off
  Battery lamp 1: Rapid blinking (4 times per second) or off
  Battery lamp 2: Rapid blinking (4 times per second) or off
  Screen indication: “BATTERY ERROR” message
  Alarm indication: Continuous “bing bong” sound (when NK1 is selected for <ALARM SOUND TYPE> on the ALARM window of the SYSTEM SETUP window) and blinking yellow alarm indicator lamp



- No monitoring and charging battery pack
  Power lamp: Off
  AC power lamp: Lit
  Battery lamp 1: Slow blinking (once every 2 seconds) or off
  Battery lamp 2: Slow blinking (once every 2 seconds) or off

Battery Pack Handling and Operation

WARNING

Do not do the following to the battery pack. It may cause leakage, overheating, explosion and fire.

- Short-circuit the + and – terminals on the battery pack.
- Put the battery pack into fire or heat the battery pack.
- Disassemble or modify the battery pack.
- Give strong impact to or deform the battery pack.
- Use the battery pack on unspecified instruments.
- Charge the battery pack on unspecified instruments.
- Install the battery pack with the wrong polarity.
- Leave the battery pack in the reach of patients.

CAUTION

Do not expose the battery pack to direct sunlight or leave in a high temperature place. The lifetime of the battery pack may be shortened, the performance of the battery pack may be degraded and the battery pack may leak.

WARNING

If the battery pack is damaged and the substance inside the battery pack contacts the eyes or skin, wash immediately and thoroughly with water and see a physician. Never rub your eyes, because you may lose your eyesight.

WARNING

- Do not immerse the battery pack in water. The battery pack may heat up and rust and the substance inside the battery pack may leak.
- Do not leave the battery pack unused for more than about two years. The battery pack may leak.

CAUTION

Do not use a battery pack with a damaged cover. The operator may receive electrical shock.

CAUTION

Do not tilt the monitor when removing the battery pack from the monitor. If the lock release lever is lifted while the monitor is tilted, the battery pack falls out of the monitor and may injure the patient or operator.

CAUTION

Do not leave the battery pack near the patient or in reach of children.

CAUTION

Do not use a battery pack which is past the expiration date written on the label.

CAUTION

Do not subject the battery pack to a strong mechanical shock.

CAUTION

Use the battery pack between 10°C (50°F) and 40°C (104°F). Temperatures out of this range affect the working of the battery.

CAUTION

Before disposing of the battery pack, check with your local solid waste officials for details in your area for recycling options or proper disposal. The battery pack is recyclable. At the end of its useful life, under various state and local laws, it may be illegal to dispose of this battery pack into the municipal waste stream.

NOTE: Be careful when handling the fully charged battery pack. The battery pack heats up to about 60°C (140°F).

Battery Pack Handling Procedures

- Always place a battery pack in the monitor. This charges it so that you will always have a fully charged battery pack ready.
- Fully recharge the battery pack before using it for the first time or after storing it for over a month. When the battery pack is not used, it self-discharges.
- Replace the battery pack with a new one every year. This is because the battery pack is a chemical product which gradually deteriorates whether or not it is used.
- Store the battery packs under the following conditions.

  Temperature: –20 to +60°C (–4 to +140°F) (within 30 days)
  –20 to +45°C (–4 to +113°F) (within 90 days)
  –20 to +35°C (–4 to +95°F) (more than 90 days)

  Humidity: 20 to 85% RH (noncondensing)

When Not Using the Monitor or Battery Pack

- When the monitor is not used for a long time, remove the battery pack. When a charged or discharged battery pack is left inside the monitor with the power cord unplugged, the battery pack self-discharges and deteriorates.
- When a battery pack is not used, fully charge it before storage. When a battery pack is not used for over one month, fully charge it once every six months.

When the "BATTERY WEAK" Message Appears

Operate the monitor on AC power and/or replace the battery pack when the "BATTERY WEAK" message appears. When the "BATTERY WEAK" message appears, the remaining battery power is less than 25%. The yellow alarm lamp lights with a continuous "bing bong" sound.

If no AC or battery power is supplied to the monitor, there is no measurement and patient data such as trend data may be lost.

Charging the Battery Pack

The battery pack can be charged by the monitor. It takes about 10 hours to charge one battery pack during monitoring and 6 hours to charge two battery packs when not monitoring.

NOTE: The new battery pack is not charged. Charge the battery pack before use.

The monitor can operate for about 90 minutes (BSM-6301/BSM-6501) or 60 minutes (BSM-6701) with a new fully charged battery pack when:

- Used in normal temperature.
- Recorder is stopped.
- No alarm occurs.
- Monitoring ECG, respiration (impedance) and SpO_2.
- <POWER SAVING MODE> on the SYSTEM SETUP window is set to ON.
- <SYNC SOUND VOLUME> on the VOLUME window is set to OFF.
- NIBP measurement interval is 15 minutes.
- QI-671P and QI-672P interfaces or QI-631P and QI-632P or QI-634P interfaces are installed in the monitor.
- The input unit is an AY-600P series input unit and not a BSM-1700 series bedside monitor.

CAUTION

When charging the battery pack, keep the ambient temperature at approximately 20°C to maintain the optimal battery operation time. If the battery pack is charged at less than 10°C (50°F) or more than 30°C (86°F), the maximum battery operation time will be 20% to 30% less than the optimal operation time.

Charging in the Monitor

Normal charging

During AC operation, the battery pack is automatically charged without interrupting monitoring. It takes approximately 10 hours of continuous charging to fully charge a battery pack.

Fast charging

It takes 6 hours of continuous charging to fully charge two battery packs when not monitoring. When installing two battery packs, the monitor can charge the two battery packs at the same time.

After continuous charging, the monitor automatically switches to trickle charging mode to keep the battery pack fully charged. Trickle charging is necessary because the battery pack can self-discharge even when it is not in use.

NOTE: Do not disconnect the power cord from the monitor during battery charging.

Stored Data Status at Power On

Stored data status at power on depends on the settings on the DATA MANAGEMENT window of the SYSTEM CONFIGURATION screen, whether the previous patient is discharged, and whether the power is off for more than 30 minutes. For details, refer to the “Admitting/Discharging Patient” section.

Monitor Status on Power Interruption

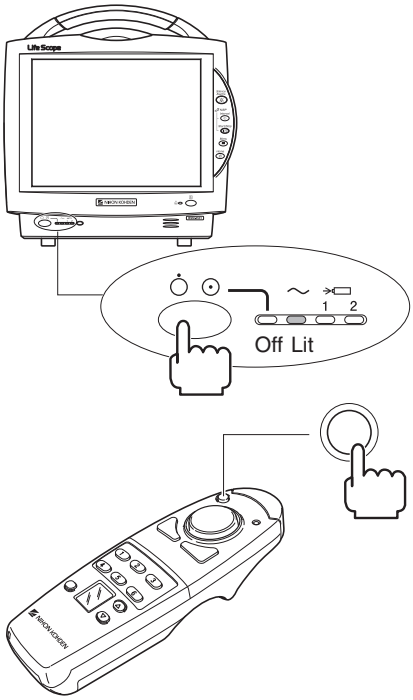
When there is a power failure or sudden power interruption, the monitor status is as follows.

- When a battery pack is installed in the monitor, the BSM-6301 and BSM-6501 operate for about 90 minutes and the BSM-6701 operates for about 60 minutes on battery power.
- When the monitor has no battery pack installed or the battery pack is discharged, the monitor turns off. When the AC power is restored, the monitor turns on automatically. The patient data and settings are stored for about 30 minutes after power off when <DATA TRANSPORT USING INPUT UNIT> is set to DISABLE and <SHOW ADMIT CONFIRMATION WINDOW> is turned off in the SYSTEM CONFIGURATION screen.

  When <DATA TRANSPORT USING INPUT UNIT> is set to ENABLE, the patient data and settings are always stored.

When there is a power failure or sudden power interruption, immediately connect the monitor to the emergency power source. It is recommended to always keep the battery pack in the monitor.

Turning the Monitor Off



Press the [Power] switch on the bedside monitor for more than three seconds to turn the power off. The screen becomes dark and the power lamp on the front panel turns off.

NOTE:

- Press the [Power] switch and hold for more than three seconds to turn the power off.
- Do not disconnect the power cord while the monitor power is on. Data may be lost.
- Even though the position of symbol marks for the lamps are different on BSM-6301 and BSM-6501/BSM-6701 bedside monitors, the function and the position of lamps are the same.

The power can also be turned off by pressing the [POWER] button for more than three seconds on the remote control.

Check After or Before Turning the Power Off

Check the following items for the next use.

- Previous patient data is deleted.
- Temporarily changed settings are changed back to the previous settings.
- There is no dirt, damage or scratches on the monitor.
- The sensors, probes, transducers, and cables are cleaned and sterilized.
- Accessories are cleaned and stored properly.
- There are enough consumables, such as recording paper, and disposable electrodes for the next use.
- Battery pack is fully charged.
- The power switch on the monitor is turned off and the power cord is disconnected from the monitor.
- The monitor is not in a wet place.
- Dead batteries are disposed of properly.
- The medical waste is disposed of properly.
- The monitor is stored properly.

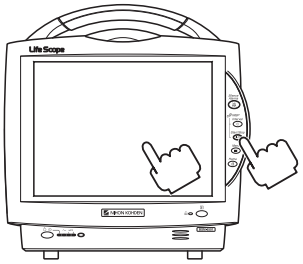
Basic Operation

The monitor can be operated by the following methods. These methods can be used together.

- The hard keys on the bedside monitor
- Touch screen
- Remote control
- Mouse

This manual mainly describes operations using the hard keys on the bedside monitor and touch screen.

Using the Hard Keys on the Bedside Monitor and Touch Screen

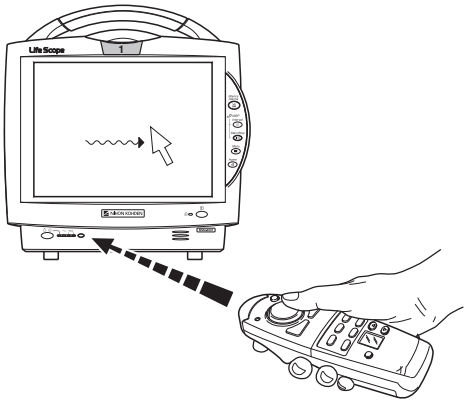


Press the key on the bedside monitor to open the window or operate the function assigned to the key.

Press the key on the screen to select the setting or open/close a window. You can use the scroll bar on the screen to scroll data on the window.

There is a pip sound when a key or screen is touched, or the scroll bar on the screen is used.

Using the Remote Control



Use the remote control to operate the monitor from a distance. A pointer appears on the screen when the monitor is operated by the remote control. The remote control channel can be assigned to the monitor to prevent operating a different monitor. Point the transmitter on the remote control to the remote control sensor on the bedside monitor.

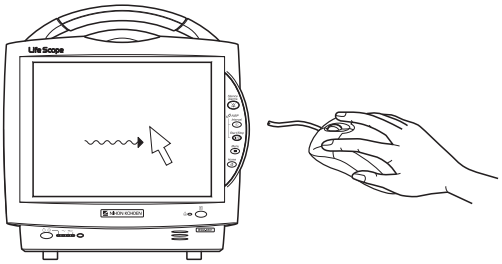
Press the keys on the remote control to open/close a window.
Move the selection knob up/down/left/right to scroll the data or select a setting and press the [ENTER] key to register the setting.

There is a pip sound when a key on the remote control is pressed or the selection knob is moved to scroll the data.

NOTE:

- Watch the monitor screen and check the operation when using the remote control to avoid wrong operation.
- Make sure that the remote control is handled appropriately.

Using the Mouse

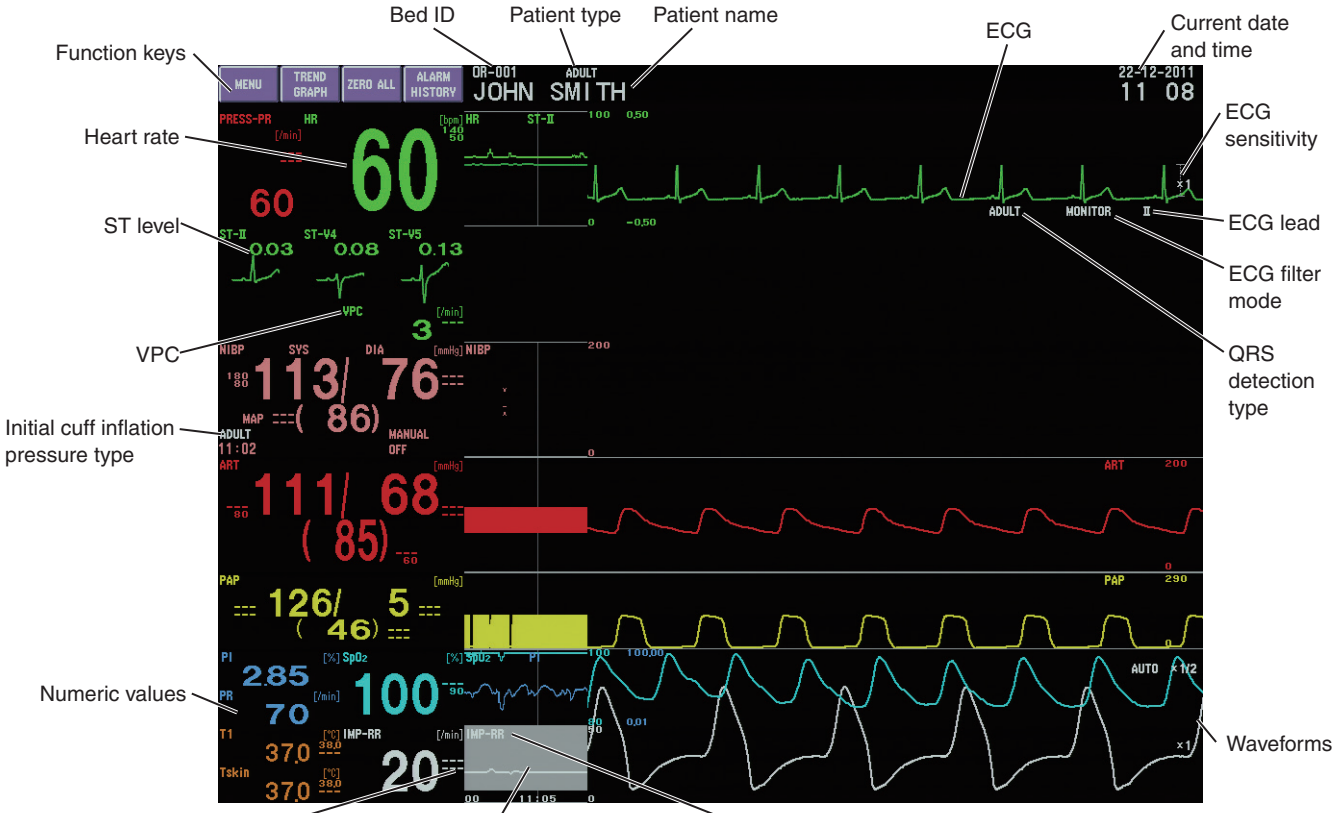


When connecting a QI-632P, QI-634P or QI-672P interface, use the mouse to move the pointer on the screen and click the left button to select and register the setting.

There is a pip sound when the mouse is clicked.

Home Screen Description

The home screen displays the numeric values and waveforms of the monitoring parameters, current trendgraphs, various messages and operation keys. Different screen layouts are available by changing the settings on the SYSTEM SETUP window.



Alarm limit settings
For BSM-6000A series, when the limit is set to OFF, “OFF” is displayed. For BSM-6000K series, when the limit is set to OFF, “---” is displayed.

Current trendgraphs
The width of the trendgraph can be changed. OCRG can be displayed instead of trendgraphs.

Respiration rate
Respiration rate is detected from one parameter. When several respiration parameters are monitored at the same time, the respiration rate is counted from the parameter in the following priority.
Anesthetic gas > Flow > CO_2 > thermistor respiration > impedance respiration

The respiration rate is detected from two parameters when <DISPLAY IMP-RR AS SECOND PARAMETER> is set to ON.

To close the opened window and return to the home screen, press the [Home] key on the bedside monitor or the [MENU/HOME] key on the remote control.

Touching the following items on the home screen displays the following windows.

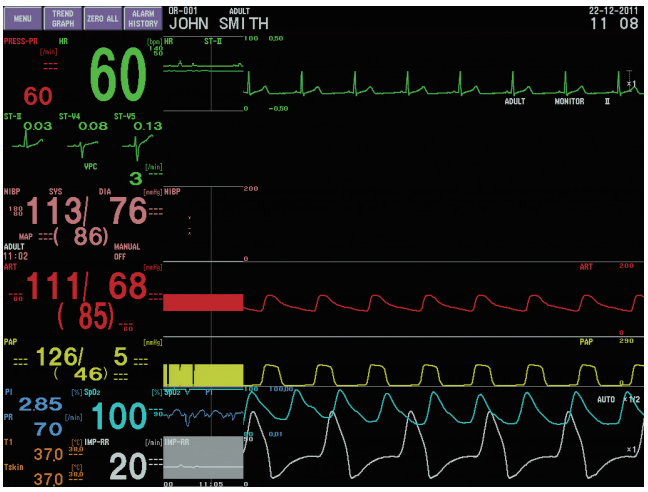
- Numeric value: Parameter window
- Patient name: ADMIT DISCHARGE window
- Time: DATE window
- Function key: Window assigned to the function key

Settings for the Home Screen

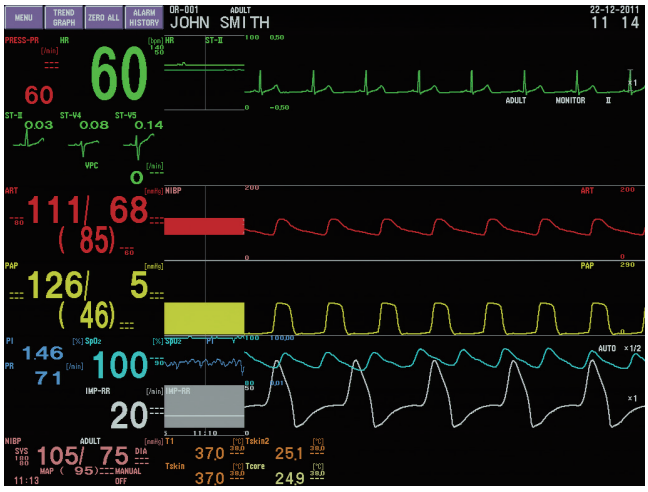
The home screen has the following settings.

- Select numeric parameter display area (On the DISPLAY window of the SYSTEM SETUP window)
- Select large numeric screen layout (On the DISPLAY window of the SYSTEM SETUP window)
- Select cascade ECG waveform on or off (On the DISPLAY window of the SYSTEM SETUP window)

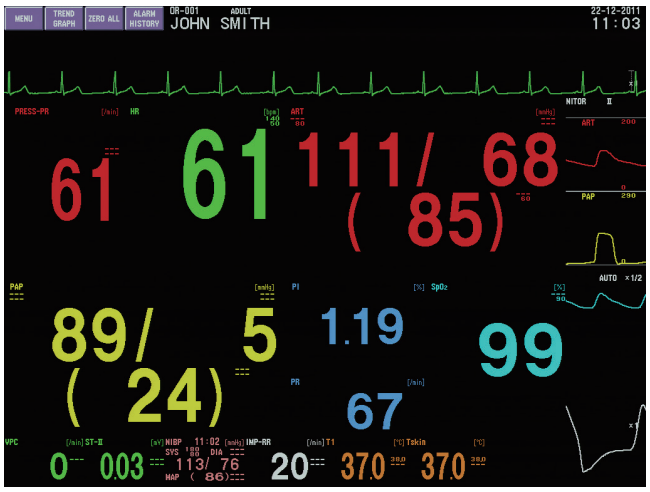
NOTE: ECG waveform can be cascaded when there is enough space.



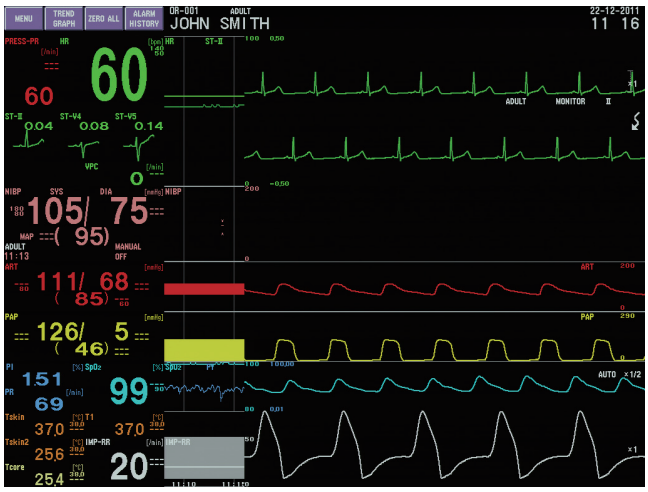
NUMERIC PARAMETER AREA - SIDE



NUMERIC PARAMETER AREA - SIDE + SMALL BOTTOM



LARGE NUMERIC SCREEN LAYOUT - 2 × 2



CASCADE DISPLAY - ON

- Select waveform display on or off (On the DISPLAY window of the SETUP window)
- Select current trendgraph/OCRG display (On the SYSTEM window of the SYSTEM SETUP window)
- Select number of ECG waveforms (On the DISPLAY window of the SETUP window)
- Select the pacing mark position on the ECG waveform (On the PARAMETERS window of the SYSTEM SETUP window)
- Select pulse rate display (On the ECG window of the SETUP window)
- Select ECG measurement on or off (On the ECG window)
- Select respiration/CO_2 waveform sweep speed (On the DISPLAY window of the SETUP window)
- Select pulse rate display in SpO_2 or SpO_2-2 area (On the SpO_2 window)
- Select oscillation graph display (On the NIBP window)
- Select IBP waveform display type (On the DISPLAY window of the SETUP window)
- Select IBP waveform display area (On the SYSTEM window of the SYSTEM SETUP window)
- Select PPV/SPV display (On the PRESS window)
- Select sensitivity/scale of the waveform (Parameter windows) and SCALE SETUP window of the TREND GRAPH page
- Select ST wave and reference ST wave display on or off (On the ST window of the REVIEW window)

Trendgraph on the Home Screen (Current Trendgraph)

The latest 30 minute parameter data can be displayed as a trendgraph on the home screen. This trendgraph can be dragged left or right by touching the right edge of the trendgraph on the screen.

OCRG

The OCRG (oxygen-cardio-respirogram) can be displayed on the home screen instead of a trendgraph. To display OCRG on the home screen, select either “OCRG 1 cm/min” or “OCRG 3 cm/min” for <CURRENT TREND> on the DISPLAY window of the SYSTEM SETUP window.

Freezing Waveforms

You can freeze (stop sweeping) the waveforms on the home screen by touching the FREEZE function key at the upper left corner of the screen or on the remote control. The waveforms are frozen for 3 minutes or until the interbed window appears. To unfreeze the waveforms manually, touch any key on the screen or press any key on the bedside monitor.

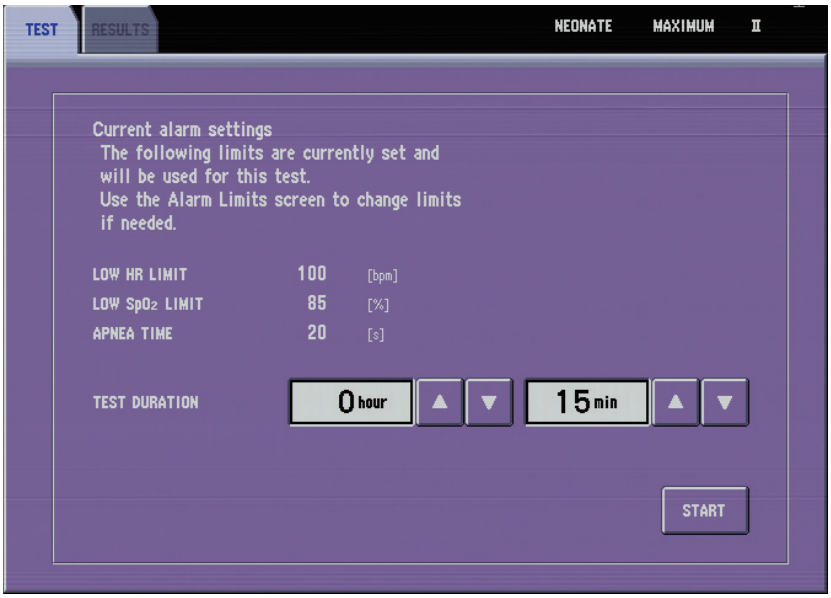
Using the Timer

The timer can be displayed on the home screen by touching the TIMER key on the MENU window or the TIMER function key on the upper left of the screen if the TIMER is assigned to the function key.
To start counting up, touch the START key on the TIMER window. To stop the timer, touch the STOP key. When closing the TIMER window, touch the RESET key to reset the timer and touch the ☒ key.

Car Seat Challenge

The American Academy of Pediatrics recommends car seat challenge for all neonates born before 37 weeks gestation to ensure that the neonate is able to sit in a car seat safely without any episodes of oxygen desaturation apnea or bradycardia.

The CAR SEAT CHALLENGE window measures a neonate’s lower heart rate limit, lower SpO_2 limit and apnea time for a set duration. This function is only available on BSM-6000A series bedside monitors when the site mode is NICU.



Using Sleep Mode

To prevent the monitor from disturbing the patient during sleep or other times, use the SLEEP MODE. In sleep mode, the screen is darkened and sync sound is turned off. To turn sleep mode on, touch the SLEEP key on the MENU window. The sleep mode is only available when the ZS-900P* transmitter is connected or the bedside monitor is connected to the central monitor network.

* ZS-900P transmitter is not available for BSM-6000A series.

WARNING

When using sleep function, monitor the patient on the central monitor or telemetry system. Otherwise, the bedside monitor alarm may be overlooked. When <EXIT SLEEP MODE ON CRISIS ALARM> check box on the ALARM page of the SYSTEM SETUP window is OFF, bedside monitor alarms and sync sound appear on the central monitor but do not appear on the bedside monitor during sleep mode.

To turn the sleep mode off, touch the screen or press any hard key on the bedside monitor. When the sleep mode is turned off by pressing a hard key, the function of that hard key is also performed.

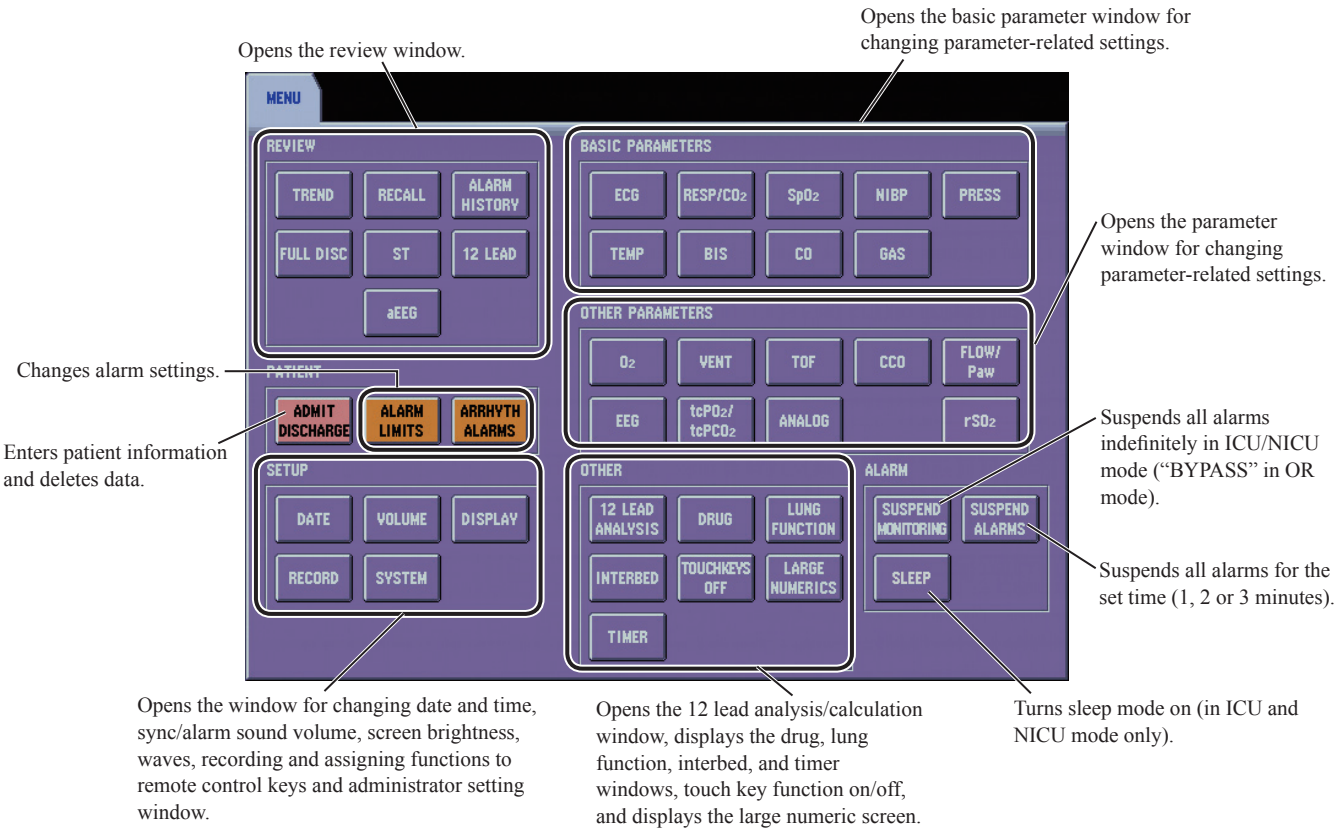
When <EXIT SLEEP MODE ON CRISIS ALARM> on the SLEEP page of the SYSTEM SETUP window is set to ON, the sleep mode is turned off when an CRISIS level alarm occurs. When the time is set in <SLEEP MODE WILL END AT> box, the monitor exits the sleep mode on the set clock time.

When the communication between the bedside monitor and central monitor is interrupted, the bedside monitor exits sleep mode.

MENU Window Description

Press the [Menu] key on the bedside monitor or the [MENU/HOME] key on the remote control to display the MENU window. Any window, except for the home screen and SYSTEM CONFIGURATION screen, can be displayed from the MENU window. The MENU window layout differs according to the selected site.

Example: OR or ICU site



NOTE:

- On BSM-6000A series,
  - FLOW/Paw key is not available.
  - 12 LEAD and 12 LEAD ANALYSIS keys are not available when the site setting is NICU and 12 LEAD ANALYSIS is set to Off in the SYSTEM CONFIGURATION screen.
  - When the site setting is NICU, the CAR SEAT CHALLENGE key is in the <OTHER> box.
- On BSM-6301A/K, aEEG is not available.
- aEEG is only available when EEG is monitored with AE-918P neuro unit with software version 02-01 or later.
- When the site setting is NICU, the OCRG key is in the <REVIEW> box.

For the alarm off key on the MENU window, refer to "Silencing/Suspending Alarms" in this manual.

Changing Settings

Administrator Settings

Some settings can only be changed by the administrator. A password is required to display the window or enter the screen for changing these settings. These settings are:

- Settings on the SYSTEM SETUP window
- Settings on the SYSTEM CONFIGURATION screen

The details for these settings are described in the Administrator's Guide.

WARNING

ST, CO_2, RESPIRATION, $tcPO_2$/$tcPCO_2$ and HEMOGLOBIN settings only affect the individual bedside monitor, not on all monitors connected to the network. The unit settings must be the same on all bedside monitors and central monitors in the network. Otherwise, the different measurement values and alarms will be displayed on different monitors depending on the unit settings on each monitor.

CAUTION

When installing the monitor, change the time zone setting to the same setting as the other bedside monitors and central monitors. If the time zone setting is not the same, the data which was in the input unit before transport is deleted when using the transport function with the input unit.

Changing Parameter Settings and Other Settings

- DATE window for setting date and time
- VOLUME window for setting alarm and sync sound volume
- DISPLAY window for setting number of ECG waveforms, waveform display, IBP waveform display type and waveform sweep speed on the home screen
- RECORD window for setting recording parameters
- SYSTEM window for checking assigned functions to the remote control keys
- Parameter windows for setting various parameter-related settings

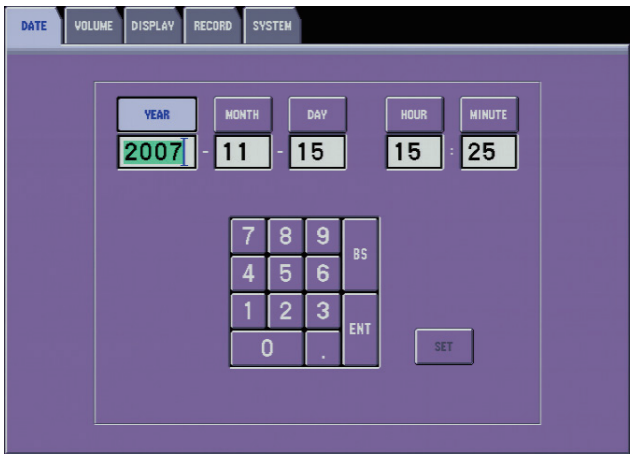
Changing Settings

1. Display the MENU window.

2. Touch the desired menu key on the MENU window to display the setting window.

3. Change the desired item by touching the keys or buttons, or dragging the slider displayed on the setting window.

Example: To correct the date and time



1. Display the DATE window of the SETUP window.
   Press the [Menu] key → DATE key.

   Or,
   Touch the date and time at the upper right corner on the home screen.

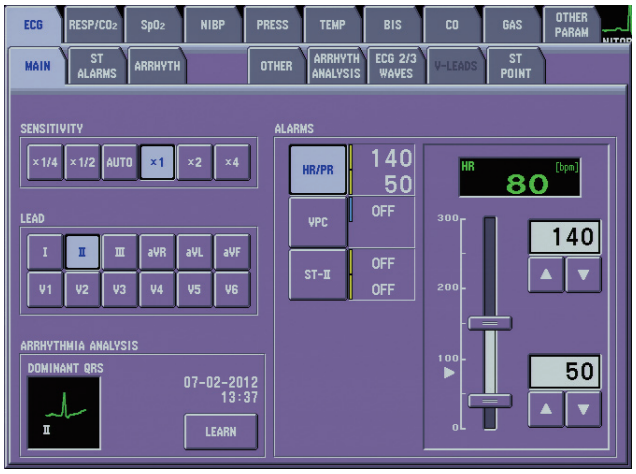
2. Touch the item key to be changed on the DATE window.

3. Touch the desired number key(s).

4. Repeat steps 2 and 3 to change other items.

5. Touch the SET key to enter the setting.

Example: Change the ECG lead



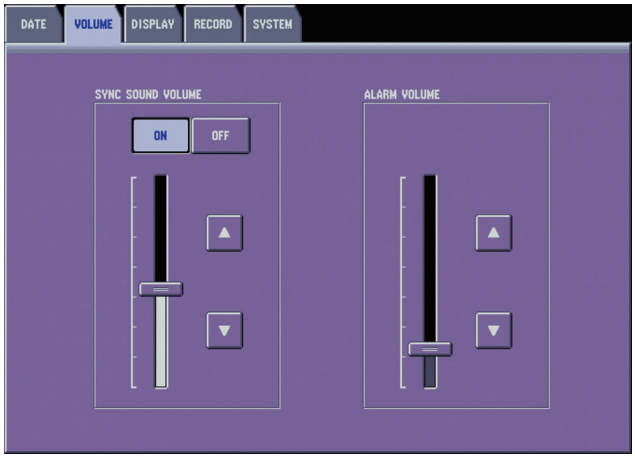
1. Display the MAIN page of the ECG window.
   Press the [Menu] key → ECG key → MAIN tab.

   Or,
   Touch the heart rate value on the home screen.

2. Touch the desired lead key from <LEAD> box.

To change the lead for the second and third traces on the home screen, display the ECG2/3 WAVES page of the ECG window and select the lead for each trace.

Changing Settings on the VOLUME Window



<SYNC SOUND VOLUME>: Set the volume for the sync sound. When ON is selected, there is a beeping sound.

<ALARM VOLUME>: Set the volume for the alarm sound. The alarm volume cannot be turned off.

NOTE: Set the alarm volume depending on the monitoring environment. When you drag the slider or touch the key to the lowest level, the alarm sound goes to the minimum volume.

Admitting/Discharging Patient

WARNING

Check the alarm settings when admitting a new patient and whenever the patient condition changes and change the alarm settings if necessary. The alarm settings return to the alarm master settings on the SYSTEM SETUP window when:

- A patient is admitted or discharged.
- <SHOW ADMIT CONFIRMATION WINDOW> is set to “Off” in the SYSTEM CONFIGURATION screen and 30 minutes elapse after monitor power off.
- “PATIENT TYPE” is changed on the ADMIT DISCHARGE window.

CAUTION

When admitting a new patient, first delete all data of the previous patient. Otherwise, the data of the previous patient and new patient will be mixed together.

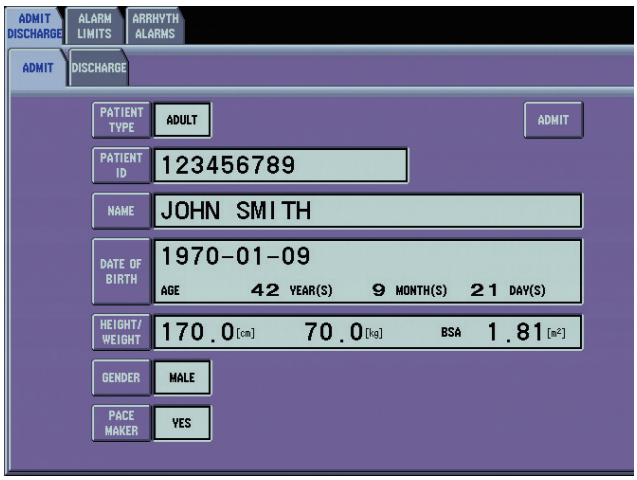
When the patient is admitted or discharged, the alarm settings, arrhythmia analysis on/off and QRS detection type setting return to the alarm master settings, the NIBP measurement mode returns to the INTERVAL MASTER settings on the SYSTEM SETUP window and the following data are deleted.

- Patient information (only when the patient is discharged)
- Data on the review windows
- Data on the DRUG window
- PCWP value on the CO window
- CO table on the MEASURE page of the CO window
- Current trendgraph on the home screen
- Data on the 12 LEAD ANALYSIS window
- Data on the LUNG FUNCTION window
- Thermodilution curve on the CO window
- CSA/DSA graph

When the patient is discharged, the PATIENT TYPE setting returns to the alarm master settings.

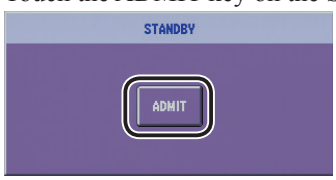
Admitting a Patient

Enter the patient information to admit the patient. Before entering data for a new patient, you must first discharge a previous patient. Refer to the “Discharging a Patient” section.

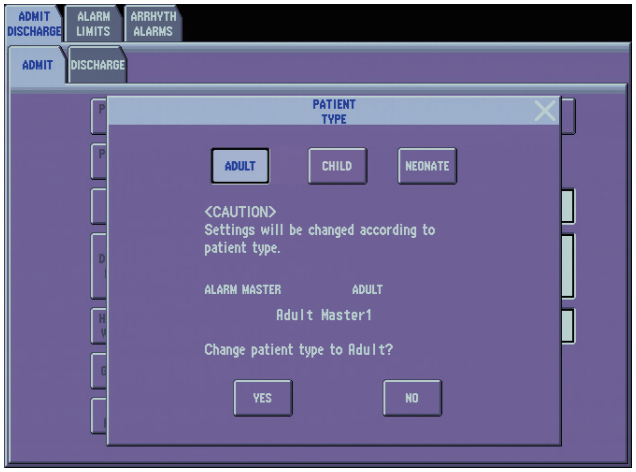


1. Display the ADMIT page of the ADMIT DISCHARGE window by doing any of the following.
   - Press the [Menu] key → ADMIT DISCHARGE key.
   - Touch the patient name area at the upper part of the home screen.

   - When <ADMIT MODE> is set to MANUAL, the STANDBY window appears after discharging a patient. Touch the ADMIT key on the STANDBY window.

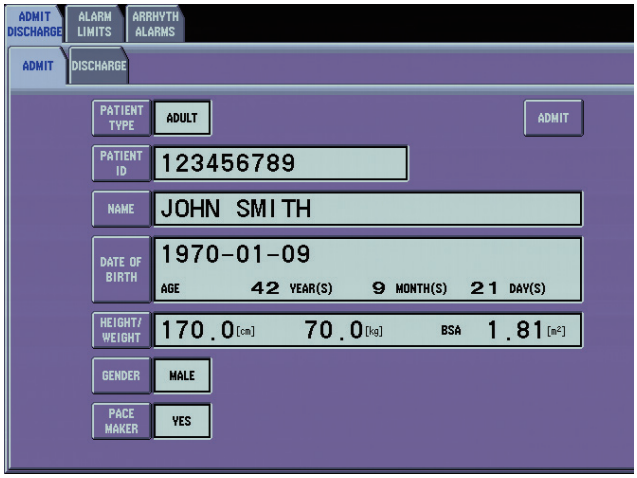


The STANDBY window depends on the <STANDBY MODE> setting in the SYSTEM CONFIGURATION screen. When <STANDBY MODE> is set to Off, the ADMIT key appears on the STANDBY window. When <STANDBY MODE> is set to On, the MONITOR key appears on the STANDBY window. You can start monitoring a patient immediately after touching the MONITOR key.



2. Touch the PATIENT TYPE key on the ADMIT page to open the PATIENT TYPE window.

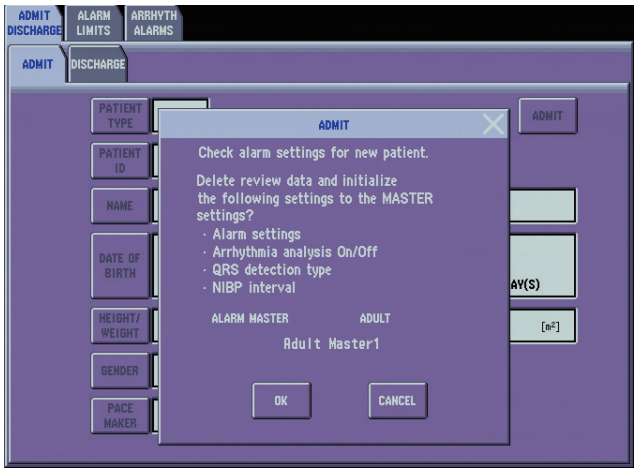
3. Select the patient type and touch the YES key. The QRS detection type, alarm and scale settings change according to the patient type. These settings can be changed on the setting windows after the patient is admitted. To change the QRS detection type, refer to “Changing ECG Settings” section.



4. Touch the desired key on the ADMIT page. The setting window opens.

5. Enter the patient information using the keyboard or key on the screen and touch the ENT key. For the date of birth, touch the SET key after touching the ENT key. For the gender and pacemaker use, touch the close key (⊠) after entering the patient information.

6. Check the information on the window and touch the ADMIT key. A confirmation message appears.



7. Confirm the message and touch the OK key.

Patient ID can be entered with a bar code reader.

1. Display the ADMIT page.
   Press the [Menu] key → ADMIT DISCHARGE key.
   Or,
   Touch the patient name area at the upper part of the home screen.

2. Touch the Patient ID key on the ADMIT page. The PATIENT ID window opens.

   NOTE: Patient ID can be entered from the home screen.

3. Scan the bar code of the patient. The PATIENT ID window closes.

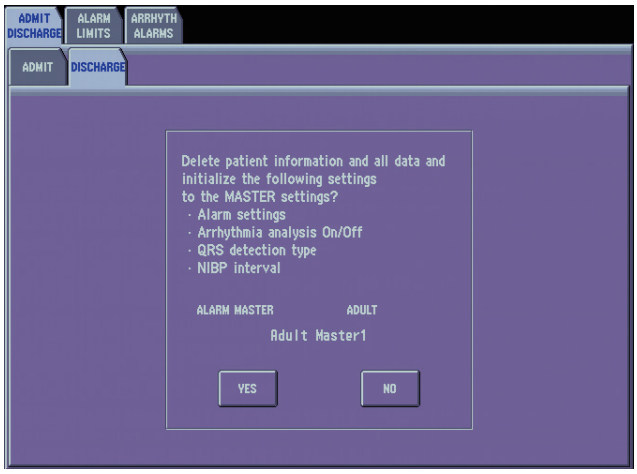
4. Confirm that the patient ID is displayed on the ADMIT page.

NOTE: After turning the monitor on and when admitting a patient on the monitor, make sure that the time displayed at the upper right of the screen is correct. When the date or time is changed during monitoring, the date and time of all stored data is also changed and might not match the date and time on the printout.

Discharging a Patient

When monitoring the patient is no longer required, discharge the patient on the DISCHARGE* page.

* For BSM-6000A series, DISCHARGE tab is NEXT CASE tab when the site setting is OR.



1. Display the DISCHARGE page of the ADMIT DISCHARGE window.
   Press the [Menu] key → ADMIT DISCHARGE key → DISCHARGE tab.
   The message confirming the data deletion appears.

2. Touch the YES key to discharge the patient.

   If No key is touched, discharging the patient is cancelled, the previous data is not deleted and the settings are not initialized.

3. When <ADMIT MODE> is set to AUTO, check the following items to confirm that all data are deleted.
   - Patient name on the home screen is deleted.
   - The message on the DISCHARGE page is dimmed.
   - ALARMS SUSPENDED message appears and alarms are suspended on the monitor.

   When <ADMIT MODE> is set to MANUAL, the “DISCHARGED” message and the STANDBY window appear. Check that the patient name is deleted from the upper left of the screen.

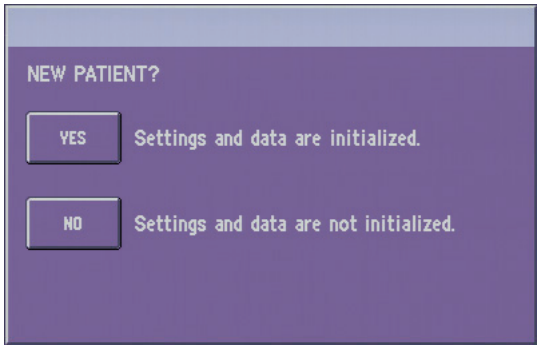
   The STANDBY window depends on the <STANDBY MODE> setting in the SYSTEM CONFIGURATION screen. When <STANDBY MODE> is set to Off, the ADMIT key appears on the STANDBY window. When <STANDBY MODE> is set to On, the MONITOR key appears on the STANDBY window. You can start monitoring a patient immediately after touching the MONITOR key.

4. Press the [Home] key to return to the home screen.

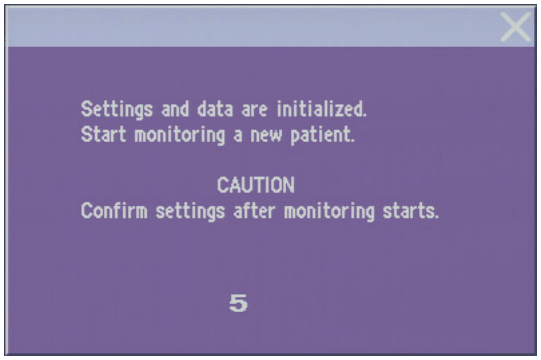
Stored Data Status and Screen Transition for Admitting Patient

When <DATA TRANSPORT USING INPUT UNIT> is set to ENABLE on the DATA MANAGEMENT window of the SYSTEM CONFIGURATION screen, the patient data and settings are always stored in the input unit or BSM-1700 series bedside monitor. For details, refer to the “Using Transport Function” section.

When <DATA TRANSPORT USING INPUT UNIT> is set to DISABLE on the DATA MANAGEMENT window of the SYSTEM CONFIGURATION screen, the stored data status at power on depends on the settings on the DATA MANAGEMENT window of the SYSTEM CONFIGURATION screen, whether the previous patient is discharged, and whether the power is off for more than 30 minutes.



When <ADMIT MODE> is set to AUTO and <SHOW ADMIT CONFIRMATION WINDOW> is turned on on the DATA MANAGEMENT window of the SYSTEM CONFIGURATION screen, the ADMIT CONFIRMATION window appears when the monitor power is turned on. Touch the YES key to monitor a new patient. Touch the NO key to continue monitoring the same patient.



When <ADMIT MODE> is set to AUTO and <SHOW ADMIT CONFIRMATION WINDOW> is turned off on the DATA MANAGEMENT window of the SYSTEM CONFIGURATION screen and the monitor is turned off for more than 30 minutes, the patient data and settings are deleted and monitoring starts about 5 seconds after power on. After turning the power on, admit the patient by doing the procedure in the “Admitting a Patient” section.

When <ADMIT MODE> is set to AUTO and <SHOW ADMIT CONFIRMATION WINDOW> is turned off on the DATA MANAGEMENT window of the SYSTEM CONFIGURATION screen and the power is turned off for less than 30 minutes, the previous patient data and settings are kept and monitoring of the same patient resumes. To monitor a new patient after turning the power on again, admit the patient by doing the procedure in the “Admitting a Patient” section.

When <ADMIT MODE> is set to MANUAL and <SHOW ADMIT CONFIRMATION WINDOW> is turned on on the DATA MANAGEMENT window of the SYSTEM CONFIGURATION screen and the previous patient was not discharged before turning the power off, the ADMIT CONFIRMATION window appears when the power is turned on again. Touch the YES key to monitor a new patient. Touch the NO key to continue monitoring the same patient.

When <ADMIT MODE> is set to MANUAL and <SHOW ADMIT CONFIRMATION WINDOW> is turned on on the DATA MANAGEMENT window of the SYSTEM CONFIGURATION screen and the patient was discharged before turning the power off, the “DISCHARGED” message and the STANDBY window appear when the power is turned on again. The STANDBY window depends on the <STANDBY MODE> setting in the SYSTEM CONFIGURATION screen. Touch the ADMIT key to display the ADMIT page of ADMIT DISCHARGE window and admit the patient by doing the procedure in the “Admitting a Patient” section. Touch the MONITOR key to start monitoring a patient immediately.

When <ADMIT MODE> is set to MANUAL and <SHOW ADMIT CONFIRMATION WINDOW> is turned off on the DATA MANAGEMENT window of the SYSTEM CONFIGURATION screen, the monitor is turned off for more than 30 minutes and the patient was not discharged before turning the power off, the patient data and settings are deleted and monitoring starts about 5 seconds after power on. You should admit the patient by doing the procedure in the “Admitting a Patient” section.

When <ADMIT MODE> is set to MANUAL and <SHOW ADMIT CONFIRMATION WINDOW> is turned off on the DATA MANAGEMENT window of the SYSTEM CONFIGURATION screen, the monitor power is off for less than 30 minutes and the patient was not discharged before turning the power off, the patient data and settings are kept and monitoring of the previous patient resumes. To monitor a new patient after the power is turned on, admit the patient by doing the procedure in the “Admitting a Patient” section.

When <ADMIT MODE> is set to MANUAL and <SHOW ADMIT CONFIRMATION WINDOW> is turned off on the DATA MANAGEMENT window of the SYSTEM CONFIGURATION screen and the patient was discharged before turning the power off, the “DISCHARGED” message and the STANDBY window appear when the power is turned on again. The STANDBY window depends on the <STANDBY MODE> setting in the SYSTEM CONFIGURATION screen. Touch the ADMIT key to display the ADMIT page of ADMIT DISCHARGE window and admit the patient by doing the procedure in the “Admitting a Patient” section. Touch the MONITOR key to start monitoring a patient immediately.

Using Transport Function in a Monitor Network

Input Unit

In this “Using Transport Function in a Monitor Network” section, the “input unit” means the AY-600P series input unit which a QM-600P memory unit is installed and the BSM-1700 series bedside monitor unless otherwise specified.

Transport Function

You can use the transport function with the input unit when <DATA TRANSPORT USING INPUT UNIT> on the DATA MANAGEMENT window of the SYSTEM CONFIGURATION screen is set to ENABLE. When using the BSM-1700 series bedside monitor as an input unit, also set <DATA TRANSPORT USING INPUT UNIT> to On on the BSM-1700 series.

Patient information and review data can be sent to another bed by disconnecting the input unit from the monitor or JA-690PA or JA-694PA data acquisition unit and connecting it into another monitor or data acquisition unit.

If the source monitor and destination monitors are in the same central monitor network, you can observe the transported patient continuously from the central monitor.

NOTE:

- A QM-600P memory unit must be installed in the AY-600P series input unit to use the transport function.
- If the BSM-6000 series bedside monitors have different software version, transport function cannot be used.
- If the BSM-6000 series bedside monitor has software version 02-03 or later, transport function using a BSM-9101 bedside monitor is available.
- When “On” is selected for <USE SETTINGS IN INPUT UNIT> on the DATA MANAGEMENT window of the SYSTEM CONFIGURATION screen and the data is transported from the source monitor whose arrhythmia type is set to STANDARD to the destination monitor whose arrhythmia type is set to EXTENDED, the STANDARD settings of the source monitor are copied to the destination monitor. However, depending on the other various settings, the STANDARD settings may be changed. Check the arrhythmia alarm settings before monitoring on the destination monitor.
- On BSM-6000A series, if <CRISIS VITAL ALARM MANAGEMENT> on the SYSTEM CONFIGURATION screen is turned on and “ALARM PRIORITY” of the following parameters is set to CRISIS on the destination monitor, the alarm settings on the destination monitor have priority and the source monitor settings are not applied to the destination monitor.
  Parameters:
  HR/PR UPPER, HR/PR LOWER, RR UPPER, RR LOWER, APNEA, SpO_2 UPPER, SpO_2 LOWER, SpO_2-2 UPPER, SpO_2-2 LOWER, CO_2 (E) UPPER, CO_2 (E) LOWER, arrhythmia alarms
- If the BSM-6000 series bedside monitor has software version 02-01 or later, transport function not using the central monitor network is available.
- If the BSM-6000 series bedside monitor has software version 02-02 or later, transport function using the central monitor network is available.
- If the central monitor is CNS-9701, it must have software version 01-77 or later. Any version of CNS-6201 is compatible with transport function.

Warnings and Cautions for Transport

General

WARNING

When the input unit is connected to the monitor, make sure to authenticate the patient on the SELECT PATIENT DATA window. Otherwise, monitoring cannot be started.

WARNING

Check the patient information and data range on the SELECT PATIENT DATA window. Otherwise, the patient may be incorrectly identified.

WARNING

The monitor cannot monitor when it is in the standby state. When the preparation for removing the input unit from the source monitor is complete, immediately insert the input unit into the destination monitor. If not transporting the patient, activate the standby state.

WARNING

Check the alarm settings after patient authentication. The alarm settings depend on the <USE SETTINGS IN INPUT UNIT> On/Off setting on the DATA MANAGEMENT window of the SYSTEM CONFIGURATION screen of the destination monitor.

CAUTION

If the patient data in the input unit has different measuring units from the data in the main unit, an INPUT UNIT ERROR dialog box to delete the data in the input unit appears. If you do not want to delete the data in the input unit, touch the CANCEL key and remove the input unit from the main unit.

CAUTION

When removing the input unit from the monitor when the transport function is enabled, perform the removal procedure of the input unit on the REMOVE tab of the ADMIT DISCHARGE window before removing the input unit. Otherwise, the data in the input unit may be lost.

CAUTION

When installing the monitor, change the time zone setting to the same setting as the other bedside monitors and central monitors. If the time zone setting is not the same, the data which was in the input unit before transport is deleted when using the transport function with the input unit.

WARNING

When using transport function in the central monitor network, patient data may be mixed together or lost in the following cases:

- Transport function and wireless LAN are used at the same time.
- The network cable is connected or disconnected from the bedside monitor or the input unit is removed while the bedside monitor power is off.

CAUTION

Do not remove the input unit while the data is being sent to the central monitor. The data may be lost.

WARNING

When you send data from the bedside monitor to the central monitor, use a 10BASE-T or 100BASE-TX switching hub. If you use another type of hub, the network may lose connection and the patient cannot be monitored on the central monitor.

CAUTION

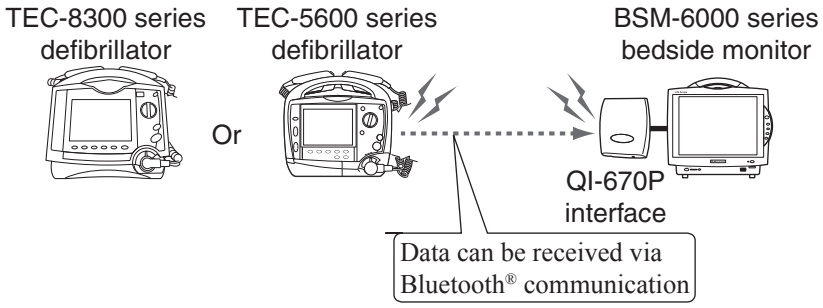
When the patient is discharged and there is no need to send the patient data to the central monitor, discharge the patient on the central monitor before removing the input unit. When the input unit is unintentionally removed or inserted when not using transport function, data that was sent to the central monitor in the past may be lost.

Using Transport Function with a Defibrillator

When a QI-670P interface is mounted on the bedside monitor, waveforms and numeric data can be received from a TEC-5600 series or TEC-8300 series defibrillator. Data from the defibrillator can be reviewed on the Review window.

Refer to the defibrillator operator's manual together with this manual.

One of the following interfaces is also required when connecting a QI-670P interface.
BSM-6301: QI-632P or QI-634P interface
BSM-6501: QI-672P interface
BSM-6701: QI-672P interface



NOTE:

- Transport function with a defibrillator can be used with BSM-6000 series bedside monitor software version 05-41 or later. For the compatible defibrillator software versions, refer to the defibrillator operator's manual.
- While receiving data, do not turn off the bedside monitor or disconnect the USB cable of the QI-670P interface from the bedside monitor. The bedside monitor may be damaged or data may be lost.
- The filter setting of the waveform cannot be received from the defibrillator.
- Data communication with the QI-670P interface is only for TEC-5600 series and TEC-8300 series defibrillators.
- If a QI-670P interface that was connected to this bedside monitor is reconnected to a different bedside monitor, all data in the interface is deleted.
- If the time setting on the bedside monitor and defibrillator are different, the time of the received data is adjusted to the time on the bedside monitor.
- Do not use the QI-670P interface at the same time as a QI-320PA or QI-420PA wireless LAN station.
- The received data from the defibrillator cannot be transferred to the central monitor.

Alarms

WARNING

When an alarm occurs:

- Check the patient first and take necessary measure to ensure patient's safety.
- Remove the cause of the alarm.
- Check the alarm settings on the bedside monitor and change the alarm settings if necessary.

WARNING

If more than one medical equipment is used together in the same facility, make sure all equipments have the same alarm default settings (alarm master). If the medical equipments have different alarm default settings and when initialized, the alarm settings differ with the other equipments and alarm cannot be managed appropriately in the facility. If using different alarm default settings according to areas or wings in the facility, manage the alarms appropriately.

WARNING

Do not diagnose a patient based on only the alarm information of the bedside monitor. An alarm may not be indicated due to alarm level or alarm on/off setting and critical changes on the patient may be overlooked.

WARNING

A physician must be within the range where he/she can hear the alarm sound of the bedside monitor while monitoring a patient on the bedside monitor. If the physician cannot hear the alarm sound, critical changes on the patient may be overlooked.

Alarm Types and Levels

There are four types of alarms: vital signs, arrhythmias, technical and interbed alarms, and three alarm levels: crisis, warning and advisory.

The monitor can indicate alarms both visually and audibly:

- Alarm sound
- Alarm message or highlighted numeric data on the screen
- Alarm indicator: the alarm indicator indicates three alarm levels.
  CRISIS: Red blinking, WARNING: Yellow blinking, ADVISORY: Cyan or yellow lit

CRISIS: Patient is in critical condition and the patient's life may be at risk. Immediate action must be taken. Electrodes or probe off, or incorrect lead or other cable connections may also cause this alarm.

WARNING: Patient is in critical condition. Prompt action should be taken. Electrodes or probe off, or incorrect lead or other cable connections may also cause this alarm.

ADVISORY: Electrodes, probe, cuff, lead and other cable connections or settings on the monitor are not appropriate for accurate measurement. Prompt action should be taken.

The priority and monitor action are different for each level.

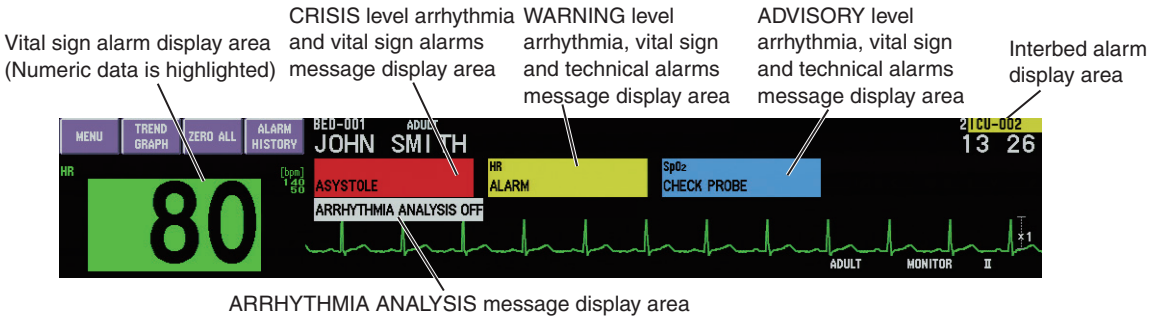
Alarm level	Alarm sound	Alarm display on the screen		Alarm indicator LED	Alarm recording
		Message	Numeric data		
CRISIS	NK1 (Continuous pip sound), NK2 (Continuous ping sound) or IEC standard (ceg-gC)	Highlighted red message	When ALARM* is selected: Highlighted red numeric data When PARAMETER is selected: Highlighted parameter color numeric data	Blinking red	Recorded at alarm occurrence when alarm recording on the RECORD window is set to ON.
WARNING	NK1 (Continuous bing bong sound), NK2 (Continuous ding ding sound) or IEC standard (ceg)	Highlighted yellow or orange message	When ALARM* is selected: Highlighted yellow or orange numeric data When PARAMETER is selected: Highlighted parameter color numeric data	Blinking yellow	
ADVISORY	NK1 and NK2 (Single beep every 20 or 120 seconds) or IEC standard (ec)	Highlighted cyan or yellow message	When ALARM* is selected: Highlighted cyan or yellow numeric data When PARAMETER* is selected: Highlighted parameter color numeric data	Lights in cyan or yellow	

* The numeric data display color depends on PARAMETER or ALARM setting in <DISPLAY COLOR MODE> on the GENERAL page of the SYSTEM SETUP window.

When an arrhythmia alarm is generated, even if the patient recovers quickly from the arrhythmia, the alarm status continues for a short time. The time depends on the alarm level.

- CRISIS: 30 s
- WARNING: 20 s
- ADVISORY: 10 s

The alarm sound, alarm display color and alarm indicator color are selected on the ALARM window of the SYSTEM SETUP window.



ARRHYTHMIA ANALYSIS message is not highlighted when the site is NICU.

When two or more alarms of the same level occur at the same time, the messages are displayed alternately.

Alarm Latching Function

BSM-6000A series bedside monitors have an alarm latching function. If alarm latching is enabled, human intervention is required to end the alarm. When alarm latching is enabled, audible and visual alarms continue until the operator acknowledges the alarm by silencing or suspending alarms on the bedside monitor or central monitor.

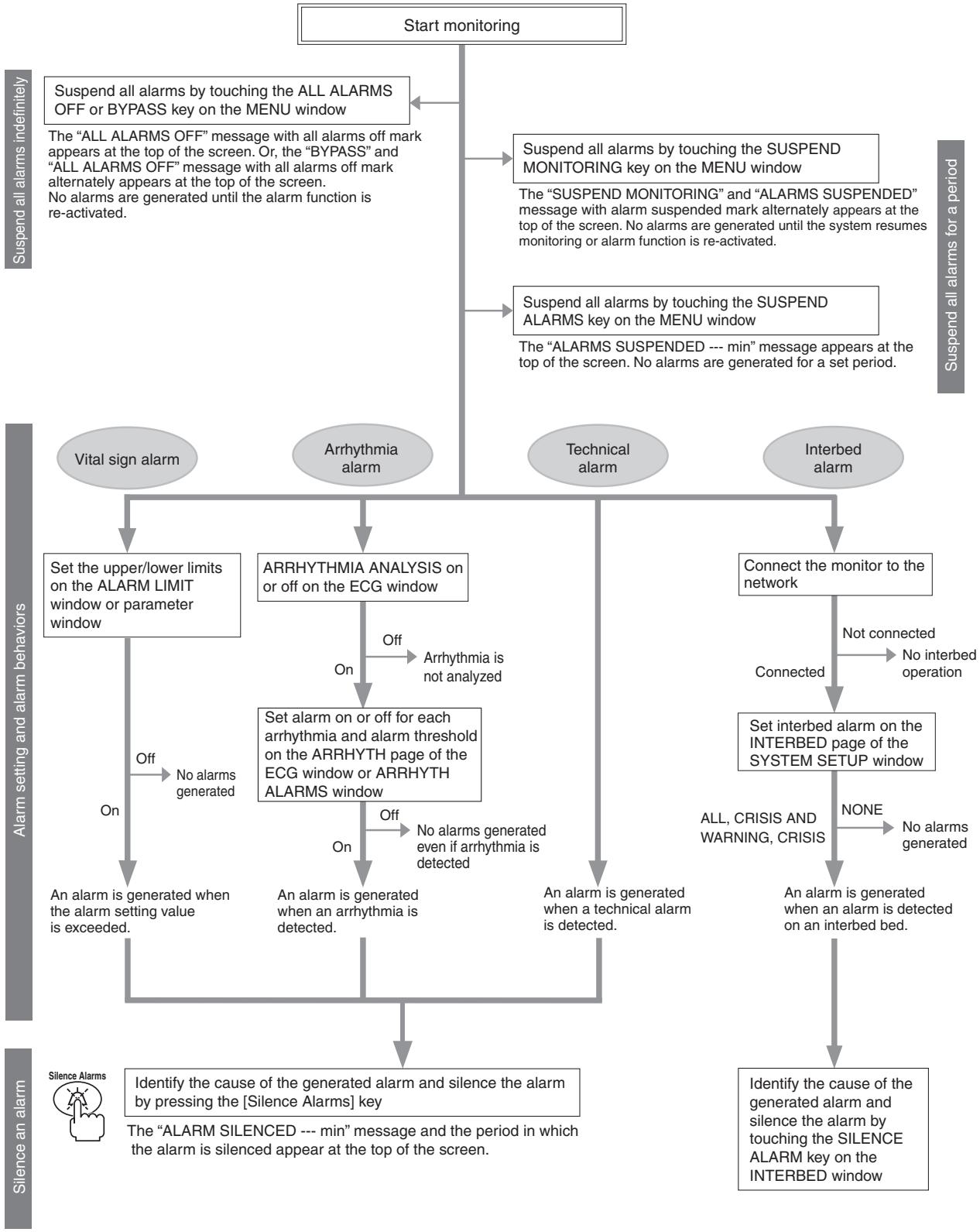
Alarm Control Marks

Alarm is silenced by pressing the [Silence Alarms] key on the bedside monitor or [SILENCE ALARMS] key on the remote control. Remaining minutes appears.

Alarms are suspended for a certain period.

Alarms are suspended infinitely or vital sign alarm limit is set to off.

Flow of Alarm Function



Silencing/Suspending Alarms

Silencing Alarms

When an alarm occurs, you can silence the alarm sound and indications for one, two or three minutes by pressing the [Silence Alarms] key on the bedside monitor or remote control. When a vital signs alarm other than NIBP or arrhythmia alarm is silenced, the alarm resumes after the alarm silence ends. When a technical alarm other than the following alarms is silenced, the alarm indication does not resume after the alarm silence ends. If the following alarms are silenced, the alarm resumes after the alarm silence ends.

- BATTERY ERROR
- CO_2 CHANGE ABSORBENT
- ECG CANNOT ANALYZE
- GAS LINE BLOCK
- MULTILINK POWER ERROR
- NIBP SAFETY CIRCUIT RUNNING
- BATTERY WEAK
- CO_2 LINE BLOCK
- EXTERNAL DEVICE ALARM
- MULTILINK CONFIG ERROR
- NIBP CUFF OCCLUSION
- SpO_2 CHANGE PROBE

When several alarms occur together and the [Silence Alarms] key is pressed, all alarms are silenced. To cancel vital sign or arrhythmia alarm silence, press the [Silence Alarms] key. <SILENCE ALARMS TIME> is set on the ALARM window of the SYSTEM SETUP window.

When the Monitor is Connected to the Central Monitor Network

When the bedside monitor is connected to a central monitor network, all alarms other than NIBP alarm are temporarily silenced by touching the Silence Alarms key on the central monitor. Refer to the central monitor operator's manual for details.

Suspending Alarms

All alarms can be suspended before they occur. This monitor has three types of alarm suspension:

- Suspending all alarms for one, two or three minutes by touching the SUSPEND ALARMS key*[2]. For example: for electrode replacement, etc.
  Alarm function resumes when the suspend alarm time elapses or the SUSPEND ALARMS key is touched. <SUSPEND ALARMS TIME> is set on the ALARM window of the SYSTEM SETUP window.

When admitting or discharging a patient or when the monitor power is turned on, alarms are automatically suspended. Alarm function resumes when the monitoring conditions*[1] are continuously met or the SUSPEND ALARMS key is touched.

- Suspending all alarms indefinitely by touching the BYPASS key (in OR mode only) or ALL ALARMS OFF key*[3] on the MENU window. For example: suspend alarms when the patient is connected to a heart-lung machine.

When the <ALARM INDICATOR LIT> on the ALARM window of the SYSTEM SETUP window is set to ON, the red lamp of the alarm indicator lights when all alarms are indefinitely suspended with the BYPASS or ALL ALARMS OFF key.

Alarm function resumes when the BYPASS or ALL ALARMS OFF key is touched.

- Suspending all alarms indefinitely by touching the SUSPEND MONITORING key*4. For example: suspend alarms while the patient is being examined. The "SUSPEND MONITORING" and "ALARMS SUSPENDED" messages appear on the screen alternately.

Alarm function resumes when the SUSPEND MONITORING key or SUSPEND ALARMS key is touched or the following monitoring conditions*1 are continuously met.

*1

Setting of <ALARM ACTIVATION DELAY> on the SYSTEM SETUP window	Condition	
AUTO	Alarm function activates when ECG, SpO_2 or IBP* is monitored or NIBP** is measured and a value is displayed. * When SYS > DIA, the difference between these two values is 3 mmHg and this status continues for more than 3 seconds. ** When SYS, DIA or MAP value is measured. The alarm function is also recovered when the heart rate is 0.	
1 min 2 min 3 min	When one of the following requirements is met.	
	1	ECG, SpO_2 or IBP is continuously monitored for the selected time.
	2	NIBP is measured (SYS, DIA or MAP value is measured).
	3	Heart rate becomes 0.

*2 SUSPEND ALARMS key is available when SUSPEND ALARMS is selected for <ALARM INACTIVATION> on the ALARM window of the SYSTEM SETUP window.

*3 ALL ALARMS OFF key is available when ALL ALARMS OFF is selected for <ALARM INACTIVATION> on the ALARM window of the SYSTEM SETUP window.

*4 SUSPEND MONITORING key is available when SUSPEND ALARMS is selected for <ALARM INACTIVATION> on the ALARM window of the SYSTEM SETUP window.

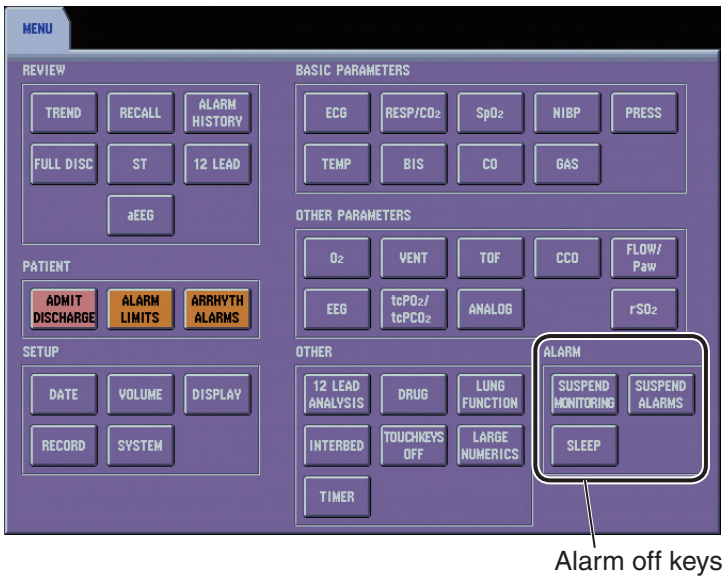
WARNING

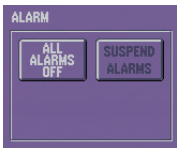
During alarm suspension ("ALARMS SUSPENDED" or "ALL ALARMS OFF" message displayed), all alarms are turned off. Be careful when you suspend the alarm.

WARNING

Do not turn all alarms off with the ALL ALARMS OFF or BYPASS key when there is no medical staff around the patient or when the patient is connected to a ventilator.

The alarm off key on the MENU window



ALARM INACTIVATION setting	ICU/NICU site	OR site
SUSPEND ALARMS		
ALL ALARMS OFF		ALARMS OFF TYPE: BYPASS  ALARMS OFF TYPE: ALL ALARMS OFF 

Alarm off function

SUSPEND MONITORING key

Use this key to temporarily stop patient monitoring for examination. When this key is touched, all alarms and NIBP STAT/SIM and auto measurements are suspended. Alarms resume when the SUSPEND MONITORING key is touched again or when the <ALARM ACTIVATION DELAY> condition is met.

SUSPEND ALARMS key

Use this key to suspend all alarms for the time set in <SUSPEND ALARMS TIME>.

BYPASS key

Use this key when the patient is connected to a heart-lung machine. When this key is touched, all alarms and NIBP STAT/SIM and auto measurements are indefinitely suspended. Touch the BYPASS key and touch the YES key on the confirmation window. Alarms resume when the BYPASS key is touched again.

ALL ALARMS OFF key

Use this key to suspend all alarms indefinitely. Touch the ALL ALARMS OFF key and touch the YES key on the confirmation window. Alarms resume when the ALL ALARMS OFF key is touched again.

Canceling Technical Alarms

When you remove a sensor cable, probe cable, input unit or BSM-1700 series bedside monitor from the bedside monitor and press the [Silence Alarms] key, the technical alarm can be canceled. Touching the SUSPEND MONITORING, SUSPEND ALARMS, BYPASS and ALL ALARMS OFF keys also cancel the technical alarm.

Alarm Sound Volume

The alarm sound volume is adjusted on the VOLUME window in the SETUP window.

Alarm Recording

With an optional WS-671P recorder module, you can set the monitor to automatically record ECG waveforms and data when an alarm occurs. Set <ALARM RECORDING> on the OTHER page of the RECORD window in the SETUP window to ON. The waveforms of 8 seconds before to 12 seconds after the alarm occurrence are recorded.

Alarm Setting

There are vital sign upper/lower limit alarm and arrhythmia alarm settings. The vital sign alarm settings can be set on the ALARM LIMITS window. The arrhythmia alarm settings can be set on the ARRHYTH ALARMS window. The vital sign alarm setting can also be changed on the setting window for each parameter and the arrhythmia alarm setting can also be changed on the ARRHYTH window of the ECG window. The alarm settings are linked between different windows. For example, when a heart rate upper alarm limit is changed on the ALARM LIMITS window, the heart rate upper alarm limit is also changed on the ECG window. This section describes changing settings on the ALARM LIMITS and ARRHYTH ALARM windows.

The alarm returns to the master settings when:

- The monitor power is off for more than 30 minutes when <SHOW ADMIT CONFIRMATION WINDOW> is set to off in the SYSTEM CONFIGURATION screen.
- The patient is admitted or discharged.
- The “PATIENT TYPE” setting is changed on the ADMIT DISCHARGE window.

WARNING

Check the alarm settings when admitting a new patient and whenever the patient condition changes and change the alarm settings if necessary. The alarm settings return to the alarm master settings on the SYSTEM SETUP window when:

- A patient is admitted or discharged.
- <SHOW ADMIT CONFIRMATION WINDOW> is set to “Off” in the SYSTEM CONFIGURATION screen and 30 minutes elapse after monitor power off.
- “PATIENT TYPE” is changed on the ADMIT DISCHARGE window.

WARNING

For arrhythmia monitoring, set <ARRHYTHMIA ANALYSIS> on the ECG window to ON. Otherwise, there is no sound or indication for arrhythmia alarms (except for ASYSTOLE).

WARNING

If more than one medical equipment is used together in the same facility, make sure all equipments have the same alarm default settings (alarm master). If the medical equipments have different alarm default settings and when initialized, the alarm settings differ with the other equipments and alarm cannot be managed appropriately in the facility. If using different alarm default settings according to areas or wings in the facility, manage the alarms appropriately.

WARNING

Change the anesthetic alarm settings by referring to anesthetic agent reference information.

CAUTION

When the alarm limit is set to OFF, there will be no alarm for that limit. Be careful when you set the alarm limit to OFF.

CAUTION

When the alarm is turned OFF for an arrhythmia, there will be no alarm for that arrhythmia type. There is no message or mark to indicate that a certain arrhythmia alarm is turned off. Therefore, be careful when you turn off an arrhythmia alarm.

CAUTION

When the ZS-900P transmitter is attached to the bedside monitor, check the alarm, arrhythmia and monitoring settings on the central monitor or telemetry system. The transmitter does not transmit the alarm, arrhythmia and monitoring setting information.

NOTE: For BSM-6000A series bedside monitor, arrhythmia alarm whose priority is set to CRISIS on the ALARM window of the SYSTEM SETUP window cannot be set to OFF.

When the Monitor is Connected to the Central Monitor Network

When the bedside monitor is connected to a central monitor network, the alarm setting can also be changed from the central monitor. When the alarm setting is changed on the central monitor, check that the same setting on the bedside monitor is also changed.

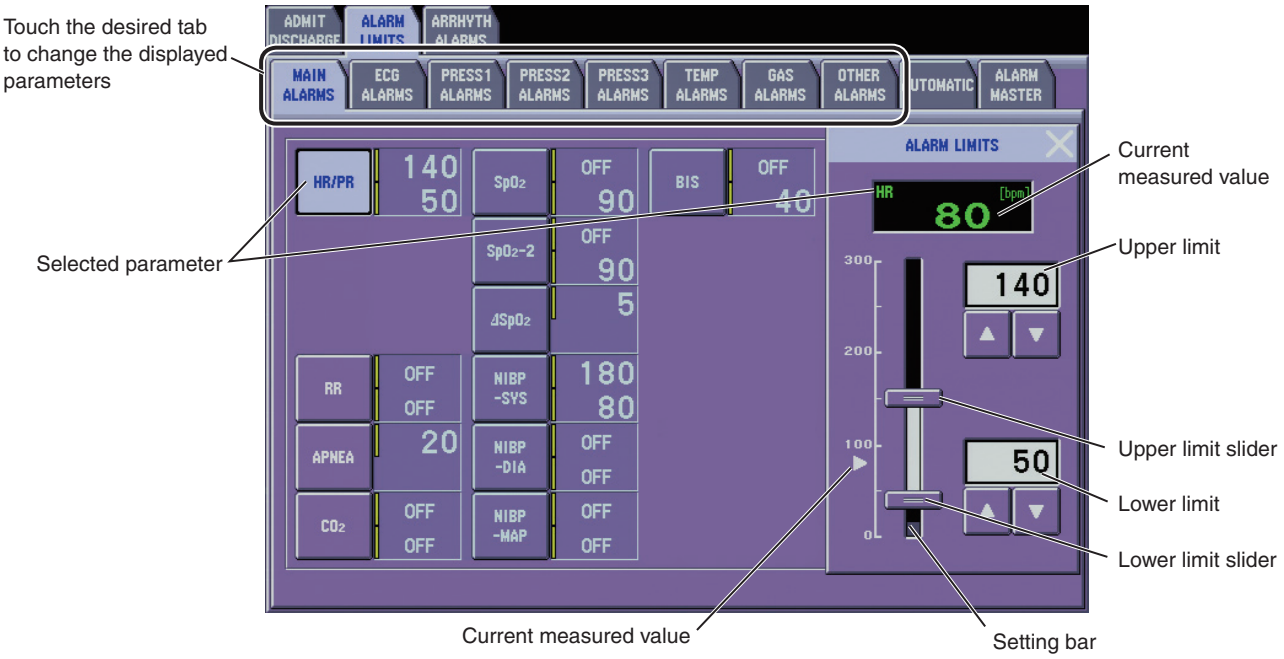
Changing Vital Sign Upper/Lower Alarm Limits

There are three ways to change vital sign upper/lower alarm limits.

- Change upper or lower alarm limits for each parameter individually.
- Change upper or lower alarm limits for each parameter individually from the each parameter window. Refer to the “Monitoring Parameters” section.
- Set all alarm limits to the alarm master settings. The procedure is described in the User’s Guide Part I.

Changing Each Parameter Alarm Limits Individually

1. Display the ALARM LIMITS window.
   Press the [Menu] key → ALARM LIMITS key.



2. Touch the parameter key for the limit you want to change.

3. Touch or drag the sliders to the desired level on the setting bar. Use the ▲ or ▼ key to adjust the setting.

4. Press the [Home] key to return to the home screen.

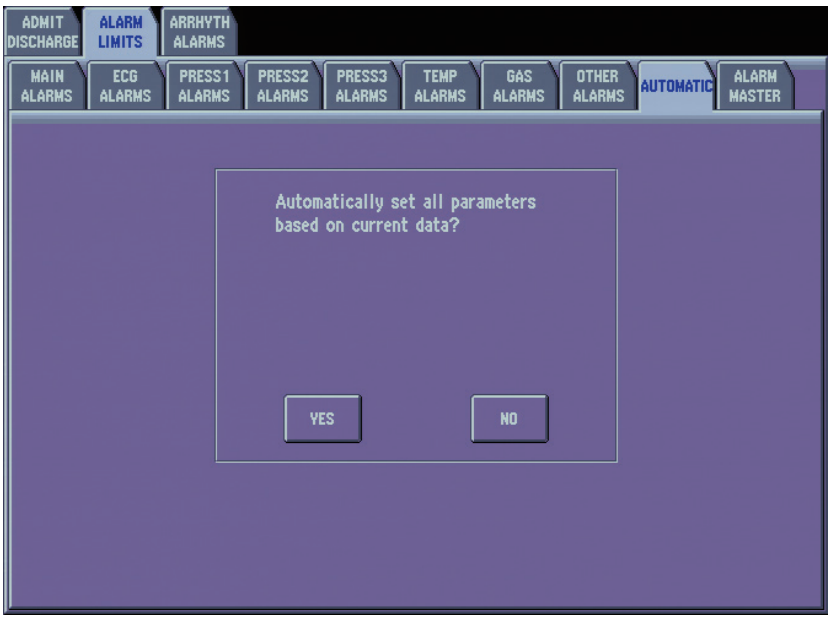
Automatically Changing All Upper/Lower Limits

All upper/lower alarm limits, including ST levels, can be set automatically according to the current measured parameter values. This function can be used on the Vital Signs page, All Vital Signs page and ST page.

NOTE: The alarm limit is not automatically changed for the parameter which is not monitored or whose measured value is invalid.

1. Display the ALARM LIMITS window.
   Press the [Menu] key → ALARM LIMITS key.

2. Touch the AUTOMATIC tab.



3. Touch YES to change all upper/lower alarm limits, including ST levels, according to the current measured values.

4. Check that the settings are appropriate.

5. Press the [Home] key to return to the home screen.

Automatic Setting Range

Parameter		Upper limit value	Lower limit value	Unit
ECG	HR	HR×1.25	HR×0.75	beat/min
PR		PR×1.25	PR×0.75	count/min
ST		ST+0.5	ST–0.5	mV
Resp	RR	RR×1.25+4	RR×0.75–4	count/min
	APNEA	(60/RR)×2	–	s
NIBP	SYS, DIA, MAP	NIBP×1.25+10	NIBP×0.75–10	mmHg
SpO_2	SpO_2, SpO_2-2	–*1	SpO_2–5	% SpO_2
IBP (ART, ART2, RAD, DORS, AO, FEM, UA, PAP, RVP, LVP, P1 to 7)	SYS, DIA, MEAN	IBP×1.25+10	IBP×0.75–10	mmHg
IBP (UV, CVP, RAP, LAP, ICP, ICP2 to 4)	MEAN	IBP×1.25+5	IBP×0.75–5	
Temp (Tb, Tskin, Tskin2, Tskin3, Trect, Tcore, Tnaso, Teso, Ttymp, Tblad, Taxil, T1 to 4)		TEMP+0.5	TEMP–0.5	°C
ΔT		ΔT+0.5	–	
O_2	O_2 (I)	O_2 (I)×1.1	O_2 (I)×0.9	%
	O_2 (E)	O_2 (E)×1.25	O_2 (E)×0.75	
CO_2	CO_2 (I)	CO_2 (I)×1.25	–	mmHg
	$ETCO_2$	$ETCO_2$×1.25	$ETCO_2$×0.75	
N_2O	N_2O (I)	N_2O (I)×1.2+5	N_2O (I)×0.8–5	%
	N_2O (E)	N_2O (E)×1.2+5	N_2O (E)×0.8–5	
HAL	HAL (I)	HAL (I)×1.1+0.5	HAL (I)×0.9–0.5	
	HAL (E)	HAL (E)×1.1+0.5	HAL (E)×0.9–0.5	
ISO	ISO (I)	ISO (I)×1.1+0.5	ISO (I)×0.9–0.5	
	ISO (E)	ISO (E)×1.1+0.5	ISO (E)×0.9–0.5	
ENF	ENF (I)	ENF (I)×1.1+0.5	ENF (I)×0.9–0.5	
	ENF (E)	ENF (E)×1.1+0.5	ENF (E)×0.9–0.5	

Parameter		Upper limit value	Lower limit value	Unit
SEV	SEV (I)	SEV (I)×1.1+0.5	SEV (I)×0.9–0.5	%
	SEV (E)	SEV (E)×1.1+0.5	SEV (E)×0.9–0.5	
DES	DES (I)	DES (I)×1.2+0.5	DES (I)×0.8–0.5	
	DES (E)	DES (E)×1.2+0.5	DES (E)×0.8–0.5	
MV*2		MV×1.25	MV×0.75	L/min
Ppeak*2		Ppeak×1.25	Ppeak×0.75	cmH_2O
PEEP*2		PEEP×1.25	PEEP×0.75	
BIS		Off	40	–
EEG	SEF	SEF×1.25+2.0	SEF×0.75–2.0	Hz
	TP	TP×1.25+0.20	TP×0.75–0.20	nW

*1 Not automatically set (the upper limit value is greater than the lower limit value).
*2 These parameter alarms are not available on BSM-6000A series.

Changing All Alarm Limits to the Alarm Master Settings

All alarms, including arrhythmia alarm, can be set to a group of alarm settings called the alarm master. The alarm masters are set by the administrator on the MASTER window of the SYSTEM SETUP window.

NOTE: The vital sign upper/lower limits settings and arrhythmia alarm settings are changed on the different alarm master page but the same master setting is applied to the both settings. (i.e., if the master for the upper/lower limits is changed, the master for the arrhythmia alarm is changed to the same master as the upper/lower limits.)

1. Display the ALARM MASTER page. The “APPLY SETTINGS FROM MASTER?” message appears.
   Press the [Menu] key → ALARM LIMITS or ARRHYTH ALARMS key → ALARM MASTER tab.

<NUMBER OF MASTER SETTINGS> is set to “1”

<NUMBER OF MASTER SETTINGS> is set to “3”

2. Select a master when the <NUMBER OF MASTER SETTINGS> is set to “3” on the MASTER window of the SYSTEM SETUP window.

3. Touch the YES key to apply the alarm master settings. The master setting is applied to the both vital sign upper/lower limit alarm and arrhythmia alarm settings.

   Touch the NO key to cancel applying the alarm master settings.

4. Press the [Home] key to return to the home screen.

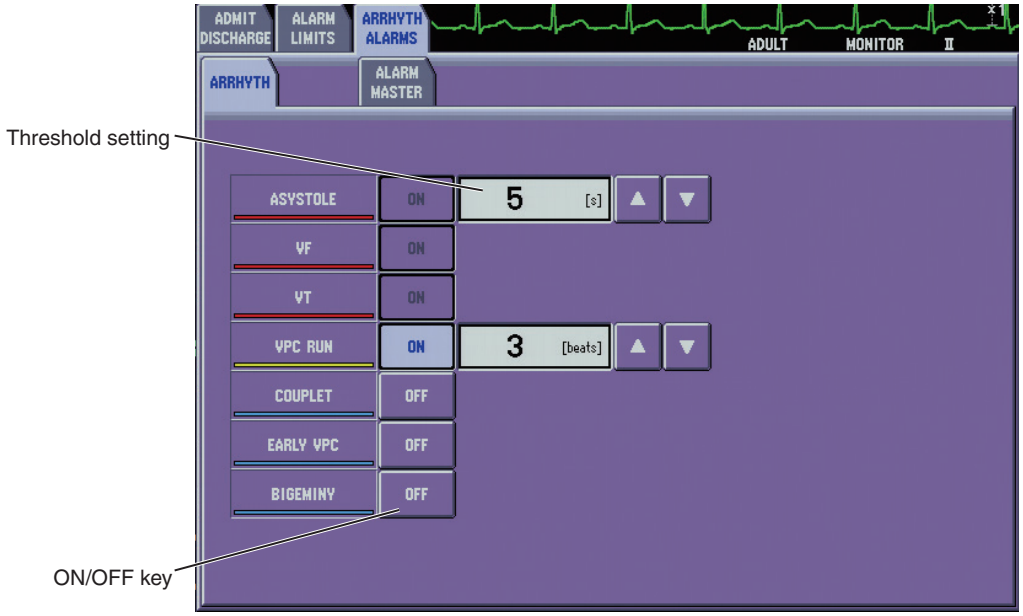
Changing the Arrhythmia Alarm Settings

You can turn the alarm for individual arrhythmias on or off and set the threshold for some arrhythmias.

The arrhythmia alarm can also be set to the alarm master settings. To use the alarm master, refer to the previous “Changing All Alarm Limits to the Alarm Master Settings” section.

NOTE: If arrhythmia type is changed to “EXTENDED” and the bedside monitor is connected via network to a central monitor that has old software, the “Lost communication with instruments in the network” message appears on the bedside monitor and the bedside monitor cannot be monitored on the central monitor.

1. Display the ARRHYTH page.
   Press the [Menu] key → ARRHYTH ALARMS key → ARRHYTH tab.



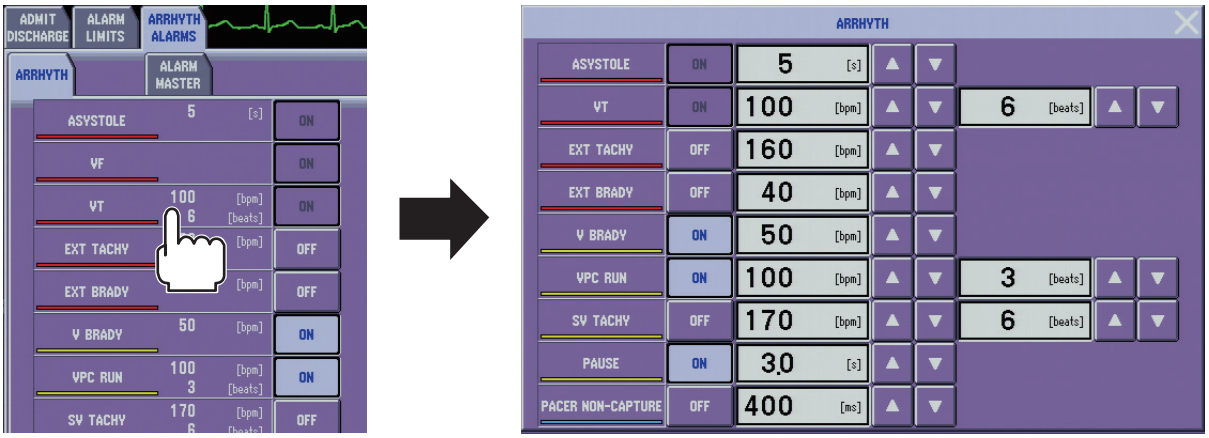
2. <u>To turn off an arrhythmia alarm</u>
   Touch the ON key to turn it to OFF.

   <u>To turn on an arrhythmia alarm</u>
   Touch the OFF key to turn it to ON.

   <u>To set the threshold</u>
   Use the ▲ or ▼ key to adjust the setting.

   NOTE:
   For BSM-6000A series bedside monitors:
   - Items can be turned on or off but thresholds are fixed and cannot be changed. The thresholds are set by the administrator on the MASTER window of the SYSTEM SETUP window.
   - Arrhythmia alarm whose alarm level is set to CRISIS on the ALARM window of the SYSTEM SETUP window, the alarm cannot be set to OFF.
   - When the “EXT TACHY” or “EXT BRADY” alarm is set to OFF, the heart rate limit range is 15 to 300 beat/min or OFF.

When EXTENDED is selected for the <ARRHYTHMIA TYPE> on the ECG page of the PARAMETERS window in the SYSTEM SETUP window, touch the threshold to display the ARRHYTH window and adjust the setting.



3. Press the [Home] key to return to the home screen.

Alarm Escalation

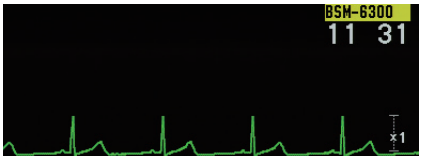
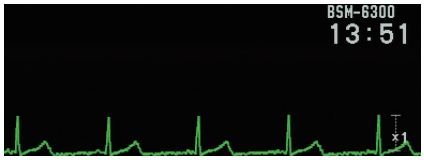
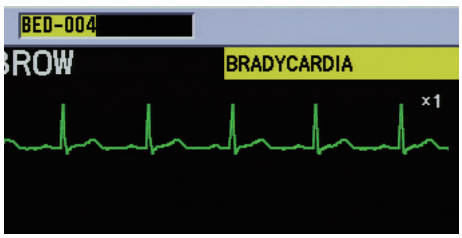
If the APNEA, SpO_2, ECG CHECK ELECTRODES, CANNOT ANALYZE or SpO_2 CHECK PROBE alarm occurs and no action is taken for a selected time, the alarm level can be escalated. If an SpO_2 value drops below a set level for a selected duration, the alarm level can also be escalated.

Interbed Alarm

When the bedside monitor is connected to a central monitor network, the bedside monitor can display monitoring data and alarms of up to 20 other beds in the network on the INTERBED window if the other beds are registered as “interbed” bed. When an interbed alarm occurs, the monitor acts as follows. The monitor action depends on the INTERBED ALARMS TO DISPLAY setting on the SYSTEM SETUP window. Refer to the “INTERBED Window” section of this manual and Section 3 of the Administrator’s Guide for details.

NOTE:

- Parameters which cannot be measured on this monitor are displayed as “ALARM”.
- The interbed alarm for another bed is lower level than any other alarm for this bed. Therefore, the interbed alarm might not be indicated during an alarm for this bed.

<table>
<tr><th colspan="2">INTERBED ALARMS TO DISPLAY Setting</th><th>ALL, CRISIS AND WARNING, CRISIS</th><th>NONE</th></tr>
<tr><td colspan="2">Alarm Indicator</td><td colspan="2">Off</td></tr>
<tr><td colspan="2">Alarm Sound</td><td>Three continuous ping sounds (only when the alarm is detected)</td><td>No sound</td></tr>
<tr><td rowspan="2">Home Screen</td><td>The bed ID of interbed alarm bed is displayed in the upper right corner. When two or more alarms are detected, the bed IDs alternate.</td><td>The bed ID is highlighted in the alarm priority color.*1
 
</td><td>The bed ID is displayed in white.
 
</td></tr>
<tr><td>After  is touched.</td><td>Bed ID: remain highlighted</td><td>Bed ID: remain in white font</td></tr>
<tr><td rowspan="2">Multiple Beds Window</td><td>Interbed alarm message is displayed</td><td colspan="2">The bed ID and interbed alarm message is highlighted in the alarm priority color.*1*2
 
</td></tr>
<tr><td rowspan="2">After  is touched.</td><td colspan="2">Bed ID: displayed in white</td></tr>
<tr><td colspan="2">Alarm: remain highlighted</td></tr>
<tr><td rowspan="2">Individual Bed Window</td><td>The alarm message and bed ID are highlighted in the alarm priority color. When the vital sign alarm occurs, the measurement value is also highlighted.</td><td colspan="2">The bed ID and alarm message is highlighted in the alarm priority color.*1*2
 
</td></tr>
<tr><td rowspan="2">After  is touched.</td><td colspan="2">Bed ID: displayed in white</td></tr>
<tr><td colspan="2">Alarm: remain highlighted</td></tr>
</table>

*1 The alarm priority is displayed as set on the interbed bed. The alarm priority color is set at <ALARM PRIORITY COLOR> on the DISPLAY/SOUND page of the ALARM window of the SYSTEM SETUP screen. Refer to “ALARM Window” in Section 3 of the Administrator’s Guide.

*2 When the alarm of crisis or warning level occur, the message blinks.

Review Windows

General

You can review saved data on the following review windows. You can expand the memory of the monitor from 128 MB to 1 GB with the optional QM-601P memory card. The parentheses show the capacity when the QM-601P memory card is installed in the monitor.

- TREND window
  - GRAPH page: Displays the trendgraph of the past 24 hours (72 hours).
  - TABLE page: Displays the vital sign data of the past 24 hours (72 hours).
  - NIBP TREND page: Displays vital sign data at the NIBP measurement. Up to 512 files (1,024 files) can be saved.
  - HEMO TREND page: Displays the hemodynamic data when CO is measured. Up to 512 files (1,024 files) can be saved.
  - LUNG TREND page: Displays data acquired at the lung function measurement. Up to 128 files (128 files) can be saved.
- RECALL window: Displays arrhythmia waveforms of 4 seconds before and 4 seconds after the arrhythmia detection. Up to 8,192 files (16,384 files) can be saved.
- ALARM HISTORY window: Displays the table of vital sign alarms and arrhythmia alarms. Up 8,192 files (16,384 files) can be saved.
- FULL DISC window: Displays up to 24 hours (72 hours) of compressed and expanded waveforms of up to 5 parameters.
- ST window: Displays the ST level waveforms of the past 24 hours (72 hours). All monitoring ECG can be saved. ST window is available when the site setting is OR or ICU.
- 12 LEAD window: Displays the 12 lead analysis result data of up to 6 files (18 files). Refer to the "12 LEAD/12 LEAD ANALYSIS Windows" section.
- OCRG window: Displays the OCRG trendgraph of the past 24 hours (72 hours). OCRG window is available when the site setting is NICU.
- aEEG window: Displays 2 aEEG traces of the past 24 hours (72 hours). aEEG is only available when EEG is monitored with AE-918P neuro unit with software version 02-01 or later.

NOTE:

- When <DATA TRANSPORT USING INPUT UNIT> is set to DISABLE, and <SHOW ADMIT CONFIRMATION WINDOW> is set to OFF in the SYSTEM CONFIGURATION screen, the stored data remains in memory for about 30 minutes after the power is turned off. After 30 minutes, the stored data is lost. When <DATA TRANSPORT USING INPUT UNIT> is set to ENABLE, the patient data and settings are always stored.
- The oldest file is deleted when the maximum number of files are saved.
- Do not disconnect the power cord while the monitor power is on. Data may be lost.
- On BSM-6000A series, the 12 LEAD ANALYSIS window is not available when the site mode is NICU and 12 LEAD ANALYSIS is set to Off in the SYSTEM CONFIGURATION screen. Refer to "SITE Window" in Section 2 of the Administrator's Guide.
- On BSM-6301A/K, the aEEG window is not available.

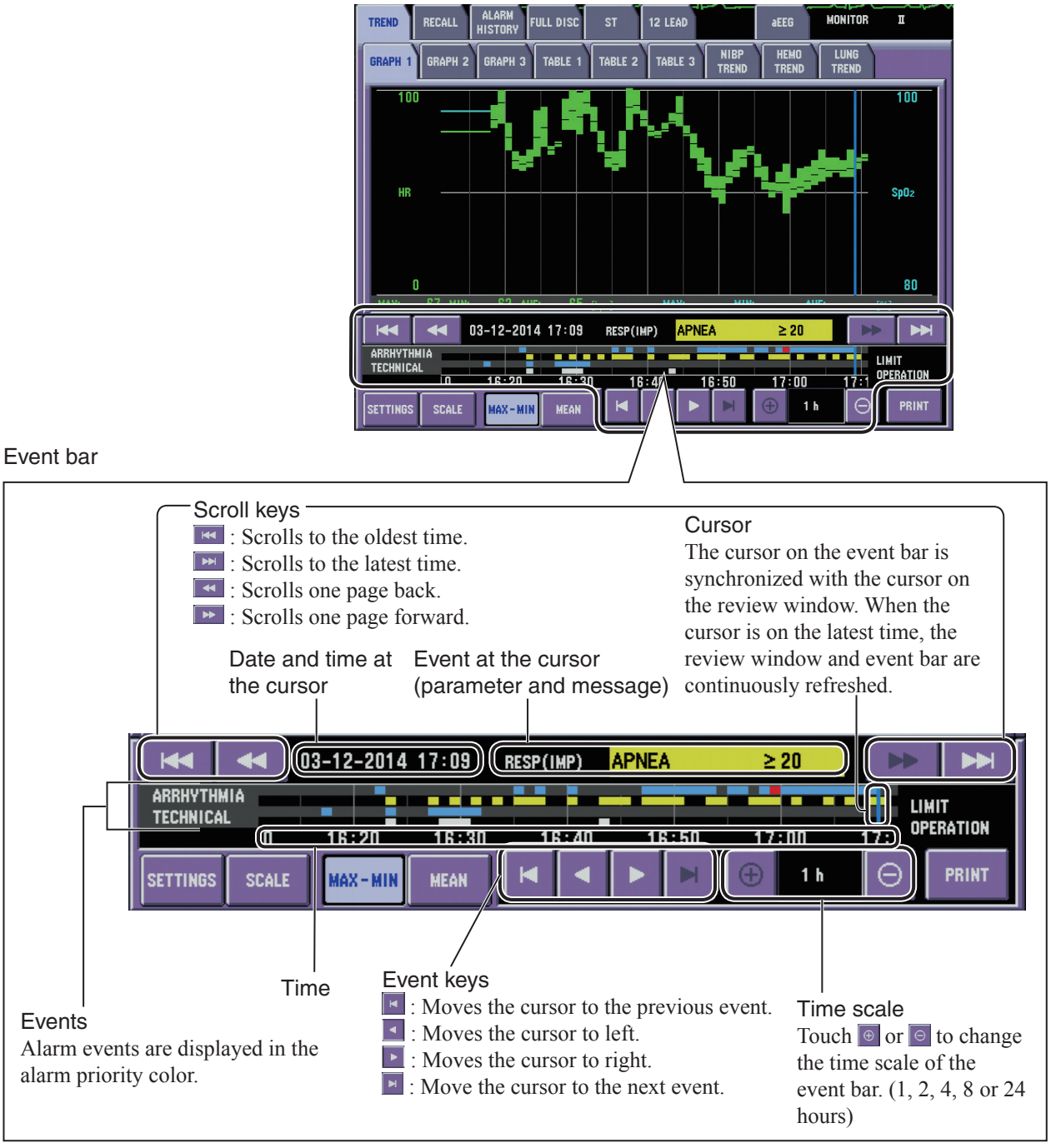
Event Bar

An event bar near the bottom of the review window shows events during displayed review time. The event bar and review window are synchronized. They have the same time scale and scroll together.

You can display up to four types of events.

- Arrhythmia alarms
- Technical alarms
- Vital sign alarms
- Monitoring operations: silence alarm, suspend alarms, all alarms off, bypass, and suspend monitoring

Example: GRAPH 1 page



TREND Window

GRAPH 1, GRAPH 2, GRAPH 3 Page

There are 3 trend graph pages. Each page displays up to 6 parameters of the past 24 hours. With the optional QM-601P memory card, data of past 72 hours can be saved.

The screen example is when 2 parameters are selected on the SETTINGS window. On the SETTINGS window, you can select parameters and on the SCALE window you can select each scale for the trendgraph display. To change the time threshold for the apnea trendgraph, select the interval in <APNEA TREND TIME> box on the SETTINGS window. You can select to display maximum and minimum values or mean values for the trendgraph display.

Press the [Menu] key → TREND key → GRAPH 1, GRAPH 2 or GRAPH 3 tab to display the TREND GRAPH page.

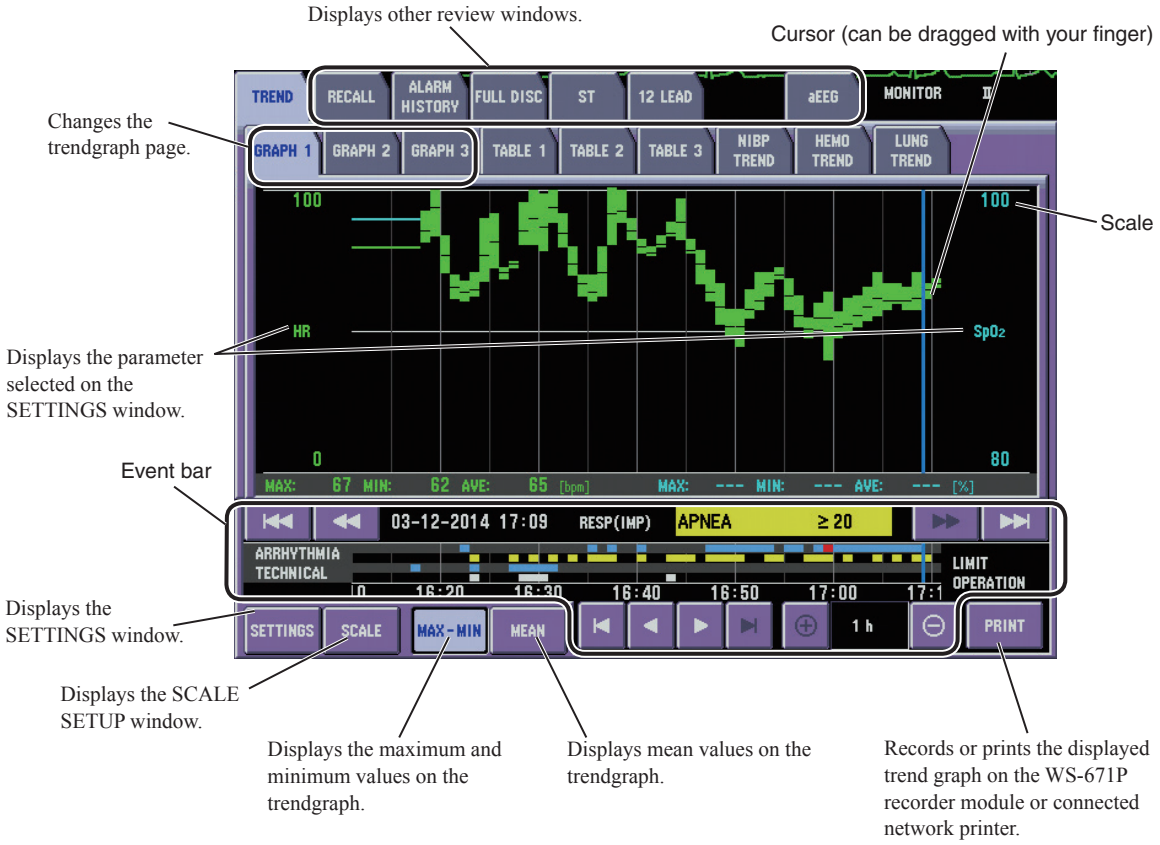
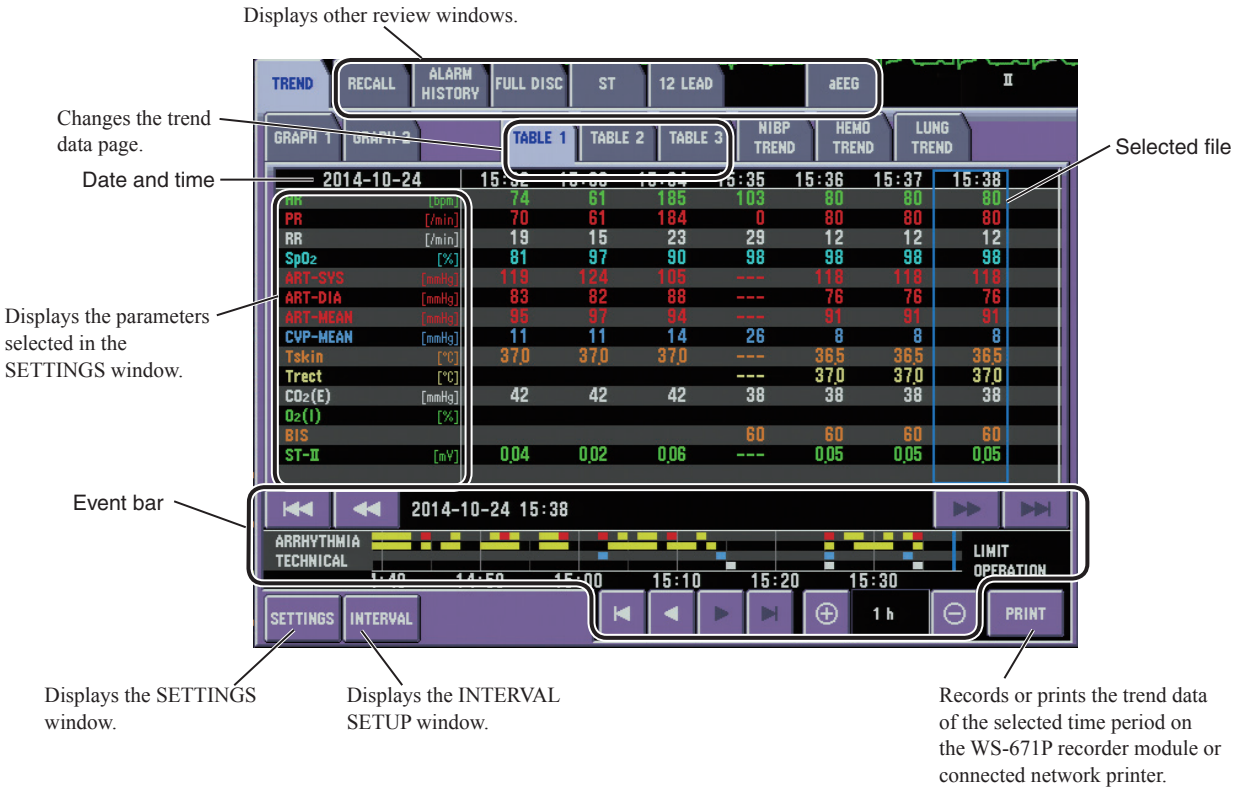


TABLE 1, TABLE 2, TABLE 3 Page

There are 3 table pages. Each page displays the vital sign data of the past 24 hours. With the optional QM-601P memory card, data of past 72 hours can be saved.

The data of all monitoring parameters can be displayed on the TREND TABLE page. The data of the selected parameters at the selected interval are displayed. Select the parameters to be displayed on the SETTINGS window on the TABLE 1 to TABLE 3 page.

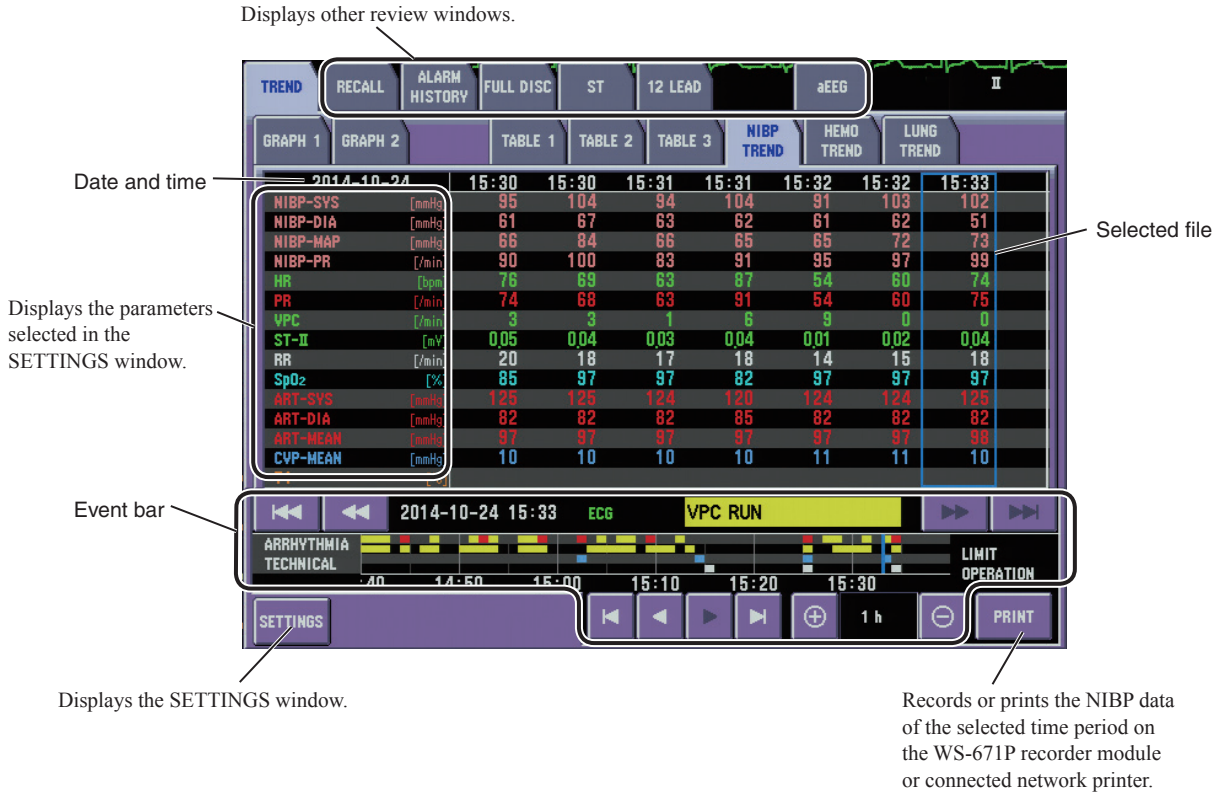
Press the [Menu] key → TREND key → TABLE 1, TABLE 2 or TABLE 3 tab to display the TREND TABLE page.



NIBP TREND Page

The NIBP TREND page displays data of the selected parameters at the NIBP measurement. Select the parameters to be displayed on the SETTINGS window of the NIBP TREND page. Displays the vital sign data at the NIBP measurement of up to 512 files. With the optional QM-601P memory card, data of up to 1,024 files can be saved.

Press the [Menu] key → TREND key → NIBP TREND tab to display the NIBP TREND page.

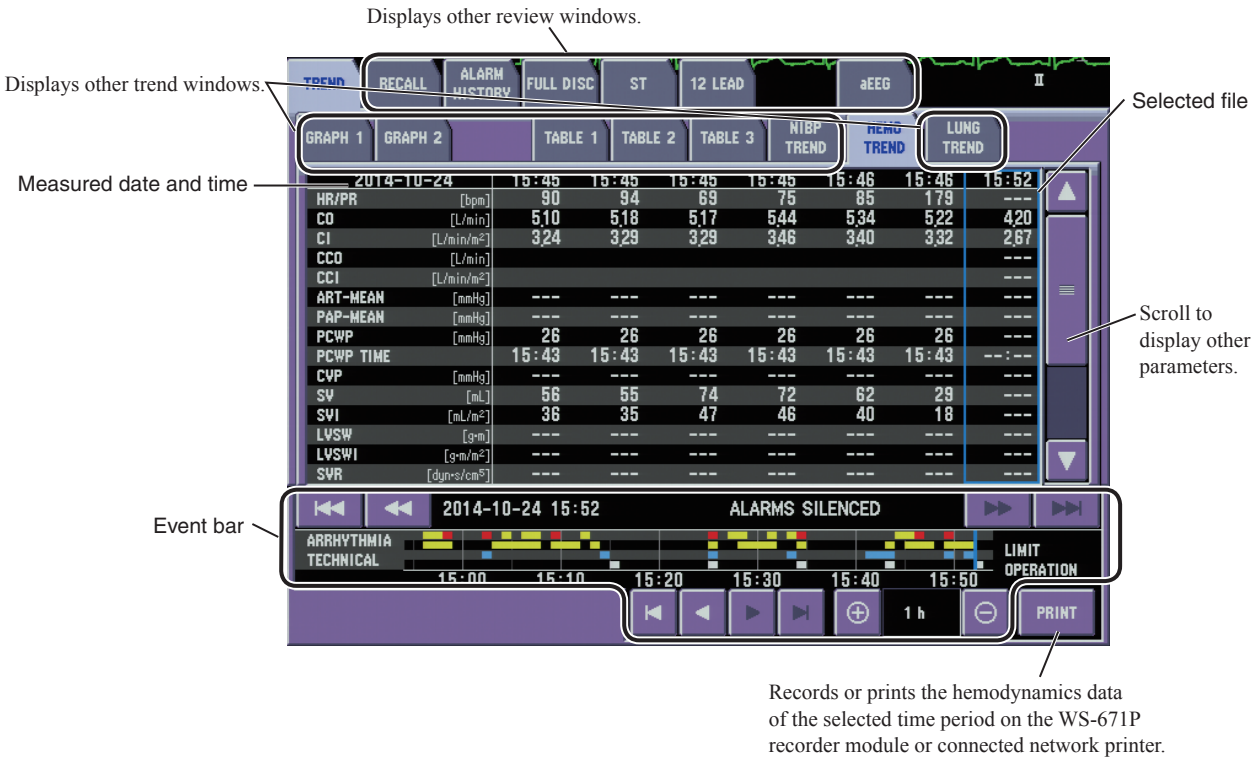


NOTE: The HR on the NIBP TREND page is the HR at the completion of NIBP measurement. The HR on the TABLE page and NIBP TREND page may be different.

HEMO TREND Page

The HEMO TREND page displays the hemodynamics table when cardiac output is measured and the measured values are added to the hemodynamics table. When cardiac output is monitored by the CCO monitor, measured values are also added to the hemodynamics table. Up to 512 files of the hemodynamic data are displayed when CO is monitored. With the optional QM-601P memory card, data of up to 1,024 files can be saved.

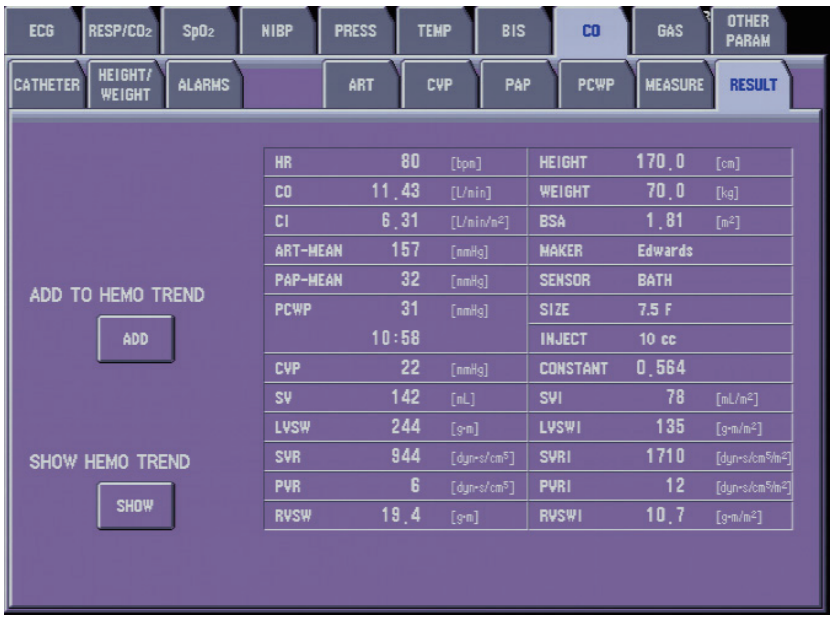
Press the [Menu] key → TREND key → HEMO TREND tab to display the HEMO TREND page.



Registering the Acquired Data to the Hemodynamics Table

The acquired CO data can be added to the hemodynamics table in the HEMO TREND page. When data is added to the hemodynamics table, the data disappears from the home screen and CO window. "- - -" appears on the CO data display area on the screen.

1. Display the RESULT page of the CO window.
   Press the [Menu] key → CO key → RESULT tab.



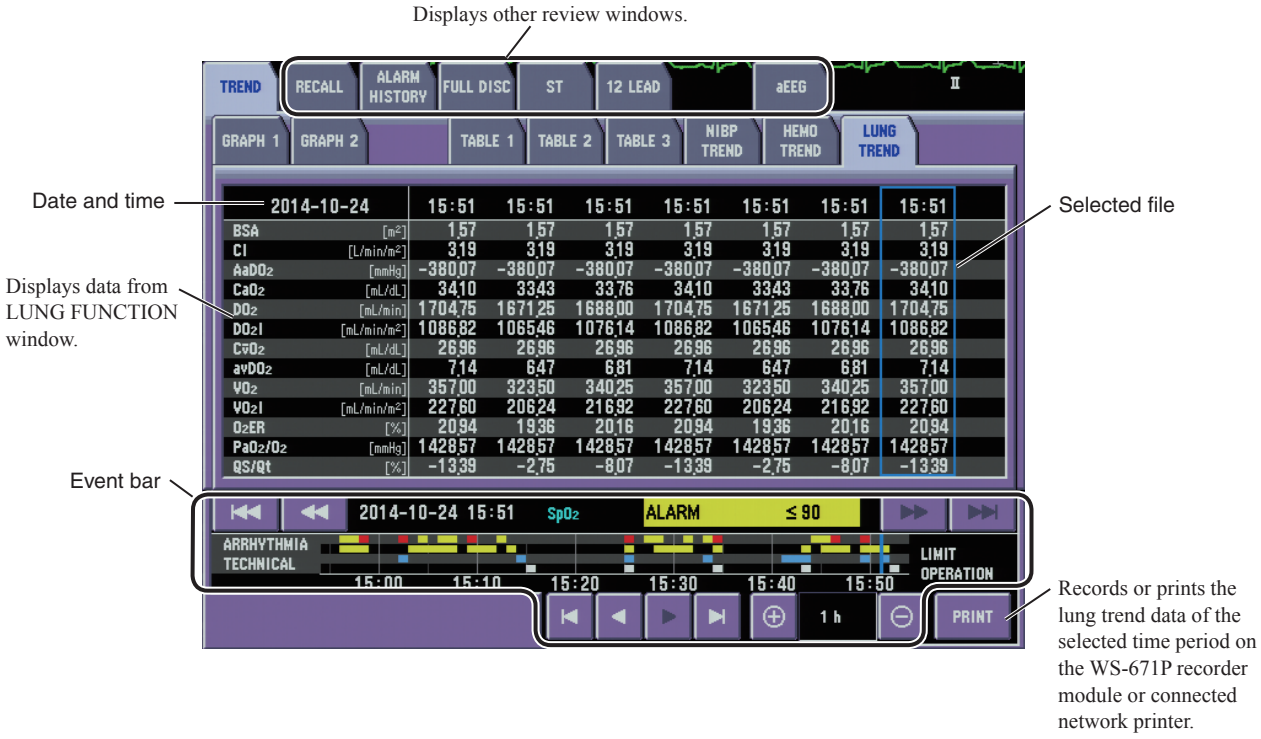
2. Touch the ADD key under <ADD TO HEMO TREND>. The data on the RESULT page is registered to the hemodynamics table (in the HEMO TREND page).

3. Touch the SHOW key under <SHOW HEMO TREND> to display the HEMO TREND page. The registered CO data is displayed in the HEMO TREND page.

LUNG TREND Page

The LUNG TREND page displays data acquired at the lung function measurement from the LUNG FUNCTION window. The files of past 24 hours or up to 128 files can be saved. Refer to the “DRUG/ LUNG FUNCTION Windows” section.

Press the [Menu] key → TREND key → LUNG TREND tab to display the LUNG TREND page.



RECALL Window

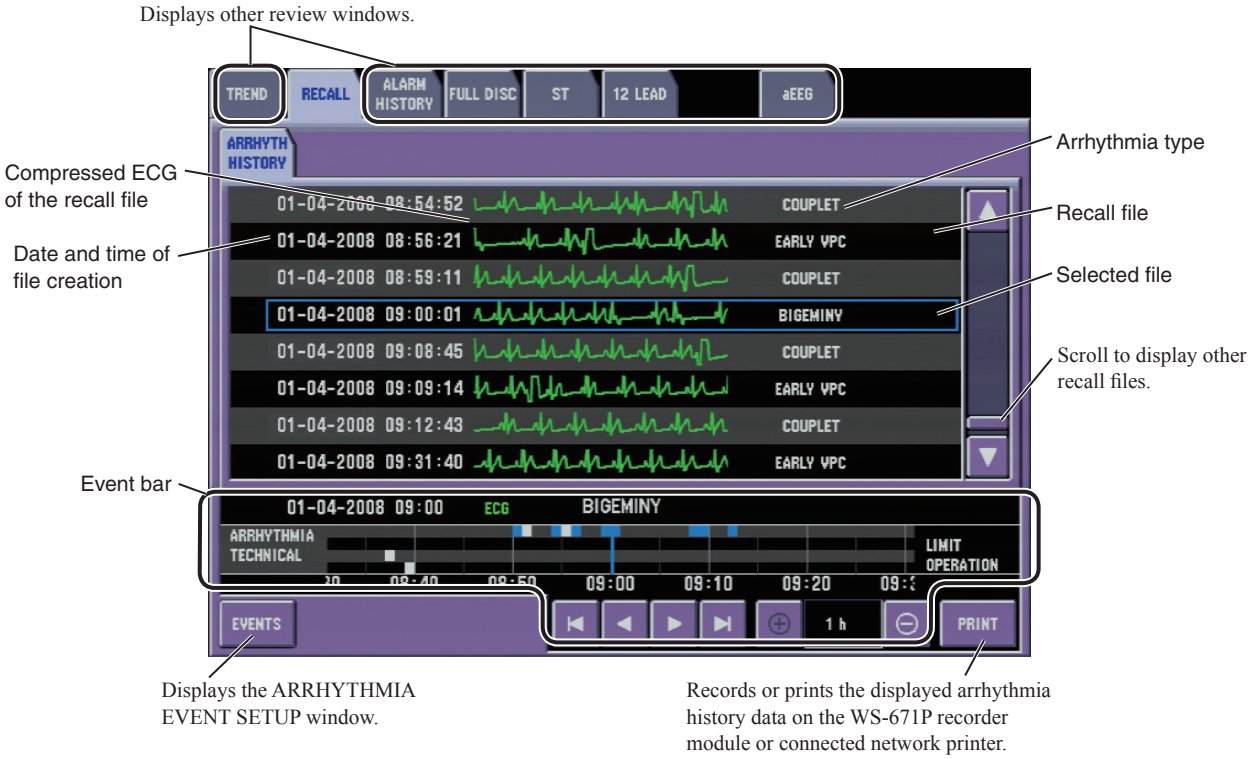
ARRHYTH HISTORY Page

Up to 8,192 files can be saved for arrhythmias. 8 second ECG is saved for each recall file. With the optional QM-601P memory card, data of up to 16,384 files can be saved.

To create arrhythmia recall files:

- <ARRHYTHMIA ANALYSIS> on the ECG window must be set to ON.
- The type of arrhythmias you want to save as files must be selected on the ARRHYTHMIA EVENT SETUP window on the RECALL window.

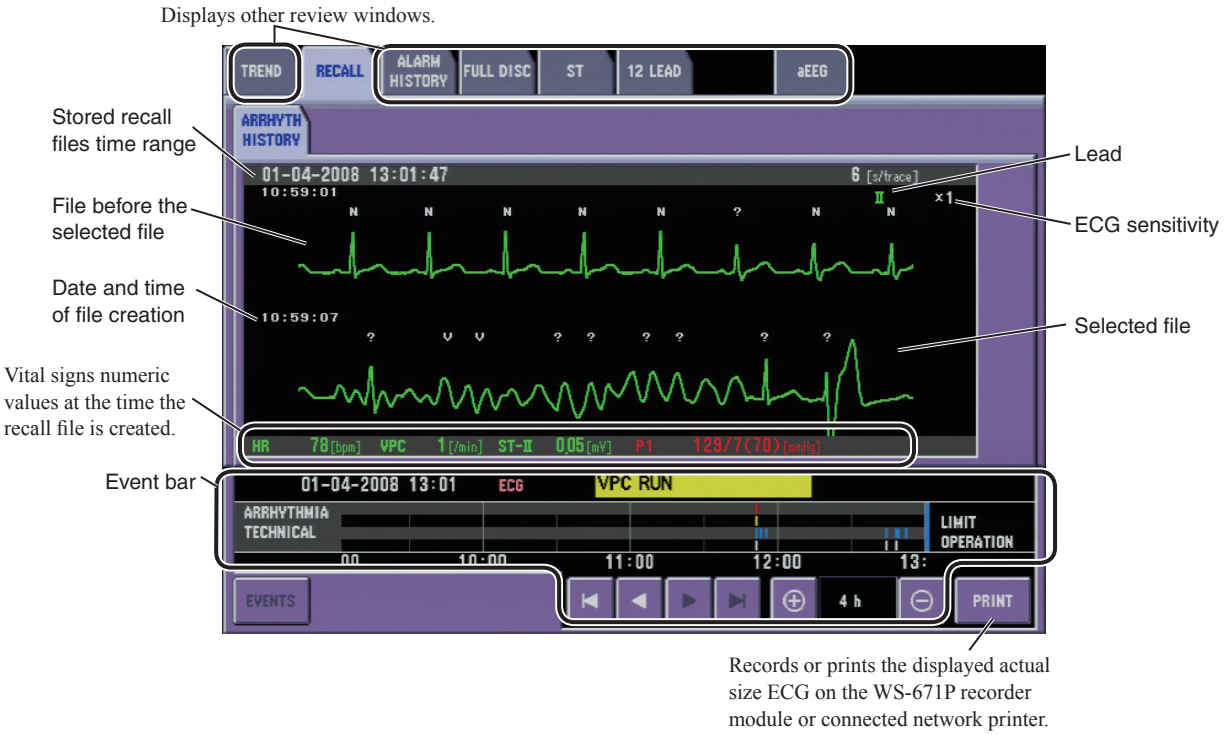
Press the [Menu] key → RECALL key to display the ARRHYTH HISTORY page.



The recall file of past 24 hours can be displayed on the ARRYTH HISTORY page. Use the scroll bar to display other files. Touch the desired file to display the actual size ECG.

Actual Size ECG

The ARRHYTH HISTORY page displays the actual size ECG of the selected recall file with the ECG of one before and one after the selected file.

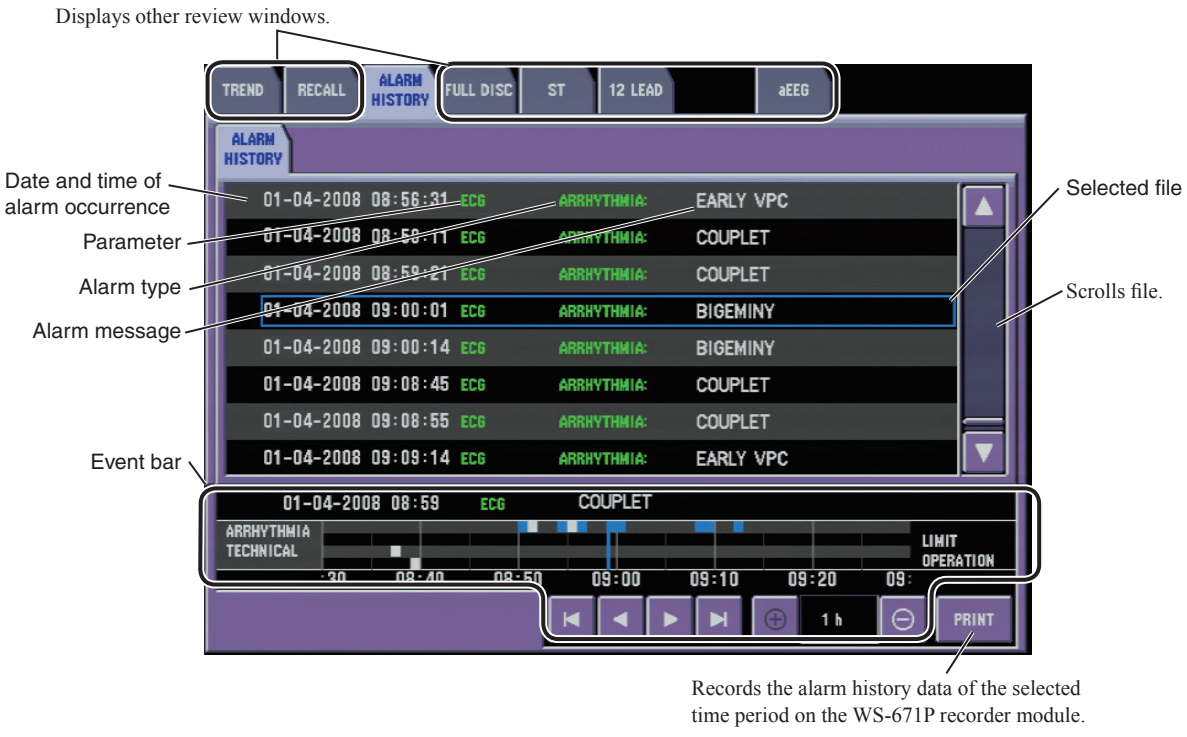


ALARM HISTORY Window

ALARM HISTORY Page

Displays the history of the past 24 hours. Up to 8,192 files can be saved. With the optional QM-601P memory card, data of up to 16,384 files can be saved.

Press the [Menu] key → ALARM HISTORY key to display the ALARM HISTORY page.



FULL DISC Window

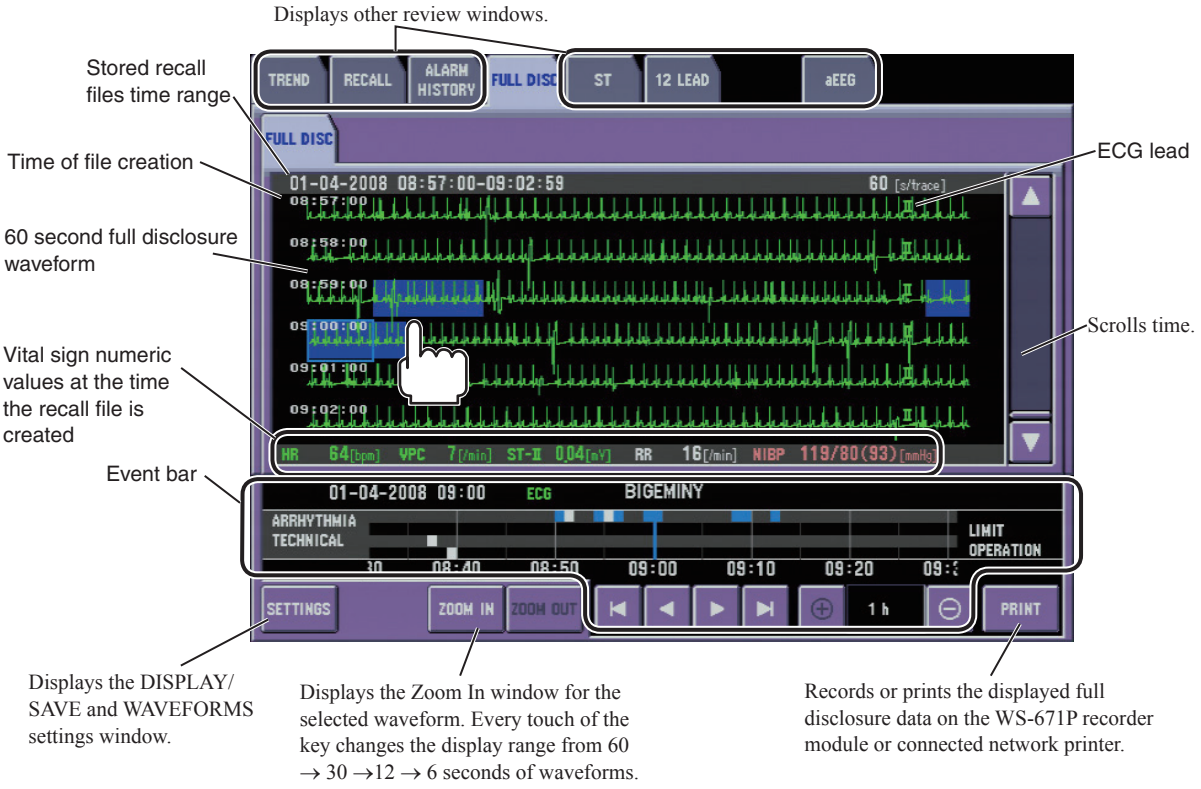
FULL DISC Page

Up to 5 parameter waveforms can be saved for the past 24 hours. With the optional QM-601P memory card, data of past 72 hours can be saved. Up to 4 parameters waveforms can be displayed. The full disclosure waveforms can be zoomed in to display the enlarged waveforms. Select the parameters for the waveform to be saved as the full disclosure on the SETTINGS window.

Press the [Menu] key → FULL DISC key to display the FULL DISC page.

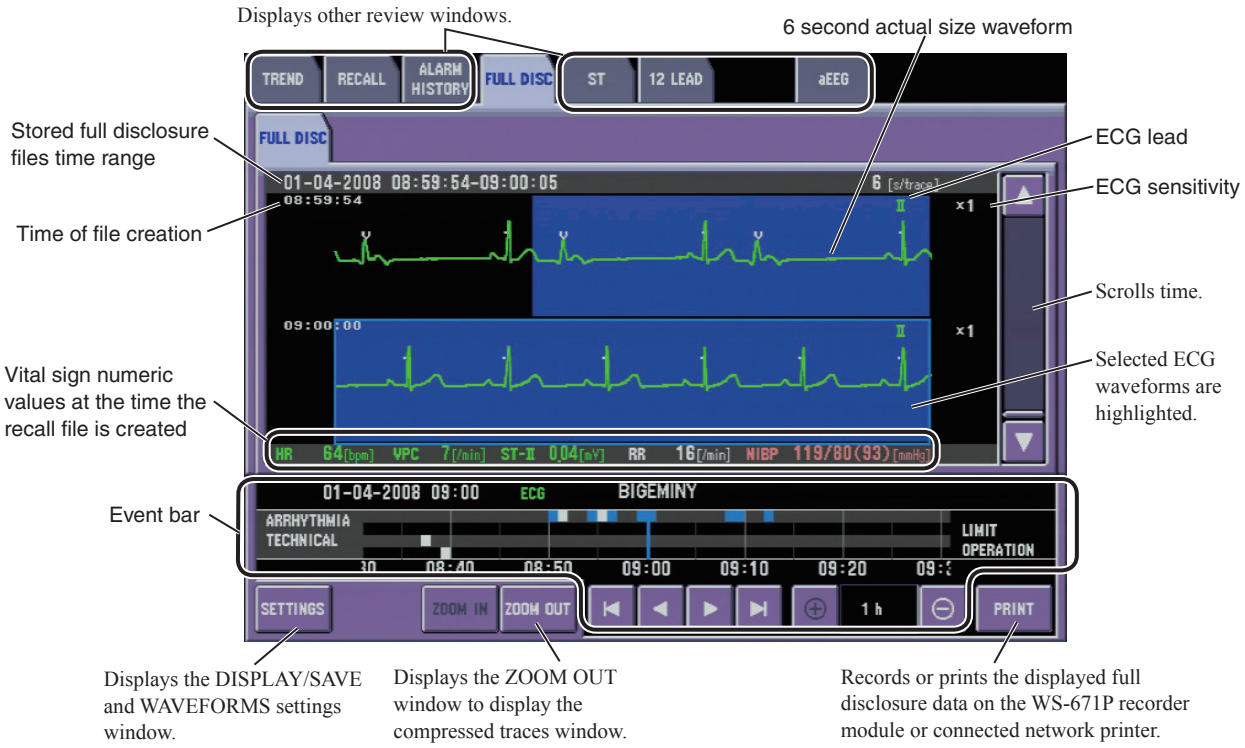
Full Disclosure Waveform

Touch to display the 6 seconds of enlarged waveforms. Touch again to restore the previous display.



Zoom In Window

The full disclosure waveform can be displayed in actual size.



ST Window

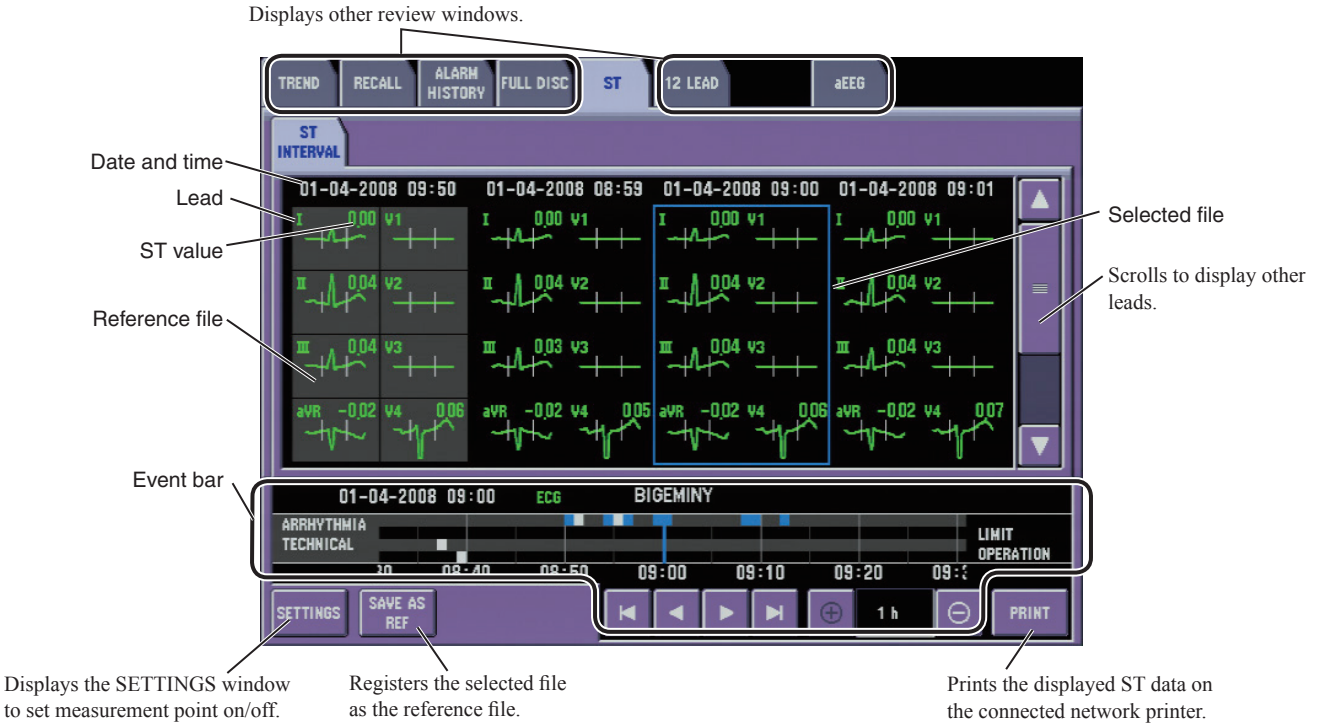
ST INTERVAL Page

Displays the past 24 hours of ST waves of all monitoring ECG leads. With the optional QM-601P memory card, data of past 72 hours can be saved. The reference ST waves are also displayed so that you can see the changes on the ST waves.

NOTE:

- The ST window is not available when the site setting is NICU.
- Although the ST algorithm has been tested for accuracy of the ST analysis result, the significance of the ST level changes need to be determined only by a physician.

Press the [Menu] key → ST key to display the ST INTERVAL page.



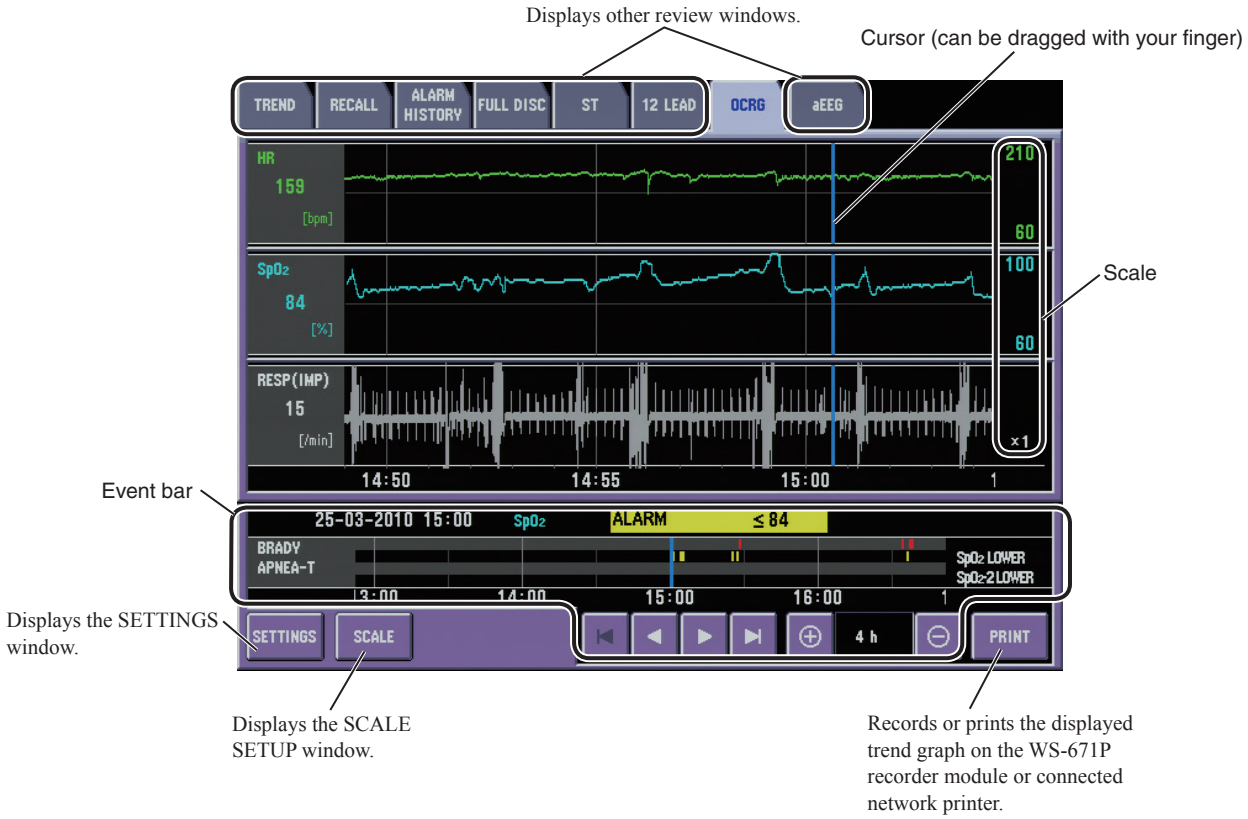
OCRG Window

Displays the past 24 hours of OCRG trendgraph. With the optional QM-601P memory card, data of past 72 hours can be saved.

On the SETTINGS window, you can select the OCRG trendgraph type of 1 cm/min or 3 cm/min and on the SCALE window, you can select the scale for the heart rate, SpO_2 and impedance respiration trendgraph display.

NOTE: The OCRG window is available only when the site setting is NICU.

Press the [Menu] key → OCRG key to display the OCRG window.



aEEG Window

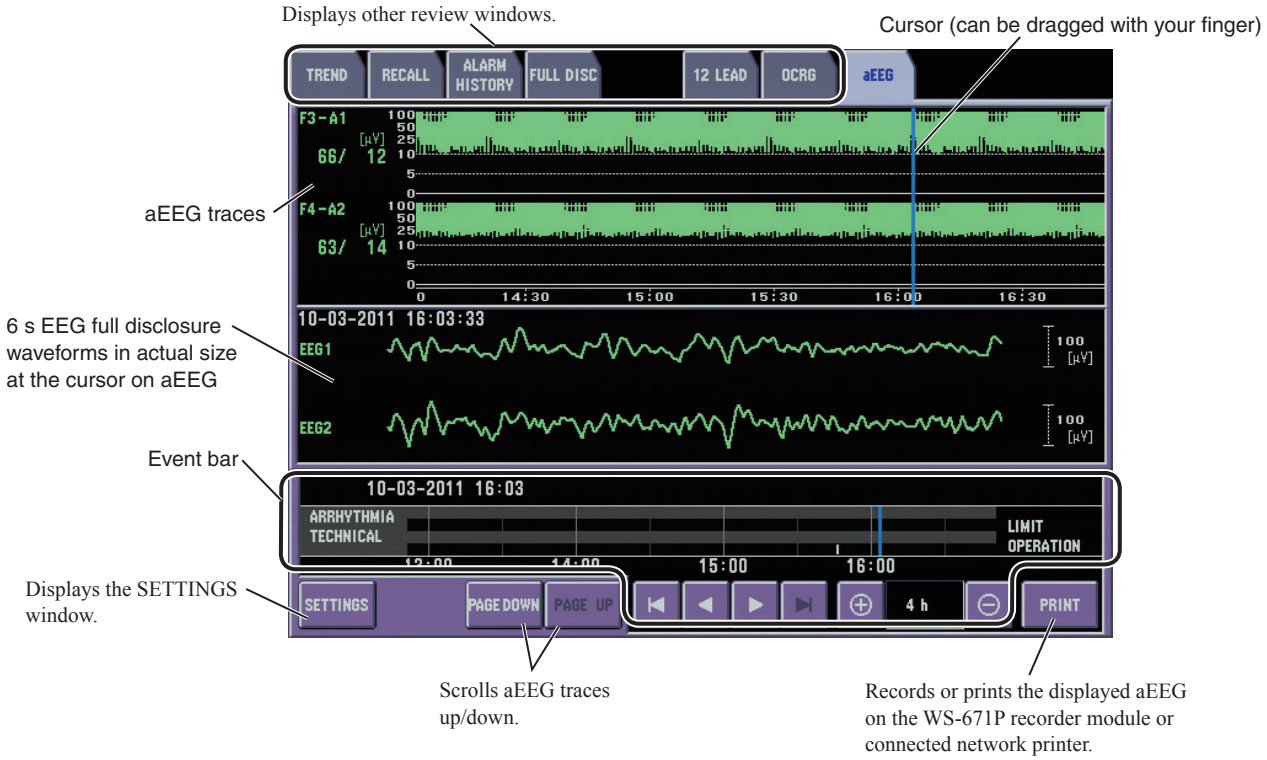
NOTE: aEEG window is not available on BSM-6301A/K.

Displays 2 aEEG traces on the aEEG window of the past 24 hours. With the optional QM-601P memory card, data of past 72 hours can be saved. aEEG is only available when EEG is monitored with an AE-918P neuro unit with software version 02-01 or later.

Press the [Menu] key → aEEG key to display the aEEG window.

To display aEEG (amplitude integrated electroencephalography), EEG must be monitored with an AE-918P neuro unit. aEEG of 2 channels monitored by the neuro unit is displayed on the aEEG window. When EEG is selected for the parameters to be saved as full disclosure on the FULL DISC window, the actual size EEG of the full disclosure is displayed in the lower part of the aEEG window.

aEEG and EEG can be recorded or printed by specifying the recording or printing range.



12 LEAD/12 LEAD ANALYSIS Windows

General

When 12 lead ECG is monitored, ECG can be analyzed on the 12 LEAD ANALYSIS window and the analysis result and clinical findings can be displayed on the 12 LEAD window. Up to 6 files can be saved. With the optional QM-601P memory card, data of up to 18 files can be saved.

The 12 LEAD window has the following pages to display the analysis result and clinical findings.

- 12 LEAD page for displaying the 12 lead analysis result data.
- ANALYSIS WAVE page for displaying ECG waveforms used for analysis.
- AVERAGE WAVE page for displaying averaged ECG waveforms.
- REPORT page for displaying clinical findings.

NOTE:

- 12 lead analysis is not available when an AY-660P input unit is used.
- On BSM-6000A series, the 12 LEAD and 12 LEAD ANALYSIS windows are not available when the site setting is NICU and 12 LEAD ANALYSIS is set to Off in the SYSTEM CONFIGURATION screen. Refer to Section 2 of the Administrator's Guide.
- ECG must be monitored with 10 electrodes to perform 12 lead ECG interpretation. ECG cannot be analyzed when monitoring with 3 or 6 electrodes.
- The oldest file is deleted when the maximum number of files are created.
- The stored data remains in memory for about 30 minutes after the power is turned off. After 30 minutes, the stored data is lost.
- Do not disconnect the power cord while the monitor power is on. Data may be lost.

12 LEAD ANALYSIS Window

Performing 12 Lead ECG Interpretation

WARNING

Do not use 12 lead ECG interpretation results and measured values from the Mason-Likar modification for diagnosis because the limb electrode placement is not the same as the standard 12 lead ECG. This may cause wrong diagnosis since 12 lead ECG interpretation of this monitor is based on the standard 12 lead ECG.

CAUTION

- The 12 lead ECG interpretation is performed for acquired ECG waveforms only and does not reflect all conditions of the patient. The results of the analysis might not correspond to the judgement of a physician.
- Overall judgement must be performed by the physician, referring to the analysis result, clinical findings and other examination results. After the physician's overall judgement, the analysis results should be signed or initialed by the physician.

CAUTION

When the gender is not specified, 12 lead ECG interpretation is performed with the patient as male.

CAUTION

When the date of birth or age is not entered, 12 lead ECG interpretation is performed with the patient as 35 years old.

NOTE:

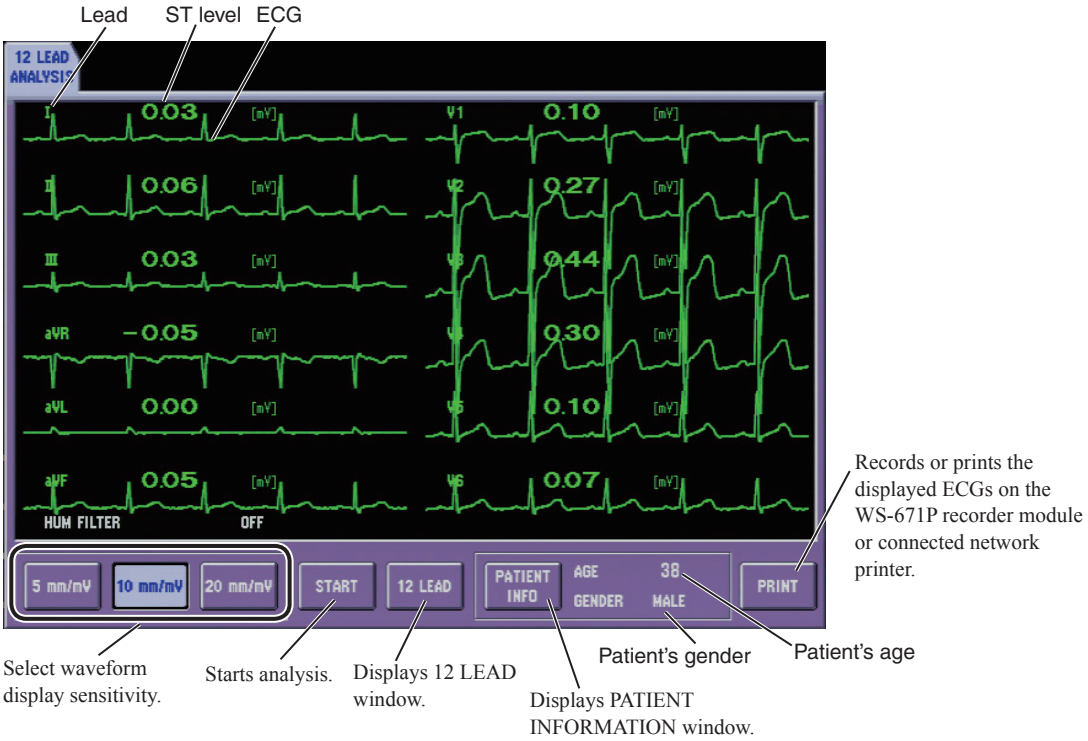
- When electrodes are not attached to the limbs, the analysis result concerning the ECG axis (such as axis deviation) may differ from the analysis with electrodes attached to limbs.
- When analyzing the pacemaker patient, set the pacing spike detection on the ECG window to ON.
- Refer to the ECAPS12C ECG Interpretation Program User's Guide for details about the analysis and the clinical findings.

1. Display the PATIENT INFORMATION window and check that the age and gender are correct.
   Press the [Menu] key → 12 LEAD ANALYSIS key → PATIENT INFO key.

2. Check that the electrodes are attached to the patient and leads are connected appropriately.

3. Display the 12 LEAD ANALYSIS window and check that ECGs on the window are stable.
   Press the [Menu] key → 12 LEAD ANALYSIS key.

   NOTE: When the age and/or gender is not entered, the "ENTER DATE OF BIRTH AND GENDER" message appears.



4. Touch the START key to start analyzing ECGs. The "SAVING. PLEASE WAIT" message appears and 10 second ECG of all leads are acquired and analyzed.

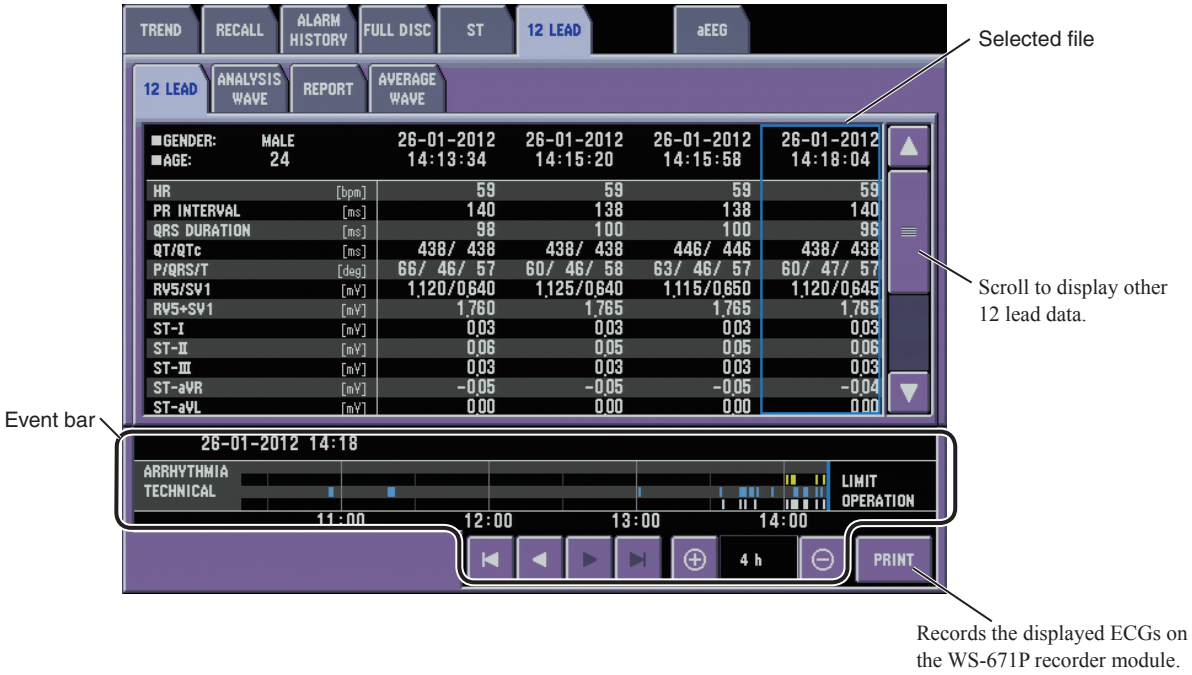
   When analyzing is complete, the "ANALYZING. PLEASE WAIT" message disappears and the 12 LEAD window is displayed.

You can select the print format when printing the 12 LEAD ANALYSIS window. Refer to Section 3 of the Administrator's Guide.

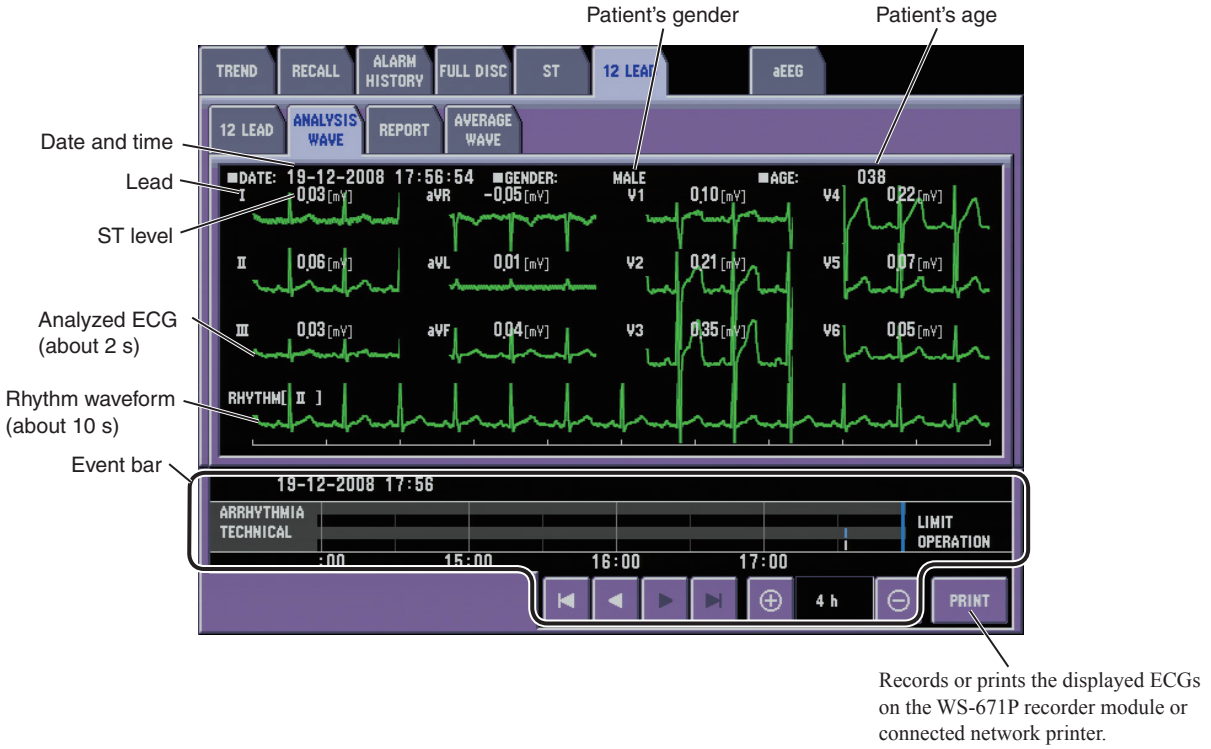
12 LEAD Window

Viewing the 12 Lead Analysis Result

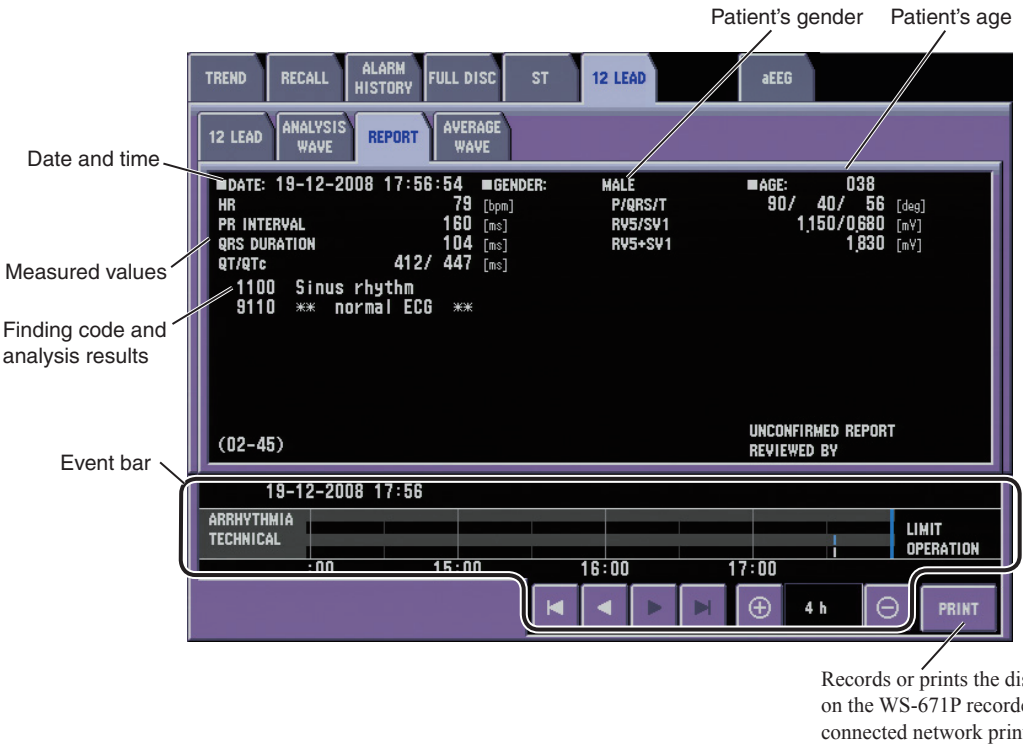
To see the 12 lead analysis result data, touch the 12 LEAD tab.



To see the analyzed waveforms, touch the ANALYSIS WAVE tab. About 2 seconds of the ECG of each lead and 10 seconds of rhythm waveform (lead II) used for the analysis are displayed.

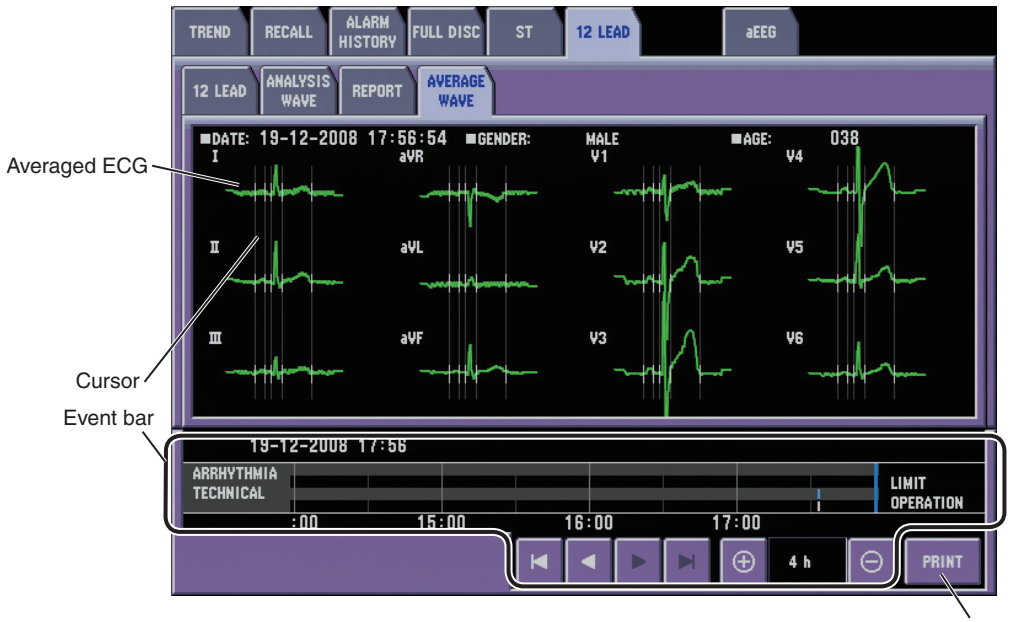


To see the interpretation result, touch the REPORT tab.



Records or prints the displayed ECGs on the WS-671P recorder module or connected network printer.

To see the averaged ECGs, touch the AVERAGE WAVE tab. The cursors appear to indicate the P wave start and end points, QRS start and end points and T wave end points.



Prints the displayed ECGs on the connected network printer.

DRUG/LUNG FUNCTION Windows

DRUG Window

On the DRUG window, you can calculate the flow rates and dosages for medication titrations. The flow rate is calculated from the following equation. The dosage can also be calculated when the flow rate is known.

$$\text{Flow rate} = \frac{\text{Dosage} \times \text{Patient Weight} \times \text{Solution Amount}}{\text{Drug Amount}}$$

The DRUG window has the following windows.

- DRUG window for entering drug name, registering drugs and the units other than the factory default settings
- SETTINGS window for entering drug amount (AMOUNT), solution amount (VOLUME), dosage (DOSE), flow rate (SAMPLE RATE), patient weight and dose step
- DOSE window for displaying the table of the selected drug titration

NOTE:

- When using the DRUG window for the first time after shipment or after settings are initialized, you must set the drug names and other settings.
- When the patient weight is changed on the ADMIT page of the ADMIT DISCHARGE window, the titration is automatically recalculated with the new weight.

17 drugs and drug amount, solution amount, dosage and dose step for each drug are preset on the monitor. You can set four other drugs on the DRUG window and change the settings on the EDIT window. The following drug names are preset.

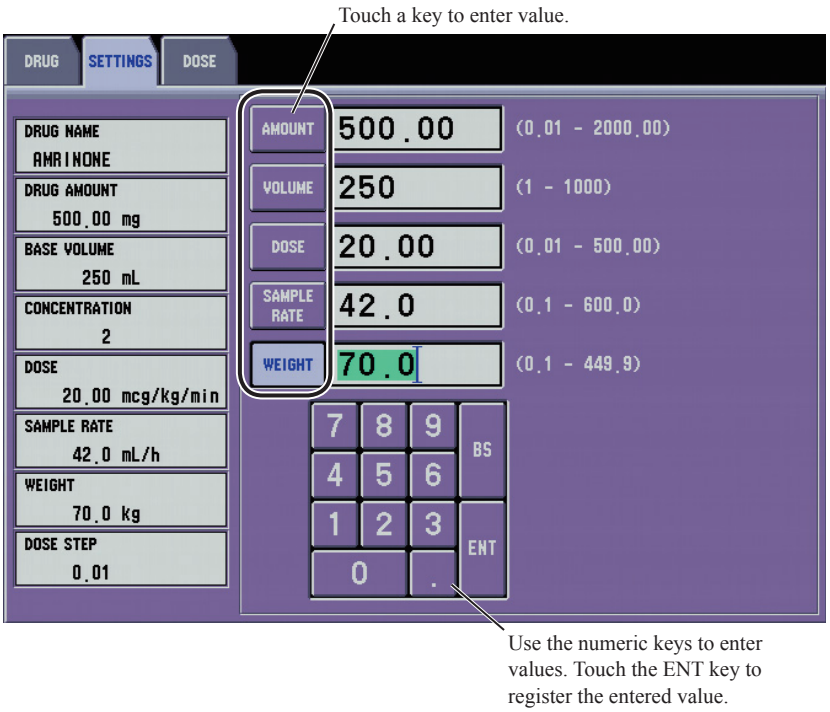
- Amrinone
- Aminophylline
- Bretylium
- Dobutamine
- Dopamine
- Epinephrine
- Heparin
- Insulin
- Isoproterenol
- Lidocaine
- Nitroglycerin
- Nitroprusside
- Norepinephrine
- Phenylephrine
- Procainamide
- Streptokinase
- tPA

Using Drug Calculation

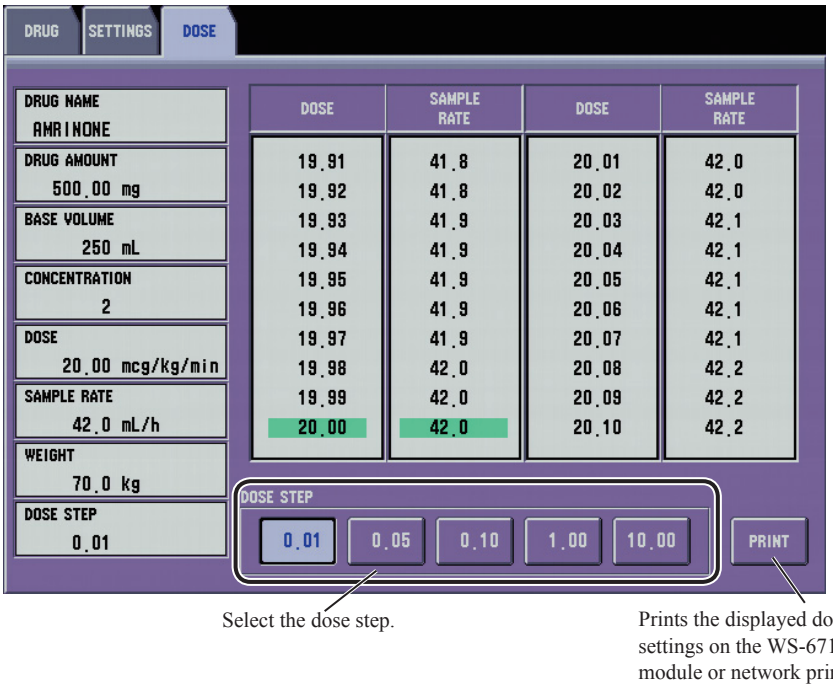
1. Display the DRUG window.
   Press the [Menu] key → DRUG key.

2. On the DRUG window, select the drug name.

3. On the SETTINGS window, enter other necessary settings. For drugs which need patient weight to calculate the flow rate, enter the patient weight on the ADMIT page of the ADMIT DISCHARGE window or the SETTINGS window of the DRUG window.

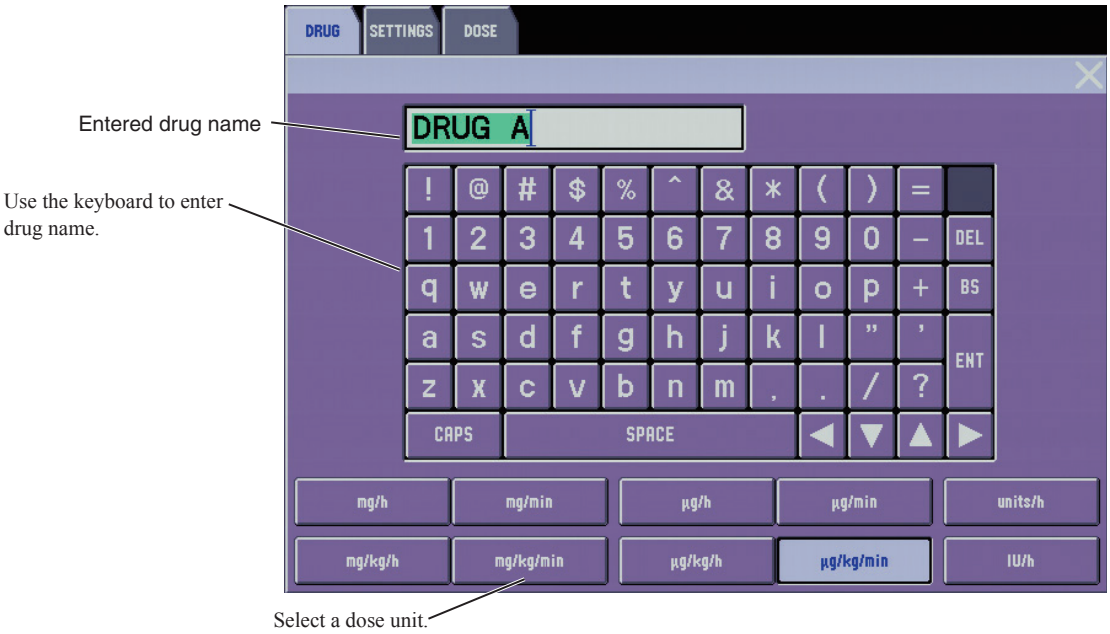


4. Touch the DOSE tab to display the titration table. The titration values calculated from the settings on the SETTINGS window are displayed in the table.



Registering Drugs

When using a drug other than the 17 preset drugs, assign a drug name and dose unit to Drug A, B, C or D on the DRUG window. When the dosage unit is set, the sample rate unit is automatically set.



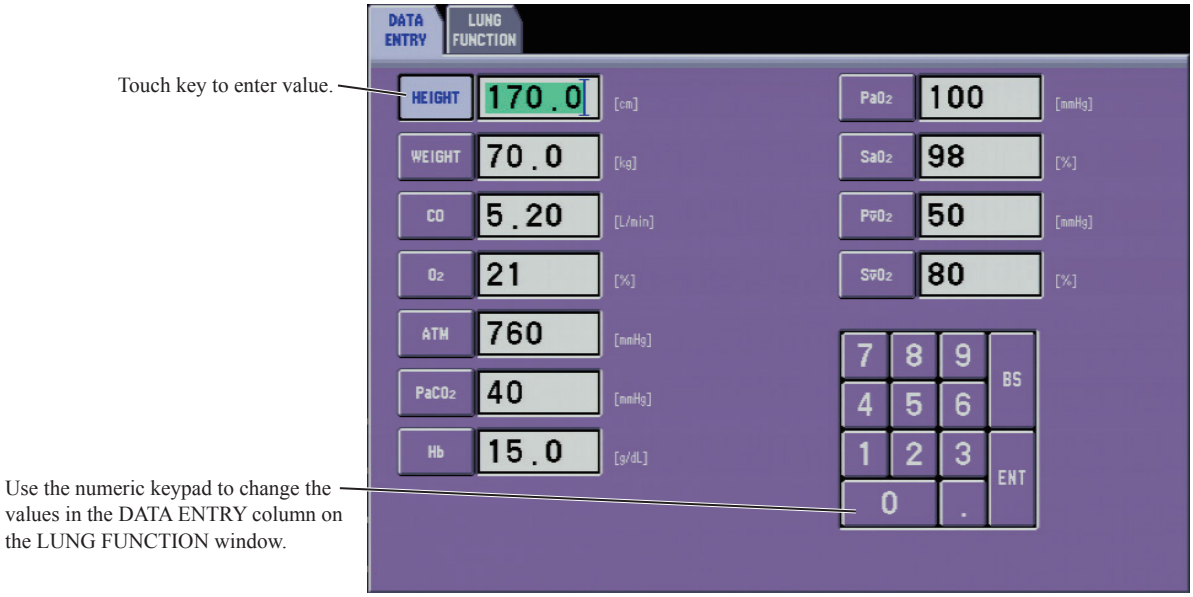
LUNG FUNCTION Window

There are two windows. The DATA ENTRY window calculates the patient's respiration dynamics and the LUNG FUNCTION window displays the calculation result. The following data required for this calculation is automatically acquired from the monitoring parameters when the window is opened.

- Patient's height and weight entered on the ADMIT page of the ADMIT DISCHARGE window
- CCO value (When CCO is measured, the CCO value is used as the CO value)
- O_2 when O_2 or anesthetic gas is monitored

Calculating the LUNG FUNCTION

1. Display the DATA ENTRY window.
   Press the [Menu] key → LUNG FUNCTION key → DATA ENTRY tab.



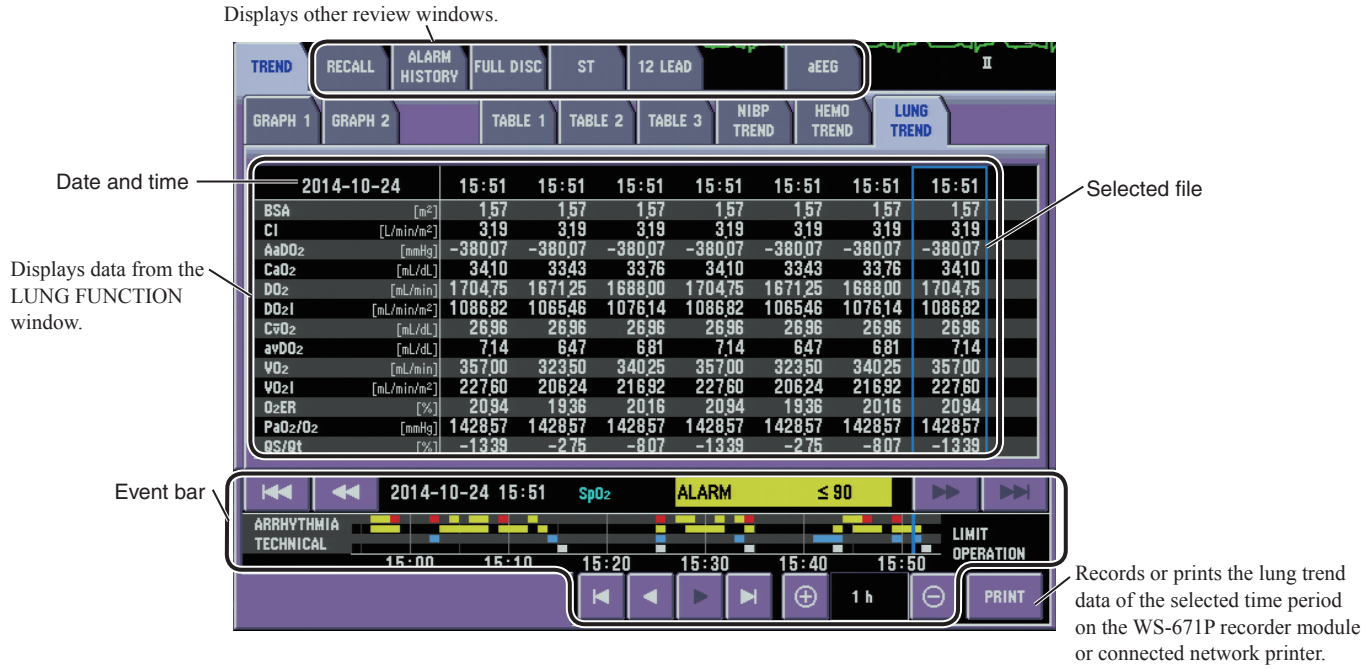
2. If necessary, change values using the numeric keypad. When height or weight is changed, the same setting on the ADMIT page of the ADMIT DISCHARGE window and windows which use height and weight are also changed. Touch ENT key to register the entered value. The respiration dynamics are recalculated according to the entered values.

3. Touch the LUNG FUNCTION tab to display the LUNG FUNCTION window.

4. Touch the ADD key to register the calculated values to the table in the LUNG TREND page in the TREND window.

Displaying the LUNG TREND Table

Touch the SHOW key on the LUNG FUNCTION window to display the table in the LUNG TREND page in the TREND window.



Recording

Recording can be performed on the optional WS-671P recorder module. When the bedside monitor has no recorder module but is connected to the central monitor network, recording can be performed on the central monitor recorder. When recording on the central monitor is available, the central monitor name appears in <RECORD ON CENTRAL MONITOR> box on the RECORD window of the SYSTEM SETUP window.

Recording Modes

There are three recording modes:

- Manual recording
  Real time/delayed waveform recording: Three waveforms selected on the RECORD window and vital signs data are recorded whenever the [Record] key on the bedside monitor is pressed. When the RECORD WAVE key is assigned to the function key, the manual recording on the optional recorder module can be performed with the function key. The function key is not available for recording on the central monitor recorder.
  Recording on the review windows and analysis/calculation windows: The displayed data on the review/analysis/calculation window is recorded when the PRINT key on the review/analysis/calculation window is touched.
- Periodic recording
  Waveform recording: Three waveforms selected on the RECORD window and vital signs data are recorded automatically at the set interval.
  OCRG trendgraph recording: OCRG on the home screen can be recorded in 5 or 15 minute interval when OCRG is selected for <PERIODIC REC INTERVAL (min)>.
- Alarm recording
  When a vital sign alarm or arrhythmia alarm occurs, three waveforms selected on the RECORD window and vital signs data are automatically recorded.

NOTE: Alarm recording is not performed when an alarm is suspended or <ALARM RECORDING> is set to OFF.

When More than One Recording Modes is Triggered

If another recording is triggered during recording, only the first recording is performed.

During alarm recording, if a higher alarm level alarm occurs, the current alarm recording period is extended for 20 seconds.

Changing Recording Settings

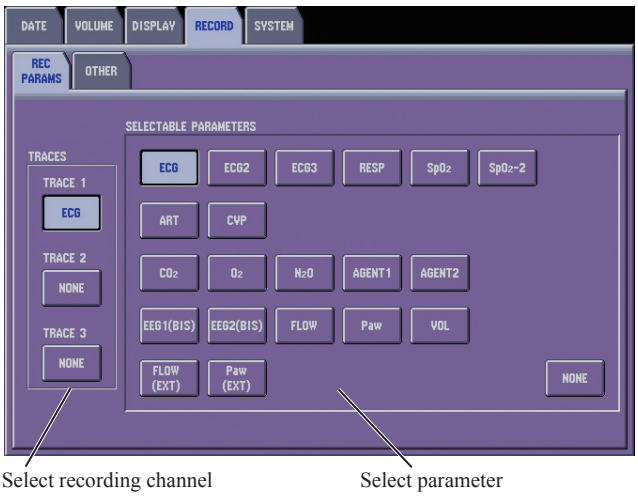
The following items can be set for recording.

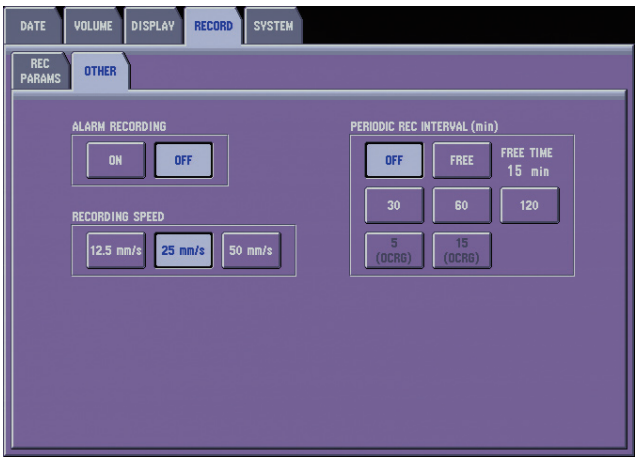
- Recording waveforms (up to three parameters)
- Recording speed for manual recording by the [Record] key on the bedside monitor
- Periodic recording interval/off
- Alarm recording on or off

The following items are set on the RECORD window of the SYSTEM SETUP window.

- Real time or 8 second delayed recording for manual recording (REAL TIME, DELAY)
- Recording period for manual recording (CONTINUOUS, 10 s, 20 s or 30 s)
- Interval for the FREE periodic recording (1 to 120 minutes)
- Feed the paper after recording on or off

Press the [Menu] key →RECORD key to display the RECORD window.





Selecting Recording Waveforms

The selected waveforms are recorded in manual recording by pressing the [Record] key, periodic recording and alarm recording. Up to three waveforms can be selected.

1. Select the channel in <TRACES> box on the REC PARAMS page.

2. Select the parameter in <SELECTABLE PARAMETERS> box on the OTHER page. Touch the NONE key when not using the channel.

Changing Recording Speed

Select 12.5 mm/s, 25 mm/s or 50 mm/s in <RECORDING SPEED> box on the OTHER page for manual recording.

Selecting Recording Interval for Periodic Recording

Select the recording interval in <PERIODIC REC INTERVAL> box. Select OFF when not performing periodic recording.

FREE

The interval for FREE is set on the RECORD window of the SYSTEM SETUP window which should be set by the administrator.

OCRG

When <CURRENT TREND> on the LAYOUT page of the DISPLAY window in the SYSTEM SETUP window is set to “OCRG 1 cm/min” or “OCRG 3 cm/min”, OCRG is recorded at the selected 5 minute or 15 minute interval in <PERIODIC REC INTERVAL> box.

Turning Alarm Recording On or Off

Set ON or OFF for <ALARM RECORDING> to automatically record waveforms and data at vital signs alarm and arrhythmia alarm occurrence.

INTERBED Window

When the bedside monitor is connected to a central monitor network, the bedside monitor data can be sent to the central monitor. The bedside monitor can display monitoring data of up to 20 other beds in the network on the INTERBED window. If you have previously registered other beds as interbed beds on the INTERBED window, an alarmed interbed bed ID appears on the home screen and alarm sounds on this bedside monitor.

To use the interbed function, the following must be set.

- Register the beds to be managed by the interbed function on this monitor.
- Set <INTERBED ALARMS TO DISPLAY> on the INTERBED page of the SYSTEM SETUP window to ALL, CRISIS AND WARNING, or CRISIS. Refer to Section 3, Administrator's Guide.
- Set <AUTO INTERBED DISPLAY> on the SETTINGS window of the INTERBED window to ON to automatically display the VIEW OTHER BEDS window when an alarm occurs on that bed.

WARNING

Do not monitor a patient's vital signs only by the interbed function. The patient must be monitored on the interbed bed or central monitor.

WARNING

When an alarm occurs:

- Check the patient first and take necessary measure to ensure patient's safety.
- Remove the cause of the alarm.
- Check the alarm settings on the bedside monitor and change the alarm settings if necessary.

NOTE: The monitor must be connected to a network to use the interbed function.

Registering/Removing Interbed Beds

Up to 20 beds can be registered. Any bed in the monitor network can be registered as an interbed bed. When registering an interbed bed, the power of the bedside monitor to be registered must be turned on.

1. Display the SELECT BEDS window. Press the [Menu] key → INTERBED key → SELECT BEDS tab.
2. In the <SELECTED BEDS> box, select the position to register the interbed bed.
3. Touch the GROUP key to select the group to which the desired bed belongs and select the bed from the bed list. The beds which are already registered as interbed beds cannot be selected.
4. Check that the selected bed appears in the <SELECTED BEDS> box.

To remove a bed from the interbed beds, select the bed to be removed in the <SELECTED BEDS> box and touch the VACANT key.

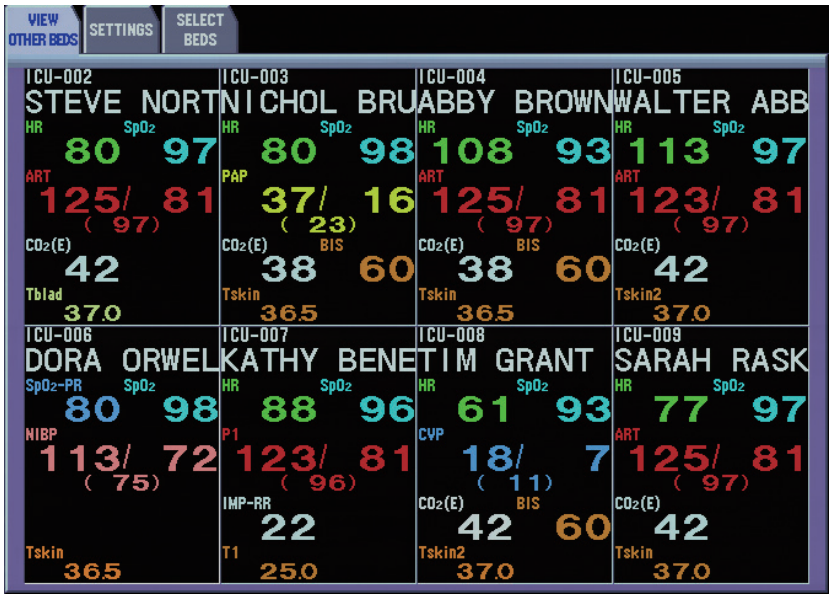
Displaying the Interbed Bed Data

NOTE: When the instrument which is registered to the interbed bed is turned off or not connected to the network correctly, a “MONITOR OFF” message is displayed and no measurement value or alarm is displayed.

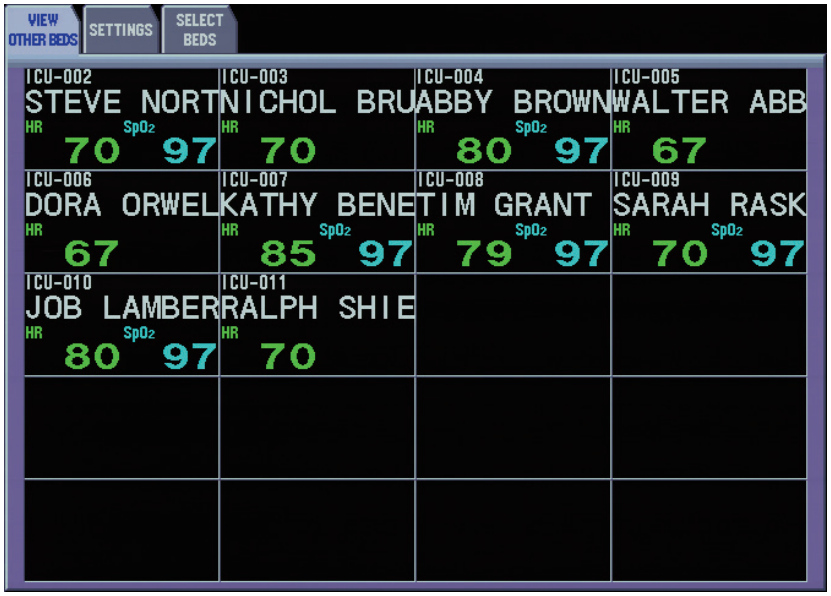
Display the VIEW OTHER BEDS window.
Press the [Menu] key → INTERBED key → VIEW OTHER BEDS tab.

VIEW OTHER BEDS Window

There are two display patterns for the VIEW OTHER BEDS window. Touching a patient name opens the individual bed window.



- When no interbed beds are registered in the bottom three rows on the SELECT BEDS window, the heart rate, SpO_2, blood pressure, CO_2, BIS and temperature of the interbed beds are displayed.

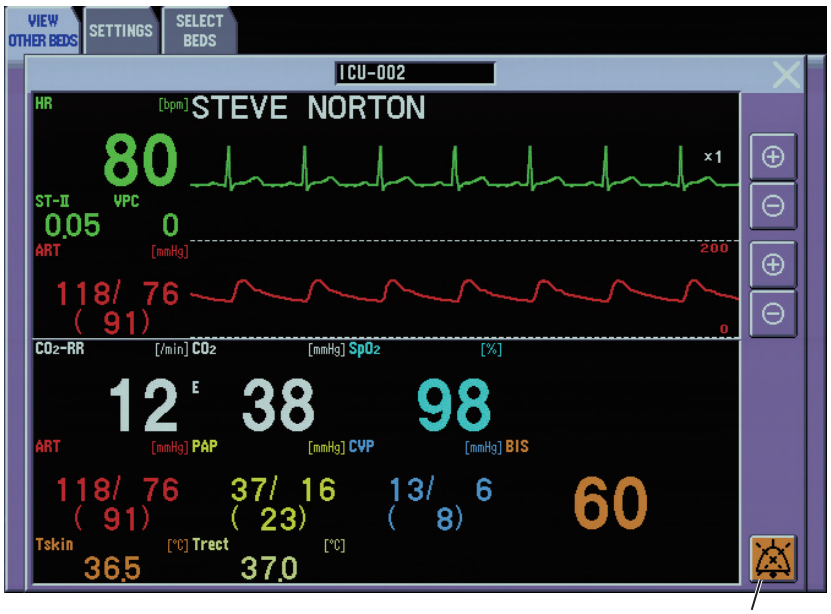


- When interbed beds are registered in the bottom three rows on the SELECT BEDS window, only the heart rate and SpO_2 of the interbed beds are displayed.

To see more parameters on the VIEW OTHER BEDS window, register beds only in the top two rows of the SELECT BEDS window.

When any beds are registered in the bottom three rows on the SELECT BEDS window, only the HR and SpO_2 are displayed on the VIEW OTHER BEDS window.

Individual Bed Window



Silences the alarm on the alarmed interbed bed.

Touch the desired bed to display the individual bed window. On the individual bed window, numeric data of monitoring parameters are displayed with ECG and another selected parameter waveform. You can change beds by selecting the bed on the VIEW OTHER BEDS window.

To change the second waveform, touch the numeric data of the parameter you want to display. You can also change the waveform sensitivity or scale by using the ⊕ and ⊖ keys.

The parameters which can be displayed on the individual bed window are:
Heart rate, VPC, ST, respiration rate, CO_2, SpO_2, NIBP, temperature (2 channels), O_2, IBP (3 channels), BIS

Even when ECG is not monitored, pulse rate is displayed on the screen when IBP or SpO_2 is monitored.

Interbed Alarm Function

When an alarm occurs at an interbed bed, the alarm is indicated on this bedside monitor. The interbed alarm can be silenced from this bedside monitor. The alarm silence time depends on the setting on the alarmed bed. The interbed alarm can only be suspended on the alarmed bed.

NOTE: When the alarm function is turned off by “all alarms off” or “alarm suspended” on the interbed bed, the interbed alarm does not occur on this bedside monitor.

To silence the interbed alarm, touch the Silence Alarm key ( ) on the individual bed window. The alarm sound is also silenced and the alarm indicator turns off on the alarmed bed. For the monitor action when the interbed alarm is silenced, refer to “Interbed Alarm” section.

NOTE: When several interbed alarms occur, all interbed alarms are silenced by touching the key on the individual bed window of the INTERBED window.

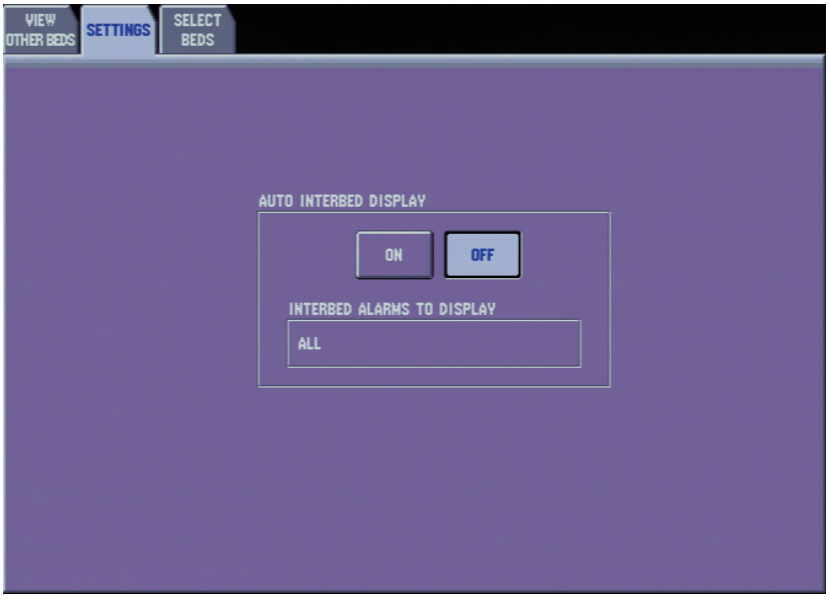
Interbed Alarm Setting

CAUTION

The interbed window only appears on the home screen when an interbed alarm occurs and <AUTO INTERBED DISPLAY> is set to ON.

Display the SETTINGS window of the INTERBED window to change settings.
Press the [Menu] key → INTERBED key → SETTINGS key.

Select ON or OFF for <AUTO INTERBED DISPLAY> in the SETTINGS window. When this is set to ON, the VIEW OTHER BEDS window is automatically displayed when an alarm occurs at an interbed bed.



Monitoring Parameters

Only the parameters which can be monitored by the basic configuration of the system are described in this manual.

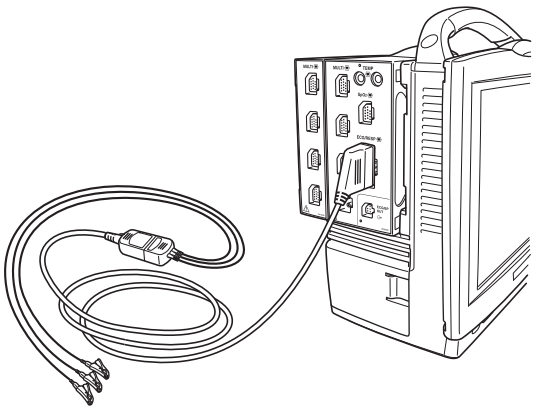
ECG

Preparation

The following electrodes and leads are available for ECG monitoring.

No. of Electrodes	Disposable Electrodes	Electrode Lead	ECG Connection Cord
3 (I, II, III)	Vitrode F-150M, F-150S, L-150, L-150X	BR-903P (IEC)/BR-903PA (AHA) (Clip type), BR-963P (IEC) (Clip type)	JC-906P (IEC)/ JC-906PA (AHA) JC-916P (IEC)
	Disposable Electrode with DIN type lead, Vitrode V-090M3, V-09IO3, V-120S3, N-03IS3		
6 (I, II, III, aVR, aVL, aVF, 2 from V1 to V6)	Vitrode F-150M, F-150S, L-150, L-150X	BR-906P (IEC)/BR-906PA (AHA) (Clip type)	
	Disposable Electrode with DIN type lead, Vitrode V-060M6, V-06IO6		
10 (I, II, III, aVR, aVL, aVF, V1, V2, V3, V4, V5, V6)	Vitrode F-150M, F-150S, L-150, L-150X	ECG patient cable BJ-900P (IEC)/BJ-900PA (AHA)	
	Disposable Electrode with DIN type lead, Vitrode V-040M4, V-04IO4, V-060M6, V-06IO6		JC-900P (IEC)/ JC-900PA (AHA)

NOTE: The MULTI socket on the AY-660P input unit cannot be used for monitoring ECG using 10 electrodes.



Attach electrodes to the patient, connect the electrode lead to the electrodes and ECG connection cord, and connect the ECG connection cord to the ECG/RESP socket.

To obtain a stable ECG:

- Shave excess hair.
- Rub the patient's skin with a piece of cotton where the electrodes are to be attached.
- If the skin is dirty, clean with soap and water. Dry completely.

WARNING

After attaching the electrode to the patient and connecting the cable to the monitor, check that electrodes are attached to the patient and check that the cable is connected to the monitor properly. When the electrodes are removed from the patient, do not touch the metal part of the electrode with bare hands or let the metal part of the electrode contact the metal part of the bed or any other conductive parts. Failure to follow this warning may cause electrical shock or injury to the patient by discharged energy.

WARNING

When using a defibrillator together with the monitor, use Ag/AgCl electrodes. Other types of electrodes, stainless steel in particular, will adversely affect the ECG waveform by slowing the baseline recovery on the monitor and result in no monitoring immediately following defibrillation.

WARNING

Do not use 12 lead ECG interpretation results and measured values from the Mason-Likar modification for diagnosis because the limb electrode placement is not the same as the standard 12 lead ECG. This may cause wrong diagnosis since 12 lead ECG interpretation of this monitor is based on the standard 12 lead ECG.

CAUTION

At the start of ECG monitoring, check that the dominant QRS is appropriate. Otherwise arrhythmia monitoring may be inaccurate.

CAUTION

Only use Nihon Kohden specified electrodes and electrode leads. When other type of electrodes or electrode leads are used, the “CHECK ELECTRODES” message may be displayed and ECG monitoring may stop.

CAUTION

- When using the electrodes with DIN type lead, use only Vitrode V or N electrodes. If other electrodes are used, the electrode lead might not be properly connected and ECG monitoring may be unstable.
- Do not use electrodes of different metals. ECG monitoring may be unstable if electrodes of different metals are used.

CAUTION

When the “NOISE” or “CANNOT ANALYZE” message is displayed, ECG data and alarm are not reliable. Remove the cause by checking the electrodes, electrode leads, patient’s body movement, EMG and peripheral instruments grounding. Also make sure that an electric blanket is not used.

CAUTION

When the “CHECK ELECTRODES” message is displayed, ECG is not monitored properly and the ECG alarm does not function. Check the electrode, electrode leads and connection cord, and if necessary, replace with new ones.

NOTE

- When a line isolation monitor is used, noise from the line isolation monitor may resemble actual ECG waveforms on the bedside monitor and cause false heart rate alarms or no alarm at all.
- Do not use the different types of the electrodes together. This might cause ECG monitoring to become unstable.

When using 3 electrodes, one lead can be monitored. When using 6 electrodes, 8 leads can be monitored. When using 10 electrodes, up to 12 leads can be monitored and 12 lead ECG interpretation can be analyzed. For details on the 12 lead interpretation, refer to the "12 LEAD ANALYSIS Window" in "12 LEAD/12 LEAD ANALYSIS Windows" section.

Use with an Electrosurgical Unit

For use with an electrosurgical unit (ESU), this monitor has a circuit to protect the patient from skin burn and to reduce ESU interference on the ECG waveform. However, the effectiveness of this circuit depends on electrode position and monitor setup. With an ESU, pay attention to the following points.

WARNING

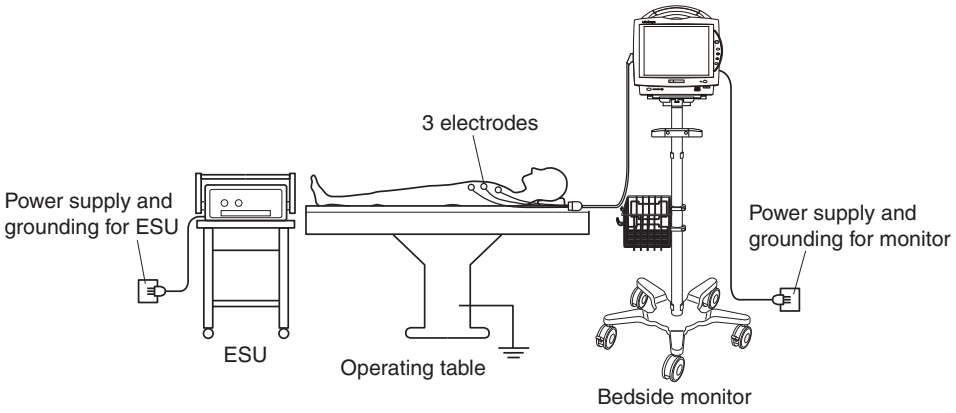
When the monitor is used with an electrosurgical unit (ESU), firmly attach the entire area of the ESU return plate. Otherwise, the current from the ESU flows into the electrodes of the monitor, causing electrical burn where the electrodes are attached. For details, refer to the ESU manual.

CAUTION

When using the monitor with an ESU, locate the monitor and ESU appropriately and ground instruments properly. Otherwise noise from the ESU may interfere with the ECG and the heart rate and arrhythmia analysis may be incorrect.

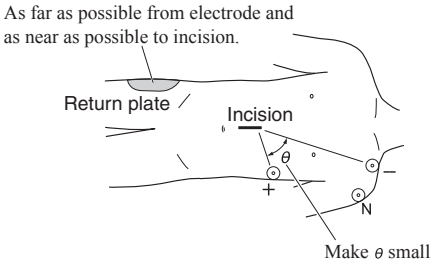
- Arrangement
  Install the monitor as far from the ESU as possible. If possible, locate them on opposite sides of the operating table.

- Power supply
  Noise from the ESU may interfere with the ECG signal through the AC power line. Supply power to the monitor and ESU from different outlets located as far from each other as possible. Do the equipotential grounding properly.



- Measure with 3-electrode lead
  Use the minimum number of electrodes. Use new electrodes.

- Minimize noise
  1. Select an ECG lead where the active ECG electrodes are located as far from the incision as possible.
  2. Position the + and – electrodes as close as possible.
  3. Select the leads where the angle (θ) between the active electrodes and the incision is as small as possible.
  4. Set the electrosurgical return plate as close to the incision as possible.



- Set the following items on the OTHER page of the ECG window.
  FILTERS: MAXIMUM
  SYNC SOURCE: SpO_2 or PRESS

- Monitor respiration by thermistor method or monitor CO_2
  Noise is superimposed on the waveform and the respiration rate cannot be monitored accurately in the impedance method. When monitoring respiration, turn respiration monitoring off or monitor the respiration by thermistor method or monitor CO_2.

Monitoring Arrhythmia

The following arrhythmias are monitored.

Arrhythmia Name	Description
ASYSTOLE	Longer than 3 to 10 seconds (selectable) with no QRS complex.
VF	Ventricular fibrillation longer than 4 seconds.
VT	Ventricular tachycardia. 3 to 9 (selectable*[1]) or more consecutive VPCs when heart rate exceeding the VT heart rate limit (16 to 300 beats/min selectable*[1]).
EXT TACHY*[1]	Extreme tachycardia exceeding the EXTREME TACHY limit.
EXT BRADY*[1]	Extreme bradycardia dropping below the EXTREME BRADY limit.
V BRADY*[1]	Ventricular bradycardia. 3 or more consecutive VPCs when heart rate drops below the V BRADY heart rate limit (15 to 299 beats/min selectable).
VPC RUN	VPC short run. 3 to 8 (selectable) consecutive VPCs when heart rate exceeds the VPC RUN heart rate limit (16 to 300 beats/min selectable*[1]). or The selected number*[4] of consecutive VPCs when heart rate drops below the VT heart rate limit.
SV TACHY*[1]	Supraventricular tachycardia. 3 to 9 (selectable) or more consecutive normal QRS of regular R-R interval when heart rate exceeding the SV TACHY heart rate limit (16 to 300 beats/min selectable).
TACHYCARDIA	Heart rate above the upper heart rate limit.
BRADYCARDIA	Heart rate below the lower heart rate limit.
PAUSE*[1]	1 to 3 seconds (selectable) with no QRS.
V RHYTHM*[1]	Ventricular rhythm. 3 or more consecutive VPCs.
COUPLET	VPC couplet (paired VPCs). 2 consecutive VPCs.
EARLY VPC	Early VPC including R-on-T type. VPC with a time interval from the preceding normal QRS complex of less than approximately one-third of the normal R-R interval, at heart rate dropping below 120*[2] beats/min.
MULTIFORM*[1]	Two different shaped VPCs within the last 3 minutes.

Arrhythmia Name	Description
BIGEMINY	Ventricular bigeminy. 3 or more consecutive pairs of VPC and normal QRS. A dominant rhythm of N-V-N-V-N-V (N = normal beat, V = ventricular beat)
TRIGEMINY*1	Ventricular trigeminy. A dominant rhythm of N-N-V-N-N-V.
FREQ VPC	Frequent VPCs. VPC rate (VPCs/min) reaching or exceeding the preset limit of 1 to 99 VPCs/min (selectable).
VPC	Ventricular premature contraction.
IRREGULAR RR*1	Consistently irregular R-R intervals.
PROLONGED RR*1	R-R interval 1.75 times longer than the dominant R-R interval.
NO PACER PULSE*1*3	No QRS and pacing pulse within the bradycardia limit. Oversensing.
PACER NON-CAPTURE*1*3	No QRS from the preceding pacing pulse for the preset time interval (40 to 480 ms selectable). Non-capture.

*1 These become available when “EXTENDED” is selected for <ARRHYTHMIA TYPE> on the SYSTEM SETUP window.

*2 120 beats/min when <QRS DETECTION TYPE> is set to ADULT, 150 beats/min when <QRS DETECTION TYPE> is set to CHILD or NEONATE.

*3 Available only when pacing detection is set to On.

*4 This number is set in the VT alarm setting.

To monitor arrhythmia, <ARRHYTHMIA ANALYSIS> on the ARRHYTH ANALYSIS window must be set to ON.

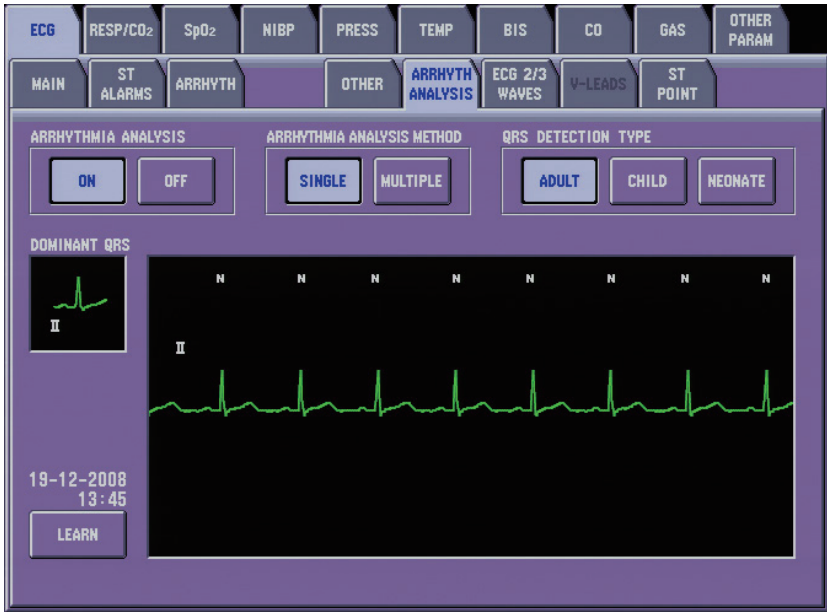
WARNING

For arrhythmia monitoring, set <ARRHYTHMIA ANALYSIS> on the ECG window to ON. Otherwise, there is no sound or indication for arrhythmia alarms (except for ASYSTOLE).

CAUTION

If there is any doubt about the arrhythmia analysis, make the monitor relearn the patient’s ECG and check that the dominant QRS is appropriate. Otherwise, an important arrhythmia may be overlooked.

Changing Arrhythmia Monitoring Settings



Turning Arrhythmia Analysis On or Off

Select ON or OFF in <ARRHYTHMIA ANALYSIS> box.

Selecting Arrhythmia Analysis Leads

Select SINGLE or MULTIPLE in <ARRHYTHMIA ANALYSIS METHOD> box to select the number of analyzing leads.

SINGLE: The lead selected for the first trace is analyzed.

MULTIPLE: The leads selected for the first and second traces are analyzed.

Selecting the Patient Type for QRS Detection

CAUTION

At the start of ECG monitoring, check that the correct patient type is set for <QRS DETECTION TYPE> on the ARRHYTH ANALYSIS page of the ECG window. If an inappropriate patient type is set, heart rate cannot be counted accurately and noise or P waves may be counted as QRS and cardiac arrest may be overlooked.

The patient type for QRS detection is the same as the patient type selected on the ADMIT DISCHARGE window. If necessary, you can change the type for QRS detection. Select the monitoring patient type in the QRS DETECTION TYPE box. The selected patient type is displayed on the home screen. This setting returns to the master setting on the ARRHYTH page of the MASTER window when 30 minutes elapse after monitor power off.

The QRS settings depend to the patient type.

Items	QRS DETECTION TYPE Setting		
	ADULT	CHILD	NEONATE
Detect narrow QRS	Not available	Not available	Available
QRS detection sensitivity	Automatic sensitivity	Same as the <SENSITIVITY> setting	Automatic sensitivity
Default setting of ISO point	R – 80 ms	R – 56 ms	
Default setting of J point	R + 48 ms	Cannot be set	
Default setting of ST point	J + 60 ms	R + 60 ms	

Learning the ECG Waveform for Arrhythmia Detection

To learn ECG for arrhythmia detection, touch the LEARN key on the MAIN or ARRHYTH ANALYSIS page. The Dominant QRS is updated.

Checking the Dominant QRS

The dominant QRS and ECG of the selected first trace is displayed on the ARRHYTH ANALYSIS page. The monitor detects QRS of the monitoring ECG and classifies them into templates. The monitor selects the most typical QRS, called dominant QRS, and uses it for analyzing arrhythmia. Whenever ECG is learned or relearned, the dominant QRS is refreshed.

The ECG on ARRHYTH ANALYSIS window are annotated by the following QRS classification.

QRS Annotation	Description
N	Normal QRS complex
V	Ventricular premature contraction
P	Paced QRS
?	Impossible to classify or during learning
–	Noise

If there is any doubt about the arrhythmia analysis, make the monitor relearn the patient's ECG and check the dominant QRS.

NOTE: The ECG waveform on the ECG window is delayed 5 seconds.

Changing ECG Settings

Change settings on the ECG window. The following settings can be changed for ECG monitoring.

- ECG measurement on or off
- Monitoring lead and lead name
- ECG sensitivity
- Number of ECG traces on the home screen
- Learn ECG. Refer to the “Monitoring Arrhythmia” section.
- Heart rate, arrhythmia and ST alarm limits and setting
- Arrhythmia analysis on or off. Refer to the “Monitoring Arrhythmia” section.
- Arrhythmia analysis lead. Refer to the “Monitoring Arrhythmia” section.
- Check dominant QRS. Refer to the “Monitoring Arrhythmia” section.
- ST level settings
- Pacing setting
- Number of electrodes
- Auto lead change on or off when electrode is detached
- Heart rate display mode
- Filter mode
- Hum filter on or off
- Sync source
- Sync sound pitch
- Pulse rate display on or off
- QRS detection type

The following items can be set on the SYSTEM SETUP window.

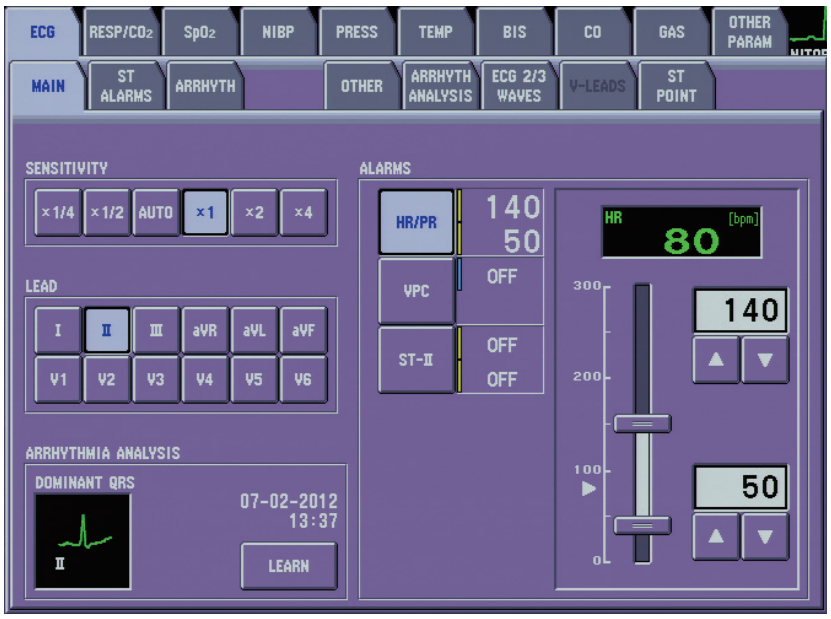
- ECG electrode lead type (IEC or AHA)
- Heart rate sync sound pitch
- ECG display color
- Arrhythmia type (standard or extended)
- Cascade ECG waveform

The ST level unit (mV or mm) can be set on the SYSTEM CONFIGURATION screen.

The scale of the heart rate and ST level trendgraphs on the home screen are the same scale as the trendgraphs of the Review window.

The ECG sweep speed is the speed set for <SWEEP SPEED> on the WAVES page of the DISPLAY window.

On the MAIN Page



<SENSITIVITY>: Select sensitivity for all monitoring ECG waves on the home screen.

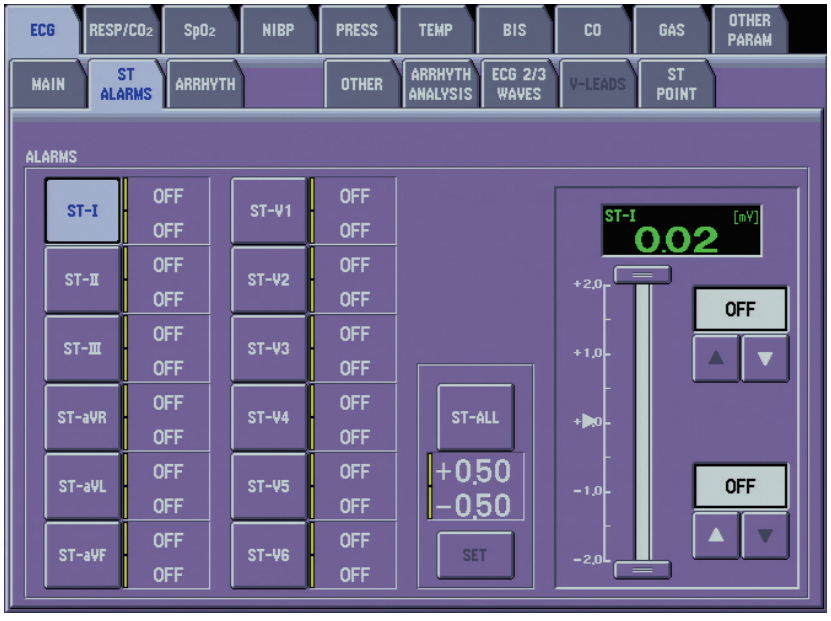
<LEAD>: Select the lead for the selected trace on the home screen.

<ALARMS>
HR/PR alarm limits: Set the upper and lower heart rate or pulse rate alarm limits.*1*2
VPC alarm limit: Set the upper VPC alarm limit.
NOTE: VPC alarm limit can only be set when <ARRHYTHMIA ANALYSIS> on the ECG window is ON.
ST alarm limits: Set the upper and lower ST alarm limits of the first trace.

*1 On BSM-6000A series, if <CRISIS VITAL ALARM MANAGEMENT> on the SYSTEM CONFIGURATION screen is turned on and "ALARM PRIORITY" on the SYSTEM SETUP window is set to CRISIS, the alarm setting is set to the alarm master setting.

*2 On BSM-6000A series, if <ALARM CAP> on the SYSTEM CONFIGURATION screen is turned on, the alarm setting is affected by the "ALARM CAP" setting on the SYSTEM SETUP window.

On the ST ALARMS Page



<ALARMS>: Set the upper and lower ST alarm limits for each lead individually or all leads together. Touch the ST-ALL key to set all the alarm limits together for all leads. ST-ALL is based on the current measurement value.

On the ARRHYTH Page

WARNING

For arrhythmia monitoring, set <ARRHYTHMIA ANALYSIS> on the ECG window to ON. Otherwise, there is no sound or indication for arrhythmia alarms (except for ASYSTOLE).

CAUTION

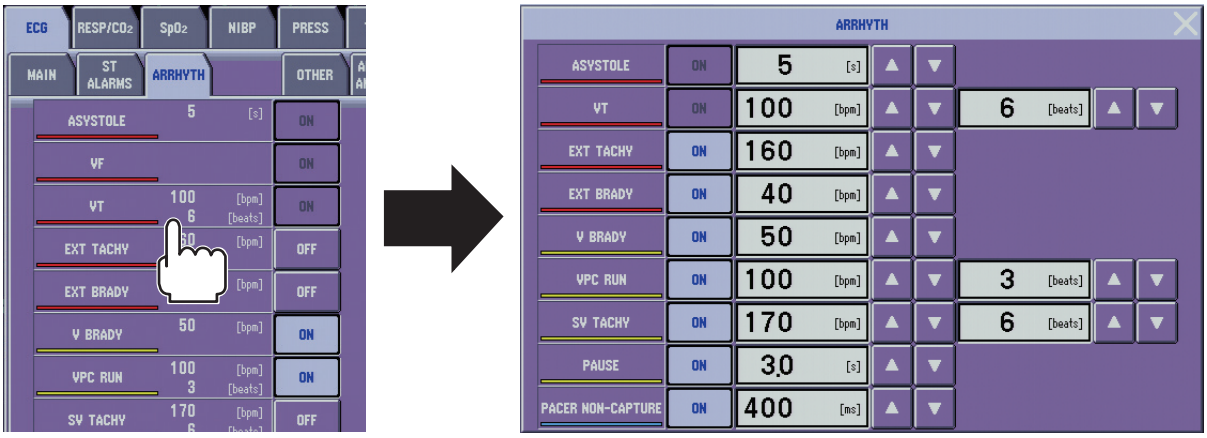
When the alarm is turned OFF for an arrhythmia, there will be no alarm for that arrhythmia type. There is no message or mark to indicate that a certain arrhythmia alarm is turned off. Therefore, be careful when you turn off an arrhythmia alarm.

Turn the alarm for individual arrhythmias ON or OFF and set the threshold for some arrhythmias.

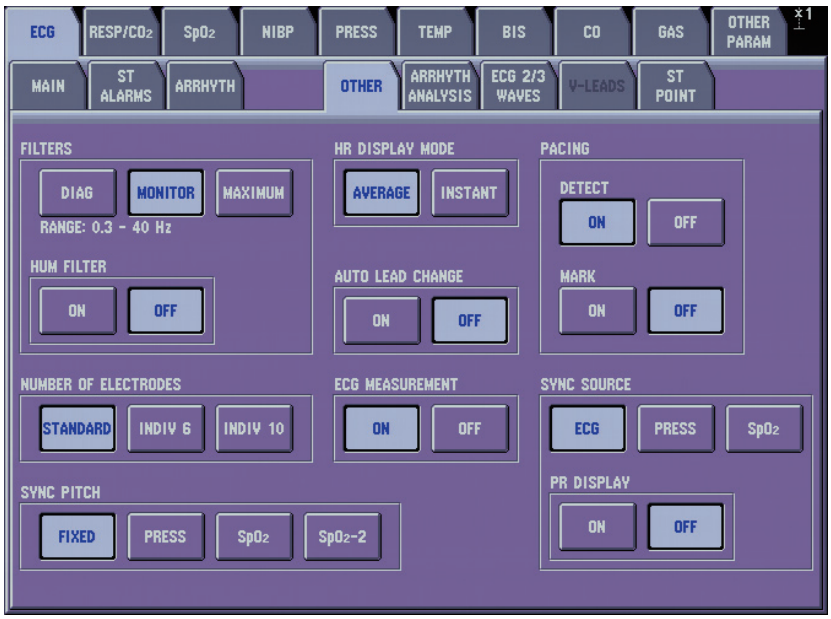
NOTE:
For BSM-6000A series bedside monitors:

- Items can be turned on or off but thresholds are fixed and cannot be changed. The thresholds are set by the administrator on the MASTER window of the SYSTEM SETUP window.
- Arrhythmia alarm whose priority is set to CRISIS on the ALARM window of the SYSTEM SETUP window cannot be set to OFF.

When EXTENDED is selected for the <ARRHYTHMIA TYPE> on the ECG page of the PARAMETERS window in the SYSTEM SETUP window, touch the threshold to display the ARRHYTH window and adjust the setting.



On the OTHER Page



<FILTERS>: Select the filter type.
DIAG: No filter. This mode is best for viewing the details of the waveform. It is similar to the real ECG. (0.05 to 150 Hz)
MONITOR: Low-cut and high-cut filter. (0.3 to 40 Hz)
MAXIMUM: Baseline drift-free, hum (AC) and high-cut filter. Appropriate when there is noise from AC or ESU. (1 to 18 Hz)

NOTE:

- When performing defibrillation, set the <FILTERS> to MONITOR or MAXIMUM. The waveform recovery may become slow due to electrode polarization when DIAG is set.
- When sending data using a ZS-900P transmitter, the waveform data is limited to the following frequency response depending on the filter setting. For the frequency response of the BSM-6000 series bedside monitor, refer to the “Specifications” section.
  DIAG mode: 0.05 to 60 Hz
  MONITOR/MAXIMUM mode: 0.3 to 60 Hz
  The waveform may be distorted or the “CHECK ELECTRODES” message may be displayed on the receiving monitor when the waveform amplitude exceeds ± 5 mV.

<HUM FILTER>: Turn the hum filter on or off.

<HR DISPLAY MODE>: Select the mode for updating the heart rate.
AVERAGE: The heart rate is calculated by a moving average. The monitor detects 12 consecutive beats including VPC, averages the R-R intervals of the latest 12 beats and uses this average to calculate the current heart rate. When a new beat is detected, the heart rate is recalculated using the latest 12 beats. The heart rate display is updated every 3 seconds.
INSTANT: The heart rate is calculated every beat. The heart rate display is updated every 3 seconds.

<PACING>

WARNING

Turn the pacing pulse detection* to ON when monitoring a pacemaker patient. Otherwise the pacemaker pulse is not rejected. However, even when the pacing pulse detection is set to ON, the pacemaker pulse might not be rejected. When the pacemaker pulse is not rejected, the pacemaker pulse is detected as QRS and false heart rate may be indicated or critical arrhythmia such as asystole may be overlooked. Keep pacemaker patients under close observation.

* For the pacemaker pulse rejection capability of BSM-6000 series bedside monitor, refer to the “Specifications - ECG” section.

WARNING

Even when the pacing pulse detection is set to ON, the pacemaker pulse can be overlooked or detected as QRS. You cannot confirm the pacemaker operation only from the detected pacemaker pulse.

NOTE: When you monitor a premature baby or infant and the monitor miscounts the narrow width QRS, set this to OFF.

<DETECT>: Select ON when detecting pacing pulse.

<MARK>: Select ON to display pacing mark on the ECG waveform.
The pacing mark display position (above wave or overlap wave) on the ECG waveform can be selected on the PARAMETERS window of the SYSTEM SETUP window.

<AUTO LEAD CHANGE>: When monitoring with 6 or 10 electrodes and when this item is set to ON, the lead for the first trace on the home screen can be automatically changed to a stable lead when there is an electrode detachment or the "CHECK ELECTRODES" message is displayed for more than 5 seconds on the screen.

<NUMBER OF ELECTRODES>: Select the type and number of electrodes.
STANDARD: Any electrodes other than DIN type. The number of electrodes (3, 6 or 10) is automatically recognized by the monitor.
INDIV 6: Monitoring with 3 or 6 DIN type electrodes.
INDIV 10: Monitoring with more than 10 DIN type electrodes. The RF/RL electrode must be attached.

<ECG MEASUREMENT>: Select ON when monitoring ECG.

NOTE:
- The <ECG MEASUREMENT> setting cannot be changed to OFF while ECG is monitored.
- Even when the setting is set to OFF, the setting automatically changes to ON when ECG measurement is started. If the measured value and waveform are not displayed on the home screen within 10 seconds, change the setting to ON manually.
- After setting <ECG MEASUREMENT> to ON, check that the ECG waveform is displayed on the home screen.

<SYNC SOURCE>: Select the sync sound source from ECG (heart rate), arterial blood pressure (IBP) and SpO_2.

NOTE:
- When heart rate is unstable because of an ESU, select SpO_2 or PRESS.
- When the connection cord of SpO_2 or IBP of the arterial blood pressure is disconnected from the monitor and an alarm occurs when the sync source is set to SpO_2 or PRESS, the sync source changes to ECG when the alarm is silenced by pressing the [Silence Alarms] key. The sync source returns to SpO_2 or PRESS when the SpO_2 or IBP is monitored again. When using IBP as the sync source, adjust zero balance.
- When the sensor is detached from the patient and alarm occurs, and the sync source is set to SpO_2 or PRESS, the sync source does not change to ECG when the alarm is silenced, and "- - -" is displayed for PR.
- The SpO_2-2 cannot be set to the sync sound source.

<PR DISPLAY>: Select the pulse rate display on or off. This setting is only available when <SYNC SOURCE> is set to ECG.

<SYNC PITCH>: Select the sync sound pitch.
FIXED: The pitch is fixed to the pitch selected on the SYSTEM SETUP window.
PRESS: The pitch is high when the BP value is above 120 mmHg. The pitch is low when the BP value is below 20 mmHg. The pitch changes in 20 steps from high to low for each 5 mmHg change between 120 and 20 mmHg BP value. The BP value of the highest priority arterial blood pressure is used.
SpO_2: The pitch changes in 20 steps from high to low for each 1%SpO_2 change between 100%SpO_2 and 81%SpO_2 in SpO_2 value of SpO_2 connected to the SpO_2 socket.
SpO_2-2: The pitch changes in 20 steps from high to low for each 1%SpO_2 change between 100%SpO_2 and 81%SpO_2 in SpO_2 value of SpO_2-2 connected to the MULTI socket. SpO_2-2 is only available for the AY-661P, AY-663P, AY-671P or AY-673P input unit or the BSM-1763 or BSM-1773 bedside monitor.

On the ECG 2/3 WAVES Page

<NO. ECG WAVES>: Select 1, 2, or 3 to change the number of ECG waveforms.

<ECG2 SENSITIVITY>: Select sensitivity for the second trace on the home screen.

<ECG3 SENSITIVITY>: Select sensitivity for the third trace on the home screen.

<ECG2 LEAD>: Select the lead for the second trace on the home screen.

<ECG3 LEAD>: Select the lead for the third trace on the home screen.

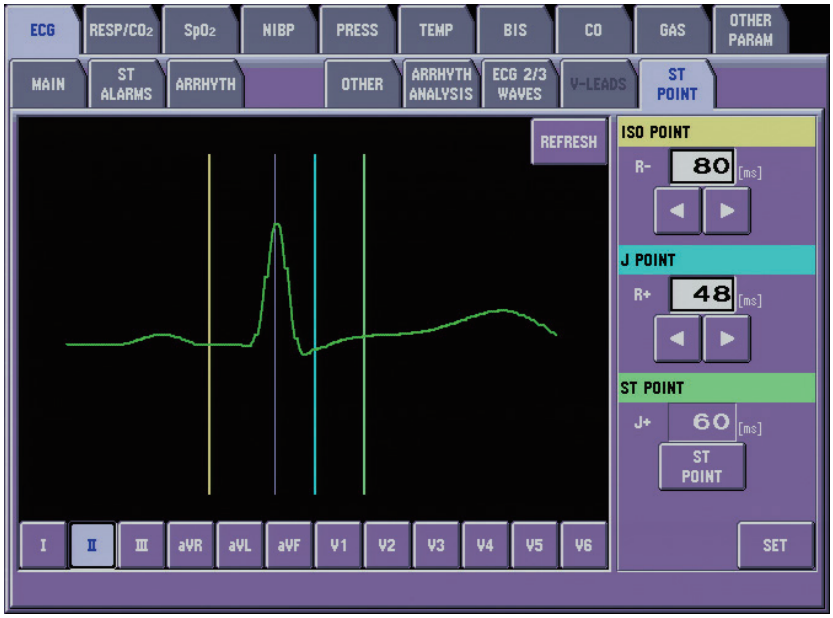
On the V-LEADS Page

When monitoring with 6 electrodes, you can assign the leads for Va and Vb. After assigning the Va and Vb leads, select the monitoring lead.

On the ST POINT Page

Set the ISO (Isoelectric) point, J point and ST point for ST level measurement.

NOTE: Although the ST algorithm has been tested for accuracy of the ST analysis result, the significance of the ST level changes need to be determined only by a physician.



Select the lead(s) from the LEAD box to be displayed on the ST POINT page. The QRS wave(s) of the selected lead(s) appears on the page.

Touch the vertical cursor left or right for each point. Use the ◄ or ► key to adjust the vertical cursor left or right for each point.

To change the ST point, touch the ST POINT key.

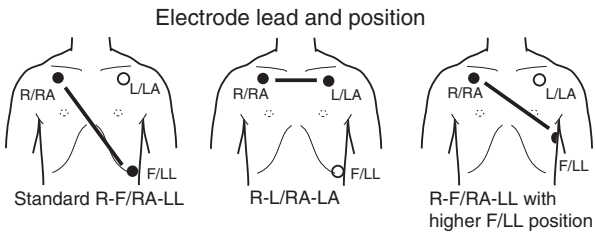
To register the ST level measurement condition settings, touch the SET key.

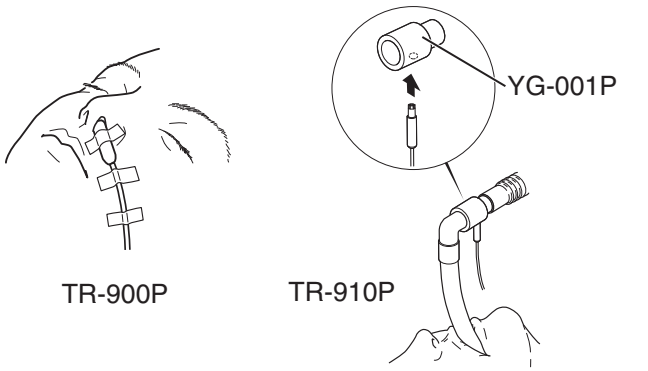
Respiration

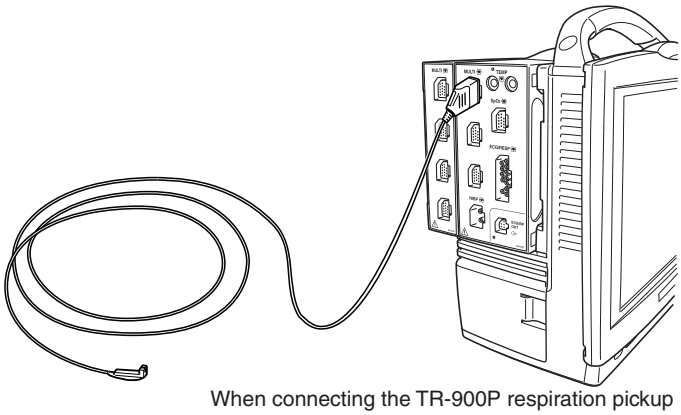
WARNING

The bioelectric impedance measurement sensor of a minute ventilation rate-adaptive implantable pacemaker may be affected by cardiac monitoring and diagnostic equipment which is connected to the same patient. If this occurs, the pacemaker may pace at its maximum rate and give incorrect data to the monitor or diagnostic equipment. In this case, set the IMPEDANCE MEASUREMENT on the RESP/CO_2 window to OFF on the bedside monitor. For a patient that requires the respiration monitoring, measure the respiration by thermistor method.

Preparation







When connecting the TR-900P respiration pickup

Impedance method: Attach electrodes to the patient and connect the ECG connection cord to the ECG/RESP socket. Attach R and F (RA and LL) or R and L (RA and LA) with the lungs between the electrodes.

Thermistor method: Attach the respiration pickup to the patient and connect the respiration pickup to the MULTI socket.

NOTE: The MULTI socket on the AY-660P input unit cannot be used for monitoring respiration in thermistor method.

The following respiration pickups are available.
TR-900P* respiration pickup for nose
TR-910P respiration pickup for airway. YG-001P airway adapter is required.

* This part has not been checked for compliance with the MDD (Medical Device Directive). For EC member countries, Nihon Kohden recommends the use of parts that comply with MDD.

NOTE: Increase in the temperature of the inspired air during monitoring in thermistor method causes decrease in the temperature difference between inspiration and expiration, and the amplitude of the respiration waveform becomes small. When the inspiration temperature increases higher than the expiration temperature, the phases of expiration and inspiration may be reversed.

Changing Respiration Settings

Change settings on the RESP/CO_2 window. The following settings can be changed for respiration monitoring.

For impedance method

- Changing monitoring lead
- Turning respiration monitoring on or off
- Displaying respiration rate as second parameter
- Respiration sensitivity
- Respiration rate and apnea alarm limits
- Respiration waveform sweep speed

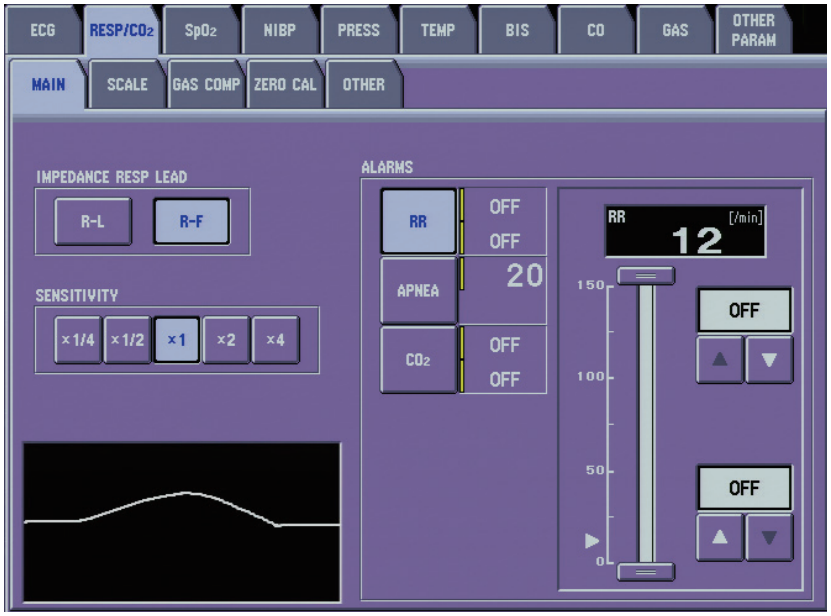
For thermistor method

- Respiration sensitivity
- Respiration rate and apnea alarm limits
- Respiration waveform sweep speed

The noise reduction for impedance respiration monitoring can be turned on or off and respiration data display color can be set on the SYSTEM SETUP window.

The scale of the respiration rate trendgraph on the home screen is the same scale as the trendgraph of the Review window.

On the MAIN Page



<IMPEDANCE RESP LEAD>: Select the monitoring lead.

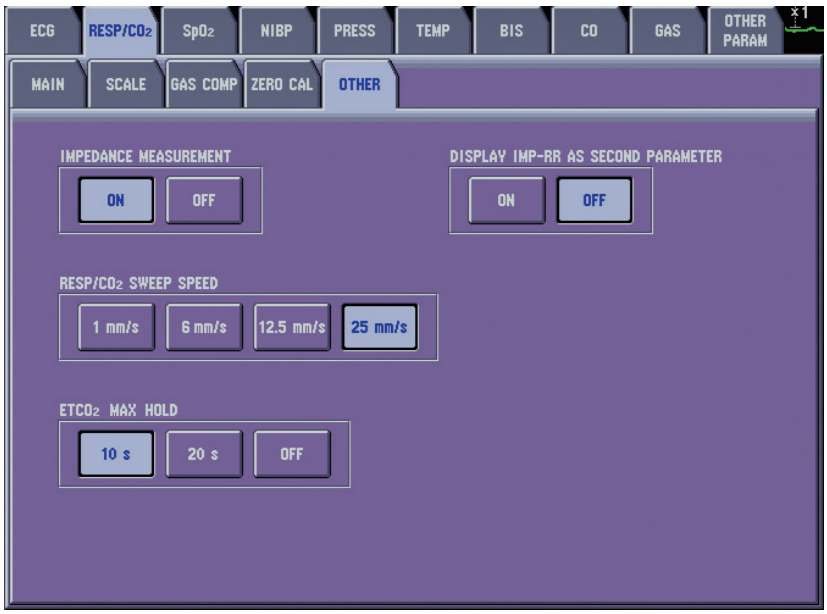
<SENSITIVITY>: Select sensitivity for respiration waveform on the home screen and recording paper.

<ALARMS>:
RR alarm limits: Set the upper and lower respiration rate alarm limits.*1*2
APNEA alarm limit: Set the upper apnea alarm limit.*1*2
CO_2 alarm limits: Set the upper and lower CO_2 alarm limits.*1*2

*1 On BSM-6000A series, if <CRISIS VITAL ALARM MANAGEMENT> on the SYSTEM CONFIGURATION screen is turned on and "ALARM PRIORITY" on the SYSTEM SETUP window is set to CRISIS, the alarm setting is set to the alarm master setting.

*2 On BSM-6000A series, if <ALARM CAP> on the SYSTEM CONFIGURATION screen is turned on, the alarm setting is affected by the "ALARM CAP" setting on the SYSTEM SETUP window.

On the OTHER Page



<IMPEDANCE MEASUREMENT>: Select respiration monitoring in impedance method on or off.

<RESP/CO_2 SWEEP SPEED>: Select the respiration waveform sweep speed.

<DISPLAY IMP-RR AS SECOND PARAMETER>: Respiration rate by impedance method can be displayed as a second respiration rate parameter together with the first respiration rate parameter. Select ON to display two measured values of respiration rate.

CO_2

CO_2 monitoring by the mainstream method is performed by connecting the TG-900P, TG-920P, TG-950P or TG-970P CO_2 sensor kit to the patient's respiration circuit or directly to the patient and connect the CO_2 sensor kit to the MULTI socket or PRESS CO_2 socket on the unit. When monitoring with the TG-950P or TG-970P CO_2 sensor kit, $FiCO_2$ is also monitored.

CO_2 by the sidestream method can be monitored when the optional AG-400R CO_2 unit, Oridion portable bedside monitor Microcap® or Covidien Microstream® Micropod™ capnography module is connected to the monitor. For details on the sidestream method, refer to the AG-400R CO_2 unit, Oridion portable bedside monitor Microcap® or Covidien Microstream® Micropod™ capnography module manual.

NOTE:
- TG-950P CO_2 sensor kit and AG-400R CO_2 unit are not available for BSM-6000A series.
- Oridion Microcap® portable bedside monitor is not available for BSM-6000K series.

Semi-quantitative method using the TG-900P or TG-920P CO_2 sensor kit
Measurements are based on the assumption of no CO_2 gas in the inspiration. The CO_2 concentration in the respiration is calculated by taking the CO_2 concentration in the inspiration as 0 mmHg (0 kPa).

Quantitative method using the TG-950P or TG-970P CO_2 sensor kit
The CO_2 partial pressure in both inspiration and expiration is measured.

WARNING

The TG-970P CO_2 sensor kit cannot correctly measure the $ETCO_2$ value and respiration rate during high frequency oscillation (HFO). Do not diagnose the patient from the $ETCO_2$ value and respiration rate.

CAUTION

When measuring CO_2 partial pressure of a patient with an oxygen mask, set the oxygen supply to 5 L/min or more. If CO_2 gas remains in the oxygen mask and mixes with the inspired air, the measured value may be lower than the actual value.

CAUTION

Supply adequate oxygen when measuring CO_2 partial pressure of a patient connected to a Jackson Rees, Mapleson D or any other respiration circuit where CO_2 gas may be present during inspiration. The semi-quantitative method measures CO_2 partial pressure based on the assumption of no CO_2 gas in the inspired air; it assumes CO_2 partial pressure 0 mmHg (0 kPa) in the inspiration of every respiration. If the inspired air contains CO_2 gas, the measured CO_2 value may be lower than the actual value.

CAUTION

The TG-900P and TG-920P CO_2 sensor kits do not adjust the measurement value to compensate for different atmospheric pressure. Be careful when reading the value when using the CO_2 sensor kit at high altitudes because the measurement value may be inaccurate.

* The measurement value drops 0.13 kPa (1 mmHg) for 5.33 kPa (40 mmHg) CO_2 gas when an atmospheric pressure drops 3.3 kPa.

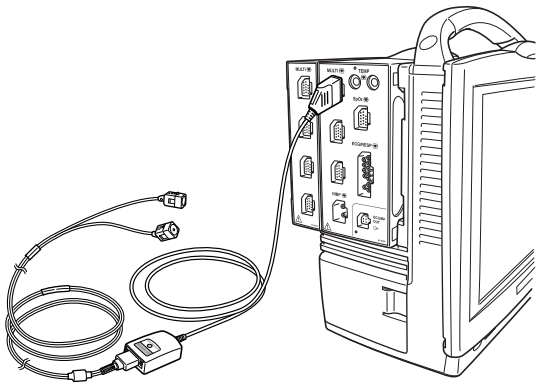
CAUTION

With the TG-950P/TG-970P CO_2 sensor kit, measured value may be incorrect when the operating temperature changes greatly. In this case, wait for about 30 minutes to acquire correct measurement.

NOTE:

- Only one MULTI socket can be used for monitoring CO_2. The sidestream and mainstream methods cannot be monitored at the same time.
- When the AG-920R, GF-110PA or GF-210R multigas unit or GF-120PA or GF-220R multigas/flow unit is connected to the monitor, turn off the AG-920R multigas unit power or disconnect the multi-link cable of the GF-110PA or GF-210R multigas unit or GF-120PA or GF-220R multigas/flow unit from the monitor while monitoring CO_2 by mainstream method. The CO_2 alarm from mainstream method cannot be indicated when the multigas unit or multigas/flow unit is turned on. (GF-120PA or GF-220R multigas/flow unit is not available for BSM-6000A series.)
- When using N_2O anesthetic gas (nitrous oxide), set the gas composition on the GAS COMP window.

Preparation



Connect the CO_2 sensor kit to the MULTI socket on the unit and connect the airway adapter to the CO_2 sensor.

Types of CO_2 Sensor Kits

Model	Method	Attachment
TG-900P	Semi-quantitative	Used on an intubated patient
TG-920P	Semi-quantitative	Attach to the patient nose or used on an intubated patient
TG-950P*	Quantitative	Used on an intubated patient
TG-970P	Quantitative	Used on an intubated patient with YG-211T/213T/214T

The CO_2 sensor kits require airway adapter or nasal adapter.

CO_2 sensor kit	Airway adapter/Nasal adapter	Weight	Dead space volume	Supply Code
TG-900P	YG-101T airway adapter	10 kg or more	5 mL	R801
TG-920P	YG-111T airway adapter	7 kg or more	4 mL	R804
	YG-120T nasal adapter	10 kg or more	1.2 mL	V921
	YG-121T nasal adapter			V922
	YG-122T nasal adapter			V923
TG-950P*	YG-201T* airway adapter for adult	10 kg or more	5 mL	R802
	YG-202T* airway adapter for child	3 to 10 kg	2 mL	R803
TG-970P	YG-211T airway adapter	7 kg or more	4 mL	R805
	YG-213T/214T airway adapter for neonate and child	YG-213T: 2 to 7 kg	0.5 mL	R806
		YG-214T: 2.5 to 7 kg	1.8 mL	R807

* TG-950P CO_2 sensor kit, YG-201T and YG-202T airway adapters are not available for BSM-6000A series.

WARNING

When using the airway adapter or nasal adapter on a patient with low ventilatory volume, the CO_2 may mix in the inspiration due to the airway adapter's dead space, resulting in inaccurate measured values or difficulty in detecting apnea. Perform ventilation taking into consideration the dead space of the adapters.

CAUTION

Select the airway adapter or nasal adapter taking into consideration the patient weight and ventilation volume. If an inappropriate airway adapter or nasal adapter is used, the resistance in the respiration circuit increases and it causes incorrect measurement value.

CAUTION

When the "CHANGE ADAPTER" or "SENSOR ERROR" message is displayed, check the CO_2 sensor kit and replace it if necessary. CO_2 cannot be monitored while the message is displayed.

CAUTION

The CO_2 data may be inaccurate when monitoring a patient with an extremely high respiration rate or irregular respiration. Read the measured values carefully.

CAUTION

When monitoring CO_2, make sure that the gas composition is entered. Otherwise the measurement result may be inaccurate.

CAUTION

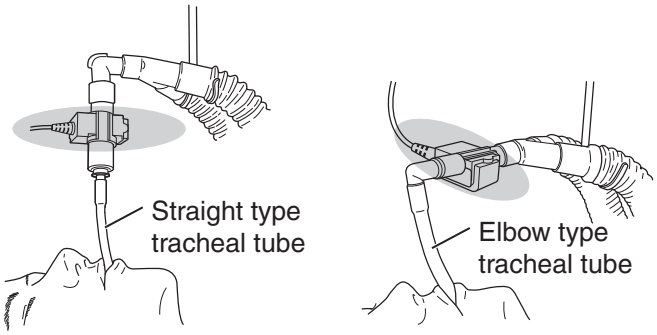
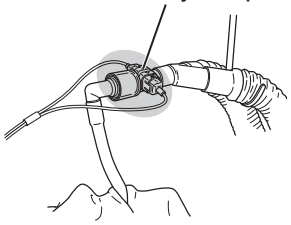
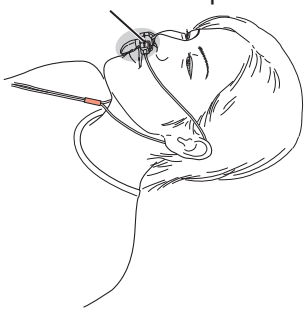
When using an anesthetic instrument with a volatile anesthetic agent, the CO_2 measurement may be inaccurate.

NOTE: The measurement may be inaccurate when monitored in the following conditions. Read the measured values carefully.

- When used in environments with high concentration nitrous oxide gas.
- When used in environments with sudden temperature changes.
- When used in environments with severe humidity.

NOTE: For intubated patients, connect the CO_2 sensor as in the following example so that the sensor does not touch the patient.

Connection Example

For intubated patients	For non-intubated patients
TG-900P/TG-950P/TG-970P  TG-920P YG-111T airway adapter 	TG-920P YG-121T nasal adapter 

Using the TG-920P CO_2 Sensor Kit

WARNING

The only oxygen cannula that can be used with YG-122T is manufactured by HUDSON RCI®. Do not use any other oxygen cannula. Other oxygen cannulas cannot be attached and oxygen cannot be delivered to the patient through the nostrils.

WARNING

Check that the oxygen cannula tube is not bent, broken, or blocked by the nasal tube. If the ends of the oxygen cannula tube turn too far up or down, it causes insufficient O_2 supply or the CO_2 value may be incorrect.

CAUTION

When using the YG-121T/YG-122T nasal adapter on a patient with bleeding disorder, poor general medical condition or malnutrition, observe the patient condition all the time. The mouth guide touches the mouth and may cause pressure sores.

WARNING

- When you use YG-122T together with an oxygen cannula, check that the oxygen cannula is correctly attached on the patient by referring to other parameters and by observing the patient periodically.
- If arterial oxygen saturation does not increase, immediately stop using the oxygen cannula with the CO_2 sensor kit and select another way to supply oxygen.

Performing Calibration

When using the TG-950P or TG-970P CO_2 sensor kit, perform zero calibration in the following conditions before connecting the CO_2 sensor to the respiration circuit.

- When the airway adapter is replaced with a new one.
- When a different type of airway adapter is used.
- When the operating temperature changes.
- When the measurement room is changed.
- Whenever necessary.

On the ZERO CAL Page

Zero calibration can be performed in two ways: calibration with air and calibration with N_2 gas. Both methods are performed on the RESP/CO_2 window.

- Calibration with air
  1. Touch the AIR CAL key.
  2. Expose the airway adapter to air.
  3. Touch the YES key. The CO_2 sensor is calibrated with about 0.2 mmHg (0.03 kPa) CO_2 in the air.

- Calibration with N_2 gas
  1. Touch the N_2 CAL key.
  2. Flow N_2 gas into the airway adapter.
  3. Touch the YES key. The CO_2 sensor is calibrated.

Changing CO_2 Settings

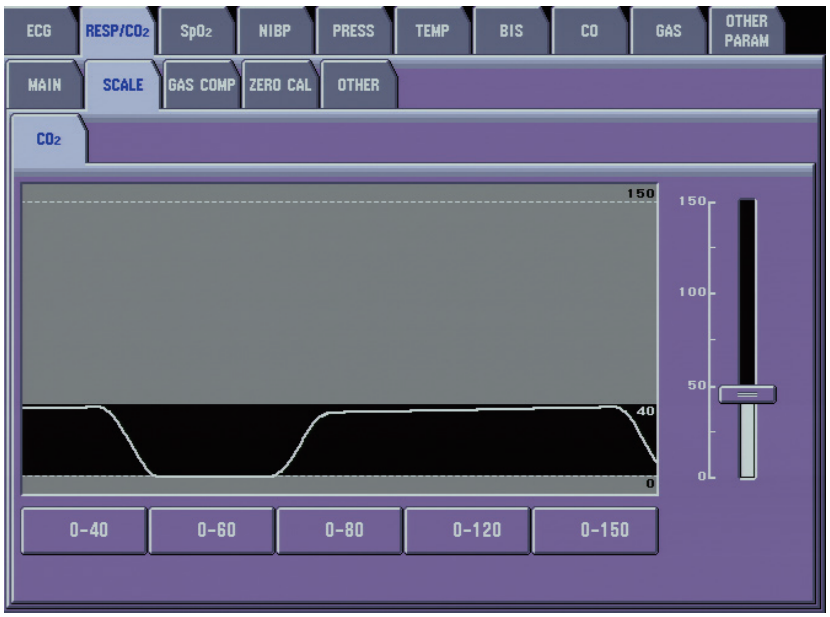
Change the settings on the RESP/CO_2 window. The following settings can be changed for CO_2 monitoring.

- Scale
- Respiration rate, apnea and inspired CO_2 alarm settings
- Inspiration composition
- CO_2 waveform sweep speed
- Duration for holding $ETCO_2$ maximum value

The CO_2 unit can be set to mmHg or kPa on the SYSTEM CONFIGURATION screen.

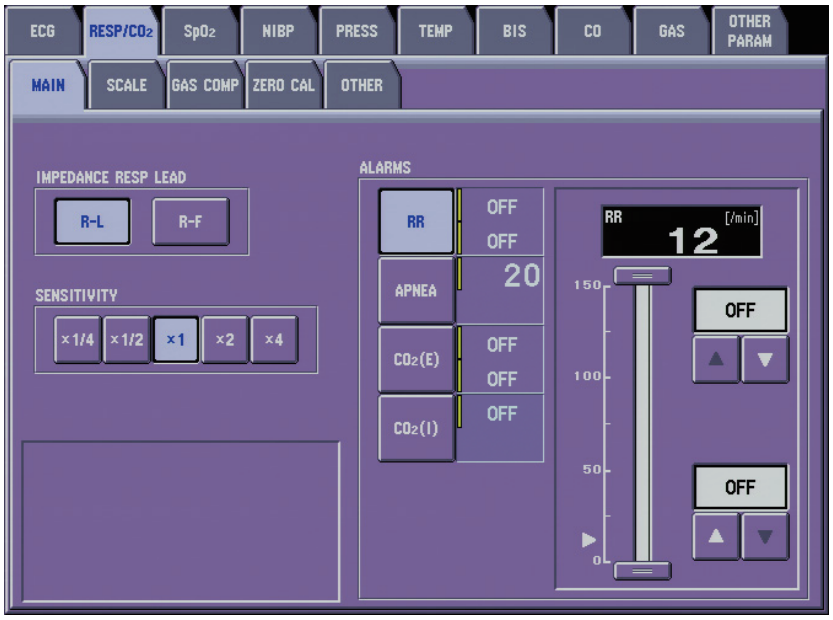
The CO_2 data display color and CO_2 waveform fill in or not can be set on the SYSTEM SETUP window.

On the SCALE Page



Select the scale by touching the desired scale key. You can adjust the scale using the scale slider.

On the MAIN Page



<ALARMS>

RR alarm limits: Set the upper and lower respiration rate alarm limits.*1*2

APNEA alarm limit: Set the upper apnea alarm limit.*1*2

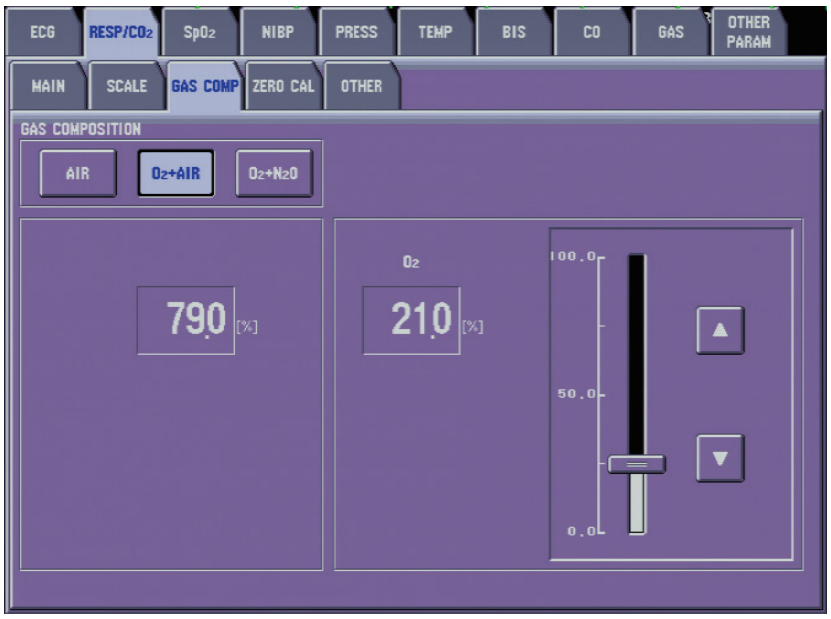
CO_2(E) alarm limits: Set the upper and lower expired CO_2 alarm limits.*1*2

CO_2(I) alarm limits: Set the upper inspired CO_2 alarm limits when monitoring CO_2 with TG-950P or TG-970P CO_2 sensor kit or by sidestream method.

*1 On BSM-6000A series, if <CRISIS VITAL ALARM MANAGEMENT> on the SYSTEM CONFIGURATION screen is turned on and "ALARM PRIORITY" on the SYSTEM SETUP window is set to CRISIS, the alarm setting is set to the alarm master setting.

*2 On BSM-6000A series, if <ALARM CAP> on the SYSTEM CONFIGURATION screen is turned on, the alarm setting is affected by the "ALARM CAP" setting on the SYSTEM SETUP window.

On the GAS COMP Page



<GAS COMPOSITION>: When using anesthetic gas or a respirator, set the inspiration composition.

This setting is not required when monitoring CO_2 by sidestream method.

CAUTION

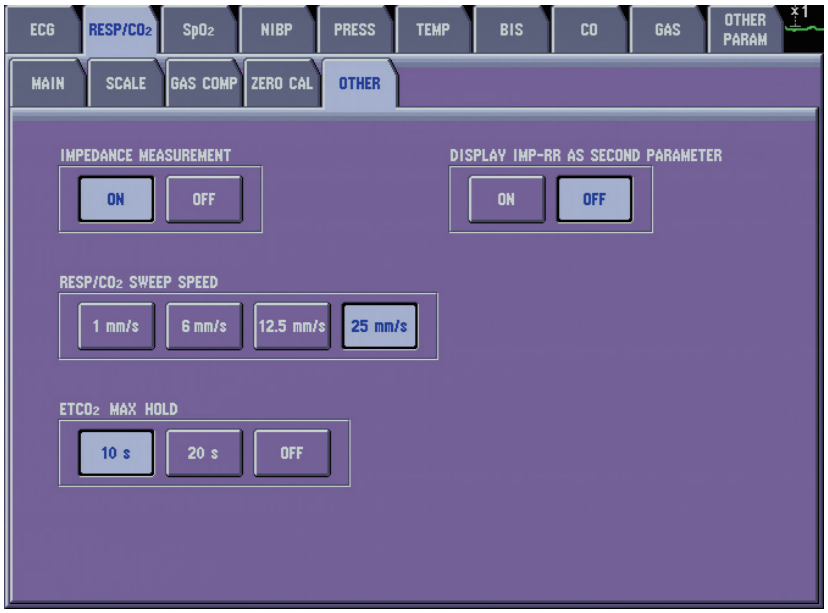
When monitoring CO_2, make sure that the gas composition is entered. Otherwise the measurement result may be inaccurate.

CAUTION

When using an anesthetic instrument with a volatile anesthetic agent, the CO_2 measurement may be inaccurate.

When N_2O is mixed in the inspiration or when a high concentration of oxygen is inspired, sensitivity of CO_2 absorbing infrared ray is affected, and as a result measurements cannot be performed correctly. When using anesthetic gas or a respirator, set the inspiration composition. The monitor corrects the CO_2 concentration automatically according to the setting.

On the OTHER Page



<$RESP/CO_2$ SWEEP SPEED>: Select the CO_2 waveform sweep speed.

<$ETCO_2$ MAX HOLD>: Select the time for holding the maximum $ETCO_2$ value. This setting is effective only when using the TG-950P* or TG-970P CO_2 sensor kit. When using the TG-900P or TG-920P CO_2 sensor kit, this item is automatically set to OFF.
10 sec: The maximum value for latest 10 seconds
20 sec: The maximum value for latest 20 seconds
OFF: The maximum value is updated each breath.
* This function is not available in some versions.

Inspection of Measuring Accuracy

The inspection of measuring accuracy must be performed by the qualified service personnel.

CAUTION

Follow the CAUTION label on the CO_2 gas cylinder.

Use with Volatile Anesthetic Agents

CAUTION

When using an anesthetic instrument with a volatile anesthetic agent, the CO_2 measurement may be inaccurate.

Volatile anesthetic agents affect the CO_2 value. Be aware of this when using volatile anesthetic agent.

Example: At 1 atmospheric pressure and gas mixtures of 5% CO_2 (5.1 kPa (38 mmHg)) and balance N_2, dry gas

Anesthetic Gas	Concentration	Difference			
		TG-900P	TG-920P	TG-950P	TG-970P
Halothane	4%	+0.9 mmHg +0.12 kPa	+0.6 mmHg +0.08 kPa	+0.2 mmHg +0.03 kPa	+0.3 mmHg +0.04 kPa
Enflurane	5%	+1.5 mmHg +0.20 kPa	+1.5 mmHg +0.20 kPa	+0.4 mmHg +0.05 kPa	+0.9 mmHg +0.12 kPa
Isoflurane	5%	+1.8 mmHg +0.24 kPa	+1.7 mmHg +0.23 kPa	+0.8 mmHg +0.11 kPa	+1.7 mmHg +0.22 kPa
Sevoflurane	6%	+2.8 mmHg +0.37 kPa	+2.7 mmHg +0.36 kPa	+1.3 mmHg +0.17 kPa	+2.1 mmHg +0.28 kPa
Desflurane	24%	+7.0 mmHg +0.93 kPa	+6.6 mmHg +0.88 kPa	+3.2 mmHg +0.43 kPa	—
	15%	—	—	—	+2.9 mmHg +0.39 kPa

SpO_2 with Nihon Kohden Probes (AY-660P/AY-661P/AY-663P/AY-671P/AY-673P/BSM-1763/BSM-1773)

WARNING

SpO_2 measurement may be incorrect in the following cases.

- When the patient's carboxyhemoglobin or methemoglobin increases abnormally.
- When dye is injected in the blood.
- When using an electrosurgical unit.
- During CPR.
- When measuring at a site with venous pulse.
- When there is body movement.
- When the pulse wave is small (insufficient peripheral circulation).

WARNING

- When using the TL-201T finger probe, do not fasten the probe and cable to the finger by wrapping with tape. This may cause burn, congestion or pressure necrosis from poor blood circulation.
- When using probes other than the TL-201T finger probe, to avoid poor circulation, do not wrap the tape too tight. Check the blood circulation condition by observing the skin color and congestion at the skin peripheral to the probe attachment site. Even for short-term monitoring, there may be burn or pressure necrosis from poor blood circulation, especially on neonates or low birth weight infants whose skin is delicate. Accurate measurement cannot be performed on a site with poor peripheral circulation.

CAUTION

Turn off the power of mobile phones, small wireless devices and other devices which produce strong electromagnetic interference around a patient (except for devices allowed by the hospital administrator). Radio waves from devices such as mobile phones or small wireless devices may be mistaken as pulse waves and the displayed data may be incorrect.

WARNING

Check the circulation condition by observing the skin color at the measurement site and pulse waveform. Change the measurement site every 8 hours for disposable probes and every 4 hours for reusable probes (every 8 hours for TL-630T3/TL-631T3 probe). The skin temperature may increase at the attached site by 2 or 3°C (4 or 5°F) and cause a burn or pressure necrosis. When using the probe on the following patients, take extreme care and change the measurement site more frequently according to symptoms and degree.

- Patient with a fever
- Patient with peripheral circulation insufficiency
- Neonate or low birth weight infant with delicate skin

WARNING

When monitoring SpO_2 of a patient who is receiving photodynamic therapy, the light from the finger probe sensor may cause a burn. Photodynamic therapy uses a photosensitizing agent that has a side effect of photosensitivity.

The SpO_2 probe manufactured by Nihon Kohden have two wavelengths with peaks in the range of 650 and 950 nm. The maximum light intensity is less than 5.5 mW.

WARNING

When not monitoring SpO_2, disconnect the SpO_2 connection cord from the input unit. Otherwise, noise from the probe sensor may interfere and incorrect data is displayed on the screen.

CAUTION

Only use the specified probes. Otherwise, SpO_2 cannot be monitored.

CAUTION

Normal external light does not affect monitoring but strong light such as a surgical light or sunlight may affect monitoring. If affected, cover the measuring site with a blanket.

CAUTION

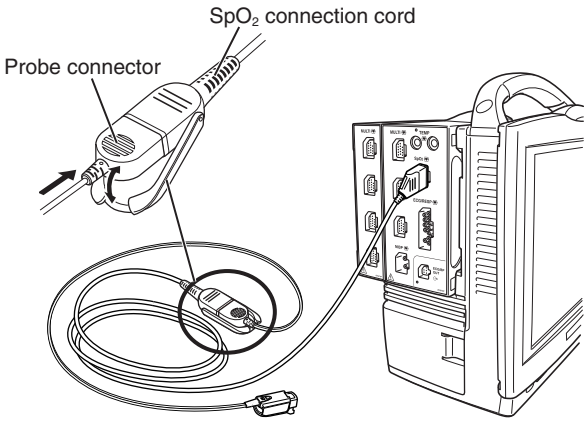
While a patient is on medication which causes vasodilation, the pulse waveform may change and in rare cases the SpO_2 value might not be displayed.

NOTE: Do not attach the probe to the same limb that is used for NIBP measurement or an IBP catheter. The SpO_2 measurement may be incorrect.

Silencing SpO_2 Alarm

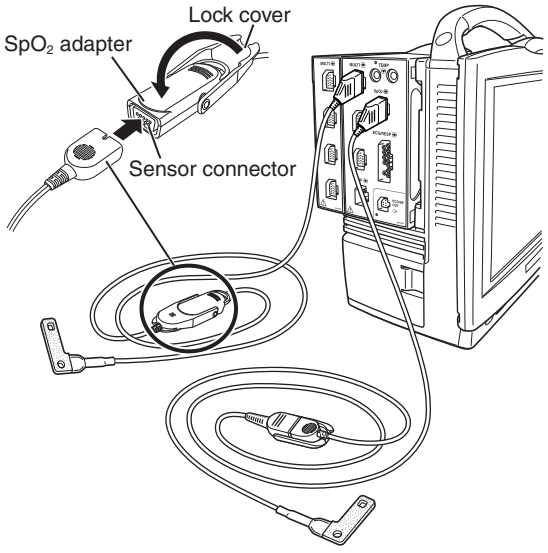
This function is only available for BSM-6000A series. When the <SILENCE SpO_2 ALARM> on the ALARM window of the SYSTEM SETUP window is set to ON, a second occurring SpO_2 alarm can be silenced when the [Silence Alarms] key is pressed.

Preparation



When connecting the TL-201T finger probe to the SpO_2 socket

Select the appropriate probe according to purpose. To connect a Nihon Kohden probe to the SpO_2 socket on the AY-660P, AY-661P, AY-663P, AY-671P or AY-673P input unit, or BSM-1763 or BSM-1773 bedside monitor, the JL-900P SpO_2 connection cord is required.



When connecting the TL-051S/052S probes to the SpO_2 socket and MULTI socket to monitor dual SpO_2

To monitor SpO_2 at two sites (dual SpO_2), connect a Nihon Kohden probe to the SpO_2 socket and another probe to the MULTI socket on the AY-661P, AY-663P, AY-671P or AY-673P input unit, BSM-1763 or BSM-1773 bedside monitor, or AA-672P or AA-674P smart expansion unit. The MULTI socket on the AY-660P input unit cannot be used.

To connect a Nihon Kohden probe to the MULTI socket, the JL-500P1 or JL-500P2 SpO_2 adapter is required.

When Monitoring Dual SpO_2

CAUTION

When two probes are attached too close to each other, the light from the probes interferes with each other and SpO_2 cannot be monitored properly. Make sure that there is no light interference when attaching two probes.

Reusable Probes

Model	Subject (Weight)	Attachment Site
Finger Probe TL-201T	Adults, children (Weight 20 kg or more)	Finger
Multi-site Probe TL-220T	Adults, infants (Weight 3 kg or more)	Finger or toe
	Neonates (Weight 3 kg or less)	Instep and sole
Finger Probe TL-630T3*	Adults, children (Weight 50 kg or more)	Finger
Finger Probe TL-631T3	Adults, children (Weight 20 kg or more)	Finger or toe

Disposable Probes

Model	Subject (Weight)	Attachment Site
TL-260T*	Children, neonates (Weight 3 kg or more)	Finger or toe (Attachment tape: type S)
	Low birth weight infants (Weight 1 kg or less)	Instep and sole (Attachment tape: type S)
	Neonates (Weight 3 kg or less)	Instep and sole (Attachment tape: type L)
TL-271T/271T3 Cable length TL-271T: 80 cm TL-271T3: 160 cm	Adults (Weight 30 kg or more)	Finger or toe
TL-272T/272T3 Cable length TL-272T: 80 cm TL-272T3: 160 cm	Children (Weight from 10 to 50 kg)	Finger or toe
TL-273T/273T3 Cable length TL-273T: 80 cm TL-273T3: 160 cm	Adults (Weight 40 kg or more)	Finger or toe
	Neonates (Weight 3 kg or less)	Instep
TL-274T/274T3 Cable length TL-274T: 80 cm TL-274T3: 160 cm	Infants (Weight from 3 to 20 kg)	Finger or toe
TL-051S/052S Cable length TL-051S: 80 cm TL-052S: 160 cm	Adults (Weight 50 kg or more)	Finger
	Neonates (Weight 3 kg or less)	Instep and sole
TL-061S/062S Cable length TL-061S: 80 cm TL-062S: 160 cm	Adults, children (Weight from 15 to 50 kg)	Finger
	Children, infants (Weight from 3 to 15 kg)	Toe

* TL-260T multi-site Y probe and TL-630T3 finger probe are not available for BSM-6000A series.

CAUTION

When the probe is attached on an appropriate site with sufficient circulation and an error message about probe attachment repeatedly appears, the probe may be deteriorated. Replace it with a new one.

CAUTION

When a message indicates a faulty probe or faulty SpO_2 connection cord, stop monitoring and replace the probe or SpO_2 connection cord with a new one.

CAUTION

If the attachment site is dirty with blood or bodily fluids, clean the attachment site before attaching the probe. If there is nail polish on the attachment site, remove the polish. Otherwise, the amount of transmitted light decreases, and measured value may be incorrect or measurement cannot be performed.

NOTE:

- In order to maintain sufficient blood circulation, keep the measurement site warm by covering with a blanket or something similar. Warming the site is effective, especially for a patient with a small pulse amplitude.
- Connect the probe and SpO_2 connection cord until you hear a stopper of the SpO_2 connection cord click.

Changing SpO_2 Settings

Change settings on the SpO_2 window. The following settings can be changed for SpO_2 monitoring.

- Pulse waveform sensitivity
- SpO_2 and pulse rate alarm limits
- Display pulse rate and/or PI in SpO_2 numeric data area on the home screen
- Display pulse rate to the left of the heart rate
- Display SQI bar graph in SpO_2 numeric data area on the home screen

The following settings can be changed on the SpO_2-2 window for dual SpO_2 monitoring.

- Pulse waveform sensitivity
- SpO_2-2 and ΔSpO_2 alarm limits
- Display SpO_2-2 pulse rate, PI and/or ΔSpO_2 in SpO_2-2 numeric data area on the home screen

The following settings are common settings for SpO_2 and SpO_2-2.

- Sync source
- Sync sound pitch
- Response mode
- Sensitivity mode (Available only when using the following units. The version can be confirmed on the INFO page of the SYSTEM SETUP window.
  - BSM-6000 series software version 03-01 or later
  - AY-600P series input unit software version 03-01 or later, AY-600P series input unit SpO_2 module version 01-11 or later, or BSM-1763 or BSM-1773 bedside monitor
  - JL-500P1/P2 version 01-11 or later)

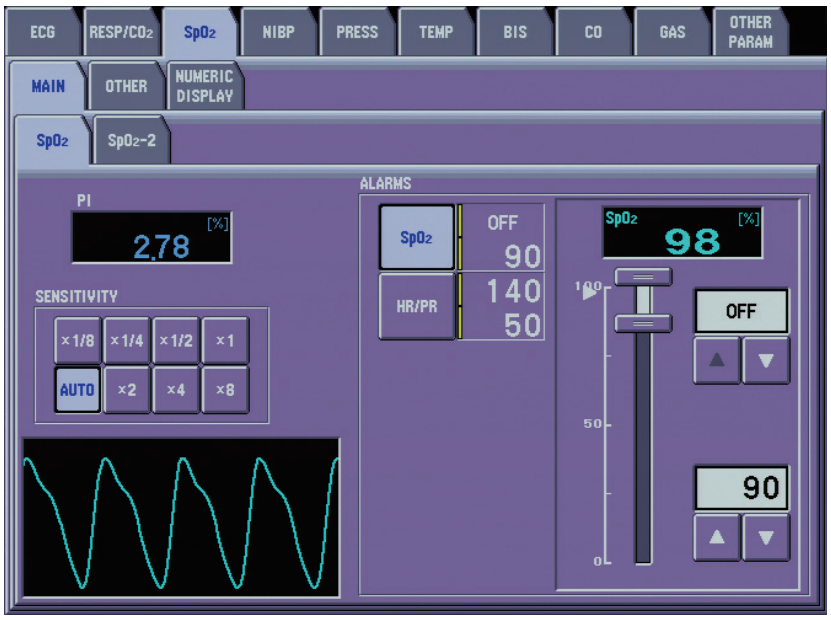
The SpO_2 data display color can be set on the SYSTEM SETUP window.

The scale of the SpO_2 trendgraph on the home screen is the same scale as the trendgraph of the Review window.

The SpO_2 pulse waveform sweep speed is the speed set for <SWEEP SPEED> on the WAVES page of the DISPLAY window.

When monitoring dual SpO_2, display the SpO_2-2 page of the SpO_2 window to change the SpO_2-2 settings (AY-661P, AY-663P, AY-671P or AY-673P input unit or BSM-1763 or BSM-1773 bedside monitor only).

On the MAIN Page



SpO_2 Tab

<SENSITIVITY>: Select sensitivity for pulse waveform on the home screen.

NOTE: The pulse wave amplitude varies according to pulsation component ratio of whole transmitted IR signal. When the pulsation component ratio is 1%, the pulse wave amplitude becomes about 10 mm at ×1 setting on the display.

<ALARMS>

SpO_2 alarm limits: Set the upper and lower SpO_2 alarm limits.*1*2

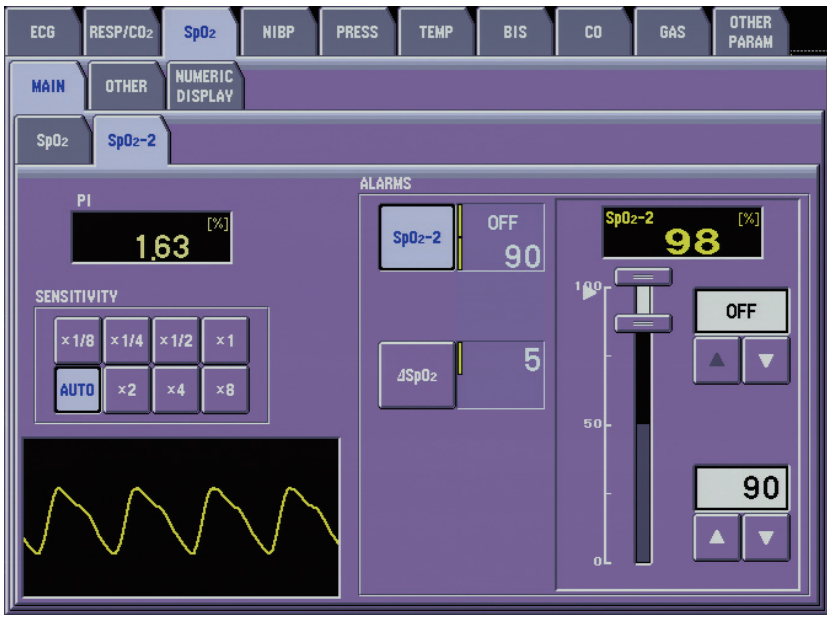
HR/PR alarm limits: Set the upper and lower heart rate or pulse rate alarm limits.*1*2

*1 On BSM-6000A series, if <CRISIS VITAL ALARM MANAGEMENT> on the SYSTEM CONFIGURATION screen is turned on and "ALARM PRIORITY" on the SYSTEM SETUP window is set to CRISIS, the alarm setting is set to the alarm master setting.

*2 On BSM-6000A series, if <ALARM CAP> on the SYSTEM CONFIGURATION screen is turned on, the alarm setting is affected by the "ALARM CAP" setting on the SYSTEM SETUP window.

PI (Pulse-amplitude Index)

The Pulse-amplitude Index indicates the percentage of pulsatile signal in the entire transmitted IR signal. This index may be affected by an artifact.



SpO_2-2 Tab

<SENSITIVITY>: Select sensitivity for SpO_2-2 pulse waveform on the home screen.

NOTE: The pulse wave amplitude varies according to pulsation component ratio of whole transmitted IR signal. When the pulsation component ratio is 1%, the pulse wave amplitude becomes about 10 mm at ×1 setting on the display.

<ALARMS>

SpO_2-2 alarm limits: Set the upper and lower SpO_2-2 alarm limits.*1*2

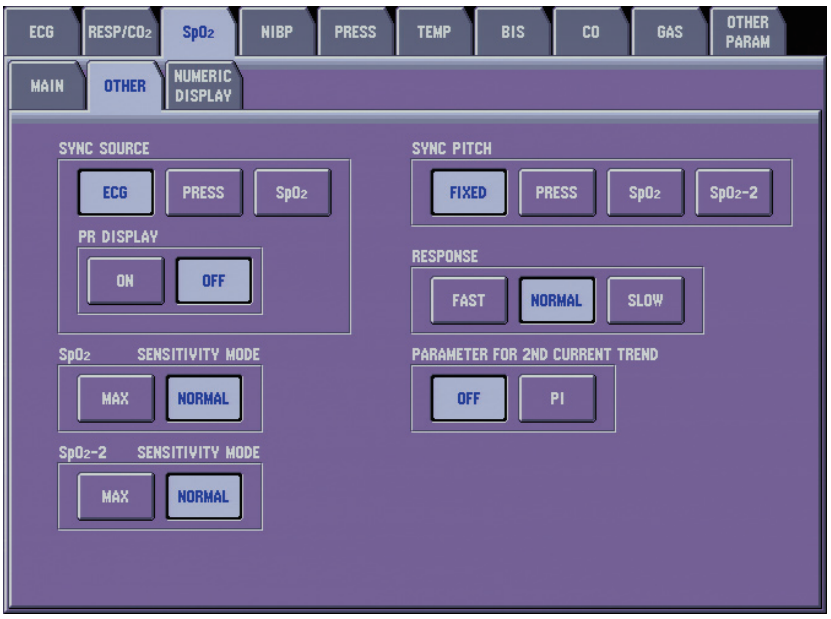
ΔSpO_2 alarm limit: Set the upper ΔSpO_2 alarm limit.

*1 On BSM-6000A series, if <CRISIS VITAL ALARM MANAGEMENT> on the SYSTEM CONFIGURATION screen is turned

on and “ALARM PRIORITY” on the SYSTEM SETUP window is set to CRISIS, the alarm setting is set to the alarm master setting.

*2 On BSM-6000A series, if <ALARM CAP> on the SYSTEM CONFIGURATION screen is turned on, the alarm setting is affected by the “ALARM CAP” setting on the SYSTEM SETUP window.

On the OTHER Page



<SYNC SOURCE>: Select the sync sound source from ECG (heart rate), SpO_2 and arterial blood pressure (PRESS).

NOTE:

- When heart rate is unstable because of an ESU, select SpO_2 or PRESS.
- When the connection cord of SpO_2 or IBP of the arterial blood pressure is disconnected from the monitor and an alarm occurs when the sync source is set to SpO_2 or PRESS, the sync source changes to ECG when the alarm is silenced by pressing the [Silence Alarms] key. The sync source returns to SpO_2 or PRESS when the SpO_2 or IBP is monitored again. When using IBP as the sync source, adjust zero balance.
- When the sensor is detached from the patient and alarm occurs, and the sync source is set to SpO_2 or PRESS, the sync source does not change to ECG when the alarm is silenced, and “- - -” is displayed for PR.
- The SpO_2-2 cannot be set to the sync sound source.

<PR DISPLAY>: Select the pulse rate display on or off. This setting is only available when <SYNC SOURCE> is set to ECG.

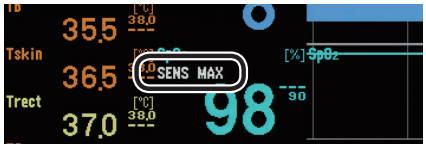
<SYNC PITCH>: Select the sync sound pitch.
FIXED: The pitch is fixed to the pitch selected on the SYSTEM SETUP window.
PRESS: The pitch is high when the BP value is above 120 mmHg. The pitch is low when the BP value is below 20 mmHg. The pitch changes in 20 steps from high to low for each 5 mmHg change between 120 and 20 mmHg BP value. The BP value of the highest priority arterial blood pressure is used.
SpO_2: The pitch changes with each 1% change in SpO_2. You can select the range (81 to 100% or 40 to 100%) of SpO_2, which is connected to the SpO_2 socket on the SYSTEM SETUP window. Refer to Section 3 of the Administrator’s Guide. When <SYNC PITCH> is set to “SpO_2” and SpO_2 cannot be measured and the alarm occurs, the sync sound pitch changes to SpO_2-2.
SpO_2-2: The pitch changes with each 1% change in SpO_2. You can select the range (81 to 100% or 40 to 100%) of SpO_2-2, which is connected to the MULTI socket, on the SYSTEM SETUP window. Refer to Section 3 of the Administrator’s Guide. When <SYNC PITCH> is set to “SpO_2-2” and SpO_2-2 cannot be measured and the alarm occurs, the sync sound pitch changes to SpO_2. SpO_2-2 is only available for the AY-661P, AY-663P, AY-671P or AY-673P input unit or BSM-1763 or BSM-1773 bedside monitor.

<RESPONSE>: Select the response mode from FAST, NORMAL or SLOW. For details on the response time, refer to the “Specifications - SpO_2” section in this manual.

NOTE: When measurement condition is unstable due to strenuous movement of the patient, etc., response may become slower in all modes.

<SpO_2 SENSITIVITY MODE>: Select the sensitivity mode for SpO_2.
MAX: This mode should be used for a critical patient, where obtaining a reading is most difficult. MAX mode is designed to interpret and display data for even the weakest of signals. This mode is recommended during procedures and when clinician and patient contact is continuous.
NORMAL: This mode provides the best combination of sensitivity and probe-off detection performance. This mode is recommended for most patients.

<SpO_2-2 SENSITIVITY MODE>: Select the sensitivity mode for SpO_2-2.
MAX: This mode should be used for a critical patient, where obtaining a reading is most difficult. MAX mode is designed to interpret and display data for even the weakest of signals. This mode is recommended during procedures and when clinician and patient contact is continuous.
NORMAL: This mode provides the best combination of sensitivity and probe-off detection performance. This mode is recommended for most patients.



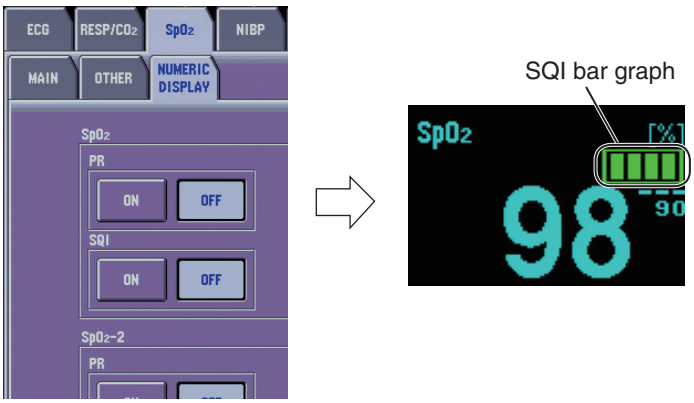
When MAX is selected for <SpO_2 SENSITIVITY MODE> or <SpO_2-2 SENSITIVITY MODE>, “SENS MAX” appears in the SpO_2 value area on the home screen.

<PARAMETER FOR 2ND CURRENT TREND>: Select the PI display on or off on the current trendgraph of the home screen.

On the NUMERIC DISPLAY Page

<NUMERIC DISPLAY ON HOME SCREEN FOR SpO_2>: Select the PR and PI display on or off in the SpO_2 area on the home screen.

<NUMERIC DISPLAY ON HOME SCREEN FOR SpO_2-2>: Select the PR, ΔSpO_2 and PI display on or off in the SpO_2-2 area on the home screen.



ON and OFF keys for <SpO_2 SQI> are displayed on the NUMERIC DISPLAY page only when the SpO_2 module version is 02-01 or later, the bedside monitor software version is 05-01 or later, and the AY-600P series input unit version is 02-01 or later.

To show the SQI bar graph on the home screen, set <SpO_2 SQI> to ON.

SpO_2 with Nellcor Probes (AY-651P/AY-653P/BSM-1753)

WARNING

SpO_2 measurement may be incorrect in the following cases.

- When the patient's carboxyhemoglobin or methemoglobin increases abnormally.
- When dye is injected in the blood.
- When using an electrosurgical unit.
- During CPR.
- When measuring at a site with venous pulse.
- When there is body movement.
- When the pulse wave is small (insufficient peripheral circulation).

WARNING

To avoid poor circulation, do not wrap the tape too tight. Check the blood circulation condition by observing the skin color and congestion at the skin peripheral to the probe attachment site. Even for short-term monitoring, there may be burn or pressure necrosis from poor blood circulation, especially on neonates or low birth weight infants whose skin is delicate. Accurate measurement cannot be performed on a site with poor peripheral circulation.

CAUTION

Turn off the power of mobile phones, small wireless devices and other devices which produce strong electromagnetic interference around a patient (except for devices allowed by the hospital administrator). Radio waves from devices such as mobile phones or small wireless devices may be mistaken as pulse waves and the displayed data may be incorrect.

CAUTION

While a patient is on medication which causes vasodilation, the pulse waveform may change and in rare cases the SpO_2 value might not be displayed.

WARNING

Check the circulation condition by observing the skin color at the measurement site and pulse waveform. Change the measurement site every 8 hours for disposable probes and every 4 hours for reusable probes. When using the probe on the following patients, take extreme care and change the measurement site more frequently according to symptoms and degree.

- Patient with a fever
- Patient with peripheral circulation insufficiency
- Neonate or low birth weight infant with delicate skin

WARNING

When monitoring SpO_2 of a patient who is receiving photodynamic therapy, the light from the finger probe sensor may cause a burn. Photodynamic therapy uses a photosensitizing agent that has a side effect of photosensitivity.

WARNING

When not monitoring SpO_2, disconnect the SpO_2 connection cord from the input unit. Otherwise, noise from the probe sensor may interfere and incorrect data is displayed on the screen.

CAUTION

Only use the specified probes. Otherwise, SpO_2 cannot be monitored.

CAUTION

Normal external light does not affect monitoring but strong light such as a surgical light or sunlight may affect monitoring. If affected, cover the measuring site with a blanket.

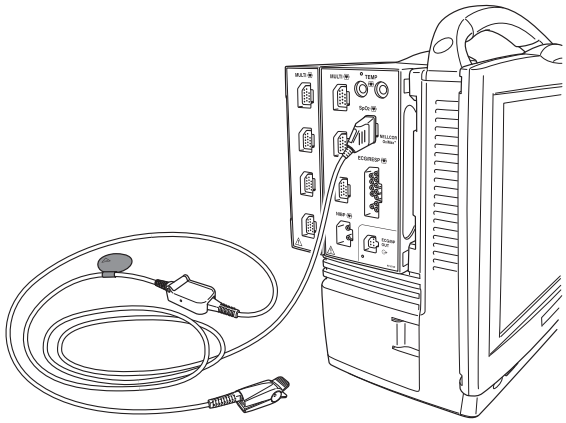
NOTE:

- Purchase of this instrument confers no express or implied license under any Nellcor Puritan Bennett patent to use this instrument with any oximetry sensor that is not manufactured or licensed by Nellcor Puritan Bennett.
- Do not attach the probe to the same limb that is used for NIBP measurement or an IBP catheter. The SpO_2 measurement may be incorrect.

Silencing SpO_2 Alarm

This function is only available for BSM-6000A series. When the <SILENCE SpO_2 ALARM> on the ALARM window of the SYSTEM SETUP window is set to ON, a second occurring SpO_2 alarm can be silenced when the [Silence Alarms] key is pressed.

Preparation



Select the appropriate probe according to purpose. To connect a Nellcor probe to the SpO_2 socket on the AY-651P or AY-653P input unit or the BSM-1753 bedside monitor, the JL-650P SpO_2 connection cord is required. The Nellcor probes are available direct from Covidien-Nellcor or their suppliers.

Monitoring SpO_2 at two sites (dual SpO_2) with Nellcor probes are available. To monitor dual SpO_2, the IF-919P communication cable and a Nellcor OxiMax™ N-600x™ pulse oximeter are required. Connect a Nellcor probe to the SpO_2 socket on the AY-651P or AY-653P input unit or the BSM-1753 bedside monitor, another probe to the OxiMax™ N-600x™ pulse oximeter and connect the pulse oximeter to the multi-link socket on the montior with the IF-919P communication cable.

When Monitoring Dual SpO_2

CAUTION

When using the Nellcor OxiMax™ N-600x™ pulse oximeter, the “Sensor Message” on the pulse oximeter do not function on the bedside monitor. When the SpO_2 data on the bedside monitor is abnormal, check the data on the pulse oximeter.

CAUTION

When two probes are attached too close to each other, the light from the probes interferes with each other and SpO_2 cannot be monitored properly. Make sure that there is no light interference when attaching two probes.

NOTE:

- If a parameter is not monitored on the pulse oximeter, it is not displayed on the bedside monitor.
- Some parameters cannot be displayed on the bedside monitor even if they are monitored on the pulse oximeter.
- Waveforms from the pulse oximeter are not synchronized with the waveforms measured on the bedside monitor.

Nellcor SpO_2 Probes

OxiMax Adhesive Sensors: Single-page use

Description	Weight Range	Measuring Accuracy	Qty	Catalog #
MAX-FAST Adhesive Forehead Sensor	>10 kg	±2%SpO_2	Case of 24	MAXFAST
MAX-FAST Headband	—	—	Case of 12	10004954
MAX-A Adhesive Sensor, adult	>30 kg	±2%SpO_2	Case of 24	MAXA
MAX-AL Adhesive Sensor, adult (longer, 36 inch cable)	>30 kg	±2%SpO_2	Case of 24	MAXAL
MAX-N Adhesive Sensor, neonatal/ adult	<3 kg or >40 kg	±2%SpO_2	Case of 24	MAXN
MAX-P Adhesive Sensor, pediatric	10 to 50 kg	±2%SpO_2	Case of 24	MAXP
MAX-I Adhesive Sensor, infant	3 to 20 kg	±2%SpO_2	Case of 24	MAXI
MAX-R Adhesive Sensor, adult nasal	>50 kg	±3.5%SpO_2	Case of 24	MAXR
MAX Sensor Assortment Pack (2 MAX-A and 2 MAX-N sensors)	—	±2%SpO_2	1	MAXPACI

OxiMax OxiCliq® Sensors: Reusable cable with adhesive sensor bandage

Description	Weight Range	Measuring Accuracy	Qty	Catalog #
OxiCliq Sensor Cable (3 ft)	—	—	1	OC-3
OxiCliq A, adult	>30 kg	±2.5%SpO_2	Case of 24	A
OxiCliq N, neonatal/adult	<3 kg or >40 kg	Neonate: ±3.5%SpO_2 Adult: ±2.5%SpO_2	Case of 24	N
OxiCliq P, pediatric	10 to 50 kg	±2.5%SpO_2	Case of 24	P
OxiCliq I, infant	3 to 20 kg	±2.5%SpO_2	Case of 24	I

OxiMax Reusable Sensors

Description	Weight Range	Measuring Accuracy	Qty
Durasensor® DS-100A finger-clip sensor, adult	>40 kg	±3%SpO_2	1
Oxiband® OXI-A/N adult/neonatal	<3 kg or >40 kg	Neonate: ±4%SpO_2 Adult: ±3%SpO_2	1
Oxiband OXI-P/I pediatric/infant	<3 kg or >40 kg	±3%SpO_2	1
Dura-Y® D-YS multisite sensor	>1 kg	Neonate: ±4%SpO_2 Infant/Adult: ±3%SpO_2	1
D-YSE ear clip for Dura-Y sensor	>30 kg	±3.5%SpO_2	1
PediCheck™ D-YSPD pediatric spot-check sensor	<3 kg or >40 kg	±3.5%SpO_2	1

For details on how to connect a Nellcor probe to the OxiMax™ N-600x™ pulse oximeter, refer to the pulse oximeter manual. To connect the pulse oximeter to the multi-link socket on the monitor, refer to the IF-919P communication cable operator's manual.

CAUTION

When the probe is attached on an appropriate site with sufficient circulation and an error message about probe attachment repeatedly appears, the probe may be deteriorated. Replace it with a new one.

CAUTION

When a message indicates a faulty probe or faulty SpO_2 connection cord, stop monitoring and replace the probe or SpO_2 connection cord with a new one.

CAUTION

If the attachment site is dirty with blood or bodily fluids, clean the attachment site before attaching the probe. If there is nail polish on the attachment site, remove the polish. Otherwise, the amount of transmitted light decreases, and measured value may be incorrect or measurement cannot be performed.

CAUTION

Only use the OxiMAX™ series sensor probes on this monitor.

NOTE:

- In order to maintain sufficient blood circulation, keep the measurement site warm by covering with a blanket or something similar. Warming the site is effective, especially for a patient with a small pulse amplitude.
- When using Nellcor probes, read the instructions provided with the probe.

Changing SpO_2 Settings

Change settings on the SpO_2 window. The following settings can be changed on SpO_2 tab for SpO_2 monitoring.

- Pulse waveform sensitivity
- SpO_2 and pulse rate alarm limits
- Display pulse rate in SpO_2 numeric data area on the home screen
- Display pulse rate to the left of the heart rate

The following settings can be changed on the SpO_2-2 tab for dual SpO_2 monitoring.

- Pulse waveform sensitivity
- ΔSpO_2 alarm limits
- Display SpO_2-2 pulse rate and/or ΔSpO_2 in SpO_2-2 numeric data area on the home screen

The following settings are common settings for SpO_2 and SpO_2-2.

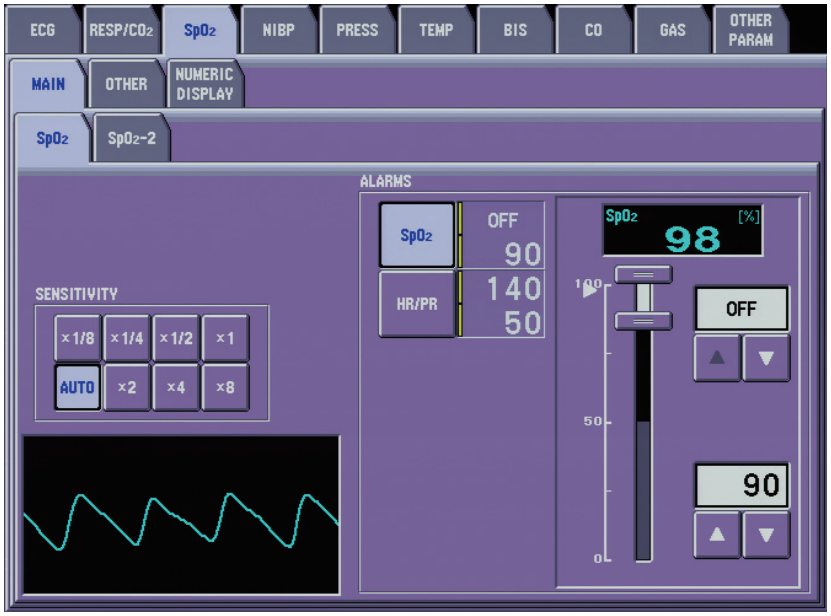
- Sync source
- Sync sound pitch

The SpO_2 data display color can be set on the SYSTEM SETUP window.

The scale of the SpO_2 trendgraph on the home screen is the same scale as the trendgraph of the Review window.

The SpO_2 pulse waveform sweep speed is the speed set for <SWEEP SPEED> on the WAVES page of the DISPLAY window.

On the MAIN Page



SpO_2 Tab

<SENSITIVITY>: Select sensitivity for pulse waveform on the home screen.

NOTE: The pulse wave amplitude varies according to pulsation component ratio of whole transmitted IR signal. When the pulsation component ratio is 1%, the pulse wave amplitude becomes about 10 mm at ×1 setting on the display.

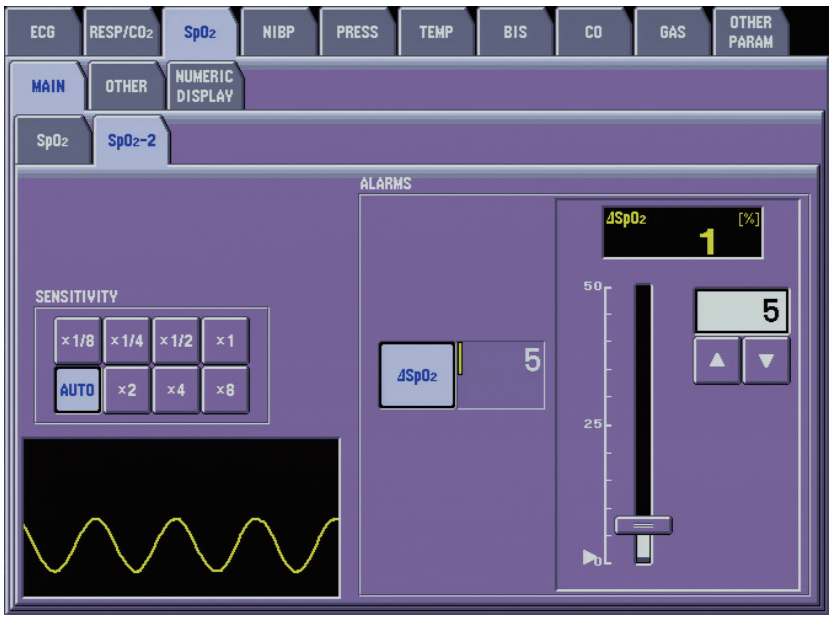
<ALARMS>

SpO_2 alarm limits: Set the upper and lower SpO_2 alarm limits.*1*2

HR/PR alarm limits: Set the upper and lower heart rate or pulse rate alarm limits.*1*2

*1 On BSM-6000A series, if <CRISIS VITAL ALARM MANAGEMENT> on the SYSTEM CONFIGURATION screen is turned on and "ALARM PRIORITY" on the SYSTEM SETUP window is set to CRISIS, the alarm setting is set to the alarm master setting.

*2 On BSM-6000A series, if <ALARM CAP> on the SYSTEM CONFIGURATION screen is turned on, the alarm setting is affected by the "ALARM CAP" setting on the SYSTEM SETUP window.



SpO_2-2 Tab

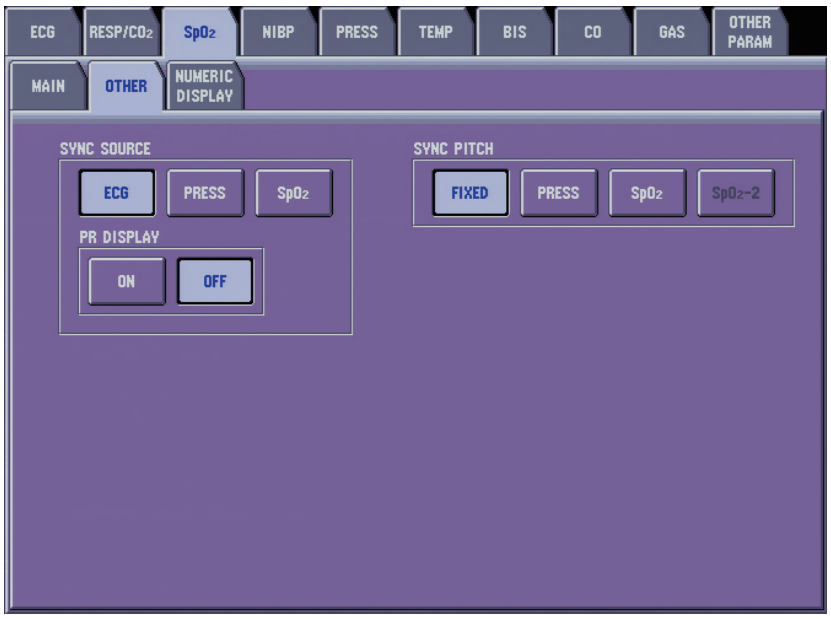
<SENSITIVITY>: Select sensitivity for SpO_2-2 pulse waveform on the home screen.

NOTE: The pulse wave amplitude varies according to pulsation component ratio of whole transmitted IR signal. When the pulsation component ratio is 1%, the pulse wave amplitude becomes about 10 mm at ×1 setting on the display.

<ALARMS>

ΔSpO_2 alarm limit: Set the upper ΔSpO_2 alarm limit.

On the OTHER Page



<SYNC SOURCE>: Select the sync sound source from ECG (heart rate), SpO_2 and arterial blood pressure (PRESS).

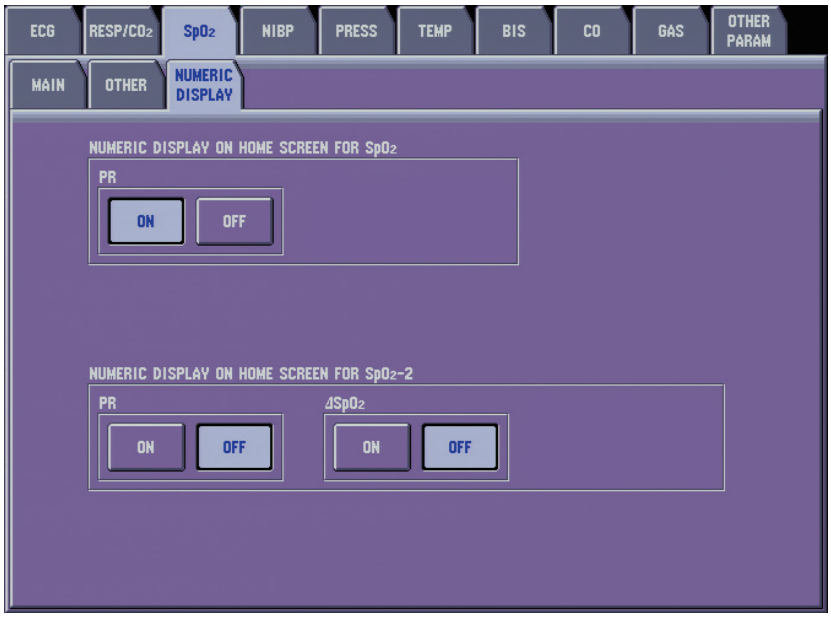
NOTE:

- When heart rate is unstable because of an ESU, select SpO_2 or PRESS.
- When the connection cord of SpO_2 or IBP of the arterial blood pressure is disconnected from the MULTI or SpO_2 socket and an alarm occurs when the sync source is set to SpO_2 or PRESS, the sync source changes to ECG when the alarm is silenced by pressing the [Silence Alarms] key. The sync source returns to SpO_2 or PRESS when the SpO_2 or IBP is monitored again. When using IBP as the sync source, adjust zero balance.
- When the sensor is detached from the patient and alarm occurs, and the sync source is set to SpO_2 or PRESS, the sync source does not change to ECG when the alarm is silenced, and "- - -" is displayed for PR.

<PR DISPLAY>: Select the pulse rate display on or off. This setting is only available when <SYNC SOURCE> is set to ECG.

<SYNC PITCH>: Select the sync sound pitch.
FIXED: The pitch is fixed to the pitch selected on the SYSTEM SETUP window.
PRESS: The pitch is high when the BP value is above 120 mmHg. The pitch is low when the BP value is below 20 mmHg. The pitch changes in 20 steps from high to low for each 5 mmHg change between 120 and 20 mmHg BP value. The BP value of the highest priority arterial blood pressure is used.
SpO_2: The pitch changes with each 1% change in SpO_2. You can select the SpO_2 range (81 to 100% or 40 to 100%) on the SYSTEM SETUP window. Refer to Section 3 of the Administrator's Guide.

On the NUMERIC DISPLAY Page



<NUMERIC DISPLAY ON HOME SCREEN FOR SpO_2>: Select the PR display on or off in the SpO_2 area on the home screen.

<NUMERIC DISPLAY ON HOME SCREEN FOR SpO_2-2>: Select the PR and ΔSpO_2 display on or off in the SpO_2-2 area on the home screen.

SpO_2 with Masimo Probes (AY-631P/AY-633P/BSM-1733)

WARNING

SpO_2 measurement may be incorrect in the following cases.

- When the patient's carboxyhemoglobin or methemoglobin increases abnormally.
- When dye is injected in the blood.
- When using an electrosurgical unit.
- During CPR.
- When measuring at a site with venous pulse.
- When there is body movement.
- When the pulse wave is small (insufficient peripheral circulation).

WARNING

To avoid poor circulation, do not wrap the tape too tight. Check the blood circulation condition by observing the skin color and congestion at the skin peripheral to the probe attachment site. Even for short-term monitoring, there may be burn or pressure necrosis from poor blood circulation, especially on neonates or low birth weight infants whose skin is delicate. Accurate measurement cannot be performed on a site with poor peripheral circulation.

WARNING

The following information are given by Masimo Corporation.

- A pulse oximeter should NOT be used as an apnea monitor.
- Pulse rate measurement is based on the optical detection of a peripheral flow pulse and therefore may not detect certain arrhythmias. The pulse oximeter should not be used as a replacement or substitute for ECG based arrhythmia analysis.
- A pulse oximeter is an early warning device. Use lab co-oximeter to completely understand the patient's condition.

WARNING

Check the circulation condition by observing the skin color at the measurement site and pulse waveform. Change the measurement site every 8 hours for disposable probes and every 4 hours for reusable probes. When using the probe on the following patients, take extreme care and change the measurement site more frequently according to symptoms and degree.

- Patient with a fever
- Patient with peripheral circulation insufficiency
- Neonate or low birth weight infant with delicate skin

WARNING

When monitoring SpO_2 of a patient who is receiving photodynamic therapy, the light from the finger probe sensor may cause a burn. Photodynamic therapy uses a photosensitizing agent that has a side effect of photosensitivity.

WARNING

When not monitoring SpO_2, disconnect the SpO_2 connection cord from the input unit. Otherwise, noise from the probe sensor may interfere and incorrect data is displayed on the screen.

CAUTION

Turn off the power of mobile phones, small wireless devices and other devices which produce strong electromagnetic interference around a patient (except for devices allowed by the hospital administrator). Radio waves from devices such as mobile phones or small wireless devices may be mistaken as pulse waves and the displayed data may be incorrect.

CAUTION

Normal external light does not affect monitoring but strong light such as a surgical light or sunlight may affect monitoring. If affected, cover the measuring site with a blanket.

CAUTION

While a patient is on medication which causes vasodilation, the pulse waveform may change and in rare cases the SpO_2 value might not be displayed.

CAUTION

SpO_2 and pulse rate readings may be inaccurate for a short time after defibrillation when using Masimo probes.

CAUTION

Only use the specified probes. Otherwise, SpO_2 cannot be monitored.

NOTE:

- Purchase of this instrument confers no express or implied license under any Masimo patent to use this instrument with any oximetry sensor that is not manufactured or licensed by Masimo Corporation.
- Do not attach the probe to the same limb that is used for NIBP measurement or an IBP catheter. The SpO_2 measurement may be incorrect.

Silencing SpO_2 Alarm

This function is only available for BSM-6000A series. When the <SILENCE SpO_2 ALARM> on the ALARM window of the SYSTEM SETUP window is set to ON, a second occurring SpO_2 alarm can be silenced when the [Silence Alarms] key is pressed.

Preparation

Select the appropriate probe according to purpose. To connect a Masimo probe to the SpO_2 socket on the AY-631P or AY-633P input unit or the BSM-1733 bedside monitor, the JL-630P or JL-631P SpO_2 connection cord is required. Use JL-630P with LNOP series probes and JL-631P with LNCS series probes. The Masimo probes are available direct from Masimo or their suppliers.

Monitoring SpO_2 at two sites (dual SpO_2) with Masimo probes are available. To monitor dual SpO_2, the IF-925P communication cable and a Masimo pulse oximeter, Radical™, Radical-7™ or Rad-8™ are required. Connect a Masimo probe to the SpO_2 socket on the AY-631P or AY-633P input unit or the BSM-1733 bedside monitor, another probe to the Masimo pulse oximeter and connect the pulse oximeter to the multi-link socket on the monitor with the IF-925P communication cable.

When Monitoring Dual SpO_2

CAUTION

Some pulse oximeter alarms do not function on the bedside monitor when an pulse oximeter is connected. When the data is abnormal, check the alarm on the pulse oximeter.

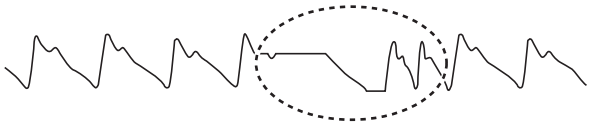
CAUTION

When two probes are attached too close to each other, the light from the probes interferes with each other and SpO_2 cannot be monitored properly. Make sure that there is no light interference when attaching two probes.

NOTE:

- If a parameter is not monitored on the pulse oximeter, it is not displayed on the bedside monitor.
- Some parameters cannot be displayed on the bedside monitor even if they are monitored on the pulse oximeter.
- Waveforms from the pulse oximeter are not synchronized with the waveforms measured on the bedside monitor.
- When the pulse oximeter is operating in power save mode, the bedside monitor cannot receive data from the pulse oximeter. For details on the power save mode, refer to the pulse oximeter manual.
- The pulse waveform displayed on the bedside monitor is affected by the operation on the pulse oximeter. Depending on the status of the pulse oximeter, the pulse waveform displayed on the bedside monitor may differ from the actual waveform.

  e.g. The pulse waveform on the bedside monitor becomes flat while the trendgraph on the pulse oximeter is updated.



Masimo SpO_2 Probes

LNOP® Reusable Probes

Model	Patient	Weight Range	Measuring Accuracy		Application Site	Qty (/box)
			No Motion	Motion		
LNOP DCI	Adult, pediatric	>30 kg	±2%SpO_2	±3%SpO_2	Finger	1
LNOP DCIP	Pediatric	10 to 50 kg	±2%SpO_2	±3%SpO_2	Finger	1
LNOP YI	Neonate, pediatric, adult	>1 kg	1 to 3 kg: ±3%SpO_2 >3 kg: ±2%SpO_2	1 to 3 kg: ±3%SpO_2 >3 kg: ±3%SpO_2	Multi-site	1
LNOP TC-I	Adult, pediatric	>30 kg	±3.5%SpO_2	N/A	Ear lobe	1
LNOP DC-195	Adult, pediatric	>30 kg	±2%SpO_2	±3%SpO_2	Finger	1
LNOP DCSC	Adult, pediatric	>30 kg	±2%SpO_2	±3%SpO_2	Finger	1
LNOP DC-12	Adult	>30 kg	±2%SpO_2	±3%SpO_2	Finger	1
LNOP TF-I	Adult	>30 kg	±2%SpO_2	N/A	Forehead	1

LNOP® Adhesive Probes

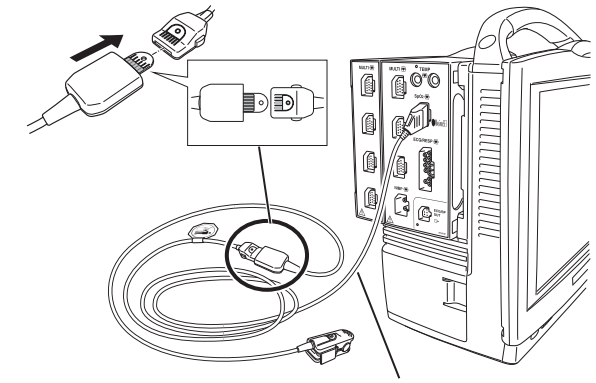
Model	Patient	Weight Range	Measuring Range		Application Site	Qty (/box)
			No Motion	Motion		
LNOP Adt	Adult	>30 kg	±2%SpO_2	±3%SpO_2	Finger	20
LNOP Pdt	Adult, pediatric	10 to 50 kg	±2%SpO_2	±3%SpO_2	Finger	20
LNOP Neo	Neonate	<10 kg	±3%SpO_2	±3%SpO_2	<3 kg: Foot >3 kg: Thumb or great toe	20
LNOP NeoPt	Neonate	<1 kg	±3%SpO_2	±3%SpO_2	Foot	20
LNOP Neo-L	Neonate, pediatric, adult	<3 kg >40 kg	<3 kg: ±3%SpO_2 >40 kg: ±2%SpO_2	<3 kg: ±3%SpO_2 >40 kg: ±3%SpO_2	<3 kg: Foot or toe >40 kg: Finger	20
LNOP NeoPt-L	Neonate	<1 kg	±3%SpO_2	±3%SpO_2	Foot	20
LNOP Inf-L	Neonate, pediatric	3 to 20 kg	±2%SpO_2	±3%SpO_2	Toe	20
LNOP Neo Bridge	Neonate	<10 kg	±3%SpO_2	±3%SpO_2	<3 kg: Foot >3 kg: Thumb or great toe	20
LNOP NeoPt Bridge	Neonate	<1 kg	±3%SpO_2	±3%SpO_2	Foot	20
LNOP Hi-Fi Trauma Neo/Adult	Adult, neonate	<3 kg >30 kg	<3 kg: ±3%SpO_2 >30 kg: ±2%SpO_2	<3 kg: ±3%SpO_2 >30 kg: ±3%SpO_2	<3 kg: Foot >30 kg: Finger	20
LNOP Hi-Fi Trauma Inf/ Ped	Infant, pediatric	3 to 30 kg	3 to 10 kg: ±3%SpO_2 10 to 30 kg: ±2%SpO_2	3 to 10 kg: ±3%SpO_2 10 to 30 kg: ±3%SpO_2	Finger or toe	20
LNOP Blue Inf	Neonate, pediatric	2.5 to 30 kg	±3 (for 80 to 100%SpO_2) ±4 (for 60 to 80%SpO_2)	N/A	Great toe	20
LNOP Adtx	Adult, pediatric	>30 kg	±2%SpO_2	±3%SpO_2	Finger	20
LNOP Pdtx	Pediatric	10 to 50 kg	±2%SpO_2	±3%SpO_2	Finger	20

LNCS™ Reusable Probes

Model	Patient	Weight Range	Measuring Accuracy		Application Site	Qty (/box)
			No Motion	Motion		
LNCS DCI	Adult, pediatric	>30 kg	±2%SpO_2	±3%SpO_2	Finger	1
LNCS DCIP	Pediatric	10 to 50 kg	±2%SpO_2	±3%SpO_2	Finger	1
LNCS TC-I	Adult, pediatric	>30 kg	±3.5%SpO_2	N/A	Ear lobe	1
LNCS TF-I	Adult, pediatric	>30 kg	±2%SpO_2	N/A	Forehead	1

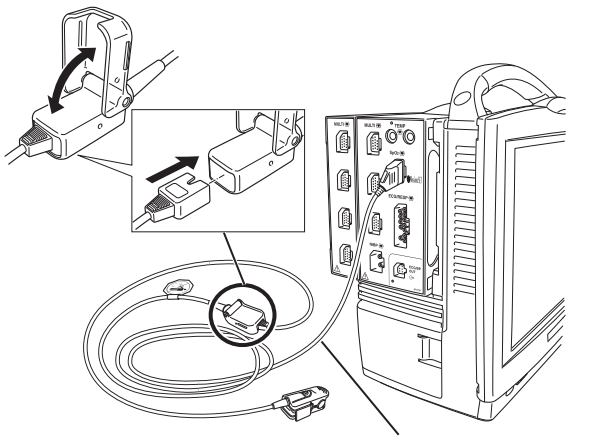
LNCS™ Adhesive Probes

Model	Patient	Weight Range	Measuring Accuracy		Application Site	Qty(/box)
			No Motion	Motion		
LNCS Adtx	Adult, pediatric	>30 kg	±2%SpO_2	±3%SpO_2	Finger	20
LNCS Pdtx	Adult, pediatric	10 to 50 kg	±2%SpO_2	±3%SpO_2	Finger	20
LNCS Inf-L	Neonate, pediatric	3 to 20 kg	±2%SpO_2	±3%SpO_2	Toe	20
LNCS Neo-L	Neonate, pediatric, adult	<3 kg >40 kg	±3%SpO_2 ±2%SpO_2	±3%SpO_2 ±3%SpO_2	<3 kg: Foot or toe >40 kg: Finger	20
LNCS NeoPt	Neonate	<1 kg	±3%SpO_2	±3%SpO_2	Foot	20



When connecting the LNOP series probe

JL-630P SpO_2 connection cord



When connecting the LNCS series probe

JL-631P SpO_2 connection cord

For details on how to connect a Masimo probe to the Masimo pulse oximeter, refer to the pulse oximeter manual. To connect the pulse oximeter to the multi-link socket on the monitor, refer to the IF-925P communication cable operator's manual.

WARNING

Do not use additional tape to secure the probe to patient.

CAUTION

When the probe is attached on an appropriate site with sufficient circulation and an error message about probe attachment repeatedly appears, the probe may be deteriorated. Replace it with a new one.

CAUTION

When a message indicates a faulty probe or faulty SpO_2 connection cord, stop monitoring and replace the probe or SpO_2 connection cord with a new one.

CAUTION

If the attachment site is dirty with blood or bodily fluids, clean the attachment site before attaching the probe. If there is nail polish on the attachment site, remove the polish. Otherwise, the amount of transmitted light decreases, and measured value may be incorrect or measurement cannot be performed.

CAUTION

- Do not reuse adhesive probes for another patients because it causes cross infection.
- Do not use the probe over its stated lifetime. Otherwise the SpO_2 measurement accuracy cannot be guaranteed.
- Do not immerse the Masimo probe in water or any other solutions. The probe, cable and connectors are not waterproof.
- Do not sterilize the probe by irradiation, steam or ethylene oxide. Refer to the probe manual.

CAUTION

Only use the specified probes. Otherwise, SpO_2 cannot be monitored.

NOTE:

- In order to maintain sufficient blood circulation, keep the measurement site warm by covering with a blanket or something similar. Warming the site is effective, especially for a patient with a small pulse amplitude.
- Connect the probe and SpO_2 connection cord until you hear a stopper of the SpO_2 connection cord click.
- When using Masimo probes, read the instructions provided with the probe.

Changing SpO_2 Settings

Change settings on the SpO_2 window. The following settings can be changed on the SpO_2 tab for SpO_2 monitoring.

- Pulse waveform sensitivity
- SpO_2 and pulse rate alarm limits
- Averaging time
- Sensitivity mode
- FAST SAT mode on or off
- Display pulse rate and/or perfusion index in SpO_2 numeric data area on the home screen
- Display pulse rate to the left of the heart rate

The following settings can be changed on the SpO_2-2 tab for dual SpO_2 monitoring.

- Pulse waveform sensitivity
- ΔSpO_2 alarm limit
- Scale for SpO_2-2 trendgraph on the home screen
- Display SpO_2-2 pulse rate, perfusion index and/or ΔSpO_2 in SpO_2-2 numeric data area on the home screen

The following settings are common settings for SpO_2 and SpO_2-2.

- Sync source
- Sync sound pitch

The SpO_2 data display color can be set on the SYSTEM SETUP window.

The scale of the SpO_2 trendgraph on the home screen is the same scale as the trendgraph of the Review window.

The SpO_2 pulse waveform sweep speed is the speed set for <SWEEP SPEED> on the WAVES page of the DISPLAY window.

On the MAIN Page

SpO_2 Tab

<SENSITIVITY>: Select sensitivity for pulse waveform on the home screen.

NOTE: The pulse wave amplitude varies according to pulsation component ratio of whole transmitted IR signal. When the pulsation component ratio is 1%, the pulse wave amplitude becomes about 10 mm at ×1 setting on the display.

<ALARMS>

SpO_2 alarm limits: Set the upper and lower SpO_2 alarm limits.*1*2

HR/PR alarm limits: Set the upper and lower heart rate or pulse rate alarm limits.*1*2

*1 On BSM-6000A series, if <CRISIS VITAL ALARM MANAGEMENT> on the SYSTEM CONFIGURATION screen is turned on and "ALARM PRIORITY" on the SYSTEM SETUP window is set to CRISIS, the alarm setting is set to the alarm master setting.

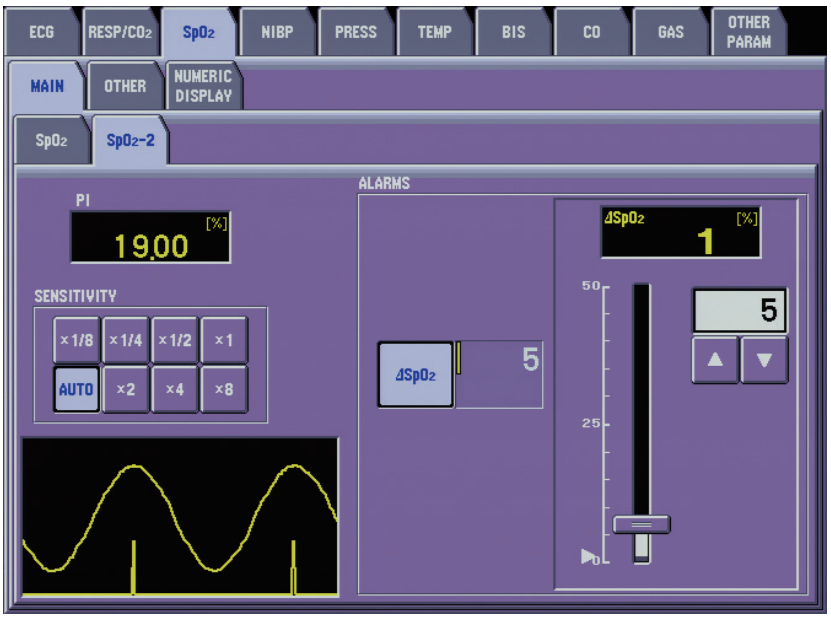
*2 On BSM-6000A series, if <ALARM CAP> on the SYSTEM CONFIGURATION screen is turned on, the alarm setting is affected by the "ALARM CAP" setting on the SYSTEM SETUP window.

Signal IQ

Signal IQ is the signal quality indicator. Signal IQ can be used to identify the occurrence of a patient's pulse and the associated signal quality of the measurement. The pulse waveform is often distorted when there is motion and may be obscured by artifact. The Signal IQ, shown as a vertical line, coincides with the peak of an arterial pulsation. The height of the vertical line of the Signal IQ indicates the quality of the measured signal. The taller the height, the higher the signal quality. When the signal quality is very low, the height of the vertical line becomes low and "LOW QUALITY SIGNAL" message is displayed on the screen.

PI (Perfusion Index)

The Perfusion Index indicates the percentage of pulsatile signal to non-pulsatile signal. The range of Perfusion Index is 0.02% (very weak pulse strength) to 20% (very strong pulse strength). The Perfusion Index allows clinicians to place sensors on optimal sites. Placing the sensor at the site with the highest Perfusion Index number improves performance during motion.



SpO_2-2 Tab

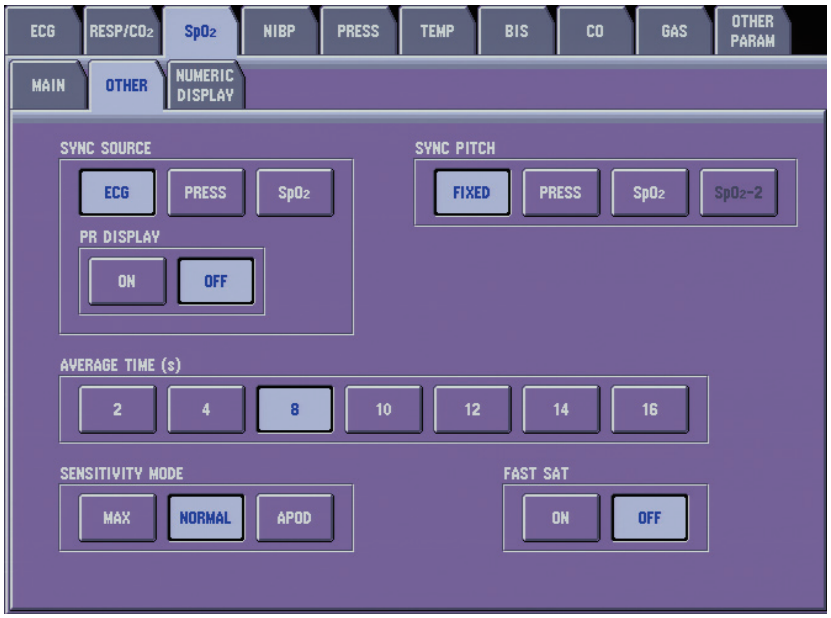
<SENSITIVITY>: Select sensitivity for SpO_2-2 pulse waveform on the home screen.

NOTE: The pulse wave amplitude varies according to pulsation component ratio of whole transmitted IR signal. When the pulsation component ratio is 1%, the pulse wave amplitude becomes about 10 mm at ×1 setting on the display.

<ALARMS>

ΔSpO_2 alarm limit: Set the upper ΔSpO_2 alarm limit.

On the OTHER Page



<SYNC SOURCE>: Select the sync sound source from ECG (heart rate), SpO_2 and arterial blood pressure (IBP).

NOTE:

- When heart rate is unstable because of an ESU, select SpO_2 or PRESS.
- When the connection cord of SpO_2 or IBP of the arterial blood pressure is disconnected from the monitor and an alarm occurs when the sync source is set to SpO_2 or PRESS, the sync source changes to ECG when the alarm is silenced by pressing the [SILENCE ALARMS] key. The sync source returns to SpO_2 or PRESS when the SpO_2 or IBP is monitored again. When using IBP as the sync source, adjust zero balance.
- When the sensor is detached from the patient and alarm occurs, and the sync source is set to SpO_2 or PRESS, the sync source does not change to ECG when the alarm is silenced, and "- - -" is displayed for PR.
- When PRESS is selected while monitoring low blood pressure, the pulse rate becomes small and might not be displayed correctly.
- The SpO_2-2 cannot be set to the sync sound source.

<PR DISPLAY>: Select the pulse rate display on or off. This setting is only available when <SYNC SOURCE> is set to ECG.

<SYNC PITCH>: Select the sync sound pitch.

FIXED: The pitch is fixed to the pitch selected on the SYSTEM SETUP window.

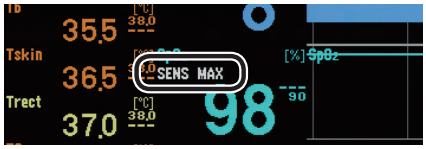
PRESS: The pitch is high when the BP value is above 120 mmHg. The pitch is low when the BP value is below 20 mmHg. The pitch changes in 20 steps from high to low for each 5 mmHg change between 120 and 20 mmHg BP value. The BP value of the highest priority arterial blood pressure is used.

SpO_2: The pitch changes with each 1% change in SpO_2. You can select the SpO_2 range (81 to 100% or 40 to 100%) on the SYSTEM SETUP window. Refer to Section 3 of the Administrator's Guide.

<AVERAGE TIME (s)>: Select the averaging time.

<SENSITIVITY MODE>: Select the sensitivity mode.
MAX: This mode should be used for a critical patient, where obtaining a reading is most difficult. MAX mode is designed to interpret and display data for even the weakest of signals. This mode is recommended during procedures and when clinician and patient contact is continuous.
NORMAL: This mode provides the best combination of sensitivity and probe-off detection performance. This mode is recommended for most patients.
APOD: APOD (Adaptive Probe Off Detection) is the least sensitive in picking up a reading on patients with low perfusion but has the best detection for probe-off conditions. This mode is useful for patients that are at particular risk of the sensor becoming detached (pediatric, body movement, etc.).

Example: MAX is selected



When MAX or APOD is selected, "SENS MAX" or "APOD" appears in the SpO_2 value area on the home screen.

<FAST SAT>: FAST SAT enables rapid tracking of arterial oxygen saturation changes by minimizing the averaging. This mode is clinically applicable during procedures when detecting rapid changes in oxygen saturation is most important such as induction, intubation and sleep studies.

On the NUMERIC DISPLAY Page

<NUMERIC DISPLAY ON HOME SCREEN FOR SpO_2>: Select the PR and PI (Perfusion Index) display on or off in the SpO_2 area on the home screen.

<NUMERIC DISPLAY ON HOME SCREEN FOR SpO_2-2>: Select the PR, ΔSpO_2 and PI (Perfusion Index) display on or off in the SpO_2-2 area on the home screen.

NIBP

The NIBP measurement can be used during electrosurgery and during the discharge of a cardiac defibrillator. This monitor complies with IEC 60601-2-30: 1999.

WARNING

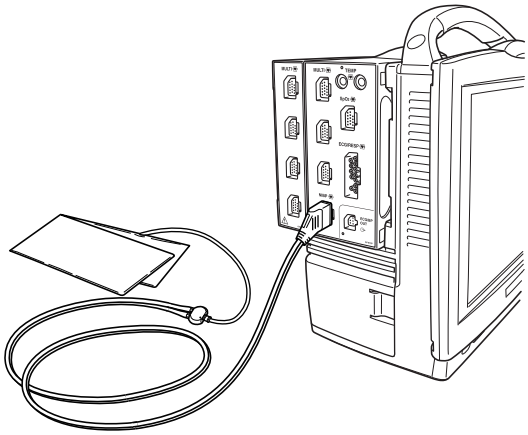
Be careful when measuring NIBP on a patient with known bleeding disorders or coagulation. After NIBP measurement, there may be dot hemorrhage, or circulatory disorder by thrombus where the cuff is attached.

WARNING

NIBP measurement may be incorrect in the following situations.

- When using an ESU
- Body movement
- Small pulse wave
- Too many arrhythmias
- Shaking from an external source
- Rapid blood pressure change
- During CPR
- Slow pulse
- Low blood pressure
- Cuff is too tight or too loose
- Cuff does not fit the arm
- Cuff is wrapped over thick clothing
- Cuff is deteriorated

Preparation



When connecting the YP-963P Cuff for Adults

Select the appropriate cuff according to the patient. A YN-900P (1.5 m) or YN-901P (3.5 m) air hose is required. A YN-990P (1.5 m) extension hose is also available. When using cuff for neonates, a YN-920P (1.5 m) or YN-921P (3.5 m) air hose is required.

Reusable Cuffs

Cuff			Width (cm)	Applicable Circumference (cm)
For infants		YP-960T	5	8 to 13
		YP-710T		
For children	Small	YP-961T	7	12 to 18
		YP-711T		13 to 18
	Standard	YP-702T	10	15 to 23
		YP-962T		
For adults	Small	YP-712T*	10	18 to 23
	Standard	YP-703T	13	21 to 30
		YP-963T		
		YP-713T*		23 to 33
	Large	YP-964T	15	26 to 36
		YP-714T*	16	33 to 45
For thigh		YP-965T	19	33 to 45
		YP-715T*		45 to 55

* Can be used for inflation method measurement. The inflation method measurement is not available for BSM-6000A series bedside monitors.

Disposable Cuffs

Cuff			Width (cm)	Applicable Circumference (cm)
Infants (Non-sterilized)		YP-810P	6	8 to 14
Children (Non-sterilized)		YP-811P	8	13 to 20
Adults (Non-sterilized)	Small	YP-812P	10	18 to 26
	Standard	YP-813P	14	26 to 35
	Medium large	YP-814P	15	29 to 38
	Large	YP-815P	17	32 to 42
	Extra large	YP-816P	18	35 to 44
For thigh		YP-817P	20	42 to 50
Neonates (Non-sterilized)		YP-820P	2	3 to 6
		YP-821P	3	4 to 8
		YP-822P	4	6 to 10
		YP-823P	4.5	7 to 13
		YP-824P	5	8 to 15
Neonates (Sterilized)		No. 11*	3	5 to 7.5
		No. 12*	4	7.5 to 10.5
		No. 13*	5	8.5 to 13

* These parts have not been checked for compliance with the MDD (Medical Device Directive). For EC member countries, Nihon Kohden recommends the use of parts that comply with MDD.

Connect the air hose to the NIBP socket.

CAUTION

Firmly connect the air hose to the NIBP socket on the monitor until it clicks. If not connected properly, the cuff type cannot be identified. At the start of NIBP measurement, check if the cuff type corresponds to the type displayed on the monitoring screen.

CAUTION

When too much pressure is applied to the cuff, or the hose is bent or squeezed, the “NIBP SAFETY CIRCUIT RUNNING” message appears on the screen and NIBP monitoring may be stopped. Remove the cause, wait 40 seconds, check that the message disappears, then measure again.

CAUTION

Do not wrap the cuff too tight. It may cause poor blood circulation and congestion. If the cuff is wrapped too loosely, the NIBP value may increase.

CAUTION

Do not wrap the cuff on an arm or thigh which is used for injection. NIBP measurement on an arm or thigh which is used for injection may cause reflux of blood and stop injection.

CAUTION

Only connect the air hose to the cuff and NIBP socket on the monitor. Do not connect the air hose, especially the air hose for neonate, to other parts, such as an infusion line. It may cause thrombus.

Changing NIBP Settings

Change settings on the NIBP window. The following settings can be changed for monitoring NIBP.

- Initial cuff inflation pressure
- Measurement mode and interval
- NIBP alarm limits
- Automatic measurement with PWTT on or off
- Oscillation graph display on or off
- Inflate mode on/off (Available only when a BSM-1700 series bedside monitor is mounted on a BSM-6000K series bedside monitor)

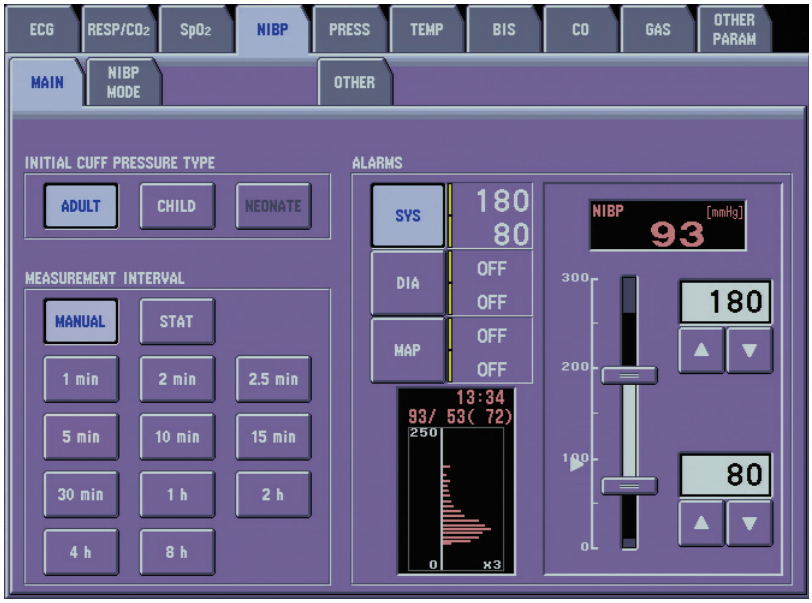
The following items can be set on the SYSTEM SETUP window.

- Measurement end sound
- Starting NIBP auto measurement by pressing the [NIBP Interval] key
- SIM mode measurement on or off
- Measurement mode after the monitor power is off for more than 30 minutes or the monitor is initialized
- Dim or hide the old measurement data
- Time after NIBP measurement for the NIBP data to be dimmed or hidden
- Measurement program for STAT and SIM modes
- Measurement interval displayed on the NIBP INTERVALS window when the [NIBP Interval] key is pressed
- Venous puncture mode on or off and cuff inflation pressure for venous puncture
- NIBP data display color

The NIBP unit (mmHg or kPa) is the same as the blood pressure unit. The pressure unit is set on the SYSTEM CONFIGURATION screen.

The scale of the NIBP trendgraph on the home screen is the same scale as the trendgraph of the Review window.

On the MAIN Page



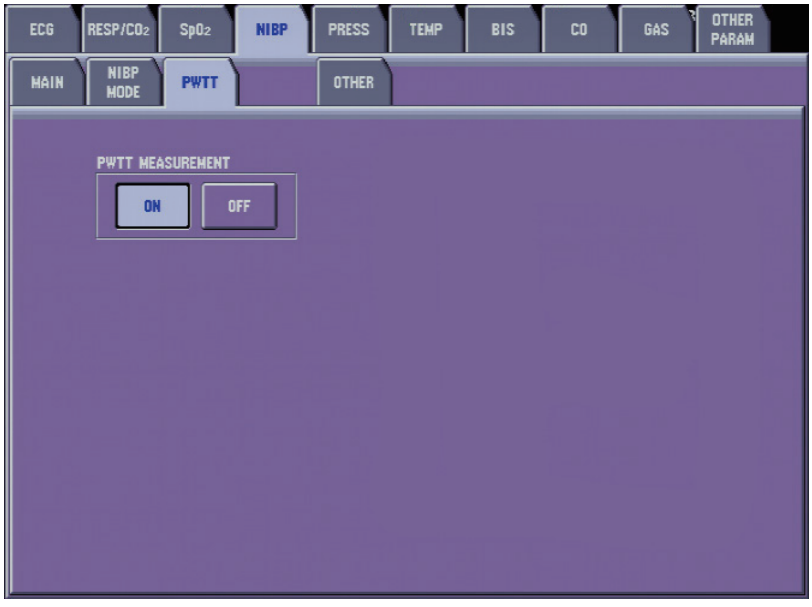
<INITIAL CUFF PRESSURE TYPE>: Select the initial cuff inflation pressure type when the air hose for adult/child/neonate is connected to the NIBP socket.

NOTE: When the air hose for neonates (1.5 m) is connected to the monitor and the initial cuff pressure is set to 125 mmHg or more, the actual pressure may be less than the setting.

<ALARMS>
SYS alarm limits: Set the upper and lower systolic alarm limits.
DIA alarm limits: Set the upper and lower diastolic alarm limits.
MAP alarm limits: Set the upper and lower mean alarm limits.

<MEASUREMENT INTERVAL>: Select the NIBP measurement mode.

On the PWTT Page

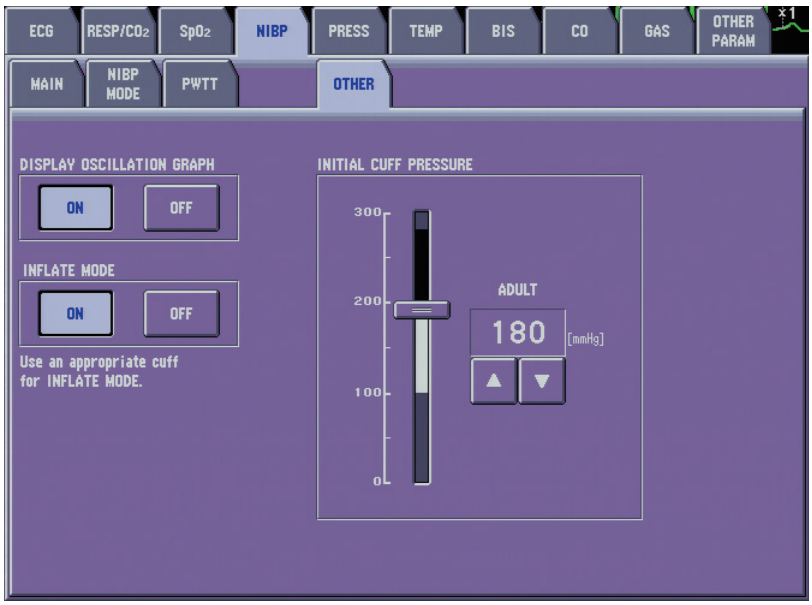


To automatically measure NIBP with PWTT, select ON for <PWTT MEASUREMENT>.

NOTE:

- PWTT is only available on the AY-660P, AY-661P, AY-663P, AY-671P or AY-673P input unit or the BSM-1763 or BSM-1773 bedside monitor and SpO_2 is monitored with Nihon Kohden probe.
- PWTT is not available when site is NICU or the patient type is Neonate.
- PWTT is not available on BSM-6000A series.

On the OTHER Page



<INITIAL CUFF PRESSURE>: Select the cuff inflation pressure for the first measurement. After the first measurement, the cuff inflation pressure is the systolic value of the previous measurement plus 30 mmHg.

To change the initial cuff inflation pressure for neonate, the air hose for neonate must be connected to the NIBP socket.

<DISPLAY OSCILLATION GRAPH>: Select whether to display the oscillation graph. However, the graph cannot be displayed when many parameters are monitored or NUMERIC PARAMETER AREA is set to SIDE + SMALL BOTTOM on the SYSTEM SETUP screen. Refer to "LAYOUT Page" in Section 3 of the administrator's guide.

<INFLATE MODE>: Select whether to perform NIBP measurement in inflate mode.
NOTE: INFLATE MODE is not available on BSM-6000A series.

WARNING

When measuring NIBP in INFLATE MODE, use a cuff specified by Nihon Kohden. If an unspecified cuff is used, correct NIBP measurement might not be performed.

On the INTERVAL Page

Select the measurement modes for the mode selection by the [NIBP Interval] key on the bedside monitor.

The SIM mode is only available in the OR site and when <SIM> on the NIBP page of the PARAMETERS window is set to ON in the SYSTEM SETUP window.

Starting and Stopping NIBP Measurement

After selecting measurement mode and interval, press the [NIBP Start/Stop] key on the bedside monitor.

To stop measurement, press the [NIBP Start/Stop] key again.

WARNING

When performing long term measurement at intervals less than 2.5 minutes, perform measurements while observing the state of the patient, blood vessels and limb to ensure adequate circulation. Congestion may occur at the measurement site. When performing periodic measurement for a long time, periodically check the circulation condition.

CAUTION

When too much pressure is applied to the cuff, or the hose is bent or squeezed, the “NIBP SAFETY CIRCUIT RUNNING” message appears on the screen and NIBP monitoring may be stopped. Remove the cause, wait 40 seconds, check that the message disappears, then measure again.

CAUTION

Before starting STAT or SIM mode measurement, check the measurement setting (measurement intervals).

NOTE:

- When measuring patients who are conscious, help the patient to relax. Measurement may not be accurate if the patient’s arm is tense or if the patient talks.
- The data for measurement on the thigh tends to be higher than measurement on the arm.
- Do not apply pressure to the cuff or air hose. NIBP might not be measured correctly because of the noise or NIBP measurement may stop due to the NIBP safety circuit running.
- Do not bend or apply pressure on the air hose. It may cause noise and NIBP might not be measured correctly.
- When NIBP START/STOP key is assigned to the function key, the NIBP measurement can also be performed with the function key.
- Do not measure NIBP on a patient on whom an IABP is used. Accurate NIBP measurement cannot be performed due to pulse waves from the IABP mixing with the patient’s pulse waves.

Measurement Mode and Interval

There are four NIBP measurement modes: manual, auto (periodic), STAT (continuous) and SIM. The SIM mode is only available in OR site and when <SIM> is set to ON on the NIBP page of the PARAMETERS window in the SYSTEM SETUP window.

Manual Measurement

NIBP is measured once whenever the [NIBP Start/Stop] key on the monitor is pressed. Manual measurement cannot be performed during the first stage of the STAT or SIM mode measurement.

Auto Measurement

The first NIBP measurement is performed when the [NIBP Start/Stop] key on the monitor is pressed. The second measurement is performed when the current time (minutes) in the monitor reaches the nearest time interval selected.

Auto Measurement with PWTT Trigger

NOTE:

- PWTT is only available on the AY-660P, AY-661P, AY-663P, AY-671P or AY-673P input unit or the BSM-1763 or BSM-1773 bedside monitor and SpO_2 is monitored with Nihon Kohden probe.
- PWTT triggered NIBP measurement is not available when site is NICU, the patient type is "Neonate" or the air hose for neonate is connected to the input unit, standard input unit or the BSM-1700 series bedside monitor.
- PWTT is not available on BSM-6000A series.

To start PWTT trigger measurement, set PWTT Trigger NIBP Measurement to "On" on the PWTT window and set the NIBP SYS alarm limits on the MAIN page. Monitor ECG and SpO_2. When stable PWTT is detected about one minute after ECG and SpO_2 monitoring start, the PWTT mark appears. Measure NIBP once for calibration. When the calibration is finished, the border around the mark disappears PWTT and PWTT trigger measurement starts. When the NIBP SYS estimated by PWTT exceeds the alarm limits for eight seconds, the mark is highlighted PWTT and the NIBP is measured automatically.

CAUTION

Do not rely only on the PWTT trigger NIBP measurement to monitor blood pressure changes. When it is necessary to monitor critical blood pressure change, set the appropriate interval for NIBP measurement.

CAUTION

In the following cases, PWTT may trigger too many or no NIBP measurements. Check the patient condition. If necessary, change the delta PWTT threshold or set the PWTT to OFF.

- Rapid blood pressure change with vasoreflex due to vasoactive drugs, such as phenylephrine and nicardipine
- Unstable pulse wave due to poor peripheral circulation
- Too many arrhythmias
- Patient movement
- Noise on ECG due to ESU
- SpO_2 measurement on foot of a child

NOTE:

- NIBP measurement with PWTT trigger is performed when ECG and SpO_2 are monitored. When ECG or SpO_2 is not monitored, PWTT appears blank on the home screen.
- To avoid too frequent NIBP measurement, PWTT does not trigger NIBP measurement within one minute of an NIBP measurement.
- If any of the following items are changed, PWTT changes discontinuously and estimated NIBP SYS might not be accurate. After changing any of these items, calibrate (measure NIBP) again.
  - "LEAD" setting on ECG window
  - Attachment place of the SpO_2 probe
- When using PWTT triggered NIBP measurement, set <AUTO LEAD CHANGE> on the ECG window to "OFF". If you set this to "ON", PWTT changes discontinuously and estimated NIBP SYS might not be accurate when the lead is changed.
- In the following cases, the PWTT mark disappears and PWTT triggered NIBP measurement is temporarily turned off. Remove the cause to turn on the PWTT triggered measurement.
  - Noise interference on ECG or SpO_2 and stable PWTT cannot be detected.
  - An ECG electrode or SpO_2 probe is detached and PWTT cannot be detected.
  - The ECG, SpO_2 or NIBP connector is disconnected.
  - Both the upper and lower NIBP SYS alarm limits are set to off.

STAT Measurement

Measurements are performed continuously according to the measurement program set for STAT measurement on the STAT page on the NIBP MODE page of the PARAMETERS window in the SYSTEM SETUP window. The program is divided into two stages. In the first stage, NIBP is measured continuously or at 1 minute intervals for 5 or 10 minutes. In the second stage, NIBP is measured at a different interval (manual or 1, 2, 2.5, 5, 10, 15, 30 minutes, usually, longer interval than the first stage). Manual measurement cannot be performed during first stage measurement.

SIM Mode Measurement

CAUTION

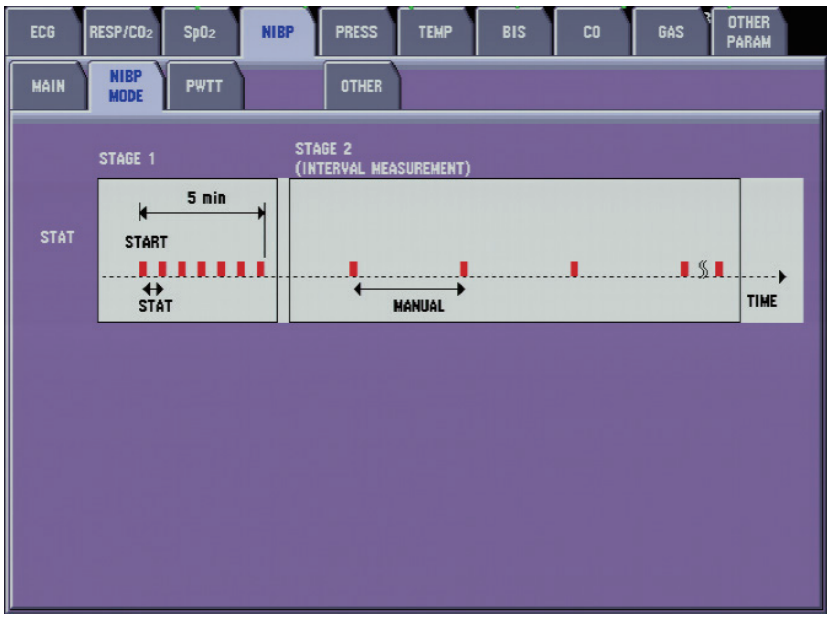
For safety during lumbar anesthesia, NIBP SIM mode measurement is recommended by medical policy in Japan and the factory default settings are the recommended settings. When changing these initial settings, make sure that the changed setting is appropriate for the patient by referring to the manual of the anesthetic agent.

SIM mode program is for monitoring blood pressure during regional anesthesia, such as lumbar block, subarachnoid block and epidural anesthesia. The SIM mode is only available in OR site and when <SIM> on the NIBP page of the PARAMETERS window in the SYSTEM SETUP window is set to ON.

Measurements are performed continuously according to the measurement program set for SIM measurement on the SIM tab of the NIBP MODE page of the PARAMETERS window in the SYSTEM SETUP window.

The program is divided into two stages. In the first stage, NIBP is measured at 1, 2 or 2.5 minute intervals for 5, 10 or 15 minutes. In the second stage, NIBP is measured at a different interval (2, 2.5 or 5 minutes, usually longer interval than the first stage). Manual measurement cannot be performed during first stage measurement.

On the NIBP MODE Page



The measurement settings for STAT and SIM modes can be checked on the NIBP MODE window.

VENOUS PUNCTURE MODE

CAUTION

Do not perform venous puncture on the same arm where NIBP is measured. This may cause infusion backflow or internal hemorrhage at the puncture.

In venous puncture mode, the cuff is inflated to a preset target pressure to constrict the flow of venous blood and distend the vein for venous puncture.

The cuff automatically deflates 2 minutes after inflation in ADULT/CHILD mode and 70 seconds after inflation in NEONATE mode.

Touch the START key on the VENOUS PUNCTURE page. To stop the cuff inflation, touch the STOP key or do any of the following:

- Display another window.
- Press the [Home] key.
- Touch the waveforms or current trendgraphs display area on the home screen.

To use venous puncture mode, <VENOUS PUNCTURE> must be set to ON and <TARGET CUFF PRESSURE> must be set on the SYSTEM SETUP window.

NOTE: Venous puncture mode is available in the following modes:

- Manual measurement mode
- STAT (continuous) measurement mode (not available during measurement)
- Auto (periodic) measurement mode (not available during measurement and not available when waiting for next measurement)
- SIM measurement mode (Not available during measurement and not available when waiting for next measurement)

VENOUS PUNCTURE Page

CUFF PRESSURE: Displays the current cuff pressure (mmHg).
TARGET CUFF PRESSURE: Displays the set target cuff pressure (mmHg).
REMAINING TIME: Displays the remaining time (s) until cuff deflation.

IBP

Invasive blood pressure and intracranial pressure (ICP) are measured and monitored by installing the blood pressure measuring device, connecting the blood pressure transducer to the IBP connection cord and IBP connection cord to the MULTI socket or PRESS CO_2 socket on the unit. Up to 7 channels can be monitored. When the ZS-900P transmitter is connected to the bedside monitor and an AY-633P, AY-653P, AY-663P or AY-673P input unit or the BSM-1700 series bedside monitor with three MULTI sockets is used for IBP monitoring, only the IBP information from the two sockets from the top can be sent.
NOTE: ZS-900P transmitter is not available for BSM-6000A series.

Preparation

Select the appropriate blood pressure measuring device according to the purpose. The following illustrates a typical blood pressure measuring device setup, the DX-360 Argon Medical Devices disposable blood pressure transducer. For details, refer to the instruction manual of the measuring kit. When using other blood pressure transducers and measuring kits, refer to the respective instruction manuals.

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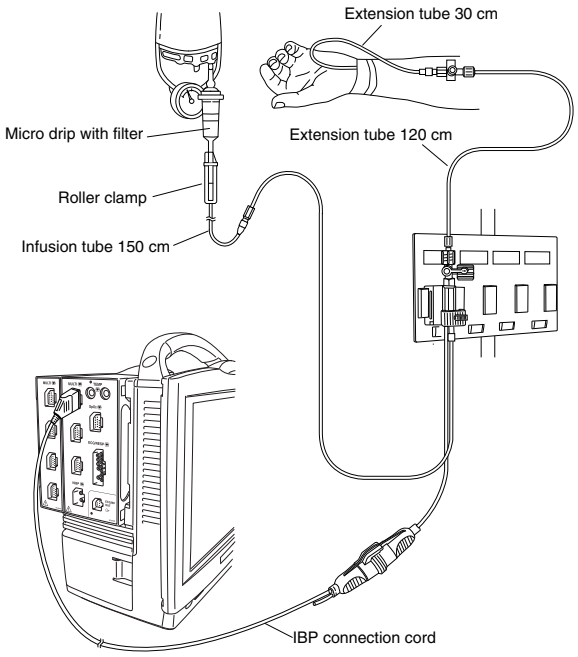


WARNING

All parts, except for transducers, must be non conductive. Otherwise, the discharged energy may cause electrical shock to the operator during defibrillation.

IBP Connection Cords

The following IBP connection cords are available for connecting the device to the monitor.

JP-900P: For Argon Medical Devices blood pressure transducers
JP-911P: For Integra NeuroSciences Camino® MPM-1 multi-parameter monitor
JP-920P: For Edwards Lifesciences (Baxter) blood pressure transducers
JP-960P: For Biosensor blood pressure transducers
JP-910P: For other blood pressure transducers

Connecting Cables to the Unit

1. Connect the blood pressure transducer to the IBP connection cord.

2. Connect the IBP connection cord to the MULTI socket on the unit.

NOTE:

- When using an IBP waveform as a synchronization signal for other equipment, connect the IBP line to the MULTI socket. The IBP waveform that is used for the synchronization signal depends on the “IBP ANALOG OUT” setting in the SYSTEM SETUP window.
  - When “IBP ANALOG OUT” is set to FIXED POSITION:
    The IBP line connected to the top MULTI socket is used.
  - When “IBP ANALOG OUT” is set to HIGHEST PRIORITY LABEL:
    When more than one IBP waveform is acquired, the IBP waveform of the highest priority label is used.
    IBP label priority:
    ART > ART2 > RAD > DORS > AO > FEM > UA > LVP > P1 > P2 > P3 > P4 > P5 > P6 > P7

- When connecting the IBP connection cord to the unit after assembling the transducer and filling the tubes with saline solutions, make sure that the connector is not wet.

Assembling the Transducer

NOTE:

- For caution and usage of the transducer, refer to the manual of the transducer.
- The DX series disposable transducers are sterilized by EOG. Keep them clean after opening.
- Check that connectors and caps are firmly connected and the 3-way stopcock are directed to the correct way.
- The 3-way stopcocks and blood pressure tube openings are protected from contamination by the white aerated caps. Keep these white caps on until the solution is filled in completely. After filling the solution, replace the white caps with the yellow sealing caps which are in the separate bag.

1. Inject 1 to 2 units of heparin into 1 mL sterilized physiological saline solution.
   NOTE: Do not mix the solution yet.

2. Insert the needle at the tip of the micro-drip into the hole on the physiological saline pack.

3. Pressurize the physiological saline pack with your hand by pressing the flush cap to remove air from the pack.

4. When the solution in the micro-drip chamber is about 1/3 full (the stainless needle is in the solution), turn the physiological saline pack upside down and mix the physiological saline solution and heparin.

5. Place the saline pack in the pressure bag and hang the pressure bag on the stand.

6. Press the flush cap to completely fill the tube with saline solution.
   NOTE: Tap the bottom part of the micro-drip to remove air bubbles from under the filter.

7. Fill in the transducer with the saline solution. Remove air bubbles by pressing the flush cap at above the saline pack, then bringing the flush cap down.
   If the air bubbles cannot be removed from the transducer:
   i) Hold the transducer higher than the saline pack to flow the saline solution back into the saline pack and fill the transducer again.
   ii) Tap the transducer lightly and flush the transducer slowly. Do not tap too hard because the air bubbles may break into small bubbles which are difficult to remove.
   iii) Check that there are no air bubbles in the transducer, tubes and 3-way stopcocks.

8. Replace the white aerated caps with the yellow sealing caps.

9. Pressurize the pressure bag to 300 mmHg (40.0 kPa). The solution in the micro-chip chamber is about a third to half full.
   At this pressure, the drip rate should be 2 to 4 drops/min.

10. Check all connections and that there is no leakage in the circuit.

11. After about 30 minutes, check the pressure of the pressure bag and drip rate. Also check that there is no leakage in the circuit.

Adjusting Zero Balance

NOTE: There is no alarm for 30 seconds after adjusting zero balance. When the measurement value is abnormal, the numeric value on the screen is highlighted.

Adjust zero balance in the following cases. Zero balance adjustment is important for accurate IBP measurement.

- Before starting measurement.
- When the patient moved so that the height of the heart changed.
- When the height of the blood pressure transducer changes.
- When changes in the measured value are expected due to measurements over a long period of time or due to changes in the ambient temperature (check the pressure when exposed to air).
- IBP connection cord or transducer is changed.

When the zero balance is not adjusted, the "ZERO IMBALANCE" message is displayed beside each IBP value.

Zero Balance Mode

There are two modes for adjusting zero balance.

- **All zero**

  Zero balance of all blood pressure lines exposed to air, except for ICP, is performed at the same time. Touch the ZERO ALL key on the PRESS window. The zero all function can also be assigned to one of the function keys.

  Adjust zero balance separately for ICP (intracranial pressure).

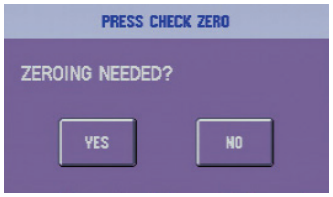
- **Individual zero**

  The zero balance is adjusted individually for one pressure line.
  Touch the ZERO CAL key on the PRESS window of the IBP label (including the ICP label).

  When using the optional JP-940P IBP connection box, the zero balance keys on the box can be used for each line.

Adjusting Zero Balance

1. When zero balance is not adjusted, the following dialog box appears.



2. Touch the YES key to adjust zero balance. When the YES key is touched, the MAIN page of the PRESS window appears. Adjust zero balance by doing the following steps.

   When the NO key is touched, the monitor starts monitoring IBP by using the zero balance value memorized in the connector of the IBP connection cord and the "ZERO IMBALANCE" messages disappear. The IBP values appear on the screen. If necessary, adjust zero balance by doing the following steps.

3. Move the dome up or down to the appropriate position.

4. To adjust zero balance of all blood pressure lines at the same time
   NOTE: Zero balance cannot be adjusted for ICP by using the zero all function. Adjust zero balance separately from the ICP window.

   Touch the ZERO ALL function key on the home screen or the ZERO ALL key on the MAIN page of the PRESS window.

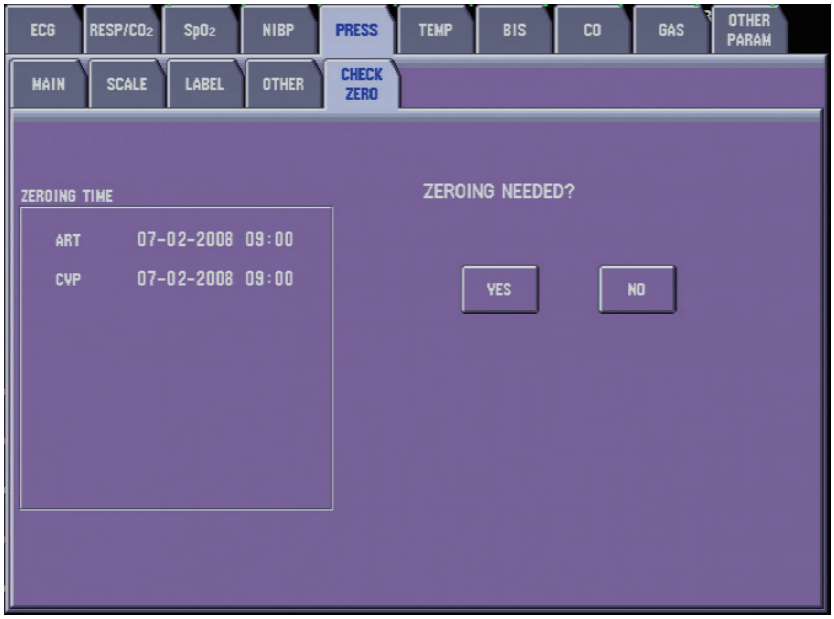
   To adjust zero balance individually
   Touch the ZERO CAL key on the desired LABEL page of the PRESS window.

   When the “ZEROING COMPLETE” message is displayed, zero balance adjustment is complete.

5. Close the 3-way stopcock.

The CHECK ZERO Page

This page becomes active when zero balance is not adjusted. Zero balance can also be adjusted on the CHECK ZERO page.



Changing IBP Settings

Change settings on the PRESS window. The following settings can be changed for monitoring IBP.

- Label
- Scale
- IBP alarm limits
- Adjust zero balance. Refer to the “Adjusting Zero Balance” section.
- IBP calculation mode
- Numeric data display mode
- CPP display on or off
- Auto ET mode for CVP mean calculation on or off
- Sync source
- Sync sound pitch
- Pulse rate display on or off
- Waveform display mode (scale mode)
- PPV/SPV display on or off
- PPV/SPV average time

The blood pressure unit (mmHg or kPa) can be set on the SYSTEM CONFIGURATION screen. The noise filter and IBP data display color can be set on the SYSTEM SETUP window.

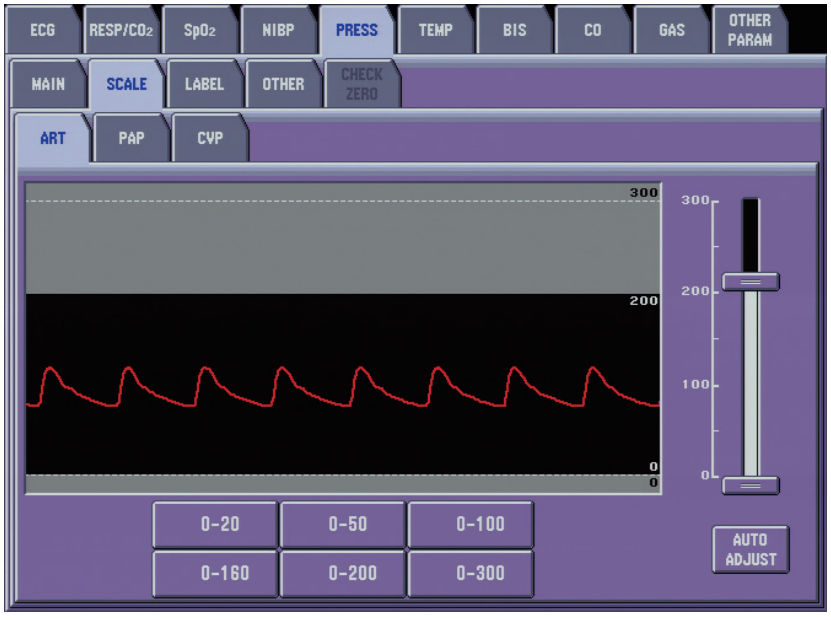
The IBP waveform sweep speed and the waveform display of all monitoring IBP labels on the home screen can be selected on the DISPLAY window.

On the LABEL Page

Select the blood pressure label for the line connected to the MULTI socket from the <SELECTABLE ITEMS> box.

NOTE: The blood pressure label is fixed to ART when a JP-600P APCO/IBP processor is used.

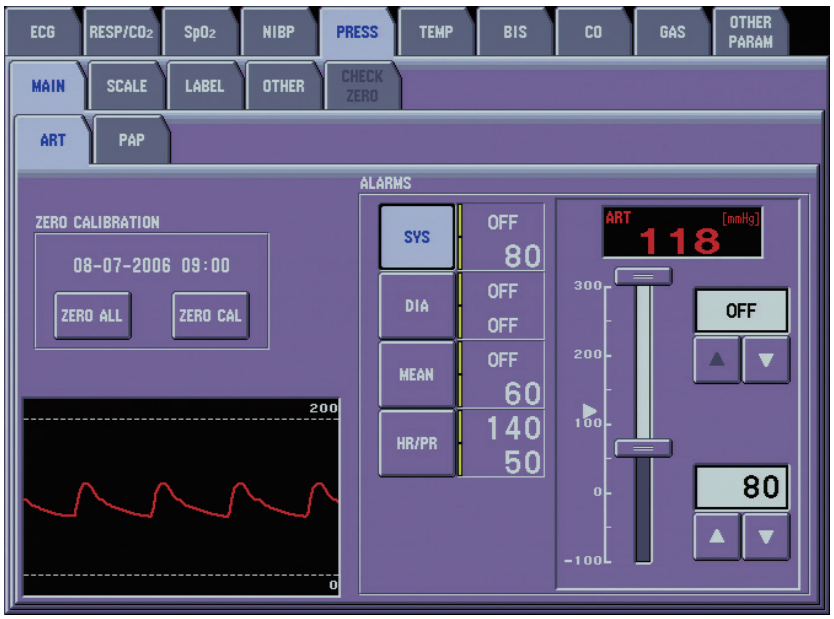
On the SCALE Page



Select the scale for the blood pressure line waveform on the home screen. The same scale is used on both the home screen and PRESS window.

You can touch the AUTO ADJUST key to automatically select the appropriate scale.

On the MAIN Page



<ALARMS>

SYS alarm limits: Set the upper and lower systolic alarm limits.*1

DIA alarm limits: Set the upper and lower diastolic alarm limits.*1

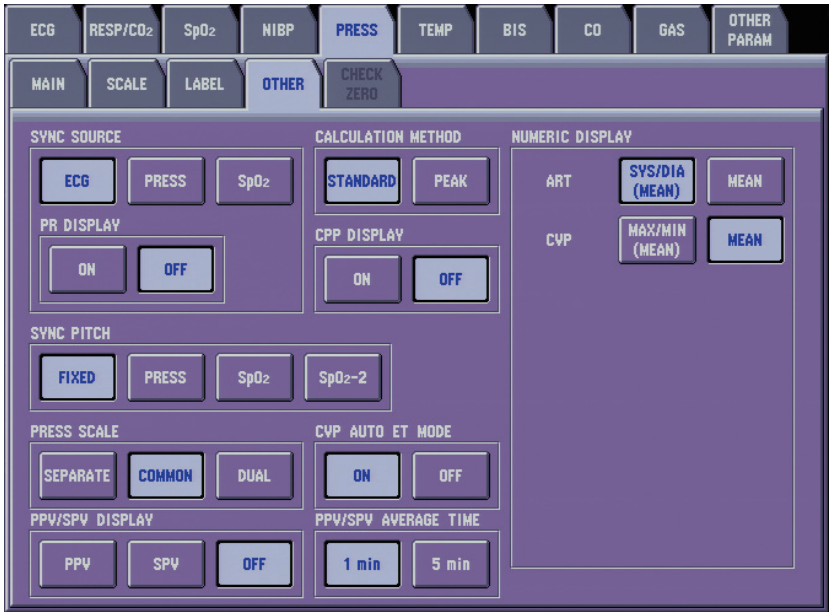
MEAN alarm limits: Set the upper and lower mean alarm limits.*1

HR/PR alarm limits: Set the upper and lower heart rate or pulse rate alarm limits.*1*2

*1 On BSM-6000A series, if <ALARM CAP> on the SYSTEM CONFIGURATION screen is turned on, the alarm settings for ART (SYS, DIA, MEAN), PAP (SYS, DIA, MEAN), CVP (MEAN) and HR/PR are affected by the "ALARM CAP" setting on the SYSTEM SETUP window.

*2 On BSM-6000A series, if <CRISIS VITAL ALARM MANAGEMENT> on the SYSTEM CONFIGURATION screen is turned on and "ALARM PRIORITY" on the SYSTEM SETUP window is set to CRISIS, the alarm setting is set to the alarm master setting.

On the OTHER Page



<SYNC SOURCE>: Select the sync sound source from ECG (heart rate), arterial blood pressure (IBP) and SpO_2.

NOTE:

- When heart rate is unstable because of an ESU, select SpO_2 or PRESS.
- When the connection cord of SpO_2 or IBP of the arterial blood pressure is disconnected from the monitor and an alarm occurs when the sync source is set to SpO_2 or PRESS, the sync source changes to ECG when the alarm is silenced by pressing the [SILENCE ALARMS] key. The sync source returns to SpO_2 or PRESS when the SpO_2 or IBP is monitored again. When using IBP as the sync source, adjust zero balance.
- When the sensor is detached from the patient and alarm occurs, and the sync source is set to SpO_2 or PRESS, the sync source does not change to ECG when the alarm is silenced, and "- - -" is displayed for PR.
- The SpO_2-2 cannot be set to the sync sound source.

<PR DISPLAY>: Select the pulse rate display on or off. This setting is only available when <SYNC SOURCE> is set to ECG.

<CALCULATION METHOD>: Select the IBP calculation mode.
STANDARD: The IBP values are calculated by moving average. The monitor averages the latest 8 consecutive pulses and displays this average as the IBP value. When a new pulse is detected, the IBP value is recalculated using the latest 8 pulses. The IBP value display is updated every 3 seconds.
PEAK: The systolic, diastolic and mean values of the highest pulse wave in the latest 8 consecutive pulses are displayed as the IBP values. The IBP value display is updated every 3 seconds.
When connected IABP causes the IBP values to vary greatly, use PEAK to improve measurement accuracy.

<CPP DISPLAY>: Select the CPP display on the home screen ON or OFF when monitoring ICP.

<NUMERIC DISPLAY>: Select the IBP/ICP display mode on the home screen.
SYS/DIA(MEAN): Displays the systolic blood pressure (SYS), diastolic blood pressure (DIA) and the averaged blood pressure (MEAN).
MEAN: Displays only the averaged blood pressure.

<SYNC PITCH>: Select the sync sound pitch.
FIXED: The pitch is fixed to the pitch selected on the SYSTEM SETUP window.
PRESS: The pitch is high when the BP value is above 120 mmHg. The pitch is low when the BP value is below 20 mmHg. The pitch changes in 20 steps from high to low for each 5 mmHg change between 120 and 20 mmHg BP value. The BP value of the highest priority arterial blood pressure is used.
SpO_2: The pitch changes in 20 steps from high to low for each 1%SpO_2 change between 100%SpO_2 and 81%SpO_2 in SpO_2 value of SpO_2 connected to the SpO_2 socket.
SpO_2-2: The pitch changes in 20 steps from high to low for each 1%SpO_2 change between 100%SpO_2 and 81%SpO_2 in SpO_2 value of SpO_2-2 connected to the MULTI socket. SpO_2-2 is only available for the AY-661P, AY-663P, AY-671P or AY-673P input unit or BSM-1763 or BSM-1773 bedside monitor.

<PRESS SCALE>: Select the display mode for IBP waveforms.
SEPARATE: IBP waveforms are displayed separately on different scales.
COMMON: All IBP waveforms are displayed on the same scale.
DUAL: IBP waveforms are separated into arterial blood pressures and other type of blood pressures. The arterial blood pressures are labeled ART, ART-2, RAD, DORS, AO, FEM, UA, LVP and PRESS (P1 to P7).

<CVP AUTO ET MODE>: Select the auto ET mode for CVP mean calculation on or off
On: Automatically uses the ET mode to calculate the mean CVP. When CO_2 is not monitored in mainstream method with the TG-900P, TG-920P, TG-950P or TG-970P CO_2 sensor kit, the mean CVP is calculated in normal mode. When the ET mode is used, "CVP_ET" appears for the CVP value on the home screen.
Off: The mean CVP is calculated in normal mode every 3 seconds.

NOTE:
- To use the ET mode, CO_2 must be monitored with the TG-900P, TG-920P, TG-950P or TG-970P CO_2 sensor kit.
- In the following cases, the mode automatically changes from ET to normal mode:
  - Cannot detect changes from expiration to inspiration for more than 20 seconds.
  - The CO_2 sensor connector is not connected or disconnected from the socket.
  - CO_2 cannot be monitored due to CO_2 sensor failure
  - CO_2 is not monitored with a TG-900P, TG-920P, TG-950P or TG-970P CO_2 sensor kit.

- When the ET mode is used, the mean CVP might not be calculated at the appropriate end-tidal point due to the CO_2 sensor attachment or patient's respiration state. When using the ET mode, check that the CVP value is appropriate by reading the CVP waveform on the screen.
- The mean CVP value obtained by the ET mode might not be accurate due to patient movement or unstable respiration.
- When "NUMERIC DISPLAY" is set to SYS/DIA (MEAN), the ET mode is used for the calculation, but "CVP" appears instead of "CVP_ET" for the CVP value on the home screen.

<PPV/SPV DISPLAY>: Select PPV or SPV to be displayed on the home screen. Select OFF when not displaying either PPV or SPV.

NOTE:
- PPV or SPV of IBP with the highest priority label of arterial blood pressure (ART, ART2, RAD, DORS, AO or FEM) is displayed. If the connection cord of IBP whose PPV or SPV is monitored is disconnected from the monitor, PPV or SPV of the blood pressure with the second priority label is monitored. If the disconnected IBP is connected again, PPV or SPV of the highest priority label is monitored again. In such a case, adjust zero balance.
- PPV or SPV is accurately measured when the patient is using a ventilator and when there is no patient movement and no arrhythmias. In the following cases, PPV or SPV is not accurate or cannot be measured.
  - Patient movement
  - Spontaneous respiration
  - Arrhythmia
  - Respiration rate less than 6 counts/min
  - Ventilation volume less than 8 mL/kg
  - Acute right heart failure
- This setting is common for all IBP labels. It only needs to be set on one label window.

<PPV/SPV AVERAGE TIME>: Select the averaging time for PPV or SPV display. 5 min is appropriate for monitoring variation for long term (more than an hour) with less noise interference.

NOTE:
- This setting is only available when "PPV" or "SPV" is selected for the <PPV/SPV DISPLAY> setting.
- This setting is common for all IBP labels. It only needs to be set on one label window.

Temperature

Preparation

Select the appropriate probe according to the purpose.

CAUTION

Select the appropriate probe for the patient. Using adult probes on premature infants and children may injure the mucous membrane.

CAUTION

The insulation pad may irritate the skin. In long term monitoring, change the attachment site to prevent irritation.

NOTE:

- When the measuring site is exposed directly to air, the temperature may be lower than normal. It takes about 20 to 30 minutes to reach the equilibrium temperature after attaching the sensor.
- The monitor simulates the temperature signal of 27°C and 37°C inside the monitor. Monitoring this simulated signal periodically, the monitor self-diagnoses the temperature signal processor part of the monitor. When the monitor could not cover the 0 to 45°C measurement range, a "MPU MODULE ERROR" message is displayed.

Reusable Probes

Thermistor Probe	Purpose
401J	For adult rectum/esophagus
402J	For child rectum/esophagus
409J	For body surface

Disposable Probes

Disposable Probe		Thickness	Purpose
Sonatemp	5-13212*	12F	For esophagus
	5-13218*	18F	
	5-13224*	24F	
Foley catheter	5-18808*	8F	For bladder
	5-18810*	10F	
	5-18812*	12F	
	5-18814*	14F	
	5-18816*	16F	
	5-18818*	18F	

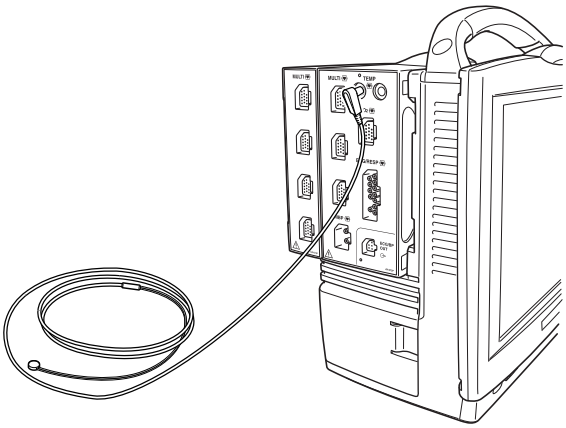
* These parts have not been checked for compliance with the MDD (Medical Device Directive). For EC member countries, Nihon Kohden recommends the use of parts that comply with MDD.

To connect the disposable probe to the TEMP socket or MULTI socket, the extension cable is required.

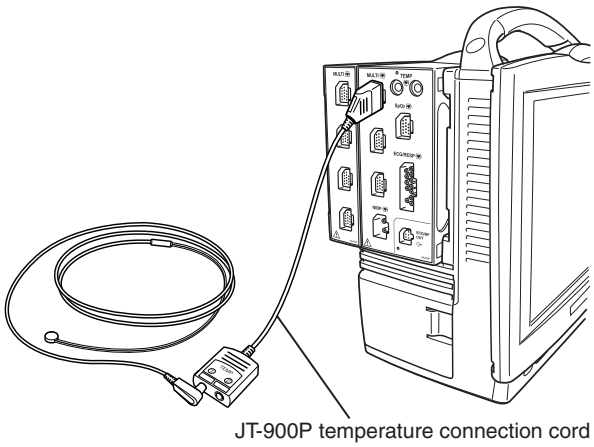
To connect the reusable probe or disposable probe to the MULTI socket, the JT-900P temperature connection cord is required.

A reusable probe can be directly connected to the TEMP socket.

NOTE: The MULTI sockets on the AY-660P input unit and BSM-1700 series bedside monitor cannot be used for monitoring temperature.



When connecting the 409J reusable probe for the body surface to the TEMP socket



JT-900P temperature connection cord

When connecting the 409J reusable probe for the body surface to the MULTI socket

Using the Insulation Pad

The pad prevents the environmental temperature from affecting the sensor temperature and also prevents internal body heat from escaping at the attached site so that a stable temperature is obtained.

Changing Temperature Settings

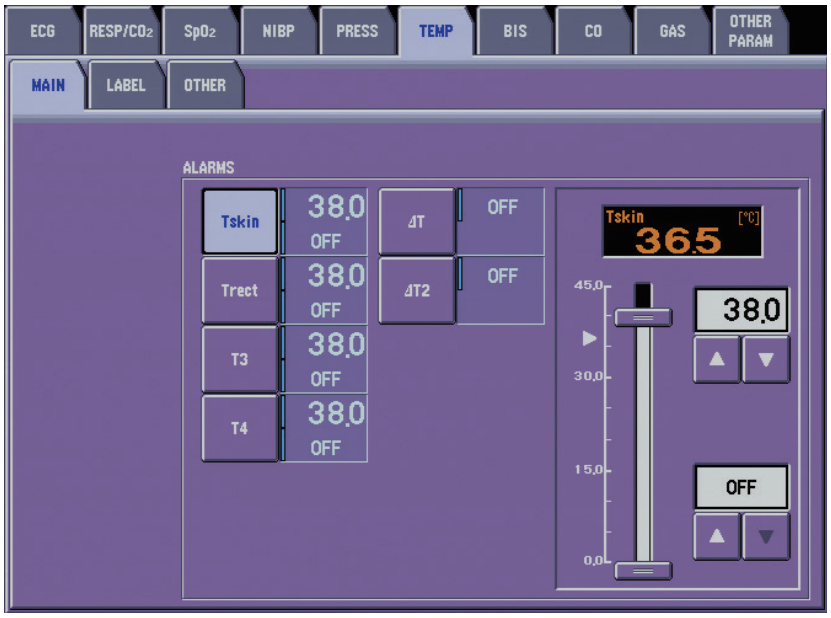
Change settings on the TEMP window. The following settings can be changed for monitoring temperature.

- Label
- Temperature alarm limits
- Delta temperature equation setting

The temperature unit can be set to °C or °F on the SYSTEM CONFIGURATION screen.

The temperature data display color can be set on the SYSTEM SETUP window.

On the MAIN Page



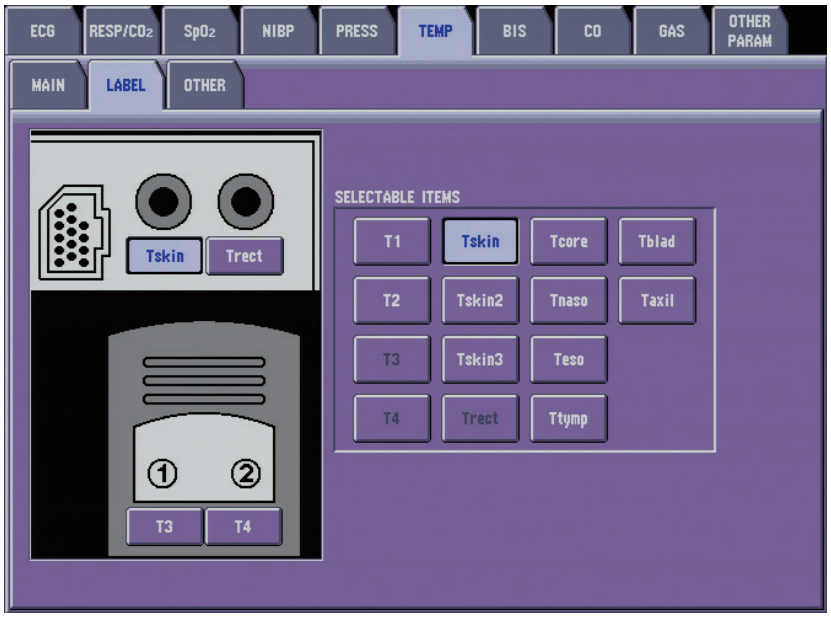
<ALARMS>

Temperature alarm limits: Set the upper and lower temperature alarm limits.

On the LABEL Page

CAUTION

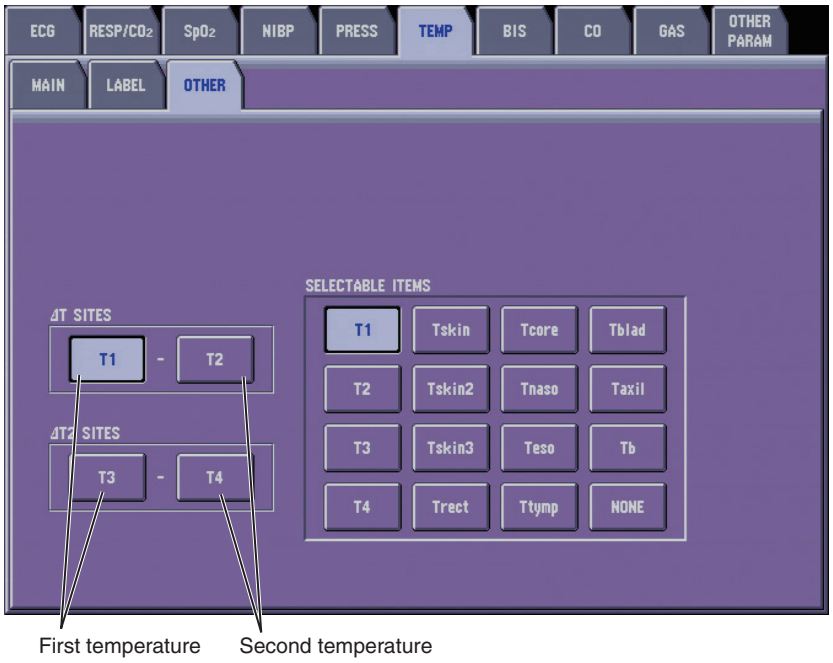
After changing the temperature label, do not reconnect the probe to another jack. This may cause an incorrect label display and lead to misjudgment.



Select the site to be labeled and select the label from <SELECTABLE ITEMS> box.

On the OTHER Page

Temperature difference for two pairs of temperatures can be selected.



<ΔT SITES>: Set the temperature difference equations to measure temperature differences. Select the label for the first temperature and second temperature from <SELECTABLE ITEMS> box.

<ΔT2 SITES>: Set the temperature difference equations to measure temperature differences. Select the label for the first temperature and second temperature from <SELECTABLE ITEMS> box.

If you do not need to monitor temperature difference, select NONE in <ΔT SITES> or <ΔT2 SITES> box.

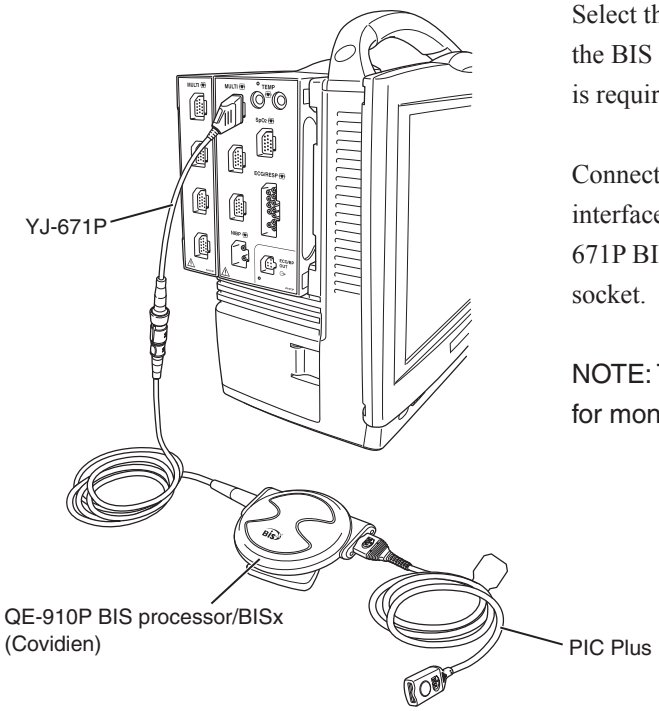
BIS

BIS monitoring can be performed by using the QE-910P BIS processor/BISx (Covidien) or BIS monitor (Covidien). The BISx and BIS monitor are available direct from Covidien. The BISx is available from Nihon Kohden as QE-910P BIS processor.

NOTE: QE-910P BIS processor is not available in USA.

To use the BIS processor/BISx, the YJ-671P BISx connection cable is required. To connect the BIS monitor to the bedside monitor, the QF-902P interface is required.

Preparation



Select the appropriate BIS sensor according to the purpose. To connect the BIS sensor to the BIS processor/BISx, PIC Plus patient interface cable is required.

Connect the BIS sensor to the PIC Plus patient interface cable, the patient interface cable to the BIS processor/BISx, the BIS processor to the YJ-671P BISx connection cable and BISx connection cable to the MULTI socket.

NOTE: The MULTI socket on the AY-660P input unit cannot be used for monitoring BIS.

WARNING

Do not place the BIS monitor or BIS processor above the patient. When installing the BIS monitor, use the pole clamp to firmly attach the BIS monitor to a secure pole (1.0 to 3.8 cm in diameter). Periodically check that the pole clamp knob is not loose. Use the clip on the back of the BIS processor to attach the BIS processor to the bed rail or pole. If the BIS monitor or BIS processor is not attached to a rail or pole, install it where it cannot fall or tip over. Otherwise, it may cause injury to the patient or operator.

WARNING

It is reported that BIS monitoring is not appropriate when an analgesic anesthetic agent, such as ketamin, fentanyl, morphine, or only a muscle relaxant is used.

WARNING

Reliance on the BIS alone for intraoperative anesthetic management is not recommended. Clinical judgement (patient face color, patient reaction, heart rate, blood pressure and other vital sign data) should always be used. BIS has been studied with the anesthetic agents listed in the "Drugs that have been Studied for Use with the BIS" section in the BIS reference guide, but the studied data are relative values and do not indicate the absolute value of the hypnotic level.

CAUTION

When performing electroconvulsive therapy (ECT), attach the BIS sensor as far as possible from the electrodes that are used for electrical shock. Otherwise noise from the electrodes may interfere and incorrect data is displayed on the screen.

CAUTION

Do not use an expired BIS sensor.

WARNING

Do not perform defibrillation with the BIS sensor placed between the defibrillator pads.

WARNING

The conductive parts of electrodes or sensor and connectors, including the neutral electrode, should not contact other conductive parts, including earth.

WARNING

The hypnotic state of a patient undergoing surgery is influenced by the intensity of stimulation that is applied. During the course of a surgical procedure, the balance between the intensity of stimulation and sensory suppression may be constantly changing. Read the BIS value carefully.

WARNING

Due to limited clinical experience in the following applications, BIS values should be interpreted cautiously in patients with known neurological disorders such as epilepsy, patients taking other psychoactive medications, patients with cerebral infarction and in children below the age of 18.

CAUTION

- The BIS sensor is single use only. Do not reuse it.
- Do not reuse the BIS sensor for another patient. There are a lot of fine projections on the BIS sensor. Reusing the BIS sensor for another patient may cause infection to another patient by bacteria adhering to the BIS sensor.
- Do not use the BIS sensor for more than 24 hours. It affects monitoring accuracy.

CAUTION

To minimize the risk of patient strangulation, the PIC Plus patient interface cable must be carefully placed and secured.

CAUTION

Turn off the automatic impedance check if the impedance check signal (1 nA, 128 Hz) interferes with other equipment.

CAUTION

When attaching the BIS sensor to the patient, press each electrode on the sensor for 5 seconds to reduce impedance between the electrode and skin.

CAUTION

Only use the specified BIS sensor.

CAUTION

Do not let the BIS processor continuously contact the patient's body. The BIS processor heats up during operation and it may cause low temperature burn to the patient.

CAUTION

When the "BIS CONNECTOR OFF" message is displayed, check that the BIS processor is firmly connected to the connection cable and connection cable is firmly connected to the monitor. The BIS cannot be monitored and the alarm does not function while this message is displayed.

CAUTION

The BIS processor cannot be sterilized. Sterilizing the BIS processor may damage it.

CAUTION

- The following physiological factors and external factors must be considered in BIS monitoring.
  1. Ischemia or hypoxia, when severe enough to cause global EEG slowing or outright suppression, results in a decrease in the BIS value. It is important to bear in mind that the frontal montage used for BIS monitoring usually will not detect episodes of focal ischemia caused by embolic events.
  2. Hypothermia will generally result in a corresponding decrease in BIS levels as brain processes slow. More profound hypothermia used during cardiac bypass procedures will cause suppression of the EEG and, consequently, a very low BIS.
  3. Artifacts and signal of poor quality cause the BIS to be unreliable. Such artifacts are caused by poor contact of sensor to skin, muscle activity or rigidity, head or body movement, eye movement, inappropriate sensor attachment and other electrical interference. Some examples are given below.
     a) Hum noise: Usually there is no hum interference, but when the hum filter is turned off and a signal larger than 100 μV is superimposed on the EEG waveform on the screen, BIS may increase.
     b) ESU (unipolar):The noise generated by unipolar ESU is so large that it saturates the EEG signal so that EEG waveforms cannot be acquired. BIS value first blinks (SQI decreases) and then disappears. After stopping the use of the ESU, BIS value is displayed again.
     c) ESU (bipolar): Bipolar ESU causes low amplitude high frequency wave signals which may be mistaken as EEG and thus cause an increase in BIS value. If there is unexpected increase in BIS, monitor EEG carefully and read the BIS value carefully.
     d) ECG: The BIS processor has a filter for detecting ECG, but large ECG may be mistaken as EEG. If ECG artifact is seen on the EEG, read the BIS value carefully.
     e) Pulse wave: There may be an interference caused by the pulse wave when the BIS sensor is attached near an artery. Reattach the BIS sensor to the appropriate site.
     f) Pacemaker: If pacing spikes can be seen on the EEG, the BIS may be affected. Read the BIS value carefully.
     g) EMG: EMG is a signal of high frequency wave of more than 500 μV (generally more than 30 Hz). There is an increase in EMG as the patient is emerging from anesthesia. Muscle activity is seen during surgery. The BIS processor has a filter for detecting EMG, but the increase in EMG causes an increase in the BIS value. Shivering in a patient who is emerging from anesthesia may increase EMG and artifact on EEG, resulting in an increase in BIS value.
- Check the BIS sensor attachment when there is an unexpected EMG increase and SQI decrease. If EMG still increases after having checked the sensor attachment, there may be an electromagnetic interference. Check the surrounding equipment and power supply.

NOTE: Connect the BSM connector of the BIS processor to the BISx connection cable until you hear a click.

On the MEASURE Page (When using the BIS Processor)

Displays the BIS data and EEG waveforms.

Changing the BIS Settings

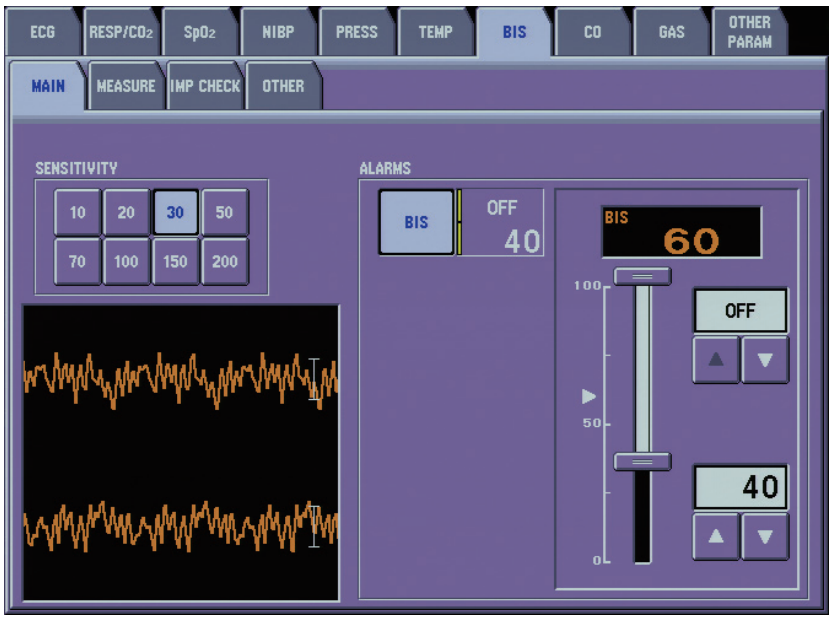
When using the BIS processor or BISx, the following settings can be changed for BIS monitoring. Change the settings on the BIS window.

- BIS alarm limits
- BIS waveform sensitivity
- Check impedance and auto impedance check on or off
- Filter on or off
- Smoothing rate
- BIS waveform sweep speed
- Parameter for second current trendgraph

The display color for BIS can be set on the SYSTEM SETUP window.

When using the BIS monitor, only the measured values are displayed on the monitor screen.

On the MAIN Page

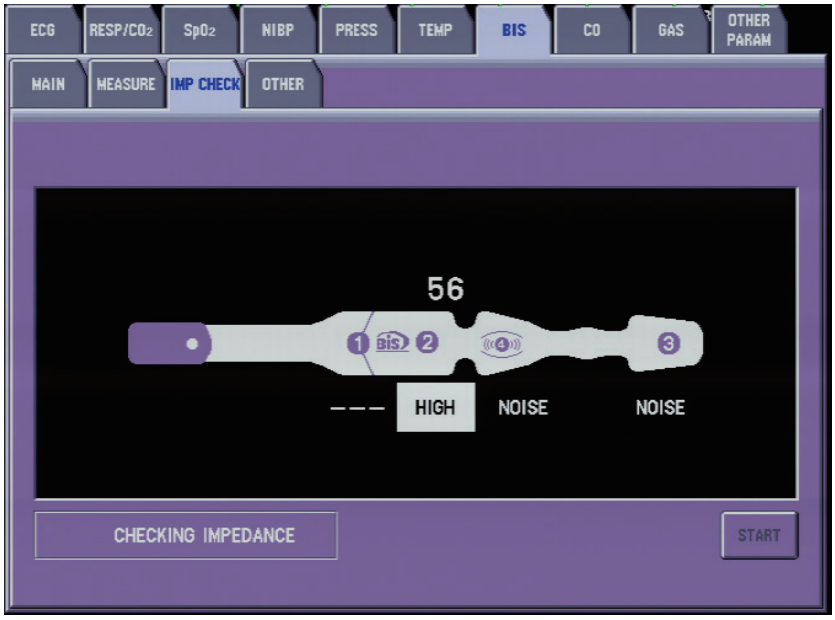


<SENSITIVITY>: Select sensitivity for BIS waveform on the home screen.

<ALARMS>
BIS alarm limits: Set the upper and lower BIS alarm limits.

On the IMP CHECK Page

This setting is not available when using the BIS monitor.



Check the impedance between the BIS sensor and skin.

Check the impedance between the BIS sensor and skin. If the check result is not “PASS”, remove the cause and repeat the impedance check until the result becomes “PASS”.

The impedance check can be performed automatically and manually. Set <AUTO CHECK> on the OTHER page to ON to perform the impedance check automatically. To perform the impedance check manually, set <AUTO CHECK> to OFF.

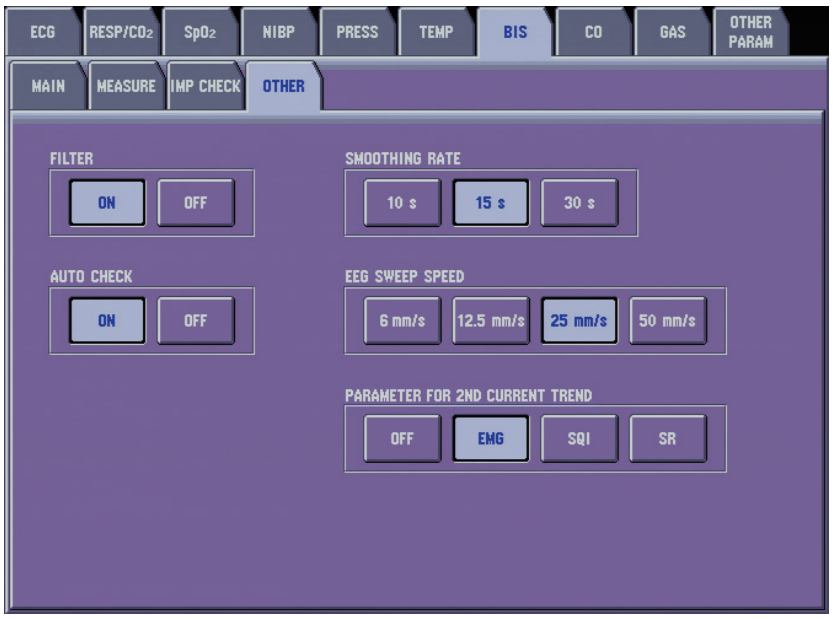
PASS: The impedance check is OK.
The impedance is 7.5 kΩ or less. However, the result of the #2 ground electrode becomes “PASS” when the impedance is 100 kΩ or less.

HIGH: The impedance is above 7.5 kΩ. As long as the sum of the impedance of all electrodes except for the ground electrode is 15 kΩ or less, the check result becomes “PASS”. If the check result is over 15 kΩ, clean the skin where the BIS sensor will be attached.

NOISE: The signal from the electrode exceeds the measurable range. Check the BIS sensor attachment. Replace the BIS sensor with a new one if necessary.

LDOFF: Connector connection is loose or disconnected. Check the connection from the BIS sensor to the monitor. If necessary, replace the BIS sensor or PIC Plus patient interface cable with a new one.

On the OTHER Page



<FILTER>: Turn the high-cut filter, low-cut filter and AC filter on or off.

<SMOOTHING RATE>: Select the smoothing rate over which the BIS value is averaged.

<AUTO CHECK>: Turn the automatic impedance check on or off.

<EEG SWEEP SPEED>: Change the sweep speed of EEG waveform on the home screen and MEASURE window.

<PARAMETER FOR 2ND CURRENT TREND>: Select the second parameter to be displayed as a trendgraph on the home screen.

Cardiac Output

CO (Cardiac Output) measurement is performed by connecting the measuring system to the MULTI socket on unit. This monitor uses the thermodilution method.

WARNING

When performing defibrillation during cardiac output monitoring, never touch the CO connection cord. The discharged energy may cause electrical shock or injury.

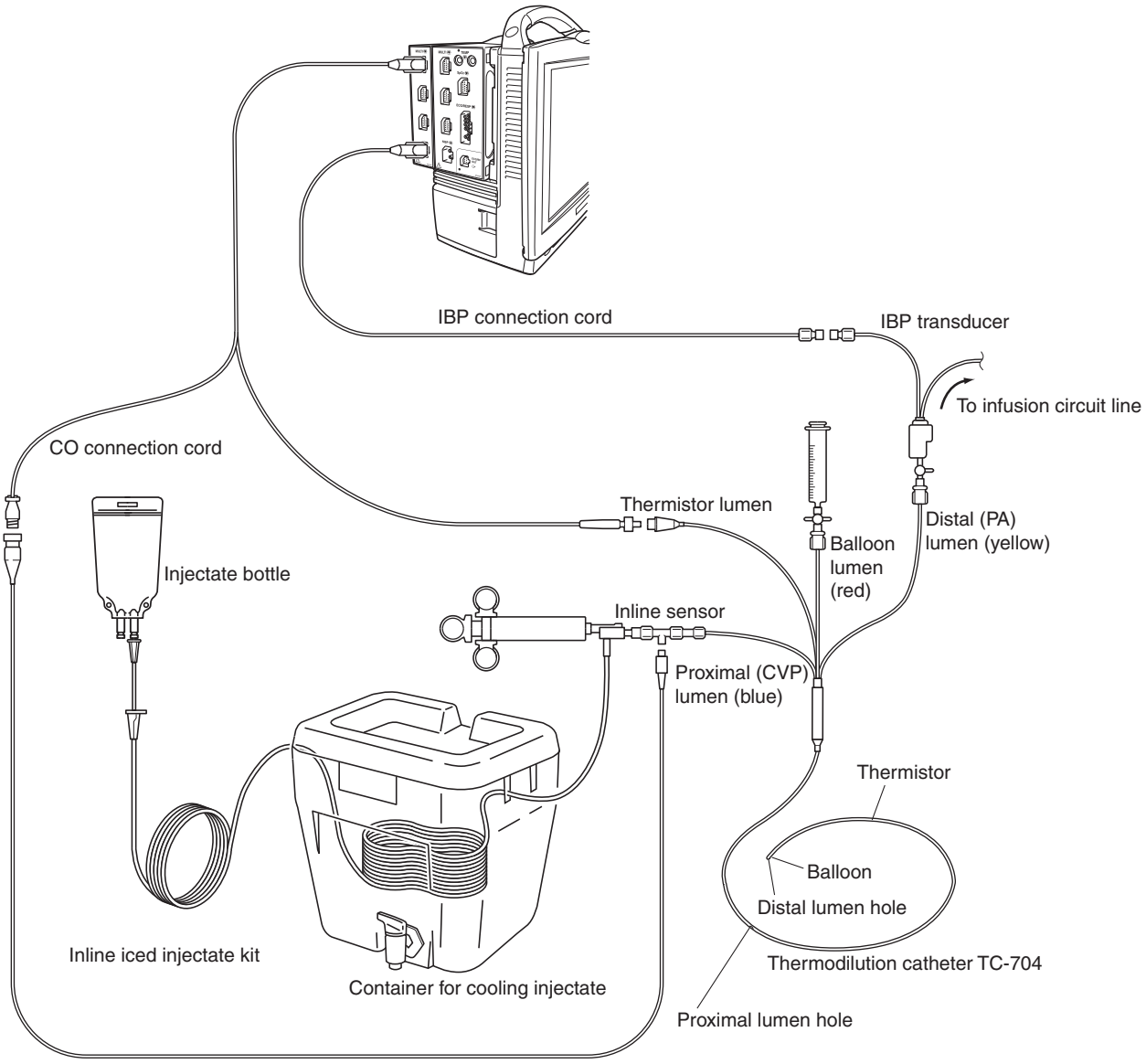
NOTE:

- CO monitoring using the MULTI socket does not comply with the Defibrillator proof type CF.
- The MULTI socket on the AY-660P input unit cannot be used for CO monitoring.

Preparation

Select the appropriate catheter according to the purpose. The following illustrates a typical measuring system setup. For details, refer to the instruction manual of the measuring kit.

When using the Argon Medical Devices Catheter TC-704 and measuring with the in-line sensor method



Measuring the Pulmonary Capillary Wedge Pressure

Inserting and Retaining the Catheter in the Patient

For details and precautions on the methods of inserting the catheter, refer to relevant literature and manuals.

WARNING

- Insert or remove the catheter from the pulmonary artery as quickly as possible. If it takes longer than about 10 seconds, pulmonary infarction, pulmonary hemorrhage or pulmonary artery perforation may occur.
- When inserting or removing the catheter, check the blood pressure waveform on the monitor, X-ray unit images, and other equipment. Do not depend on the insertion or removal messages displayed on the monitor.

NOTE:

- Set the label to PAP to monitor the blood pressure for checking the catheter position.
- When inserting the catheter into the patient, monitor the blood pressure waveform and check the position of the catheter at all times.
- If inserting the catheter takes a long time, the catheter may soften from body heat or there may be spasm in the vein which makes inserting the catheter more difficult.
- Be careful not to burst the balloon. It may cause embolization. To inflate the balloon, use carbon dioxide and not air. Inflate the balloon slowly while observing the blood pressure waveform on the monitor.
- Arrhythmia may occur when the catheter is inserted through the ventricle. Monitor ECG.

1. Quickly insert the catheter to the right atrium and inflate the balloon.

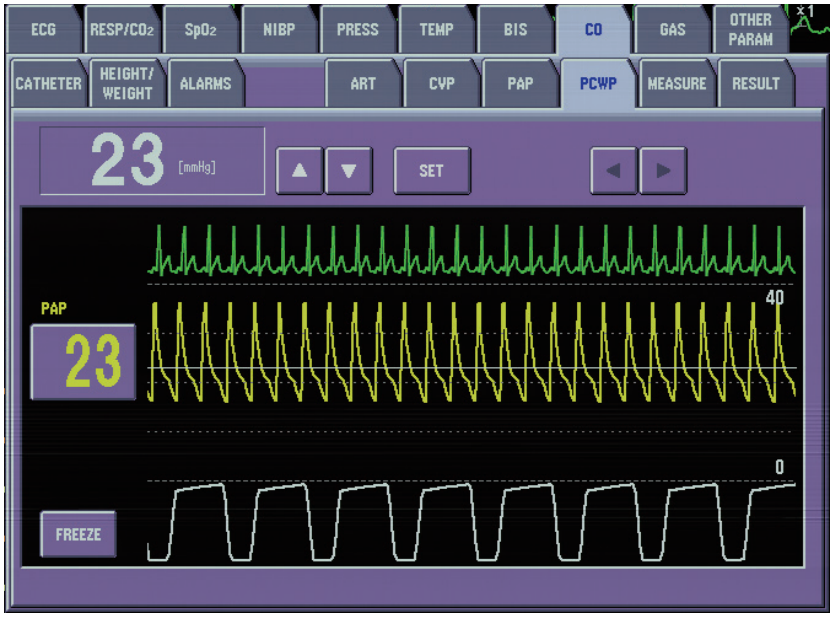
2. While checking the position of the catheter from the pressure waveform on the home screen, push it slowly to the pulmonary artery in the direction of the blood flow.

3. After inserting the catheter to the position where the pulmonary capillary wedge pressure (PCWP) waveform can be obtained, deflate the balloon promptly, and check that the pulmonary artery pressure (PAP) waveform is obtained.

4. After determining the position at which the PCWP waveform is obtained when the balloon is inflated and the PAP waveform is obtained when deflated, retain the catheter in the pulmonary artery.

NOTE: Monitor the pulmonary artery pressure (PAP) waveform while retaining the catheter and check at all times that the tip of the catheter is at the main branches of the pulmonary artery and not wedging into a peripheral artery.

Entering the PCWP and IBP Values



Enter the IBP values required for calculating the CO. When the IBP lines are labeled correctly, these values are automatically entered.

1. Touch the ART tab to enter ART mean value, CVP tab to enter CVP mean value, PAP tab to enter PAP value and PCWP tab to enter PCWP. The value appears in the upper part of the window.

   You can change the value by moving the horizontal cursor with your finger or by touching the ▲ or ▼ key.

   You can freeze the waveforms by touching the FREEZE key. When the waveforms are frozen, a vertical cursor appears. You can scroll the waveforms by moving the vertical cursor with your finger or the ◄ or ► keys. To unfreeze the waveforms, touch the FREEZE key again.

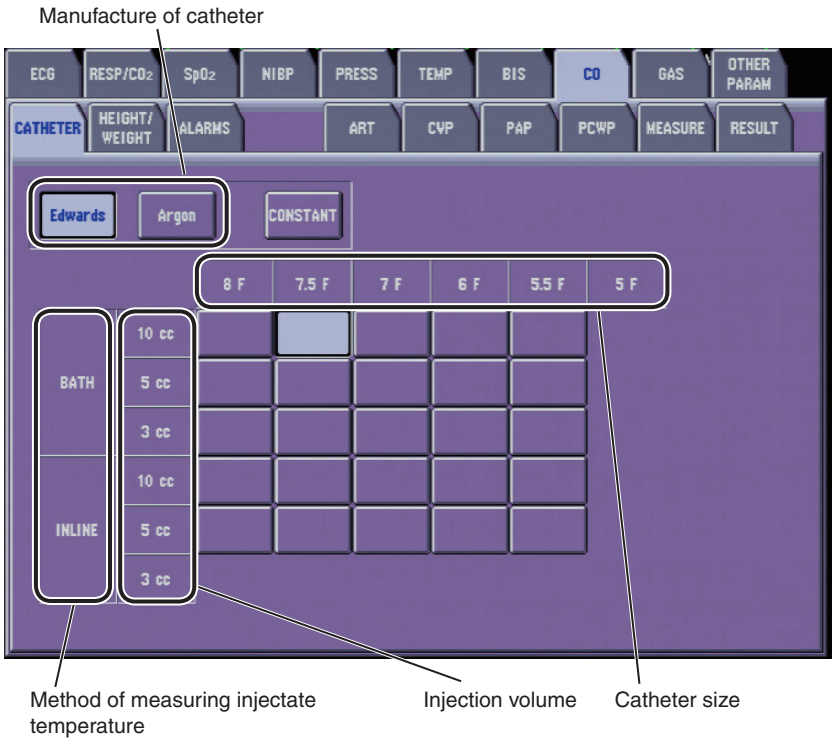
2. Touch the SET key. The value is entered into the table on the RESULT page.

Measuring Cardiac Output

When the catheter has been inserted, CO measurements can be performed. Before measurements, the coefficient value of the catheter and patient height and weight must be entered.

Changing Settings for CO Measurement

NOTE: The settings, such as injectate volume and catheter size are necessary for calculating CO. These settings cannot be changed after measurement.



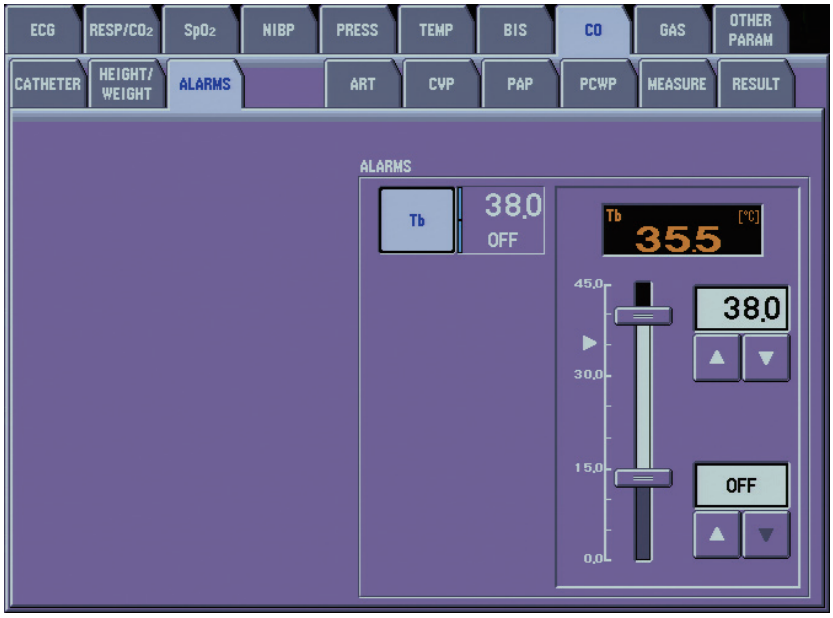
1. Set the coefficient value on the CATHETER page.

   When using a Argon Medical Devices or Edwards Lifesciences (Baxter) catheter, the injectate temperature is automatically measured by this monitor. Enter the manufacturer of catheter, catheter size, injectate volume and injectate temperature.

NOTE:

- The computation constant (coefficient value of the catheter) is necessary for calculating cardiac output. Before measurement, check that the computation constant for the catheter in the catheter manual. If the change is necessary, change the value before measurement.
- The computation constant on this monitor is a representative value. Before the setting, check the value in the catheter manual. If the value is different from the representative value or you are using a catheter which does not allow automatically calculating the computation constant, select “CONSTANT” and enter the computation constant manually.
- When using a catheter other than bath probe or inline sensor and not setting the injectate temperature on the monitor, select the coefficient value from the bath probe table.

2. Set the patient’s height and weight on the HEIGHT/WEIGHT page. BSA is automatically calculated when the ENT key is touched.



3. Set the upper and lower Tb alarm limits on the ALARMS page.

Measuring CO

Before Measurement

Do the following before measurement.

1. Completely fill the blood pressure transducer, dome and tubes with physiological saline with heparin to eliminate air completely.

2. Inject physiological saline with heparin in the CVP lumen of the catheter using a syringe and check that liquid flows out from the tip of the CVP lumen.

3. Fill the PA lumen with physiological saline with heparin.

Check the following before measurement.

1. Check the injectate temperature (Ti) on the home screen or CO window.

   NOTE: When the injectate temperature is not appropriate, the “Ti OUT OF RANGE” message appears on the screen and CO cannot be measured.

2. Check that the injectate temperature measurement lines (thermistor probe and in-line sensor) are connected correctly.

   NOTE: For BSM-6000K series, if these lines are disconnected, the monitor assumes the injectate temperature to be 0°C. For BSM-6000A series, if these lines are disconnected, “---” is displayed for Ti, a “CHECK Ti TEMP” message appears and CO measurement is not performed.

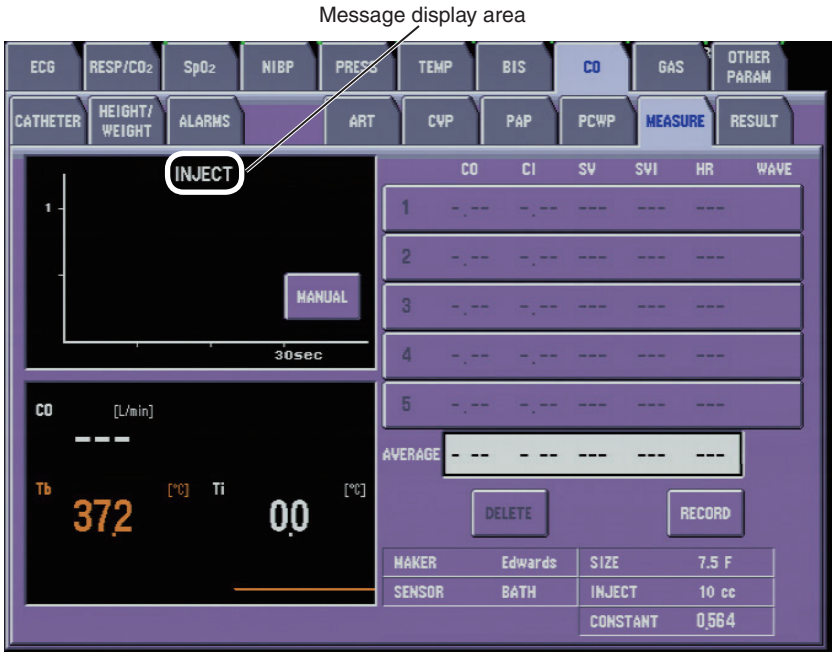
3. Check the catheter settings on the CATHETER page of the CO window.

   NOTE: The settings, such as injectate volume and catheter size are necessary for calculating CO. These settings cannot be changed after measurement.

Measuring CO

CAUTION

Do not measure the cardiac output repeatedly at short intervals. Frequently injecting the injectate affects the measuring accuracy.



1. On the MEASURE page, check that the “INJECT” message is displayed and inject the injectate quickly within 4 minutes. CO measurement starts.

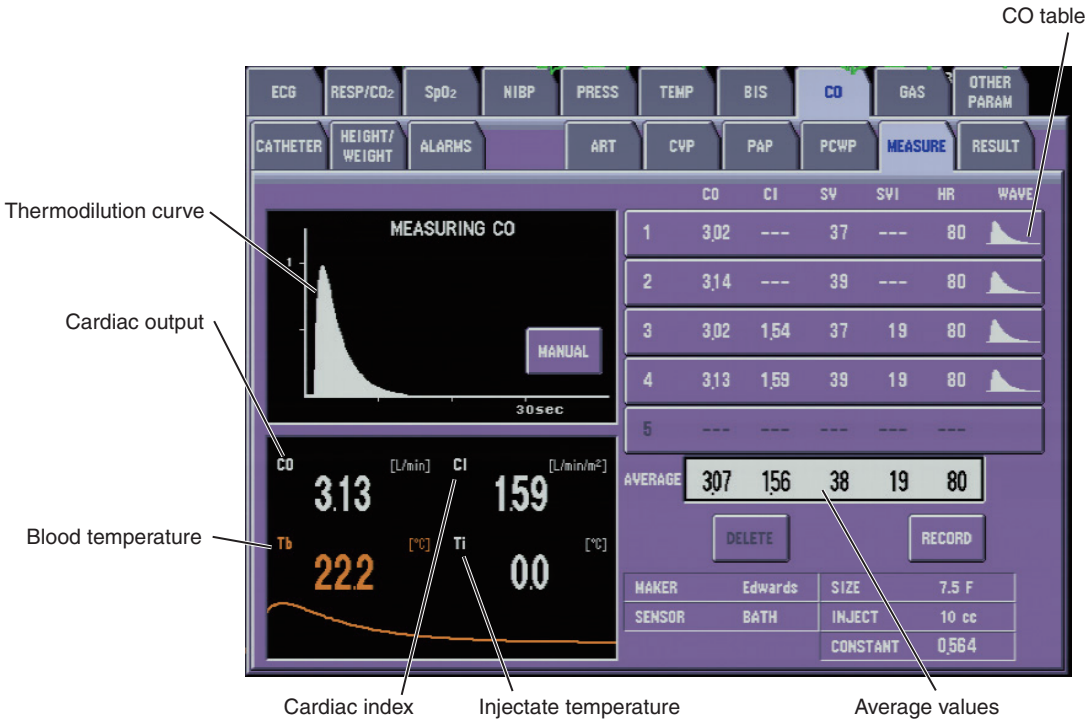
   NOTE:
   - If the injectate is not injected within 4 minutes, the “INJECTION TIME OUT” message appears. In this case, touch the MANUAL key on the MEASURE window and inject the injectate within 30 seconds.
   - Inject the injectate as quickly and steadily as possible. Measurement cannot be performed correctly if injected slowly.

2. Check that the “MEASURING CO” message is displayed on the CO window.

NOTE: The monitor has not acknowledged the injection if the “MEASURING CO” message is not displayed on the CO window within about 10 seconds after the injectate has been injected. Inject the injectate again.

When the CO value is calculated, the measurement results are displayed in the CO table on the MEASURE page.

NOTE: Do not close the MEASURE page of the CO window before the measurement result is displayed in the CO table. Otherwise, the measured data will be lost.



When the “INJECT” message is displayed on the MEASURE window again, the injectate can be injected again. Up to five measurement data can be stored in memory and displayed in the CO table. If more than five measurements are performed, the oldest data is deleted.

NOTE: To register the CO values to the hemodynamics table, refer to the “Adding the Acquired Data to the HEMO TREND Page of the TREND Window” section.

When Measurements Cannot be Performed Correctly

In some cases, measurements cannot be performed correctly because the baseline moves due to noise or conditions of the patient, such as physiological changes. In such cases, touch the MANUAL key on the MEASURE window and inject the injectate within 30 seconds. The point when the MANUAL key is touched is the start of measurement.

NOTE: If the injectate is not injected within 30 seconds, the “INJECTION TIME OUT” message appears.

Deleting the Data from the CO Table

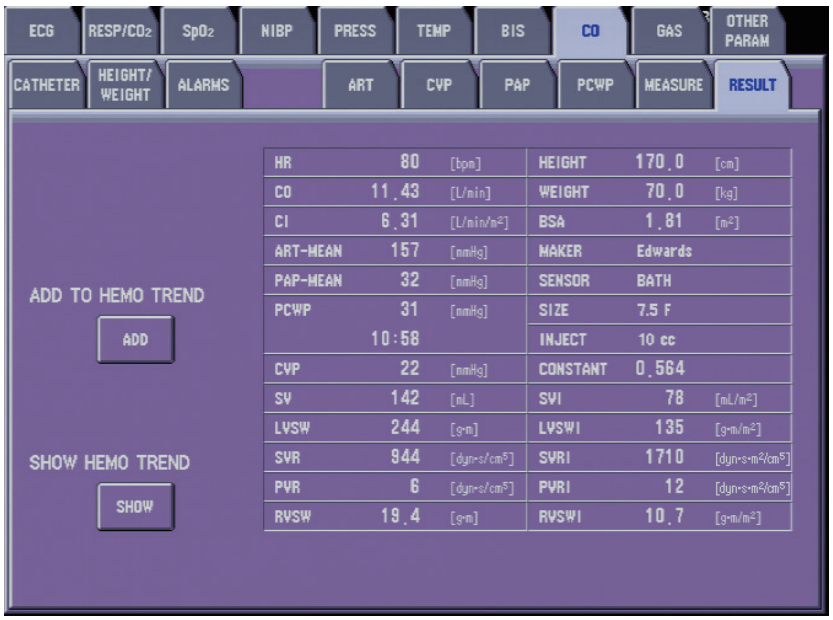
Up to five measurement data can be stored and displayed in the CO table on the MEASURE page. Stored data can be deleted from the list.

NOTE: Once data is deleted, it cannot be recovered.

1. On the MEASURE page, select the data to be deleted from the CO table.

2. Touch the DELETE key to delete data. The average is calculated again.

Adding the Acquired Data to the HEMO TREND Page of the TREND Window



The acquired CO data can be added to the hemodynamics trend table in the HEMO TREND page of the TREND window. When data is added to the HEMO TREND page, the data disappears from the MEASURE page of the CO window. “- - -” appears on the CO data display area.

On the RESULT window, touch the ADD key. The acquired data is added to the HEMO TREND page.

To display the hemodynamics trend table, touch the SHOW key.

GAS

The concentration of gases administered to and respired by the patient during anesthesia can be monitored by connecting the AG-920R multigas unit, GF-110PA or GF-210R multigas unit or GF-120PA or GF-220R multigas/flow unit to the multi-link socket on the monitor. To connect the AG-920R multigas unit to the monitor, the QF-904P interface is required.

NOTE: GF-120PA or GF-220R multigas/flow unit is not available for BSM-6000A series.

Carbon dioxide (CO_2), nitrous oxide (N_2O), oxygen (O_2), and any of five anesthetic agents (Halothane, Isoflurane, Enflurane, Sevoflurane and Desflurane) are monitored on a real-time, breath-by-breath basis. The inspiration and expiration phases are detected from the instantaneous CO_2 concentration and the respiration rate is counted from these phases. The measured data are displayed on the home screen and can be viewed with reference to other vital sign data.

Preparation

Set up the multigas unit and connect the unit to the patient.

Changing Gas Settings

Change the settings on the GAS window. The following settings can be changed for gas monitoring.

- Respiration rate, apnea, CO_2, O_2, N_2O and agent alarm settings
- Scale for CO_2, O_2, N_2O and agent waveforms
- Sampling rate (when using AG-920R or GF-110PA multigas unit or GF-120PA multigas/flow unit)
- Perform air calibration
- Displaying gas parameters on the home screen
- Gas measurement on or off (when using GF-110PA or GF-210R multigas unit or GF-120PA or GF-220R multigas/flow unit)

The CO_2 unit can be set to mmHg or kPa on the SYSTEM CONFIGURATION screen.

The display color for each gas can be set on the SYSTEM SETUP window.

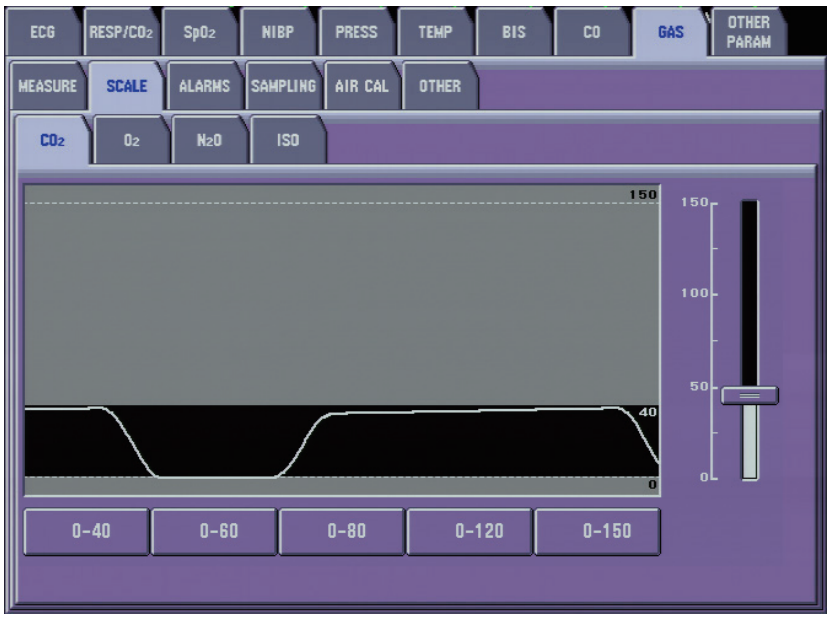
On the ALARMS Page

Set the upper and lower CO_2, O_2, N_2O, anesthetic agent, respiration rate and apnea alarm limits.*1*2

*1 On BSM-6000A series, if <CRISIS VITAL ALARM MANAGEMENT> on the SYSTEM CONFIGURATION screen is turned on and "ALARM PRIORITY" on the SYSTEM SETUP window is set to CRISIS, the alarm settings of RR, APNEA and CO_2 (E) are set to the alarm master setting.

*2 On BSM-6000A series, if <ALARM CAP> on the SYSTEM CONFIGURATION screen is turned on, the alarm settings of RR, APNEA and CO_2 (E) are affected by the "ALARM CAP" setting.

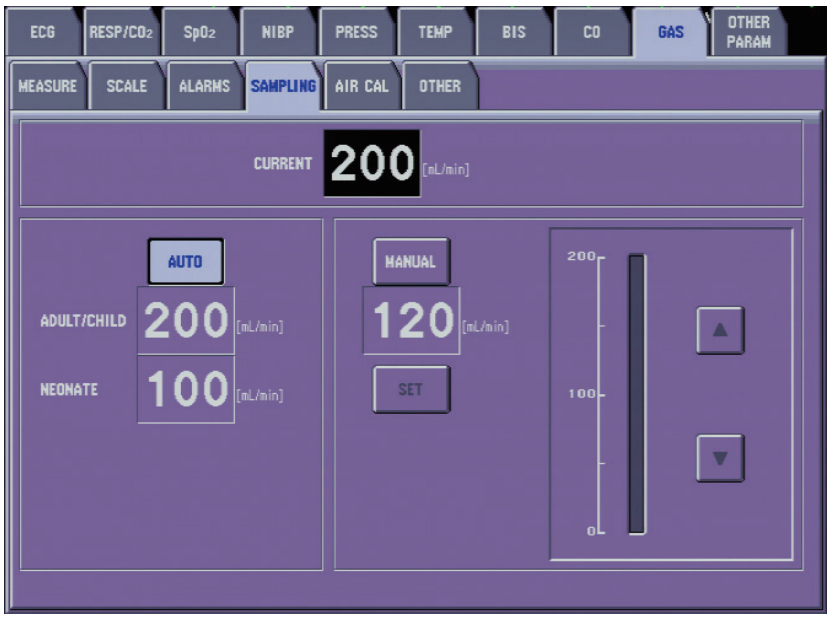
On the SCALE Page



Select the scale for the CO_2, O_2, N_2O and agent waveforms.

The same scale is used on both the home screen and GAS window.

On the SAMPLING Page



This setting is not available when using a GF-210R multigas unit or GF-220R multigas/flow unit.

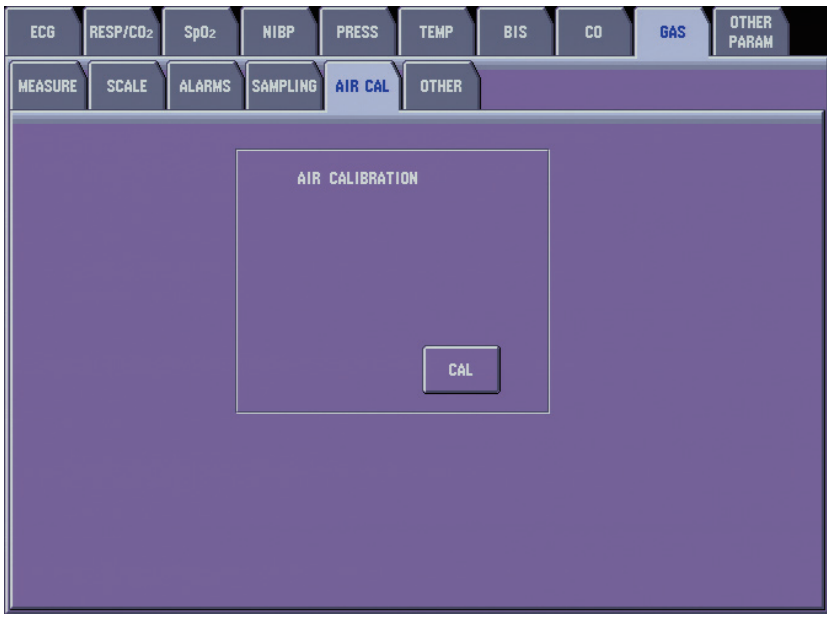
There is auto mode and manual mode for the sampling rate. The default setting is AUTO.

AUTO: Sampling volume is 200 mL/min when a water trap for adult is connected to the multigas unit. Sampling rate is 100 mL/min when a water trap for neonate is connected to the multigas unit.
MANUAL: You can select from 120 to 200 mL/min in 5 mL/min steps when a water trap for adult is connected to the multigas unit.

You can select from 70 to 120 mL/min in 5 mL/min steps when a water trap for neonate is connected to the multigas unit.

If a value outside this range is set, the mode changes to AUTO.

On the AIR CAL Page

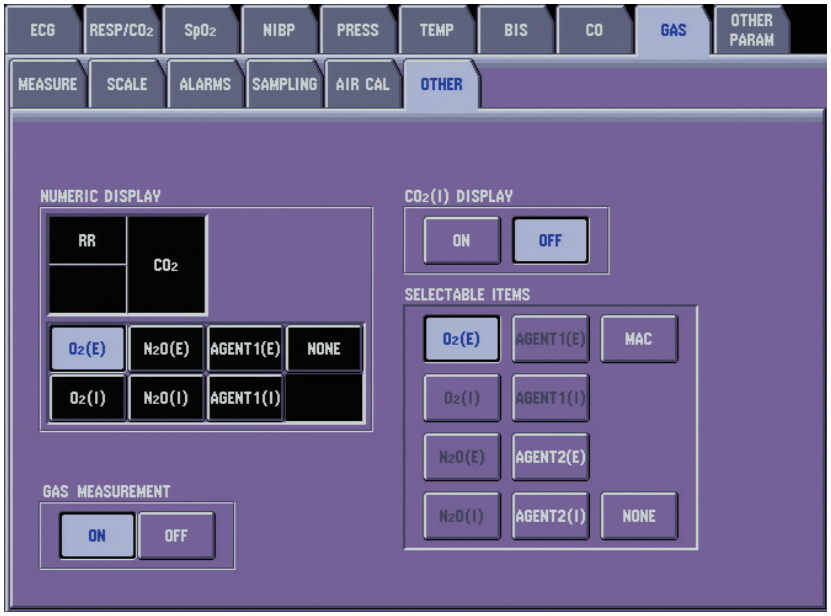


For stable measurement accuracy, perform gas calibration every year and whenever you suspect the monitor is not reading correctly.

The monitor periodically performs air calibration. Manually perform the air calibration when inappropriate measurement data appears and before performing gas calibration. It takes about 5 seconds (GF-110PA, GF-120PA) or about 60 seconds (GF-210R, GF-220R) for the air calibration to complete.

Touch the CAL key. Calibration is complete when the “CALIBRATING” message disappears.

On the OTHER Page



Select the parameters to display on the home screen from <SELECTABLE ITEMS> box. RR and CO_2(E) are always displayed.

CO_2(I) display can be turned off independently of other items when LAYOUT page on the SYSTEM window of the SYSTEM SETUP window is set to SIDE + SMALL BOTTOM or SIDE + LARGE BOTTOM.

Gas measurement can be turned off only when using a GF-110PA or GF-210R multigas unit or GF-120PA or GF-220R multigas/flow unit.

On the MEASURE Page

After completing the preparation, gas data and waveforms appear on the screen.

NOTE:

- The gas monitoring starts about 45 seconds (AG-920R, GF-110PA, GF-120PA) or 1 minute (GF-210R, GF-220R) after the [MEASURE] lamp on the multigas unit lights. The measurement accuracy is guaranteed for about 10 minutes (AG-920R, GF-110PA, GF-120PA) or 6 minutes (GF-210R, GF-220R) after the [MEASURE] lamp lights.
- Inspired and expired values are not displayed soon after starting monitoring. These values stabilize after the respiration rate appears on the screen.

Auto Calibration

Using AG-920R or GF-110PA Multigas Unit or GF-120PA Multigas/Flow Unit

The monitor periodically performs air calibration at the following intervals. Manually perform the air calibration when inappropriate measurement data appears and before performing air calibration. It takes about 5 seconds for the air calibration to complete.

5 minutes after power on: 30 to 100 seconds
5 to 60 minutes after power on: 2 to 15 minutes
1 to 2 hours after power on: 30 minutes
More than 2 hours after power on: 4 hours

Using GF-210R Multigas Unit or GF-220R Multigas/Flow Unit

The monitor performs the air calibration every 2 hours when the multigas unit is in the steady state. Manually perform the air calibration when inappropriate measurement data appears. It takes about 1 minute for the air calibration to complete.

Inspection of Measuring Accuracy

CAUTION

When the monitoring value is not appropriate, perform gas calibration. Perform gas calibration once a year for stable measuring accuracy.

The inspection of measuring accuracy must be performed by qualified service personnel.

Preparation

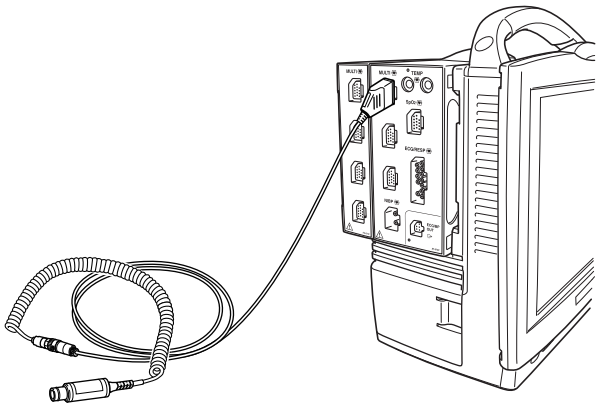
The following items are necessary for O_2 monitoring.

- Oxygen sensor, 074705
- T-shaped adapter, 110774
- FiO_2 connection cord, JO-900P

CAUTION

The oxygen sensor must be stored with the detector facing down. If the oxygen sensor is not stored with the detector facing down, the oxygen sensor must be left with the detector facing down for a few minutes before calibration. If the calibration is performed right after the oxygen sensor has been stored with the detector not facing down, calibration cannot be performed properly.

NOTE: The MULTI sockets on the AY-660P input unit and BSM-1700 series bedside monitor cannot be used for monitoring O_2.



Connect the oxygen sensor to the FiO_2 connection cord and FiO_2 connection cord to the MULTI socket.

Calibrating the O_2 Sensor

Before attaching the oxygen sensor to the patient's inspiration circuit, calibrate the oxygen sensor.

Calibration can be performed in two ways: calibration with air and calibration with 100% O_2 gas. Both methods are performed on the O_2 window.

- Calibration with air (21% O_2)
  1. Leave the oxygen sensor in the atmosphere for more than 1 minute.
  2. Display the MAIN page of the O_2 window.
     Press the [Menu] key → O_2 key → MAIN tab.
  3. Touch the AIR CAL key.
  4. When the "EXPOSE SENSOR TO AIR" message is displayed, touch the YES key to start calibration. When the calibration is complete, the calibration date and time, and the O_2 value "21" are displayed on the O_2 window.

- Calibration with 100% O_2
  1. Apply 100% O_2 flow to the oxygen sensor for more than 1 minute.
  2. Display the MAIN page of the O_2 window.
  3. Touch the O_2 CAL key.
  4. When the "FLOW CALIBRATION GAS" message is displayed, touch the YES key to start calibration. When the calibration is complete, the calibration date and time, and the O_2 value "100" are displayed on the O_2 window.

After calibration, attach the oxygen sensor to the patient's inspiration circuit. Connect the T-shaped adapter to the inspiration circuit of the respirator, with the detector of the oxygen sensor facing down and the oxygen sensor at an inclination angle within 45° from the respirator vertically.

NOTE:

- Connect the detector of the oxygen sensor facing down. Otherwise, the oxygen sensor function deteriorates and considerable errors in the measured value may occur.
- Do not connect the oxygen sensor where inspiration and expiration gas mix. The oxygen sensor cannot respond to each respiration.

Changing O_2 Settings

Change the alarm settings on the O_2 window.

The O_2 data display color can be set on the SYSTEM SETUP window.

On the MAIN Window

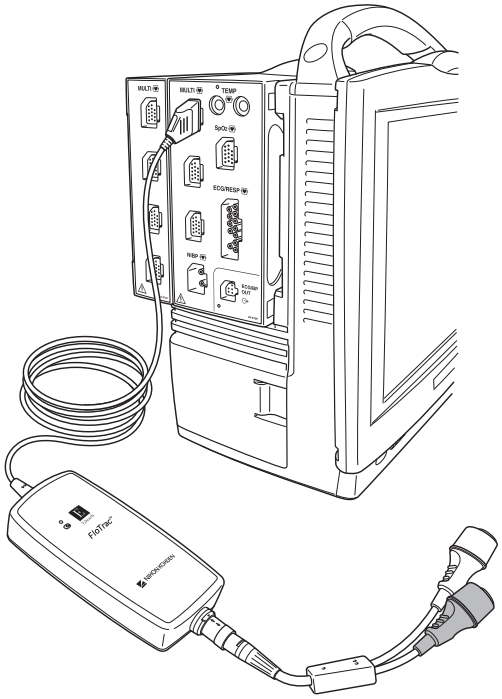
O_2 alarm limits: Set the upper and lower O_2 alarm limits.

CCO

CCO monitoring can be performed by using the JP-600P APCO/IBP processor.

NOTE: The JP-600P APCO/IBP processor is not available for BSM-6000A series.

Preparation



Select the appropriate FloTrac sensor according to the purpose.

Connect the FloTrac sensor to the JP-600P APCO/IBP processor and JP-600P APCO/IBP processor to the MULTI socket.

NOTE: The MULTI socket on the AY-660P input unit cannot be used for monitoring CCO.

On the MEASURE Page

Displays the CCO data.

Displays the hemodynamics table on the HEMO TREND Page of the TREND Window

Changing the CCO Settings

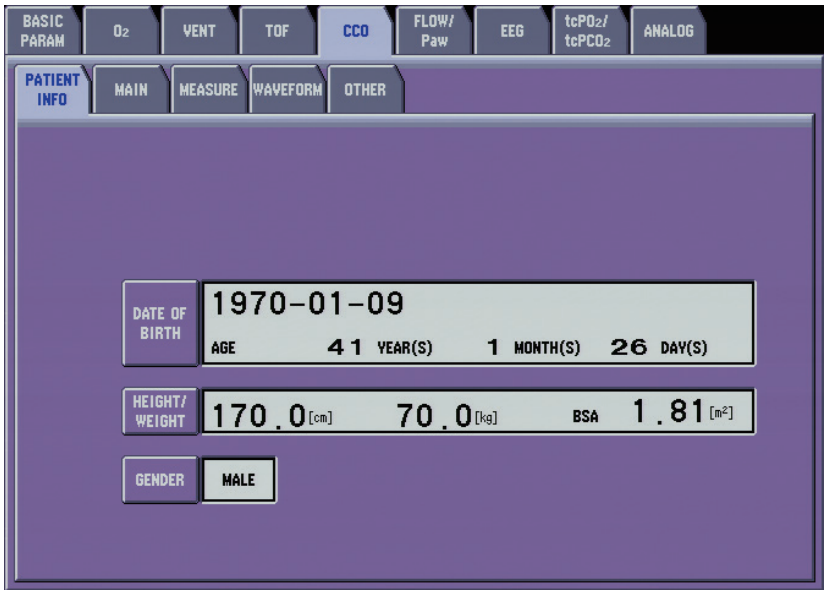
When using the JP-600P APCO/IBP processor, the following settings can be changed for CCO monitoring. Change the settings on the CCO window.

- Enter the patient's date of birth, gender, height and weight
- Perform zero calibration
- CCO and CCI alarm limits
- Scale for AP waveform
- Displaying CCO parameters on the home screen
- CCO/CCI average time
- Displaying CCO or CCI for current trendgraph on the home screen

The display color for CCO can be set on the SYSTEM SETUP window.

NOTE: The blood pressure label is fixed to ART when a JP-600P APCO/IBP processor is used.

On the PATIENT INFO Page

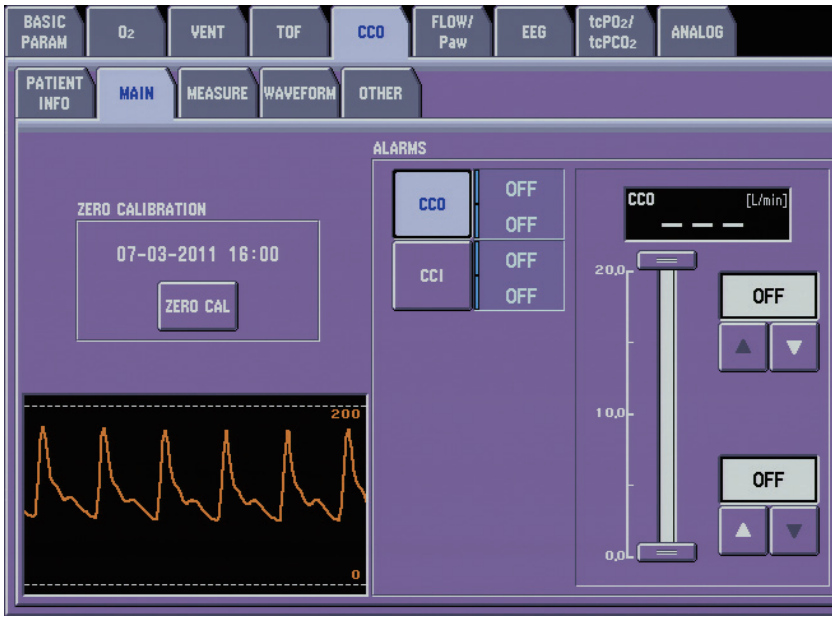


Enter the patient information when the patient information is not entered.

NOTE:

- When the date of birth, gender, height and weight are not entered, CCO monitoring cannot be performed.
- When the BSA is outside the range of 0.08 to 5.02 m^2 and the age is outside the range of 2 to 120 years old, CCO monitoring is not available.

On the MAIN Page



<ZERO CALIBRATION>
Touch the ZERO CAL key to perform zero balance adjustment. When the "ZEROING COMPLETE" message is displayed, zero balance adjustment is complete.

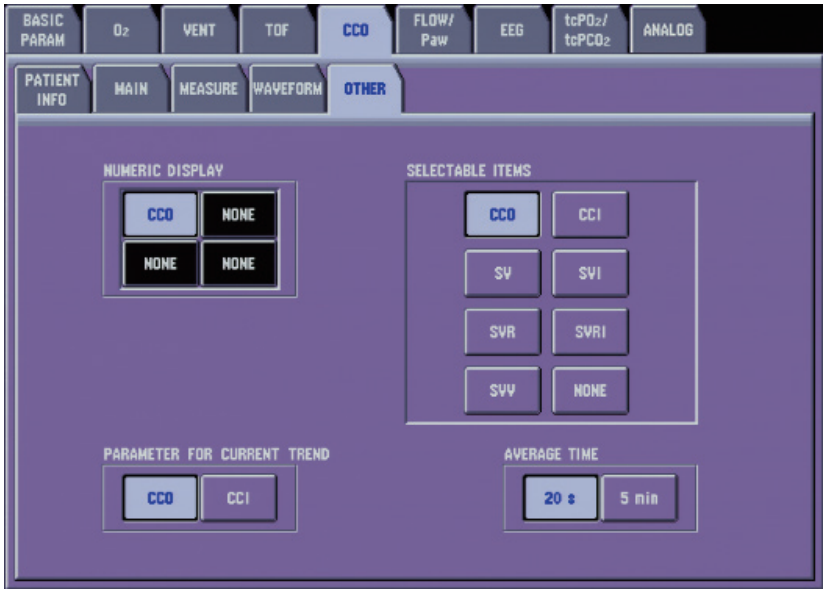
<ALARMS>
CCO and CCI alarm limits: Set the upper and lower CCO and CCI alarm limits.

On the WAVEFORM Page

Select the scale for the AP waveform.

Records AP waveform and CCO data of the selected time period on the WS-671P recorder module

On the OTHER Page



<NUMERIC DISPLAY>: Select the parameter to be displayed in the selected area from the <SELECTABLE ITEMS> box.

<PARAMETER FOR CURRENT TREND>: Select the parameter to be displayed as a trendgraph on the home screen.

<AVERAGE TIME>: Select the averaging time for CCO and CCI display.

Other Parameters

The following parameters can be monitored on a BSM-6301, BSM-6501 or BSM-6701 bedside monitor when optional units and connection cables are installed.

WARNING

When connecting an external instrument using an interface or communication cable to the monitor, some alarms and messages from the external instrument might not be displayed on the monitor. When the waveform or data is abnormal, check the alarm and message on the external instrument.

CO_2 Sidestream

CO_2 monitoring in sidestream method is available with an AG-400R CO_2 unit.

NOTE: AG-400R CO_2 unit is not available for BSM-6000A series.

CO_2 monitoring in sidestream method is available with a Oridion Microcap® portable bedside monitor or Covidien Microstream® Micropod™ capnography module.

NOTE: Oridion Microcap® portable bedside monitor is not available for BSM-6000K series.

WARNING

Alarms are set on the bedside monitor and external instrument individually. When an alarm setting is changed on one instrument, the same setting change is not automatically applied to the other instrument.

BIS

BIS monitoring is available with a Covidien BIS monitor.

Gas

Gas monitoring is available with an AG-920R, GF-110PA or GF-210R multigas unit or GF-120PA or GF-220R multigas/flow unit.

NOTE: GF-120PA or GF-220R multigas/flow unit is not available for BSM-6000A series.

Anesthesia

Anesthesia gas and ventilation monitoring is available with a Heinen + Löwenstein anesthesia machine, Dräger Medical anesthesia workstation, GE Healthcare anesthesia delivery system, Air Liquide anesthesia system, MAQUET FLOW-i anesthesia system or ACOMA Medical Industry anesthesia apparatus.

NOTE: Heinen + Löwenstein anesthesia machine and ACOMA Medical Industry anesthesia apparatus are not available for BSM-6000A series.

Ventilator

Ventilator monitoring is available with Dräger ventilators, Covidien Puritan Bennett ventilators, MAQUET ventilators, Hamilton Medical ventilators, Newport Medical ventilators or CareFusion ventilators.

TOF

TOF monitoring is available with a Merck & Co./MSD TOF-Watch® SX neuromuscular transmission monitor.

CCO

CCO monitoring is available with an Edwards Lifesciences oximeter/continuous cardiac output measuring device, Edwards Lifesciences clinical platform or LiDCO hemodynamic monitor.

PCCO

PCCO monitoring is available with a Pulsion Medical Systems PiCCO monitor.

CAUTION

Connect the PiCCO monitor to the BSM-6000 series bedside monitor using only the QF-911P interface. Do not connect the instruments using any other interface or cable. Otherwise, the measurement accuracy becomes out of range.

CCO/$S\bar{v}O_2$

CCO/$S\bar{v}O_2$ monitoring is available with an ICU Medical oxygen saturation and continuous cardiac output monitor.

Analog Input

Analog waveforms of an external device which outputs analog voltage signal, such as Transonic Systems HT series flowmeters, can be displayed on the monitor screen.

FLOW/Paw

FLOW/Paw monitoring is available with a GF-120PA multigas/flow unit.

NOTE: GF-120PA and GF-220R multigas/flow unit is not available for BSM-6000A series.

EEG

EEG monitoring is available with a AE-918P neuro unit.

WARNING

When using the JE-905P EEG connection cord, bundle all unused electrode leads. When using the JE-906P EEG connection cord, disconnect all unused electrode from the EEG connection cord. If the unused electrode or electrode lead touches a metal object or any other conductive parts, the patient may receive electrical shock.

WARNING

When abnormal waveforms appear (flat waveform or a lot of AC interference), remove all electrodes from the patient and stop using the neuro unit.

WARNING

When using the JE-906P EEG connection cord and the bedside monitor is connected to a central monitor network, EEG values and waveforms are not output to the central monitor from the bedside monitor. No data or alarm regarding the EEG data from the neuro unit are displayed on the central monitor. Be careful on EEG monitoring when the bedside monitor is connected to a central monitor network.

CAUTION

Do not use the needle electrodes for more than one hour as a measurement electrode for the EEG. When measuring the EEG for over one hour, use the EEG disk electrode.

CAUTION

Never check the skin-electrode impedance with the needle electrode inserted in the patient. Failure to follow this caution causes electrical burn where electrodes are inserted.

$tcPO_2$/$tcPCO_2$

Transcutaneous blood gas monitoring is available with a Radiometer transcutaneous monitor.

rSO_2

Regional oxygen saturation monitoring is available with a Covidien cerebral/somatic oximeter.

Screen Messages

The messages displayed when using this monitor are listed in alphabetical order. Each message is followed by the corresponding cause and countermeasure.

An item with an asterisk (*) in the left column is an alarm.

An item with a dagger (†) in the left column is an alarm which is displayed when <AVAILABLE ALARM TYPES> on the ALARM – DISPLAY/SOUND page of the SYSTEM SETUP window is set to ALL. Refer to Section 3 of the Administrator's Guide.

NOTE: If the problem cannot be solved after performing the countermeasure, contact your Nihon Kohden representative.

Screen Message		Parameter	Possible Cause/Criteria	Action
*	– – – ALARM	All parameters	Alarm concerning the – – – (parameter name) occurred.	Take appropriate action depending on the alarm level. (Displaying the home screen may display the alarm in detail.)
–	Bed name INTERBED ALARM	All parameters	Alarm occurred on an interbed bed of the bed name.	Check the data of the alarmed bed on the INTERBED window and remove the cause.
–	ACQUIRING PWTT DATA	NIBP	Started acquiring data for PWTT measurement.	Monitor ECG and SpO_2 and wait until the PWTT mark is displayed on the screen (about one minute).
–	ALARM SILENCED	All parameters	The [Silence Alarms] key was pressed to silence the alarm.	• When the alarm cause is resolved, the alarm is cleared. • When the [Silence Alarms] key is pressed during alarm silence, all alarms are resumed.
–	ALARMS SUSPENDED	All parameters	The [Silence Alarms] key was pressed before alarm occurrence.	To cancel alarm suspension, press the [Silence Alarms] key again.
–	ALARMS SUSPENDED – min	All parameters	The SUSPEND MONITORING key was touched. The SUSPEND ALARMS key was touched.	All alarms resume when the SUSPEND MONITORING or SUSPEND ALARMS key is touched again during alarm suspension.
–	ALL ALARMS OFF	All parameters	The BYPASS key or ALL ALARMS OFF key is touched to suspend alarm function.	To resume alarm function, touch the BYPASS or ALL ALARMS OFF key.
–	ARRHYTHMIA ANALYSIS OFF	ECG	<ARRHYTHMIA ANALYSIS> on the SYSTEM SETUP window is set to OFF.	If arrhythmia analysis is necessary, set <ARRHYTHMIA ANALYSIS> on the SYSTEM SETUP window to ON.
*	BATTERY ERROR	System	Battery problems.	Contact your Nihon Kohden representative.
*	BATTERY WEAK	System	Remaining battery is less than 25%.	Switch to AC power and charge the battery pack.
*	BIS CHECK EXTERNAL DEVICE	BIS (BIS monitor)	The BIS monitor is disconnected from the bedside monitor.	Check the interface connection between the BIS monitor and bedside monitor.

	Screen Message	Parameter	Possible Cause/Criteria	Action
*	BIS CHECK SENSOR	BIS (BIS processor/ BISx)	The BIS sensor is detached from the patient.	Attach the BIS sensor to the patient properly.
			The BIS sensor is disconnected from the PIC Plus patient interface cable.	Connect the BIS sensor to the PIC Plus patient interface cable properly.
			The PIC Plus patient interface cable is disconnected from the BIS processor.	Connect the PIC Plus patient interface cable to the BIS processor properly.
			The impedance between the BIS sensor and skin is too high.	Check the BIS sensor attachment and remove the cause. If necessary, replace it with a new one. Use only the specified BIS sensor.
*	BIS CONNECTOR OFF	BIS (BIS processor/ BISx)	The BIS processor is disconnected from the connection cord or the connection cord is disconnected from the monitor.	Check that the BIS processor is firmly connected to the connection cord and connection cord is firmly connected to the monitor.
–	BIS HIGH IMPEDANCE	BIS (BIS processor/ BISx)	The impedance between the BIS sensor and skin is too high.	Check the BIS sensor attachment and if necessary, replace it with a new one.
–	BIS CHECKING IMPEDANCE	BIS (BIS processor/ BISx)	The impedance of the BIS sensor is being checked.	Wait until the impedance check is complete.
*	BIS MODULE FAILURE	BIS (BIS processor/ BISx)	Faulty BIS processor.	Contact your Nihon Kohden representative.
–	BIS NOISE	BIS (BIS processor/ BISx)	Noise interference.	Check the BIS sensor attachment. If necessary, replace the sensor with a new one.
*	BIS SENSOR ERROR	BIS (BIS processor/ BISx)	The BIS sensor failure.	Display the BIS window and touch the RESET key after replacing the BIS sensor with a new one.
*	BIS SENSOR EXPIRED	BIS (BIS processor/ BISx)	BIS sensor is past its expiration date.	Replace the BIS sensor with a new one.
–	CANNOT ANALYZE‡	ECG	Noise interference for more than 30 seconds and heart rate cannot be counted and arrhythmia cannot be analyzed.	Remove noise.
*	CCO ALARM	CCO CCO/$S\bar{v}O_2$	Alarm occurring on the CCO monitor.	Check the CCO monitor and remove the cause of the alarm.
*	CCO CHECK EXTERNAL DEVICE	CCO	The CCO monitor is disconnected from the bedside monitor.	Check the interface connection between the CCO monitor and the bedside monitor.
–	CCO CHECK PATIENT INFORMATION	CCO (APCO/IBP processor)	The patient's gender, age and/or BSA are not entered.	Enter the patient's gender, age and/or BSA.
			The patient's gender, age and/or BSA are out of range.	Check the patient's gender, age and/ or BSA. Enter the patient information correctly.

‡ When <ARRHYTHMIA ANALYSIS> on the ECG window is set to ON, a "CANNOT ANALYZE" message appears instead of "ECG NOISE". If the "CANNOT ANALYZE" message is displayed for more than 30 seconds, the message changes to an alarm.

	Screen Message	Parameter	Possible Cause/Criteria	Action
*	CCO CHECK SENSOR	CCO (APCO/IBP processor)	The FloTrac sensor is disconnected from the APCO/IBP processor.	Connect the FloTrac sensor to the APCO/IBP processor.
			The specified FloTrac sensor is not used.	Use the specified FloTrac sensor.
			The cable or sensor is damaged.	Replace the cable or sensor with a new one.
			APCO/IBP processor internal system failure.	Contact your Nihon Kohden representative.
*	CCO CHECK WAVEFORM	CCO (APCO/IBP processor)	The arterial waveform is not accurate enough for measuring CO.	Check the arterial blood pressure waveform and whether there is a critical low blood pressure or high blood pressure, noise, body movement or overdamping. Check that the FloTrac sensor pressure bag is inflated enough. Check the IBP line and the connection. Check the cable connection.
			The arterial waveform is not accurate enough for a long period.	
			The IBP line is not appropriate.	
			The arterial systolic pressure is too high or arterial diastolic pressure is too low.	
*	CCO CONNECTOR OFF	CCO (APCO/IBP processor)	The APCO/IBP processor is disconnected from the monitor.	Connect the APCO/IBP processor properly. When APCO monitoring is not necessary, press the [Silence Alarms] key to silence the alarm.
			The APCO/IBP processor is damaged.	Replace the APCO/IBP processor with a new one.
*	CCO MODULE FAILURE	CCO (APCO/IBP processor)	Faulty APCO/IBP processor.	Contact your Nihon Kohden representative.
–	CCO UNSTABLE	CCO (APCO/IBP processor)	The arterial waveform is not accurate enough for measuring CCO.	Check the arterial blood pressure waveform and whether there is a critical low blood pressure or high blood pressure, noise, body movement or overdamping. Check that the FloTrac sensor pressure bag is inflated enough. Check the IBP line and the connection. Check the cable connection.
			The IBP line is not appropriate.	
			The arterial systolic pressure is too high or arterial diastolic pressure is too low.	
			The patient's pulse is getting low.	
–	CCO ZERO IMBALANCE	CCO (APCO/IBP processor)	Zero balance is not adjusted.	Adjust zero balance.
–	CCO ZERO UNSTABLE	CCO (APCO/IBP processor)	The circuit is not exposed to air during zero balance adjustment.	Expose the circuit to air and perform zero balance adjustment again.
			The pressure of zero balance is unstable.	Reconnect the circuit and perform zero balance adjustment again.
–	CCO ZEROING COMPLETE	CCO (APCO/IBP processor)	Zero balance adjustment is complete.	—
*	CCO SVV: HIGHLY VARIABLE PULSE RATE	SVV (APCO/IBP processor)	The pulse rate changes greatly from the arrhythmia, etc. The SVV value might not be reliable.	—
* †	CHECK CO_2 CELL	CO_2 (TG-950P/970P)	The respiration circuit has fluid or fluid prevents measurement.	Remove fluid from the respiration circuit and fix the airway adapter to the respiration circuit in the correct direction.
			The respiration circuit has fluid and CO_2 cannot be measured.	
*	CHECK INPUT UNIT BATTERY	System	The battery pack is not inserted correctly in the BSM-1700 series bedside monitor.	Insert the battery pack into the BSM-1700 series bedside monitor correctly.
*	CLOCK IC FAILURE	System	The clock circuit is damaged.	Contact your Nihon Kohden representative.
–	CLOSE PAPER MAGAZINE	Recording	The recorder door is open.	Push the recorder door closed until it clicks.

	Screen Message	Parameter	Possible Cause/Criteria	Action
–	CO BASELINE DRIFT	CO	Physiological change.	Increase the injectate volume or cool the injectate.
			Using a respirator.	Adjust the respiration phases.
			Injection interval is short.	Increase the injection interval.
			Noise interference from external devices.	Place external devices as far as possible from the catheter.
*	CO CHECK SENSOR	CO	The catheter is not connected to the CO connection cord.	Connect the catheter to the CO connection cord properly.
			The catheter is faulty.	Replace the catheter with a new one.
			The CO connection cord is damaged.	Replace the CO connection cord with a new one.
–	CO CHECK Ti TEMP	CO	The injectate temperature is not measured (BSM-6000A series only).	Measure the injectate temperature to monitor CO.
*	CO CONNECTOR OFF	CO	The CO connection cord is disconnected from the monitor.	Connect the connection cord properly. When CO monitoring is not necessary, press the [Silence Alarms] key to silence the alarm.
			The CO connection cord is damaged.	Replace the CO connection cord with a new one.
–	CO DETECTING BASELINE	CO	Searching for the baseline of the blood temperature.	Wait for the baseline of the blood temperature to be detected.
–	CO INJECT	CO	Injectate is not injected or the monitor does not acknowledge that injectate is injected.	Inject the injectate. The monitor has not acknowledged the injection if the "MEASURING CO" message is not displayed on the CO window even when the injectate is injected. Inject the injectate again.
–	CO INJECTION TIME OUT	CO	Injectate is not detected within 4 minutes after the "INJECT" message was displayed (or 30 seconds after the MANUAL key is pressed).	Touch the MANUAL key and inject the injectate within 30 seconds.
–	CO MEASURING CO	CO	Measuring the CO.	Wait for the calculation to be completed.
*	COMMUNICATION LOSS	System	The network cable is disconnected.	Connect the network cable properly.
			The cable or connector is faulty.	Replace the cable or connector.
			The hub or router is faulty.	Replace the hub or router.
–	CONNECT INPUT UNIT	System	The input unit‡ is not connected to the main unit or data acquisition unit and the monitor is not ready for monitoring when the transport function is enabled.	Connect the input unit‡ to the main unit or data acquisition unit and authenticate the patient on the SELECT PATIENT DATA window.
–	CO OUT OF RANGE	CO	Calculated a value outside the measuring range.	If the catheter retaining condition is not appropriate, the temperature change becomes small and the CO value may be outside the measuring range. Check the catheter retaining condition and the coefficient value setting.
			The coefficient value of the injectate temperature is not specified by the catheter manufacturer.	Make sure the injectate temperature is within the range specified by the manufacturer. For example, when using an Argon Medical Devices catheter, the coefficient values for the injectate temperature between 5 and 18°C are not specified so do not use an injectate temperature between 5 and 18°C.

‡ The "input unit" means the AY-600P series input unit and the BSM-1700 series bedside monitor.

	Screen Message	Parameter	Possible Cause/Criteria	Action
–	CO Tb TEMP ERROR	CO	The blood temperature is below 15°C or above 45°C.	—
			The catheter is faulty.	Replace the catheter with a new one.
–	CO THERMODILUTION CURVE ERROR	CO	Returned to the baseline of the thermodilution curve too late.	Use the appropriate injection method.
			Possible endocardial shunt.	Check the accuracy of the measured value.
–	CO Ti TEMP ERROR	CO	The injectate is not cooled or the room temperature is above 27°C.	Cool the injectate or decrease the room temperature.
			The bath probe or inline sensor is faulty.	Replace the probe or sensor with a new one.
*	CO_2 APNEA	CO_2	Apnea exceeded the apnea alarm limit.	—
–	CO_2 CAL??	CO_2 (Mainstream with TG-950P/970P)	Zero calibration is not performed.	Perform zero calibration.
–	CO_2 CALIBRATING	CO_2 (Mainstream with TG-900P/920P)	Zero calibration is being performed.	—
		CO_2 (Sidestream)	Calibration is being performed.	—
_	CO_2 CAL COMPLETE	CO_2 (Sidestream)	Calibration is complete.	—
–	CO_2 CAL ERROR	CO_2 (Sidestream)	Calibration failed.	Calibrate again. If the problem still occurs, contact your Nihon Kohden representative.
* †	CO_2 CELL OFF	CO_2 (TG-970P)	The airway adapter is disconnected.	Connect the airway adapter to the CO_2 sensor.
*	CO_2 CHANGE ABSORBENT	CO_2 (Sidestream)	The CO_2 absorbent needs to be replaced.	Contact your Nihon Kohden representative.
*	CO_2 CHANGE ADAPTER	CO_2 (Mainstream)	The CO_2 adapter is damaged.	Refer to the CO_2 sensor kit manual. If necessary, replace the adapter with a new one.
*	CO_2 CHECK EXTERNAL DEVICE	CO_2 (Microcap®/ MicroPod™)	The interface is disconnected from the bedside monitor or external instrument.	Check all cable connections between the external instrument and bedside monitor.
		CO_2 (Sidestream)	The AG-400R CO_2 unit is disconnected from the bedside monitor.	Check the interface connection between the AG-400R CO_2 unit and bedside monitor.
*	CO_2 CHECK SENSOR	CO_2 (Mainstream)	Insufficient sensor light.	Refer to the CO_2 sensor kit manual. If necessary, replace the kit with a new one.
*	CO_2 CONNECTOR OFF	CO_2 (Mainstream)	The CO_2 sensor kit is disconnected from the monitor.	Connect the CO_2 sensor kit properly. When CO_2 monitoring is not necessary, press the [Silence Alarms] key to silence the alarm.
			The CO_2 sensor kit is damaged.	Replace the CO_2 sensor kit with a new one.
*	CO_2 DEVICE ERROR	CO_2 (Microcap®/ MicroPod™)	The external instrument or interface failure.	Contact your Nihon Kohden representative.
			Communication error between the external instrument and bedside monitor.	
		CO_2 (Sidestream)	CO_2 unit failure.	Contact your Nihon Kohden representative.

	Screen Message	Parameter	Possible Cause/Criteria	Action
*	CO_2 LINE BLOCK	CO_2 (Sidestream/ Microcap®/ MicroPod™)	The airway adapter, filterline or exhaust gas tube is clogged and CO_2 cannot be measured.	Check that there is no clog in the airway adapter, filterline or exhaust gas tube. If necessary, replace with a new one.
				Make sure that the filterline is placed above the airway adapter.
*	CO_2 NO FILTERLINE	CO_2 (Sidestream)	The filterline is not connected to the CO_2 unit or unspecified tube is connected.	Firmly connect the specified filterline to the CO_2 unit.
		CO_2 (Microcap®/ MicroPod™)	The filterline is not connected to the external instrument or unspecified tube is connected.	Firmly connect the specified filterline to the external instrument.
–	CO_2 PLEASE WAIT	CO_2 (Sidestream)	Measurement of the sensitivity calibration is complete and calculation is started.	Stop the gas supply and wait for the calculation to complete.
–	CO_2 PURGING	CO_2 (Sidestream/ Microcap®/ MicroPod™)	Purging to remove clogging of the sampling path.	When the clogging is removed, measurement is possible. If the clogging is not removed, the "CO_2 LINE BLOCK" message appears. Refer to the "CO_2 LINE BLOCK" message.
*	CO_2 SENSOR ERROR	CO_2 (Mainstream)	CO_2 sensor is damaged.	Replace the CO_2 sensor with a new one.
–	CO_2 WARMING UP	CO_2 (Sidestream)	The CO_2 unit is warming up. Measurement is not possible.	Wait for the message to disappear.
		CO_2 (Microcap®/ MicroPod™)	The external instrument is warming up. Measurement is not possible.	
–	CO_2 ZERO CALIBRATING	CO_2 (Microcap®/ MicroPod™)	Auto zero balance adjustment is being performed.	Wait until zero balance adjustment is complete.
		CO_2 (Sidestream)	Zero calibration is being performed.	Wait for the zero calibration to complete.
–	DATA SEND ERROR	System	The network cable is not properly connected to the bedside monitor, hub and central monitor.	Connect the network cable to the bedside monitor, hub and central monitor properly and insert and remove the input unit‡ from the bedside monitor.
			The network cable is damaged.	Replace the network cable with a new one and insert and remove the input unit‡ from the bedside monitor.
			The bedside monitor is not registered as a monitored bed on the central monitor.	Register the bedside monitor on the central monitor as a monitored bed and insert and remove the input unit‡ from the bedside monitor.
–	ECG AUTO LEAD CHANGE	ECG	<AUTO LEAD CHANGE> on the ECG window is set to ON, an electrode of the lead for the first trace was detached for more than 5 seconds and therefore the lead was changed to a stable lead.	Check the electrode attachment.

‡ The "input unit" means the AY-600P series input unit and the BSM-1700 series bedside monitor.

Screen Message		Parameter	Possible Cause/Criteria	Action
*	ECG CHECK ELECTRODES	ECG	The electrode lead is detached from the electrode.	Connect the electrode lead to the electrode firmly.
			The electrode cannot be attached firmly to the skin.	Replace the electrode with a new one.
			The electrode lead is disconnected from the ECG connection cord.	Connect the electrode lead to the ECG connection cord.
			The contact between the lead and electrode is poor.	Clean the electrode lead clip or replace the electrode lead with a new one.
			<NUMBER OF ELECTRODES> setting on the ECG window is not correct.	Set the correct settings for <NUMBER OF ELECTRODES>.
			The electrode lead is damaged.	Replace the electrode lead with a new one.
			Differential offset voltage at electrodes.	Replace the electrode with a new one.
*	ECG CHECK ELECTRODE – –	ECG	Problems at the specified electrode.	Remove the cause by referring to the “ECG CHECK ELECTRODES” message.
–	ECG LEARNING	ECG	Started learning QRS for arrhythmia analysis.	Wait for learning to finish.
*	ECG MODULE ERROR	ECG	Module malfunction.	Contact your Nihon Kohden representative.
–	ECG NOISE‡	ECG	The baseline is not stable due to respiration or body movement.	Change the electrode position.
			EMG noise is superimposed.	Change the electrode position to where there is less muscle.
			The electrode is pulled by the lead.	Put some slack into the electrode lead.
			The electrode is dry.	Replace the electrode with a new one.
			The contact between the lead and electrode is poor.	Clean the electrode lead clip or replace the electrode lead with a new one.
			High electrode impedance.	Rub the skin with “skinPure” skin preparation gel.
			An electric blanket is used.	Use another warming method.
			Equipment which emits strong electromagnetic interference is nearby. e.g. ESU, cellular phone.	Keep the interference source away from the monitor or turn off the emitter source power.
			Equipotential grounding is not acquired.	Connect the equipotential ground terminal on the monitor to the equipotential ground terminal on the wall with the grounding lead.
–	ECG PACING (This message appears only when pacing spike detection on the ECG window is set to ON.)	ECG	Paced QRS is detected.	When the patient does not have an implanted cardiac pacemaker, set the pacing spike detection to OFF on the ECG window.
			An electric blanket is used.	Use another warming method.
			ECG of a neonate is monitored.	Set the pacing spike detection to OFF on the ECG window.
–	EEG CALIBRATING	EEG	The CAL key on the EEG window is touched to display the calibration waveforms.	—

‡ When <ARRHYTHMIA ANALYSIS> on the ECG window is set to ON, a “CANNOT ANALYZE” message appears instead of “ECG NOISE”. If the “CANNOT ANALYZE” message is displayed for more than 30 seconds, the message changes to an alarm.

	Screen Message	Parameter	Possible Cause/Criteria	Action
*	EEG CHECK ELECTRODES	EEG	The electrode is dry or not attached to the patient.	Attach the electrodes to the patient properly. When using disposable electrodes, replace them with new one.
			The electrode lead is disconnected from the EEG connection cord.	Connect the electrode lead to the EEG connection cord.
			Contact between the electrode lead clip and electrode is poor (when using disposable electrodes).	Replace the EEG electrode lead with a new one.
			The electrode lead is damaged.	Replace the electrode lead with a new one.
			Differential offset voltage at electrodes.	Attach the electrodes to the patient properly. When using disposable electrodes, replace them with new one.
			The electrode impedance is too high.	Clean the attachment site and attach the electrodes again.
			The EEG connection cord is disconnected then connected.	When the EEG connection cord is disconnected and then connected again, this message may appear. Press the [Silence Alarms] key to clear the message.
*	EEG CHECK EXTERNAL DEVICE	EEG	The neuro unit is disconnected from the bedside monitor.	Check the cable connection between the units.
–	EEG CHECKING IMPEDANCE	EEG	Checking electrode impedance.	—
*	EEG CONNECTOR OFF	EEG	The EEG connection cord is disconnected from the neuro unit.	Connect the EEG connection cord to the neuro unit. When EEG monitoring is not necessary, press the [Silence Alarms] key to silence the alarm.
			The EEG connection cord is damaged.	Replace the EEG connection cord with a new one.
–	EEG HIGH IMPEDANCE	EEG	The electrode impedance is too high.	Clean the attachment site and attach the electrodes again.
–	EEG RESETTING BASELINE	EEG	The RESET key on the EEG window is touched to return all EEG waveforms to the baseline position.	—
*	FLOW APNEA	FLOW/Paw	Apnea exceeded the apnea alarm limit.	—
–	FLOW CAL COMPLETE	FLOW/Paw	Zero calibration is complete.	—
–	FLOW CAL ERROR	FLOW/Paw	There was vibration during calibration and zeroing failed.	If the message appears several times, contact your Nihon Kohden representative.
			Nearby device was generating a strong noise during calibration and zeroing failed.	
*	FLOW CHECK EXTERNAL DEVICE	FLOW/Paw	Measure switch on the unit is turned off.	Turn on the measure switch on the unit.
			The connection cable is disconnected from the monitor.	Check the connection between the unit and the monitor.
			An error occurs in the communication between the unit and monitor.	Remove the connection cable from the monitor and connect it again. If the problem still occurs, contact your Nihon Kohden representative.
		FLOW/Paw (GF-220PA)	The power cord is disconnected.	Check the power cord is securely connected.
		FLOW/Paw	<FLOW/Paw MEASUREMENT> on the FLOW/Paw window is OFF.	Set the <FLOW/Paw MEASUREMENT> on the FLOW/Paw window to ON.

	Screen Message	Parameter	Possible Cause/Criteria	Action
*	FLOW CONNECTOR OFF	FLOW/Paw	Faulty flow tube.	Replace the flow tube with a new one.
			The flow tube is disconnected from the unit.	Connect the flow tube to the unit securely.
*	FLOW DEVICE ERROR	FLOW/Paw	Faulty unit.	Contact your Nihon Kohden representative.
–	FLOW OUT OF RANGE	FLOW/Paw	The measured value is outside the measurable range.	Replace the flow tube and/or flow adapter with a new one. If the problem still occurs, contact your Nihon Kohden representative.
–	FLOW ZERO CALIBRATING	FLOW/Paw	Zero calibration is being performed.	Wait for calibration to complete.
–	FREEZE	All parameters	The waveforms are frozen.	To unfreeze the waveforms: • Press any key on the screen • Press any key on the monitor • The waveforms are unfreezed 3 minutes after freezing
*	GAS APNEA	GAS	Apnea exceeded the apnea alarm limit.	—
–	GAS CALIBRATING	GAS	Air or gas calibration is being performed.	Wait for the calibration to complete.
–	GAS CAL COMPLETE	GAS (GF-110PA/ 120PA GF-210R/ 220R)	Air or gas calibration is complete.	—
–	GAS CAL ERROR	GAS	The sampling line or exhaust gas tube is clogged.	Check that the sampling line and exhaust gas tube are not bent or clogged. Replace with a new one if necessary and perform the manual or air calibration. If the problem still occurs, contact your Nihon Kohden representative.
			Contaminated air due to leaking prevented air calibration.	Check that sampling line and respiration circuit are not leaking. After confirming that there are no leaking, ventilate the air around the unit and perform the manual air calibration. If the problem still occurs, contact your Nihon Kohden representative.
		GAS (AG-920R GF-110PA/ 120PA)	The pressure in the gas cylinder is less than 0.1 MPa.	If the pressure in the gas cylinder is less than 0.1 MPa, replace with a new calibration gas and calibrate again.
			Correct gas is not used for calibration.	Check that correct gas is used for calibration.

	Screen Message	Parameter	Possible Cause/Criteria	Action
*	GAS CHECK EXTERNAL DEVICE	GAS	Measure switch on the unit is turned off.	Turn on the measure switch on the unit.
			The connection cable is disconnected from the monitor.	Check the connection between the unit and the monitor.
			An error occurs in the communication between the unit and monitor.	Remove the connection cable from the monitor and connect it again. If the problem still occurs, contact your Nihon Kohden representative. When using an AG-920R multigas unit, refer to the QF-904P interface manual.
		GAS (AG-920R GF-210R/ 220R)	The power cord is disconnected.	Check the power cord is securely connected.
		GAS (GF-110PA/120PA GF-210R/ 220R)	<GAS MEASUREMENT> on the GAS window is OFF.	Set the <GAS MEASUREMENT> on the GAS window to ON.
*	GAS CHECK SAMPLE LINE	GAS (AG-920R)	The sampling gas inlet on the water trap or sampling gas outlet on the rear panel of the unit is pressurized.	Check that the sampling gas inlet or sampling gas outlet of the unit is not pressurized.
*	GAS CHECK WATERTRAP	GAS	The water trap is not attached properly. The sampling line is not connected properly.	Make sure that the water trap is securely attached to the unit. Connect the sampling line properly.
		GAS (GF-210R/ 220R)	An unspecified sampling line is used.	Use a specified sampling line.
*	GAS CHECK WATERTRAP AND SAMPLE LINE	GAS	The water trap is clogged.	Empty the water from the water trap. If the problem still occurs, replace the water trap with a new one.
			The sampling line is clogged.	Check that sampling line is not bent or clogged. Replace with a new one if necessary.
			The exhaust gas tube is clogged.	Check that exhaust gas tube is not bent or clogged. Replace with a new one if necessary.
*	GAS DEVICE ERROR	GAS	Faulty unit.	Contact your Nihon Kohden representative.
*	GAS LINE BLOCK	GAS	The water trap is clogged.	Empty the water from the water trap. If the problem still occurs, replace the water trap with a new one.
			The sampling line is clogged.	Check that sampling line is not bent or clogged. Replace with a new one if necessary.
			The exhaust gas tube is clogged.	Check that exhaust gas tube is not bent or clogged. Replace with a new one if necessary.
*	GAS MIXED GAS	GAS	Two anesthetic agents are detected at the same time when the vaporizer is changed.	When either agent concentration becomes below 0.2% or alarm silences.
			Wrong agent is delivered to the vaporizer.	Contact the anesthetic machine manufacturer.
			Two anesthetic agents are detected when two vaporizers operated at the same time.	

Screen Message		Parameter	Possible Cause/Criteria	Action
–	GAS OUT OF RANGE	GAS	The measured value is outside the measurable range.	• Check the condition of the patient and anesthetic machine. • Check the connection of the sampling line and respiration circuit. • Remove the connection cable from the monitor and connect it again. If the problem still occurs, contact your Nihon Kohden representative.
			The measurement sensitivity has shifted.	Perform gas calibration with the correct gas.
*	GAS OVERHEAT	GAS (GF-210R/ 220R)	Faulty fan.	Contact your Nihon Kohden representative.
–	GAS PURGING	GAS (AG-920R)	Purging to remove clogging from the sampling line.	Wait for purging to complete.
–	GAS UNSPECIFIED ACCURACY	GAS (AG-920R)	The measured value is outside the accuracy range.	• Check the condition of the patient and anesthetic machine. • Check the connection of the sampling line and respiration circuit. • Remove the connection cable from the monitor and connect it again. If the problem still occurs, contact your Nihon Kohden representative.
			The measurement sensitivity has shifted.	Peform gas calibration with the correct gas.
–	GAS WARMING UP	GAS	The unit is still warming up.	Wait for warming up to complete.
*	HIS SYNC ERROR	System	The settings for HL7 are not correct.	Set the HL7 settings correctly on the HL7 page in the NETWORK window of the SYSTEM CONFIGURATION screen. Refer to Section 2 of the Administrator's Guide.
			The entered patient ID is not correct.	Enter the correct patient ID.
*	INPUT UNIT DISCONNECT	System	The input unit‡ is disconnected from the main unit or data acquisition unit when the transport function is enabled.	Connect the input unit‡ and authenticate the patient on the SELECT PATIENT DATA window to select the monitoring patient.
*	INPUT UNIT FAILURE	System	Communication error between the input unit‡ and main unit.	Insert and remove the input unit‡ from the bedside monitor. If the problem is not solved, contact your Nihon Kohden representative
			The QM-600P memory unit installed inside the input unit‡ is damaged.	
			The data is sent to a bedside monitor or central monitor which has a different time zone setting and data in the input unit‡ is deleted.	Insert and remove the input unit‡ from the bedside monitor or JA-690PA/694PA data acquisition unit and press the [Silence Alarms] key. Make sure to change the zone setting to the same setting as the other bedside monitors or central monitors.
–	INSERT REC PAPER	Recording	No recording paper.	Load the recording paper.
			The recording paper is not loaded correctly.	Correctly load the recording paper.
–	INVALID CARD	System	Invalid SD card is inserted.	Only use the Nihon Kohden specified SD card.

‡ The "input unit" means the AY-600P series input unit and the BSM-1700 series bedside monitor.

	Screen Message	Parameter	Possible Cause/Criteria	Action
–	Lost communication with instruments (such as a central monitor) in the network.	System	<AVAILABLE ALARM TYPES> is set to ALL or <ARRHYTHMIA TYPE> is set to EXTENDED on this monitor and the monitor is connected to the network. One or more instruments in the network have software version which does not support extended arrhythmia and communication is lost.	• Set the <AVAILABLE ALARM TYPES> setting to MAIN to restore communication. • Set the <ARRHYTHMIA TYPE> setting to STANDARD. • Upgrade all instruments in the network to the recommended software version.
–	MONITOR OFF (interbed window)	System	The instrument which is registered to interbed is turned off.	Check the patient condition and secure the patient safety. Then check that the system has no trouble.
			The instrument which is registered to interbed is disconnected from the network.	
*	MPU MODULE ERROR	All parameters	MPU circuit malfunction.	Contact your Nihon Kohden representative.
		TEMP	The monitor simulates the temperature signal of 27°C and 37°C inside the monitor. Monitoring this simulated signal periodically (every 128 ms), the monitor self-diagnoses the temperature signal processor part of the monitor. When the monitor could not cover the 0 to 45°C measurement range, a "MPU MODULE ERROR" message is displayed.	
*	MULTILINK CONFIG ERROR	All parameters	Communication failure between QF series interface or IF series communication cable and monitor.	Contact your Nihon Kohden representative.
*	MULTILINK POWER ERROR	All parameters	Multi-link power supply failure.	Contact your Nihon Kohden representative.
*	NIBP AIR LEAK	NIBP	The cuff pressure does not change after inflation even after a certain period of time.	Connect the cuff to the air hose properly.
				Connect the air hose to the socket properly.
			The cuff or air hose is damaged.	Replace the cuff or air hose with a new one.
*	NIBP CANNOT DETECT PULSE	NIBP	The patient's pulse wave is small.	Measure by palpation or the invasive blood pressure method.
			The cuff is not wrapped on the patient correctly.	Wrap the cuff around the arm of the patient properly.
*	NIBP CHECK INTERVAL SETTING	NIBP	NIBP is measured at 1 minute intervals for more than 30 minutes.	Check the patient condition and determine whether to continue measuring NIBP at 1 minute intervals.
*	NIBP CONNECTOR OFF	NIBP	The air hose is disconnected from the monitor.	Connect the air hose properly. When NIBP monitoring is not necessary, press the [Silence Alarms] key to silence the alarm.
			The air hose is damaged.	Replace the air hose with a new one.
*	NIBP CUFF OCCLUSION	NIBP	The cuff pressure does not decrease after measurement has completed.	Check that the air hose is not bent or squeezed.
*	NIBP HIGH CUFF PRESS	NIBP	Enormous pressure was applied to the pressure of the cuff.	When measuring an adult, ask the patient not to move too much.
–	NIBP INFLATION PRESS LOW	NIBP	Insufficient cuff inflation pressure.	Wait until the cuff pressure rises.
*	NIBP MEAS TIMEOUT	NIBP	The measuring time exceeded the specified time due to arrhythmia or noise.	If the cause is arrhythmia, measure by invasive blood pressure measurement. Remove the cause if due to noise.

	Screen Message	Parameter	Possible Cause/Criteria	Action
–	INFLATION TIME PASSED	NIBP	Venous puncture cuff inflation time is exceeded.	Restart venous puncture.
–	NIBP MEASURING NIBP	NIBP	Start venous puncture during NIBP.	Finish the NIBP measurement and restart venous puncture.
*	NIBP MODULE ERROR	NIBP	Module malfunction.	Contact your Nihon Kohden representative.
–	NIBP PLEASE WAIT	NIBP	Measurement started before the cuff inflation pressure was deflated enough.	Check the cuff pressure before starting measurements. When measuring using the adult cuff: below 15 mmHg When measuring using the cuff for neonates: below 3 mmHg
–	NIBP REMEASURING (Remeasurement is automatically performed. If the message still appears, after remeasurement, do the counter actions.)	NIBP	The cuff is not attached to the patient.	Attach the cuff to the patient.
			Patient moved during measurement.	Wait for the patient to stop moving, then measure again.
			Patient's pulse is too small.	Measure by palpation or the invasive blood pressure method.
			The cuff is not attached properly.	Attach the cuff properly.
			The cuff size is not appropriate.	Check that the cuff of the correct size is used.
			Patient's pulse and heart rate is unstable.	Wait for the patient to relax and stop moving.
*	NIBP SAFETY CIRCUIT RUNNING (When this message is displayed, measurement cannot be performed for 40 seconds.)	NIBP	The hose is bent.	Check that the hose is not bent.
			The inflation time is too long.	Stop measurement.
			In auto mode measurement, the cuff inflation started before the cuff deflation is complete.	Stop measurement.
*	NIBP SYSTOLIC OVER	NIBP	The maximum blood pressure exceeded 280 mmHg when using the adult cuff, or 150 mmHg when using the neonate cuff.	Measure by palpation or the invasive blood pressure method.
–	NIBP WEAK PULSE	NIBP	The patient's pulse wave is too small.	Measure by palpation or the invasive blood pressure method.
			The cuff is wrapped too loosely.	Wrap the cuff around the arm properly.
			The cuff size is inappropriate.	Use the appropriate cuff.
–	NIBP ZEROING	NIBP	NIBP zero balance adjustment is being performed.	Do not touch the cuff during zeroing and wait for the message to disappear.
–	O_2 CAL??	O_2	The oxygen sensor is not calibrated.	Calibrate the oxygen sensor.
			The oxygen sensor has reached the end of its life.	Replace the oxygen sensor with a new one.
			The oxygen sensor is not connected properly.	Check the connection of the oxygen sensor, wait for more than 1 minute and then calibrate again. If the problem still occurs, replace the oxygen sensor with a new one.
			Calibration is performed when the oxygen sensor is not stable.	
			The calibration mode is not appropriate.	Select the correct calibration mode.
–	O_2 CALIBRATING	O_2	Calibrating the oxygen sensor.	Wait for the calibration to be connected.

	Screen Message	Parameter	Possible Cause/Criteria	Action
*	O_2 CONNECTOR OFF	O_2	The FiO_2 connection cord is disconnected from the monitor.	Connect theFiO_2 connection cord properly. When O_2 monitoring is not necessary, press the [Silence Alarms] key to silence the alarm.
			The FiO_2 connection cord is damaged.	Replace the FiO_2 connection cord with a new one.
*	O_2 CHECK SENSOR	O_2	The oxygen sensor is disconnected from the FiO_2 connection cord.	Connect the oxygen sensor to the FiO_2 connection cord properly.
			The FiO_2 connection cord is damaged.	Replace the FiO_2 connection cord with a new one.
			The oxygen sensor is damaged.	Replace the oxygen sensor with a new one.
—†	OUT OF RANGE‡	CO_2 (TG-950P/ 970P)	CO_2 measurement value exceeds the measurement range.	—
*	PARAMETER NOT AVAILABLE	All parameters	Connected cord or cable of the parameter is not available on the monitor.	—
*	PCCO CHECK EXTERNAL DEVICE	PiCCO	The PiCCO monitor is disconnected from the bedside monitor.	Check the interface connection between the PiCCO monitor and the bedside monitor.
*	PRESS CHECK SENSOR	IBP	The blood pressure transducer is disconnected from the IBP connection cord.	Connect the blood pressure transducer to the IBP connection cord properly.
			Malfunction of the blood pressure transducer.	Replace the blood pressure transducer with a new one.
			The IBP connection cord is damaged.	Replace the IBP connection cord with a new one.
*	PRESS CONNECTOR OFF	IBP	The IBP connection cord is disconnected from the monitor.	Connect the IBP connection cord properly. When IBP monitoring is not necessary, press the [Silence Alarms] key to silence the alarm.
			The IBP connection cord is damaged.	Replace the IBP connection cord with a new one.
–	PRESS OUT OF RANGE	IBP	The measured value is outside the measuring range.	Check the measuring environment.
			Malfunction of the blood pressure transducer.	Replace the blood pressure transducer with a new one.
*	PRESS THIS LABEL IS ALREADY REGISTERED	IBP	More than one IBP connection cord with the same label are used.	Set another label.
–	PRESS ZERO CALIBRATING	IBP	Zero balance adjustment is performed.	Wait for the zero balance adjustment to complete.
–	PRESS ZERO IMBALANCE	IBP	Zero balance is not adjusted.	Adjust the zero balance.
–	PRESS ZERO OUT OF RANGE	IBP	Malfunction of the blood pressure transducer.	Replace the blood pressure transducer with a new one.
			Monitor malfunction.	Contact your Nihon Kohden representative.
–	PRESS ZERO UNSTABLE	IBP	The circuit is not exposed to air during zero balance adjustment.	Expose the circuit to air and perform zero balance adjustment again.
			The pressure of zero balance is unstable.	Re-connect the circuit and perform zero balance adjustment again.
–	PRESS ZEROING COMPLETE	IBP	Zero balance adjustment is complete.	IBP monitoring is available.

‡ When the TG-950P CO_2 sensor kit is used, the “OUT OF RANGE” message might not be displayed depending on the software version of the CO_2 sensor kit.

	Screen Message	Parameter	Possible Cause/Criteria	Action
*	PRINT ERROR	Print	Too many print commands are sent to the network printer.	Wait a while and print again.
			Printer settings are not correct.	Correctly set the printer setting on the PRINTER window on the SYSTEM CONFIGURATION screen.
			The recording paper is not loaded correctly.	Correctly load the recording paper.
–	PRINTING	System	Data is sent to the network printer.	—
–	PWTT CAL??	NIBP	Uncalibrated.	Measure NIBP (calibrate) again.
–	RECEIVING TEC DATA	System	Receiving data from the defibrillator.	—
*	RESP CHECK SENSOR	RESP (Thermistor)	The respiration pickup is damaged.	Replace the respiration pickup with a new one.
*	RESP CONNECTOR OFF	RESP (Thermistor)	The respiration pickup is disconnected from the monitor.	Connect the respiration pickup properly. When respiration monitoring is not necessary, press the [Silence Alarms] key to silence the alarm.
			The respiration pickup is damaged.	Replace the respiration pickup with a new one.
–	RESP OFF	RESP (Impedance)	<IMPEDANCE MEASUREMENT> on the RESP/CO_2 window is set to OFF.	When monitoring respiration by impedance method is necessary, set <IMPEDANCE MEASUREMENT> to ON.
*	rSO_2 CHECK EXTERNAL DEVICE	rSO_2	The cerebral/somatic oximeter is disconnected from the bedside monitor.	Check the communication cable connection between the cerebral/somatic oximeter and bedside monitor.
			Communication error between the bedside monitor and cerebral/somatic oximeter.	Check the communication settings and the communication cable connection. Refer to the communication cable manual.
–	SENDING DATA	System	The input unit‡ is removed from a bedside monitor and connected to another bedside monitor in a central monitor network. The data of the source bedside monitor is sent to the central monitor.	—
–	SIMULATED DATA	All parameters	The displayed data is simulated data.	To monitor a patient, set <SIMULATION MODE> to OFF on the SYSTEM CONFIGURATION screen. (Administrator setting)
*	SpO_2-2 ALARM	SpO_2-2 (Nellcor/ Masimo)	Alarm occurring on the pulse oximeter.	Look at the pulse oximeter and remove the cause of the alarm.
*	SpO_2 CANNOT DETECT PULSE	SpO_2 (NK)	Poor blood circulation for measuring the SpO_2 value.	Check the patient condition, probe attachment or change the attachment site.
			The probe is attached too tightly and is obstructing the blood circulation.	Reattach the probe.
			The probe is not attached to the patient properly.	Attach the probe to the patient properly.
			One of the following message is displayed for 30 seconds. • SpO_2 LIGHT INTERFERENCE • SpO_2 CHECK PROBE SITE • SpO_2 DETECTING PULSE	Refer to the each screen message section and remove the cause of the alarm or message.
		SpO_2 (Nellcor)	The pulse waveform cannot be detected.	Attach the probe to the patient properly.

‡ The “input unit” means the AY-600P series input unit and the BSM-1700 series bedside monitor.

	Screen Message	Parameter	Possible Cause/Criteria		Action
*	SpO_2-2 CANNOT DETECT PULSE	SpO_2 (NK)	Poor blood circulation for measuring the SpO_2 value.		Check the patient condition, probe attachment or change the attachment site.
			The probe is attached too tightly and is obstructing the blood circulation.		Reattach the probe.
			The probe is not attached to the patient properly.		Attach the probe to the patient properly.
			One of the following message is displayed for 30 seconds. • SpO_2-2 LIGHT INTERFERENCE • SpO_2-2 CHECK PROBE SITE • SpO_2-2 DETECTING PULSE		Refer to the each screen message section and remove the cause of the alarm or message.
*	SpO_2 CHANGE PROBE	SpO_2 (NK)	Probe is deteriorated.		Replace the probe with a new one.
			Probe is damaged or short-circuited.		Replace the probe with a new one.
			SpO_2 connection cord is damaged.		Replace the SpO_2 connection cord with a new one.
		SpO_2 (Masimo)	The monitor cannot identify the connected probe or the probe is broken.		Replace the probe. Refer to the probe manual.
*	SpO_2-2 CHANGE PROBE	SpO_2 (NK)	Probe is deteriorated.		Replace the probe with a new one.
			Probe is damaged or short-circuited.		Replace the probe with a new one.
			SpO_2 adapter is damaged.		Replace the SpO_2 adapter with a new one.
*	SpO_2-2 CHECK EXTERNAL DEVICE	SpO_2-2 (Nellcor/ Masimo)	The pulse oximeter is disconnected from the bedside monitor.		Check the communication cable connection between the pulse oximeter and bedside monitor.
			Communication error between the bedside monitor and pulse oximeter.		Check the communication settings and the communication cable connection. Refer to the communication cable manual.
*	SpO_2 CHECK PROBE	SpO_2 (NK)	The probe is not attached to the patient properly.		Attach the probe to the patient properly.
			When the pulse waveform on the screen is flat	The probe cable is disconnected from the SpO_2 connection cord or not connected properly.	Connect the probe cable to the SpO_2 connection cord. If SpO_2 monitoring is not necessary, press the [Silence Alarms] key.
				The probe is damaged or short-circuited.	Replace the probe with a new one. If the message still appears, replace the SpO_2 connection cord with a new one.
			When the pulse waveform is displayed on the screen	The probe is not attached at the appropriate site.	Attach the probe to the appropriate site.
				The probe is deteriorated.	Replace the probe with a new one.
		SpO_2 (Nellcor/ Masimo)	The probe is not attached to the patient properly.		Attach the probe to the patient properly.
*	SpO_2-2 CHECK PROBE	SpO_2 (NK)	The probe cable is disconnected from the SpO_2 adapter.		Connect the probe cable to the SpO_2 adapter. If SpO_2 monitoring is not necessary, press the [Silence Alarms] key.
			The probe is not attached to the patient properly.		Attach the probe to the patient properly.
			The probe is broken or short-circuited.		Replace the probe with a new one. If the message still appears, replace the SpO_2 adapter with a new one.

	Screen Message	Parameter	Possible Cause/Criteria	Action
*	SpO_2 CHECK PROBE SITE	SpO_2 (NK)	The probe is not attached at the appropriate site.	Attach the probe to a site 6 to 14 mm thick.
			Probe is deteriorated.	Replace the probe with a new one.
*	SpO_2-2 CHECK PROBE SITE	SpO_2 (NK)	The probe is not attached at the appropriate site.	Attach the probe to a site 6 to 14 mm thick.
			Probe is deteriorated.	Replace the probe with a new one.
*	SpO_2 CONNECTOR OFF	SpO_2 (NK/Nellcor/ Masimo)	The SpO_2 connection cord is disconnected from the SpO_2 socket.	Connect the SpO_2 connection cord properly. When SpO_2 monitoring is not necessary, press the [Silence Alarms] key to silence the alarm.
		SpO_2 (Nellcor/ Masimo)	The probe cable is disconnected from the SpO_2 connection cord.	Connect the probe cable to the SpO_2 connection cord. If SpO_2 monitoring is not necessary, press the [Silence Alarms] key.
		SpO_2 (Masimo)	The probe is not connected to the patient cable correctly.	Connect the probe to the patient cable with the logo labels facing the same direction.
			The monitor cannot identify the connected probe.	Replace the probe. Refer to the probe manual.
*	SpO_2-2 CONNECTOR OFF	SpO_2 (NK)	The probe cable is disconnected from the SpO_2 adapter.	Connect the probe cable to the SpO_2 adapter. If SpO_2 monitoring is not necessary, press the [Silence Alarms] key.
			The SpO_2 adapter is disconnected from the SpO_2 socket.	Connect the SpO_2 adapter properly. When SpO_2 monitoring is not necessary, press the [Silence Alarms] key to silence the alarm.
–	SpO_2 DETECTING PULSE	SpO_2 (NK/Nellcor/ Masimo)	Searching for the correct pulse wave.	Wait until the pulse wave is detected.
			The probe is not attached to the patient properly.	Attach the probe to the patient properly.
		SpO_2 (NK)	The SpO_2 value cannot be obtained because the waveform is unstable.	Check the probe attachment.
			Poor blood circulation for measuring SpO_2.	Check the patient condition, probe attachment or change the attachment site.
			The probe is secured too tightly and is obstructing the blood circulation.	Reattach the probe.
			The probe is disconnected from the SpO_2 connection cord.	Connect the probe to the SpO_2 connection cord.
			The finger probe is not attached to the patient properly.	Attach the finger probe firmly to the patient.
		SpO_2 (Nellcor/ Masimo)	The probe attachment site is not appropriate.	Attach the probe to an appropriate place.
–	SpO_2-2 DETECTING PULSE	SpO_2 (NK)	Searching for the correct pulse wave.	Wait until the pulse wave is detected.
			The probe is not attached to the patient properly.	Attach the probe to the patient properly.
			The SpO_2 value cannot be obtained because the waveform is unstable.	Check the probe attachment.
			Poor blood circulation for measuring SpO_2.	Check the patient condition, probe attachment or change the attachment site.
			The probe is secured too tightly and is obstructing the blood circulation.	Reattach the probe.
			The probe is disconnected from the SpO_2 adapter.	Connect the probe to the SpO_2 adapter.
			The finger probe is not attached to the patient properly.	Attach the finger probe firmly to the patient.

	Screen Message	Parameter	Possible Cause/Criteria	Action
*	SpO_2-2 ERROR	SpO_2-2 (Nellcor/ Masimo)	There is an error on the pulse oximeter.	Look at the pulse oximeter screen and remove the cause of the error.
*	SpO_2 LIGHT INTERFERENCE	SpO_2 (Masimo)	Too much light on the probe.	Remove light or cover the probe site with blanket.
			Interference from surroundings.	Remove the interference.
			The probe attachment site is not appropriate.	Attach the probe to an appropriate site.
–	SpO_2 LOW QUALITY SIGNAL	SpO_2 (NK/Nellcor/ Masimo)	Considerable body movement.	When the message is displayed frequently, check the patient condition and, if necessary, change the attachment site.
			The probe is not attached to the patient properly.	
		SpO_2 (Nellcor)	Low signal IQ.	When the message is displayed frequently, check the patient condition and, if necessary, change the attachment site.
–	SpO_2-2 LOW QUALITY SIGNAL	SpO_2 (NK)	Considerable body movement.	When the message is displayed frequently, check the patient condition and, if necessary, change the attachment site.
			The probe is not attached to the patient properly.	
*	SpO_2 MODULE ERROR	SpO_2 (NK/Nellcor/ Masimo)	SpO_2 hardware malfunction.	Turn off the monitor power, wait for a few minutes and turn on the power again. If the message still appears, contact your Nihon Kohden representative.
*	SpO_2-2 MODULE ERROR	SpO_2 (NK)	SpO_2 hardware malfunction.	Turn off the monitor power, wait for a few minutes and turn on the power again. If the message still appears, contact your Nihon Kohden representative.
*	SpO_2 NO PROBE	SpO_2 (NK)	The probe is not connected to the SpO_2 connection cord.	Connect the probe to the SpO_2 connection cord properly.
*	SpO_2-2 NO PROBE	SpO_2 (NK)	The probe is not connected to the SpO_2 connection cord.	Connect the probe to the SpO_2 connection cord properly.
–	SpO_2 WEAK PULSE	SpO_2 (NK/Masimo)	Poor peripheral circulation.	Check the patient condition and change the attachment site.
			The probe is attached too tightly and is obstructing the blood circulation.	Reattach the probe.
		SpO_2 (Masimo)	Low perfusion.	Check the patient condition and change the attachment site.
–	SpO_2-2 WEAK PULSE	SpO_2 (NK)	Poor peripheral circulation.	Check the patient condition and change the attachment site.
			The probe is attached too tightly and is obstructing the blood circulation.	Reattach the probe.
*	$tcPO_2/PCO_2$ ALARM	$tcPO_2/PCO_2$	Alarm occurring on the transcutaneous monitor.	Look at the transcutaneous monitor and remove the cause of the alarm.
*	$tcPO_2/PCO_2$ CHECK EXTERNAL DEVICE	$tcPO_2/PCO_2$	The transcutaneous monitor is disconnected from the bedside monitor.	Check the communication cable connection between the transcutaneous monitor and bedside monitor.
			Communication error between the bedside monitor and transcutaneous monitor.	Check the communication settings and the communication cable connection. Refer to the communication cable manual.
*	TEC DATA RECEIVE ERROR	System	Sending data is canceled on the defibrillator.	—
			Communication distance is too far.	Move the defibrillator closer and send data to the bedside monitor again.
			Radio waves interference	Keep the monitor away from electronic devices which emit strong radio waves.
*	TEC INTERFACE ALREADY CONNECTED	System	Two QI-670P interfaces are connected.	Remove the most recently connected QI-670P interface from the monitor.

	Screen Message	Parameter	Possible Cause/Criteria	Action
*	TEC INTERFACE DISCONNECTED	System	USB cable of the QI-670P interface is disconnected from the monitor.	Connect the USB cable of the QI-670P interface to the monitor.
*	TEC INTERFACE ERROR	System	Communication error between the QI-670P interface and monitor.	Reconnect the QI-670P interface to the monitor. If the problem still occurs, contact your Nihon Kohden representative.
			QI-670P interface error	
*	TEMP CHECK SENSOR	TEMP	The probe is disconnected from the TEMP socket or temperature connection cord is disconnected from the MULTI socket.	Connect the probe to the TEMP socket or the temperature connection cord to the MULTI socket properly.
			The probe or temperature connection cord is damaged.	Replace the probe or temperature connection cord with a new one.
			The measured value is outside the measuring range.	Check the probe attachment site.
*	TEMP CONNECTOR OFF	TEMP	The temperature connection cord is disconnected from the monitor.	Connect the temperature connection cord properly. When temperature monitoring is not necessary, press the [Silence Alarms] key to silence the alarm.
			The temperature connection cord is damaged.	Replace the temperature connection cord with a new one.
*	TEMP THIS LABEL IS ALREADY REGISTERED	TEMP	More than one temperature probe with the same label are used.	Set another label.
*	– – – THIS PARAMETER IS ALREADY REGISTERED	All parameters	More than the specified number of channels are used for a parameter.	Only use the specified number of channels.
*	TOF CHECK EXTERNAL DEVICE	TOF	The TOF-watch® SX is disconnected from the monitor.	Check the interface connection between the TOF-watch® SX and monitor.
*	TOF ALARM	TOF	There is an error on the TOF-watch® SX.	Check the TOF-watch® SX screen and remove the cause of the error.
*	TRANSMITTER CONNECTOR OFF	System	The connection cord of the transmitter is disconnected from the monitor.	Connect the connection cord properly.
–†	UNSPECIFIED ACCURACY‡	CO_2 (TG-950P/ 970P)	Temperature or pressure exceeds the operating environment.	—
–	UPDATING DATA	All parameters	Changing the parameter on the trend screen.	Wait until the message disappears.
*	VENT ALARM	VENT	Alarm occurring on the ventilator.	Check the ventilator and remove the cause of the alarm.
*	VENT CHECK EXTERNAL DEVICE	VENT	The ventilator is disconnected from the monitor.	Check the interface or communication cable connection between the ventilator and the monitor.

‡ When the TG-950P CO_2 sensor kit is used, the “UNSPECIFIED ACCURACY” message might not be displayed depending on the software version of the CO_2 sensor kit.

Troubleshooting

Monitoring

Trouble	Possible Cause/Criteria	Action
Cannot turn the power on.	The monitor is not connected to the AC outlet.	Connect the monitor to an AC outlet.
	Monitor malfunction.	Contact your Nihon Kohden representative.
	The remaining battery power is low.	Remove the battery pack and use AC power.
The screen is dark.	The brightness of the screen is not appropriate.	Adjust the setting on the BRIGHT window.
	The backlight is old.	Contact your Nihon Kohden representative.
	The monitor is operating on battery.	If necessary, set <POWER SAVE MODE> to OFF on the GENERAL window.
No sync sound.	The sync sound setting is turned OFF.	Select the ON button of <SYNC SOUND VOLUME>.
	The sync sound volume is turned down.	Adjust the volume setting on the VOLUME window.
	The sleep mode is turned on.	The sleep mode is turned off when: • An alarm occurs. • The touch screen is touched. • Key on the bedside monitor is pressed.
The time displayed on the upper right corner of the screen is not correct.	The date and time setting is not correct.	Set the correct date and time on the DATE window.
	The backup battery is old.	Check the date and time setting on the DATE window and turn the power of the monitor off and on. If the time is incorrect, replace the battery with a new one. Contact your Nihon Kohden representative.
The monitor is too hot.	The vent hole is obstructed.	Remove the cause.
The touch screen keys do not function.	The pressed position and activated position do not match.	Calibrate the touch screen.
The monitor only operates for less than 90 minutes (BSM-6301/BSM-6501) or 60 minutes (BSM-6701) with a fully charged battery.	The battery pack is old.	Replace the battery pack with a fully charged new one.
Some part of the review data is deleted or the time is incorrect.	The monitor was turned off during the system check screen display.	The remaining data may not be reliable. Delete all data.
Three pip sounds and the monitor restarts.	Monitor malfunction.	Contact your Nihon Kohden representative.
GF-110PA multigas unit, GF-120PA multigas/flow unit or AE-918P neuro unit is not recognized.	BSM-1700 series bedside monitor is mounted on the BSM-6301 bedside monitor, and GF-110PA multigas unit, GF-120PA multigas/flow unit or AE-918P neuro unit is connected to the multi-link socket.	The combination of BSM-6301 bedside monitor + BSM-1700 series bedside monitor + GF-110PA multigas unit, GF-120PA multigas/flow unit or AE-918P neuro unit is not possible. Replace the BSM-1700 series bedside monitor with an AY-600P series input unit if possible.

Network

Trouble	Possible Cause/Criteria	Action
The monitor cannot be connected to the network.	The network cable is not connected to the monitor properly.	Connect the network cable to the monitor properly.
	The network settings are not correct.	Set the correct network settings on the NETWORK window of the SYSTEM CONFIGURATION screen.
	The monitor is not selected as a monitored bed on the central monitor or receiving instrument.	Select the monitor as a monitored bed on the central monitor or receiving instrument.
	Discontinuity in the network cable or faulty hub.	Replace the network cable or the hub with a new one.
The “Lost communication with instruments in the network” message appears on the bedside monitor and the bedside monitor data cannot be monitored on the central monitor.	The <AVAILABLE ALARM TYPES> on the ALARM − DISPLAY/SOUND page of the SYSTEM SETUP window is set to ALL or <ARRHYTHMIA TYPE> on the PARAMETERS window of the SYSTEM SETUP window is set to EXTENDED on the bedside monitor but the central monitor software is old and so the central monitor cannot receive data from this bedside monitor.	To monitor this bedside monitor data on the central monitor, change the <AVAILABLE ALARM TYPES> setting to MAIN. If the bedside monitor still cannot communicate with the central monitor, change the <ARRHYTHMIA TYPE> setting to STANDARD on the bedside monitor. If possible, upgrade the central monitor software.

Transport in a Monitor Network

Trouble	Possible Cause/Criteria	Action
Cannot display data saved in the input unit* on the destination monitor.	The AY series input unit has no QM-600P memory unit installed.	The QM-600P memory unit must be installed in the AY series input unit to save data.
	The data or memory unit in the input unit* is damaged.	Replace the memory unit. Contact your Nihon Kohden representative.
	The software version of the main unit is old and the transport function cannot be used.	To use the transport function, the main unit software version must be 02-01 or later. When transporting data with the BSM-9101 bedside monitor, the BSM-9101 software version must be 08-74 or later.
	The software versions of the source BSM-6000 series bedside monitor main unit and destination BSM-6000 series bedside monitor main unit are different.	Upgrade both the source and destination BSM-6000 series bedside monitor main units to the same software version. To use the transport function, the main unit software version must be 02-01 or later. Contact your Nihon Kohden representative.
Cannot display waveforms on the full disclosure window.	The source and destination monitors have different parameters to be saved for full disclosure.	Select the same parameters to be saved for full disclosure on the source and destination monitors.
Cannot perform transport function using the central monitor network.	The software versions of the main unit and/or central monitor are old.	Transport function using the network is available with BSM-6000 series bedside monitor software version 02-02 or later and central monitor software version 01-77 or later.
Cannot send review data on the HEMO TREND page of the TREND window, RECALL window and 12 LEAD window to the central monitor.	The software versions of the main unit and/or central monitor are old.	To send the review data on the HEMO TREND page of the TREND window, RECALL window and 12 LEAD window, the BSM-6000 series bedside monitor software version must be 02-03 or later and central monitor software version must be 01-77 or later.

Trouble	Possible Cause/Criteria	Action
Cannot send review data on the ST window to the central monitor.	The software versions of the main unit and/or central monitor are old.	To send the review data on the ST window, the BSM-6000 series bedside monitor software version must be 02-10 or later and central monitor software version must be 01-77 or later.
Cannot display data on the aEEG window on the destination monitor.	Data on the aEEG window cannot be saved in the input unit*.	—

* The "input unit" means the AY-600P series input unit and the BSM-1700 series bedside monitor.

Remote Control

Trouble	Possible Cause/Criteria	Action
The remote control does not function.	The batteries in the remote control are old.	Replace the batteries with new ones.
	Wrong bed is selected.	Select the correct remote control channel of the bed.
	The display number on the remote control is not correct.	Select the correct display number.
Nothing appears on the display window of the remote control.	The batteries in the remote control are weak.	Replace the batteries with new ones.
LED on the remote control does not blink or light.	The batteries in the remote control are weak.	Replace the batteries with new ones.

Recording

Trouble	Possible Cause/Criteria	Action
There is no printing (only paper feeding).	The recording paper is upside down.	Reload the recording paper into the recorder correctly.
Recorder operates only some of the time.	Dust in the sensor inside the recorder.	Clean the surface of the sensor inside the recorder with a dry cotton swab.
Recording is faint.	The specified paper is not used.	Use the FQW50-2-100 recording paper.
	The thermal head is dirty.	Clean the thermal head with the thermal head cleaning pen.
Dots are missing.	The thermal head is dirty.	Clean the thermal head with the provided thermal head cleaning pen.
Recording suddenly starts without key operation.	Alarm recording or periodic recording mode is set to ON.	Set the alarm recording or periodic recording on the RECORD window to OFF if not needed. Press the [Record] key on the monitor to stop recording.
No paper is feeding.	The recorder door is open.	Push the recorder door closed until it clicks.
	Dust may have collected in the gears.	Contact your Nihon Kohden representative.
Waveforms can be recorded but the trend and list recording cannot.	The recording paper is upside down.	Reload the recording paper correctly.
	Dust in the sensor inside the recorder.	Clean the surface of the sensor inside the recorder with a dry cotton swab.

Printing

Trouble	Possible Cause/Criteria	Action
The monitor cannot be connected to the network printer.	The network cable is not connected to the monitor properly.	Connect the network cable to the monitor properly.
	The printer settings are not correct.	Set the correct settings on the PRINTER page of the RECORD window in the SYSTEM CONFIGURATION screen.

ECG

Trouble	Possible Cause/Criteria	Action
The heart rate is inaccurate.	The QRS amplitude is small.	Change the sensitivity so that the QRS amplitude is larger than 1 cm.
	The QRS is not detected correctly.	Change to a lead which provides good QRS.
		Change the lead or electrode position so that the QRS is large and T wave is small.
	The pacing detection setting on the ECG window is not appropriate.	When the patient does not have an implanted cardiac pacemaker or neonate's ECG is monitored, set the pacing detection to Off on the ECG window.
The arrhythmia alarm occurs frequently when heart rate is normal.	The dominant QRS is not appropriate for arrhythmia monitoring.	Re-learn the patient ECG or change the dominant QRS.
	Patient moved or EMG noise is superimposed.	Change the electrode position to where there is less muscle.
ECG waveform does not appear on the screen when electrodes are attached properly.	<NUMBER OF ELECTRODES> setting on the ECG window is not correct.	Set the correct number for <NUMBER OF ELECTRODES> setting.
AC interference on the ECG waveform.	An electrical blanket is used.	Use another warming method or place a shield cover around the electrical blanket.
	The electrode is dry.	Replace the electrode with a new one.
	<FILTERS> on the ECG window is set to DIAG.	Set <FILTERS> to MONITOR.
Baseline wandering.	The baseline is not stable due to respiration or body movement.	Change the electrode position to where there is less muscle.
	The electrode is dry.	Replace the electrode with a new one.
	The contact resistance between the skin and electrode is high.	Rub the skin with "skinPure" skin preparation gel.
	<FILTERS> on the ECG window is set to MONITOR or DIAG.	Set <FILTERS> to MAXIMUM.

Respiration

Impedance Method

Trouble	Possible Cause/Criteria	Action
The respiration waveform is not displayed on the screen.	<IMPEDANCE MEASUREMENT> on the RESP/CO_2 window is set to OFF.	Set <IMPEDANCE MEASUREMENT> to ON.
	Electrodes, electrode leads, ECG connection cord are not connected correctly.	Connect them properly.
	The electrode is dry.	Replace the electrode with a new one.
	The skin-electrode contact impedance is high.	Reduce the impedance by using “skinPure” skin preparation gel.
The respiration waveform and respiration rate are not stable.	The electrode positions are not appropriate for measuring respiration.	Check the attached position of the electrodes.
	The electrode is dry.	Replace the electrode with a new one.
	<NOISE REDUCTION ON IMPEDANCE RESP> is set to OFF and the respiration waveform amplitude is too small.	Change the sensitivity so that the amplitude is larger than 10 mm.
	<NOISE REDUCTION ON IMPEDANCE RESP> is set to ON and the timing of the respiration and heart rate coincide.	Set <NOISE REDUCTION ON IMPEDANCE RESP> on the SYSTEM SETUP window to OFF.
There is sine wave noise on the respiration waveform.	Equipotential grounding is not acquired.	Connect the equipotential ground terminal on the monitor to the equipotential ground terminal on the wall with the grounding lead.

Thermistor Method

Trouble	Possible Cause/Criteria	Action
The respiration waveform is not displayed on the screen.	Malfunction of the respiration pickup.	Replace the respiration pickup with a new one.
The amplitude of the respiration waveform is small or becomes a baseline.	When measuring at the nostrils, the position of the respiration pickup is not appropriate.	Attach the respiration pickup to a position where sufficient temperature changes can be seen.
	The respiration pickup for nose is used for measuring a patient with trachea tube inserted.	Measure with a respiration pickup for airway.
	The temperature difference between inspiration and expiration is small due to increase in temperature of the inspired air.	Use the impedance method.
The expiration and inspiration phases are reversed.	The inspiration temperature is higher than the expiration temperature.	Use the impedance method.
The respiration rate is not accurate.	The respiration waveform amplitude is too small.	Change the sensitivity so that the amplitude is larger than 10 mm.

CO_2

Mainstream Method

Problem	Possible Cause/Criteria	Action
The measured value is low.	CO_2 is mixed in the inspiration. (TG-900P/TG-920P only)	Refer to the CO_2 section.
	The airway adapter/nasal adapter is dirty.	Replace the adapter with a new one.
	The measurement is performed where atmospheric pressure is low, such as at high altitude. (TG-900P/TG-920P only)	Consider the atmospheric pressure when making evaluations.
	Zero calibration is not performed. (TG-950P/TG-970P only)	Calibrate the CO_2 sensor.
The measured value is high.	Anesthetic gas is used. N_2O: 2 L/min, sevoflurane: 1%	Set the correct inspired gas composition. Refer to the "On the GAS COMP Page" in CO_2 monitoring section.
The measured value is inaccurate.	Oscillation.	Check the respirator and remove the cause.
	Doing suction with a suction catheter in the airway adapter. (TG-900P/TG-920P only)	Do not let the suction catheter in the airway adapter.
	A Jackson Rees respiration circuit or Mapleson D respiration circuit is connected to the patient. (TG-900P/ TG-920P only)	Cannot measure correctly.
	The respiration rate of the patient is very high or respiration is irregular.	Cannot measure correctly.
The respiration waveform does not appear.	Oscillation.	Check the respirator and remove the cause.
	The airway adapter/nasal adapter is disconnected from the CO_2 sensor kit.	Connect the adapter to the CO_2 sensor kit.
The red LED on the CO_2 adapter blinks.	CO_2 sensor or CO_2 adapter is faulty. (TG-900P/TG-920P only)	Replace the CO_2 sensor or CO_2 adapter with a new one.
	Apnea for longer than 20 seconds. (TG-900P/TG-920P only)	The red LED blinks when apnea is longer than 20 seconds regardless of the alarm setting on the monitor.
The measured value is displayed as "---".	Less than three respirations are detected.	The measured value is displayed after three or more respirations are detected.
	After respiration detection, respiration is not detected for 40 seconds or more. The time depends on the APNEA setting.	The measured value is displayed after respiration is detected.
	Zero calibration is performed. (TG-950P/TG-970P only)	After zero calibration, the measured value is displayed as "---". The measured value is displayed after three or more respirations are detected.

Sidestream Method

Trouble	Possible Cause/Criteria	Action
Cannot measure CO_2	The FilterLine is clogged.	Replace the FilterLine with a new one.
	The exhaust gas adapter is clogged.	Remove the clog or replace the exhaust gas adapter with a new one.
	The CO_2 unit is faulty.	Contact your Nihon Kohden representative.
Low CO_2 value	The sample gas is leaking from the FilterLine connector.	Connect the FilterLine properly.
	The sample gas is leaking from the airway adapter.	Replace the airway adapter with a new one.
	The measuring sensitivity is not stable.	Perform CO_2 calibration.
High CO_2 value	The measuring sensitivity is not stable.	Perform CO_2 calibration.
The standby lamp on the CO_2 unit does not light.	The power cord is not connected to the CO_2 unit or AC outlet properly.	Connect the power cord properly. Refer to the AG-400R CO_2 unit manual.
The MEASURE lamp on the CO_2 unit does not light when the MEASURE switch is pressed to on.	The power cord is not connected to the CO_2 unit or AC outlet properly.	Connect the power cord properly. Refer to the AG-400R CO_2 unit manual.
	The interface cable is not connected properly.	Connect the connection cable to the CO_2 unit and bedside monitor properly. Refer to the AG-400R CO_2 unit manual.
	The bedside monitor to which the CO_2 unit is connected is not turned on.	Turn on the bedside monitor power.

When Using Microcap® Monitor or Micropod™ Module

Trouble	Possible Cause/Criteria	Action
The measured value for the external instrument (Microcap® monitor or Micropod™ module) is not displayed.	The external instrument is not connected to the bedside monitor.	Connect the external instrument to the bedside monitor with the following interface. Refer to the interface manual. Microcap® monitor: QF-921P interface Micropod™ module: QF-801P interface
	The interface is connected to a wrong socket on the external instrument.	Connect the interface to the correct socket. Refer to the interface manual.
	The communication settings do not match.	Set the correct communication setting. Refer to the interface manual.

SpO_2

Trouble	Possible Cause/Criteria	Action
Unstable SpO_2 value.	The probe size is inappropriate.	Use the correct size probe.
	The probe is attached to the same limb that is used for NIBP or IBP measurement.	Attach the probe to the other limb.
	An ESU is used.	Locate the ESU as far as possible from the probe and wait until the pulse wave stabilizes.
	Measuring on the venous pulse.	Cannot measure correctly.
SpO_2 value on the monitor and CO oximeter do not match.	The probe is not attached properly.	Attach the probe correctly. (The emitter and detector of the probe must face each other.)
	The attachment site is inappropriate.	Attach the probe to a site 6 to 14 mm thick.
	The measuring site is not clean.	If necessary, remove nail polish and clean the measuring site.
	Too much abnormal hemoglobin (HbCO, MetHB, etc.).	Cannot measure correctly.
	Dye (methylene blue or indocyanine green) is injected in the blood.	Cannot measure correctly.
	Measuring during CPR.	Cannot measure correctly.
Probe is damaged.	Probe is disinfected by an unspecified procedure.	Disinfect the probe using the specified method.
	The probe is repeatedly used.	Replace the probe with a new one when the probe is deteriorated.
Sine wave noise on the pulse wave.	Light interference.	Cover the attachment site with a blanket.
	The line frequency setting on the monitor is not correct.	Set the correct line frequency on the monitor.
No SpO_2 data on the screen when using Nellcor probe.	The SpO_2 connection cord other than JL-650P is used.	Only the JL-650P SpO_2 connection cord can be used with Nellcor probe.
No SpO_2 data on the screen when using Masimo probe.	The SpO_2 probe and/or connection cord other than specified is used.	Only use the specified SpO_2 probe and connection cord.
	The probe is not connected to the connection cord correctly.	Connect the probe to the connection cord with the logo labels facing the same direction.
No SpO_2-2 data on the screen when using Nihon Kohden probe.	The JL-500P1 or JL-500P2 SpO_2 adapter is disconnected from the monitor or probe.	Connect the SpO_2 adapter to the monitor and probe.
	The MULTI socket on the AY-660P input unit is used for SpO_2-2 monitoring.	SpO_2-2 cannot be monitored by the MULTI socket on the AY-660P input unit. Use the MULTI socket on the AA-672P or AA-674P smart expansion unit or JA-694PA data acquisition unit.

When Using Nellcor or Masimo Pulse Oximeter

Trouble	Possible Cause/Criteria	Action
The SpO_2 measured values of the pulse oximeter are not displayed.	The pulse oximeter is not connected to the bedside monitor.	Connect the pulse oximeter to the bedside monitor with the communication cable. Refer to the communication cable manual.

NIBP

Trouble	Possible Cause/Criteria	Action
Cuff inflation pressure is less than 10 mmHg or NIBP data display disappears for a few seconds.	The air hose is not connected to the cuff socket properly.	Connect the air hose to the socket properly.
	The cuff is not wrapped around the arm or is wrapped too loosely.	Wrap the cuff around the upper arm.
The cuff does not inflate when the [NIBP Start/Stop] key is pressed.	The cuff hose is not connected to the cuff socket.	Connect the cuff hose to the socket firmly.
	The cuff hose or air hose may be folded or squeezed when the cuff pressure display on the screen increases quickly but the actual cuff does not inflate.	Check the cuff hose and air hose.
Abnormal measurement results are displayed.	The cuff size is not correct.	Select the cuff which fits the patient's limb circumference.
	The cuff is not wrapped around the arm correctly.	Wrap the cuff around the upper arm, not too tightly or too loosely.
	Body movement.	Prevent the patient from moving during measurement.
	Measurement on the wrong site.	Measure NIBP at the correct site.
The cuff is suddenly deflated during inflation.	The [NIBP Start/Stop] key is pressed during inflation.	—
Auto measurement does not start even when the time interval has passed.	The time interval for the NIBP auto measurement is set incorrectly.	Set the correct time interval.
The cuff suddenly inflates.	The measurement mode is set to auto mode.	Check the time interval.
	NIBP measurement is triggered by PWTT. (PWTT is only available on the AY-660P, AY-661P, AY-663P, AY-671P or AY-673P input unit or the BSM-1763 or BSM-1773 bedside monitor and SpO_2 is monitored with Nihon Kohden probe.)	Set PWTT on the NIBP window to Off when measuring NIBP with PWTT is not necessary.
Cannot connect cuff to the air hose.	Unspecified cuff is used.	Use a cuff specified by Nihon Kohden.
Cannot measure NIBP.	Noise which disables calculation of the blood pressure has interfered.	Remove the cause.
	The air hose is bent or squeezed.	Remove the cause.
	The cuff has worn out.	Use a new cuff.
Blood congestion occurs.	Measuring over a long period of time at intervals less than 2.5 minutes.	Increase the measuring interval.
		Do not measure NIBP over a long time.
Thrombus occurs.	Measuring a patient with known bleeding disorders or a sickle anemia patient.	Do not perform NIBP measurement on such a patient.
NIBP data on the screen is dark or "---" appears.	The time set at <TIME UNTIL DATA IS OLD> on the SYSTEM SETUP window elapsed from the last measurement.	When NIBP is measured again, the data is displayed in normal brightness.

IBP

Trouble	Possible Cause/Criteria	Action
The acquired blood pressure value is different from the estimated value.	Air bubbles remain in the circuit.	Remove the air bubbles.
	An extra tube is connected in the circuit.	Remove the extra tube.
	The position of the blood pressure transducer is inappropriate.	Check the position of the blood pressure transducer.
	A blood pressure transducer with different sensitivities is used.	Check the blood pressure transducer.
	Other causes.	Perform zero balance adjustment again.
No invasive blood pressure value appears on the screen.	The measurement is out of range.	Check the measuring condition.
	The blood pressure transducer is damaged.	Replace the blood pressure transducer with a new one.
No waveform is output from the ECG/BP OUTPUT socket.	IBP is monitored only using the MULTI sockets on the JA-690PAor JS-694PA data acquisition unit.	IBP signal from one of the MULTI sockets is used for BP output. Connect IBP to the MULTI socket for BP output.
The measurement data is displayed as 0 mmHg when the JP-911P IBP connection cord is used.	JP-911P IBP connection cord is damaged.	Replace the JP-911P IBP connection cord with a new one.

Temperature

Trouble	Possible Cause/Criteria	Action
The temperature value is not displayed on the screen.	The temperature probe or temperature connection cord is faulty.	Replace the temperature probe or temperature connection cord with a new one.
	Monitor malfunction.	Contact your Nihon Kohden representative.

BIS

When Using BIS Processor/BISx

Trouble	Possible Cause/Criteria	Action
Nothing appears on the BIS window.	BIS processor or BISx failure.	Replace the BIS processor or BISx with a spare if available and contact you Nihon Kohden representative.

When Using BIS Monitor

Trouble	Possible Cause/Criteria	Action
The measured value for the BIS monitor is not displayed.	The BIS monitor is not connected to the bedside monitor.	Connect the BIS monitor to the bedside monitor with the QF-902P interface. Refer to the QF-902P interface manual.
	The interface is connected to a wrong socket on the BIS monitor.	Connect the interface to the correct socket. Refer to the QF-902P interface manual.
	The communication settings do not match.	Set the correct communication setting. Refer to the QF-902P interface manual.

Cardiac Output

Trouble	Possible Cause/Criteria	Action
Infarction occurs.	The balloon burst.	Remove the catheter from the patient, treat the infarction and insert the new catheter into the patient. Check that the balloon is not damaged before use.
No CO data on the screen.	The MULTI socket on the AY-660P input unit is used for CO monitoring.	CO cannot be monitored by the MULTI socket on the AY-660P input unit. Use the MULTI socket on the other unit.

GAS

When Using AG-920R Multigas Unit

Trouble	Possible Cause/Criteria	Action
The power lamp on the rear panel of the multigas unit does not light.	The power cord is not connected to the multigas unit properly.	Connect the power cord properly. Refer to the AG-920R multigas unit manual.
	The power cord is not connected to the AC outlet properly.	
The MEASURE lamp on the front panel of the multigas unit does not light.	The power cord is not connected properly.	Connect the power cord properly. Refer to the AG-920R multigas unit manual.
	The interface cable is not connected to the multigas unit and main unit of the bedside monitor properly.	Connect the interface properly. Refer to the QF-904P interface manual.
The "Warming up" message does not disappear.	The sampling tube or exhaust gas adapter is bent.	Correct the bent portion and turn on a power supply again.
	The water trap or sampling line is kinked or blocked.	Replace with a new one.
	The multigas unit is not connected properly.	Connect the sampling gas exhaust outlet of the multigas unit to the scavenging system of the anesthetic machine properly.
The measured value is too low.	The sampling gas is leaking from a sampling tube, airway adapter or water trap.	Check that the water trap or sampling line is connected properly. Replace with a new one if necessary.
	The measurement sensitivity has shifted.	Perform gas calibration.
The measured value is too high.	The measurement sensitivity has shifted.	Perform gas calibration.

When Using GF-110PA Multigas Unit or GF-120PA Multigas/Flow Unit

Trouble	Possible Cause/Criteria	Action
The measured value and waveform are not displayed on the screen.	The multi-link cable is not connected to the monitor and multigas/flow unit properly.	Connect the multi-link cable properly.
	The software of the monitor does not correspond to the multigas/flow unit.	Contact your Nihon Kohden representative.
The "GAS WARMING UP" message does not disappear.	The sampling tube or exhaust gas tube is bent.	Correct the bent portion and turn on the power supply again.
	The water trap or sampling line is kinked or blocked.	Replace with a new one.
	The exhaust gas tube is directly connected to an aspirator.	Connect the sampling gas exhaust outlet of the multigas/flow unit to the scavenging system of the anesthetic machine properly.
	Multigas/flow unit failure.	Contact your Nihon Kohden representative.

Trouble	Possible Cause/Criteria	Action
Gas calibration cannot be done.	Ten minutes have not passed since the power was turned on.	Perform gas calibration when one hour has passed since the power was turned on.
	The calibration gas is not flowing.	Flow the calibration gas.
	Multigas/flow unit failure.	Contact your Nihon Kohden representative.
The measured density of gas is low.	The sampling gas is leaking from the sampling line or T-piece.	Check that the sampling line or T-piece is connected properly. Replace with a new one if necessary.
	When an unspecified sampling line is used, accurate measurement is not possible and the gas may adsorb into the inner wall of the tube.	Use a Nihon Kohden specified sampling line.
	The measurement sensitivity has shifted.	Perform gas calibaration.
The measured density of gas is high.	When an unspecified sampling line is used, accurate measurement is not possible and the gas may adsorb into the inner wall of the tube.	Use a Nihon Kohden specified sampling line.
	The measurement sensitivity has shifted.	Perform gas calibaration.
	Pressure in the gas cylinder is low (less than 0.17 mPa at 200 mL/min) when the sensitivity calibration is done.	Replace with new calibration gas and calibrate again.
Anesthetic gas name displayed on the bedside monitor is different from the actual gas.	Nearby device is generating a strong noise.	Connect the noise-causing device to a different power source than the multigas/flow unit and monitor. Put the multigas/flow unit and monitor and the device that generates strong noise far away from each other.
	An unspecified power cord is used.	Use a Nihon Kohden specified power cord.
	The sampling line does not meet specifications.	Replace with a specified sampling line.
	Multigas/flow unit failure.	Contact your Nihon Kohden representative.

When Using GF-210R Multigas Unit or GF-220R Multigas/Flow Unit

Trouble	Possible Cause/Criteria	Action
No measured data displayed on the screen.	<GAS MEASUREMENT> on the GAS window is OFF.	Set the <GAS MEASUREMENT> on the GAS window to ON.
	The water trap is not attached properly. The sampling line is not connected properly.	Attach the water trap properly. Make sure that the water trap is securely attached to the unit. Connect the sampling line properly.
	The flow tube is disconnected from the unit. (GF-220R only)	Connect the flow tube to the unit securely.
The “GAS WARMING UP” message does not disappear.	The unit is still warming up.	Wait for the warm up to complete. Warming up takes about 6 minutes.
	Unit failure.	Contact your Nihon Kohden representative.
“---” is displayed on the screen.	The unit is still warming up.	Wait for the warm up to complete. Normally measurement value is displayed on the screen during warming up, “---” may appear due to calibration during warming up.
	Zeroing.	Wait for the zeroing to complete. “---” is displayed for GAS on the screen during zeroing.
	There is an alarm for a faulty unit.	Look at the multigas unit and remove the cause of alarm.

Trouble	Possible Cause/Criteria	Action
The measured value of is low.	—	Check the measurement accuracy. For details on the measurement accuracy check, refer to the Service Manual.
	The sampling gas is leaking from the sampling line or T-piece.	Check that the sampling line or T-piece is connected properly. Replace with a new one if necessary.
	An unspecified sampling line is used.	Use a Nihon Kohden specified sampling line. When an unspecified sampling line is used, accurate measurement is not possible and the gas may be absorbed into the inner wall of the tube.
	Patient's ventilation conditions are bad.	Check the patient's ventilation conditions. $ETCO_2$ may be less than $PaCO_2$ depending on the patient's ventilation conditions.
	Faulty anesthetic machine.	Contact the representative for the anesthetic machine.
	The measurement sensitivity has shifted (faulty unit).	Contact your Nihon Kohden representative.
The measured value of gas is high.	—	Check the measurement accuracy. For details on the measurement accuracy check, refer to the Service Manual.
	An unspecified sampling line is used.	Use a Nihon Kohden specified sampling line. When an unspecified sampling line is used, accurate measurement is not possible and the gas may be absorbed into the inner wall of the tube.
	Faulty anesthetic machine.	Contact the representative for the anesthetic machine.
	The measurement sensitivity has shifted (faulty unit).	Perform gas calibration.
Anesthetic gas name displayed on the screen is different from the actual gas.	Nearby device is causing strong noise interference.	Connect the noise-causing device to a different power source than the unit and monitor. Put the unit and the monitor far away from the device that generates noise.
	Spray is used around the unit.	Ventilate the air in the room.
	An unspecified power cord is used.	Use a Nihon Kohden specified power cord.
	An unspecified sampling line is used.	Use a Nihon Kohden specified sampling line.
	Faulty unit.	Contact your Nihon Kohden representative.

O_2

Trouble	Possible Cause/Criteria	Action
The measured value is abnormal.	The direction of the oxygen sensor changed considerably after calibration.	Face the oxygen sensor downwards and calibrate again.
	Peripheral equipment problem.	Check the state of the equipment connected to the patient.
The measured value appears "– – –".	The oxygen sensor is not calibrated.	Calibrate the oxygen sensor.
	The oxygen sensor is deteriorated.	Replace the oxygen sensor with a new one.
No O_2 data on the screen.	The MULTI socket on the AY-660P input unit is used for O_2 monitoring.	O_2 cannot be monitored by the MULTI socket on the AY-660P input unit. Use the MULTI socket on the other unit.

Ventilation

Trouble	Possible Cause/Criteria	Action
The measured value for the ventilator is not displayed.	The ventilator is not connected to the bedside monitor.	Connect the ventilator to the bedside monitor with the interface or communication cable. Refer to the QF series interface or IF series communication cable manual.
	The interface or communication cable is connected to a wrong socket on the ventilator.	Connect the interface or communication cable to the correct socket. Refer to the QF series interface or IF series communication cable manual.
	The communication settings do not match.	Set the correct communication setting. Refer to the QF series interface or IF series communication cable manual.
	The value is out of display range.	Check the measured data on the ventilator screen.

TOF

Trouble	Possible Cause/Criteria	Action
The TOF measured value is not displayed.	The TOF-watch® SX is not connected to the bedside monitor.	Connect the TOF-watch® SX to the bedside monitor with the QF-909P interface. Refer to the QF-909P interface manual.

CCO

When Using APCO/IBP Processor

Trouble	Possible Cause/Criteria	Action
The acquired value is different from the estimated value.	Air bubbles remain in the circuit.	Remove the air bubbles.
	An extra tube is connected in the circuit.	Remove the extra tube.
	The position of the FloTrac sensor is inappropriate.	Check the position of the FloTrac sensor.
	APCO/IBP processor and FloTrac sensor are not connected properly.	Connect the APCO/IBP processor and FloTrac sensor properly.
	Other causes.	Perform zero balance adjustment again.
The measured value for the APCO/IBP processor is not displayed.	The patient's gender, age and/or BSA are not entered.	Enter the patient's gender, age and/or BSA.
	The patient's gender, age and/or BSA are out of range.	Check the patient's gender, age and/or BSA. Enter the patient information correctly.
	Zero balance is not adjusted.	Adjust zero balance.
	APCO/IBP processor and FloTrac sensor are not connected properly.	Connect the APCO/IBP processor and FloTrac sensor properly.
	The measured value is out of range.	Check the measurement condition.
	The FloTrac sensor is damaged.	Replace the FloTrac sensor with a new one.
IBP waveform is not displayed.	APCO/IBP processor and FloTrac sensor are not connected properly.	Connect the APCO/IBP processor and FloTrac sensor properly.

When Using PiCCO Monitor

Trouble	Possible Cause/Criteria	Action
The measured value for the PiCCO monitor is not displayed.	The PiCCO monitor is not connected to the bedside monitor.	Connect the PiCCO monitor to the bedside monitor with the QF-911P interface. Refer to the QF-911P interface manual.
	The interface is connected to a wrong socket on the PiCCO monitor.	Connect the interface to the correct socket. Refer to the QF-911P interface manual.
	The communication settings do not match.	Set the correct communication setting. Refer to the QF-911P interface manual.

When Using Other CCO Monitors

Trouble	Possible Cause/Criteria	Action
The measured value for the CCO monitor is not displayed.	The CCO monitor is not connected to the bedside monitor.	Connect the CCO monitor to the bedside monitor with the QF-903P interface or IF-922P, IF-946P or IF-948P communication cable. Refer to the QF-903P interface or IF-922P, IF-946P or IF-948P communication cable manual.
	The communication cable is connected to a wrong socket on the CCO monitor.	Connect the interface to the correct socket. Refer to the QF-903P interface or IF-922P, IF-946P or IF-948P communication cable manual.
	The communication settings do not match.	Set the correct communication setting. Refer to the QF-903P interface or IF-922P, IF-946P or IF-948P communication cable manual.

FLOW/Paw

When Using GF-120PA Multigas/Flow Unit

Trouble	Possible Cause/Criteria	Action
The measured value and waveform are not displayed on the screen.	<FLOW/Paw MEASUREMENT> on the FLOW/Paw window is OFF.	Set the <FLOW/Paw MEASUREMENT> on the FLOW/Paw window to ON.
	The flow tube is not connected to the multigas/flow unit properly.	Connect the flow tube properly.
The accuracy of the measured C (Compliance) and R (Airway Resistance) are low.	In the following cases, C and R can not be measured accurately. • Patient with spontaneous breathing. • Auto PEEP is applied. • Flow gas is leaking.	—
The accuracy of the measured flow is low.	The flow gas is leaking from a flow adapter, flow tube or respiration circuit.	Check that the flow adapter, flow tube and respiration circuit are connected properly. Replace with a new one if necessary.
	The settings of temperature and humidity are not set on the monitor.	Set the temperature and humidity in the flow adapter.
	The settings of gas composition are not set on the monitor. When the anesthetic gas is not monitored at the same time, it is necessary to set the gas composition manually.	Set the gas composition in the flow adapter.

When Using GF-220R Multigas/Flow Unit

Trouble	Possible Cause/Criteria	Action
The measured value and waveform are not displayed on the screen.	The flow tube is not connected to the unit properly.	Connect the flow tube properly.
"---" is displayed on the screen.	Respiration is not detected.	The measurement value is displayed after the 3 breaths are detected.
The accuracy of the measured C (Compliance) and R (Airway Resistance) are low.	In the following cases, C and R cannot be measured accurately. • Patient with spontaneous breathing. • Auto PEEP is applied. • Flow gas is leaking.	—
The accuracy of the measured airway volume is low.	—	Check the measurement accuracy. For details on the measurement accuracy check, contact your Nihon Kohden representative.
	The flow gas is leaking from a flow adapter, flow tube or respiration circuit.	Check that the flow adapter, flow tube and respiration circuit are connected properly and not leaking. Replace the flow adapter or flow tube with a new one if necessary.
	Water droplets are on the flow tube.	Replace the flow tube with the new one.
	The settings of temperature and humidity are not set on the monitor.	Set the temperature and humidity in the flow adapter.
	The gas composition are not set on the monitor. When the anesthetic gas is not monitored at the same time, it is necessary to set the gas composition manually.	Set the gas composition in the flow adapter.
	Faulty unit.	Contact your Nihon Kohden representative.

EEG

Trouble	Possible Cause/Criteria	Action
Noise or artifacts superimposed on the waveforms.	The electrode lead is damaged.	Check that the electrode leads are not damaged.
	The Z electrode is not attached to the patient.	Attach the Z electrode.
	The 1 and 2 electrodes (JE-906P) or EEG1 (+) and EEG1 (–) electrodes (JE-905P) are not used.	Use the 1 and 2 electrodes (JE-906P) or EEG1 (+) and EEG1 (–) electrodes (JE-905P).
	The bed is not grounded.	When the bed is metallic, ground it.
	The monitor is not grounded.	Ground the monitor. Make sure that the provided power cord is used.
	Several ME instruments are used on the patient.	Perform equipotential grounding.
	There is an AC outlet or table tap near the patient or bed.	Arrange the measurement environment so that there is no influence from an AC power line.
	A desk lamp or fluorescent light is turned on.	Turn the desk lamp or fluorescent light off.
	The patient is touching some metal part.	Patient must not touch any metal part.
	An electric blanket is used.	Turn the electric blanket off and use another warming method.
	There is a cell phone or radio near the patient.	Turn the cell phone or radio off.
The waveform is not stable.	The Z electrode is not attached to the patient.	Attach the Z electrode to the patient.
	The 1 and 2 electrodes (JE-906P) or EEG1 (+) and EEG1 (–) electrodes (JE-905P) are not used.	Use the 1 and 2 electrodes (JE-906P) or EEG1 (+) and EEG1 (–) electrodes (JE-905P).
	New and old electrodes or different types of electrodes are used together.	Do not use the new and old electrode or different types of electrodes together. This may cause high polarization voltage.
Sometimes the waveform becomes flat.	The electrodes are not attached to the patient correctly.	Check the electrode attachment. Clean the electrode attachment to reduce impedance.

$tcPO_2$/$tcPCO_2$

Trouble	Possible Cause/Criteria	Action
The measured value for the transcutaneous monitor is not displayed.	The transcutaneous monitor is not connected to the bedside monitor.	Connect the transcutaneous monitor to the bedside monitor with the IF-913P or IF-914P communication cable. Refer to the IF-913P or IF-914P communication cable manual.
	The communication cable is connected to a wrong socket on the transcutaneous monitor.	Connect the communication cable to the correct socket. Refer to the IF-913P or IF-914P communication cable manual.
	The communication settings do not match.	Set the correct communication setting. Refer to the IF-913P or IF-914P communication cable manual.

rSO_2

Trouble	Possible Cause/Criteria	Action
The rSO_2 measured value is not displayed.	The cerebral/somatic oximeter is not connected to the bedside monitor correctly.	Connect the cerebral/somatic oximeter to the bedside monitor with the IF-937P communication cable. Refer to the IF-937P communication cable manual.

Anesthesia

Trouble	Possible Cause/Criteria	Action
The measured value for the anesthetic machine is not displayed.	The anesthetic machine is not connected to the monitor.	Connect the anesthetic machine to the monitor with the communication cable. Refer to the communication cable manual.
	The communication cable is connected to a wrong socket on the anesthetic machine.	Connect the communication cable to the correct socket. Refer to the communication cable manual.
	The communication settings do not match.	Set the correct communication setting. Refer to the communication cable manual.

Transmitter

Trouble	Possible Cause/Criteria	Action
"SIGNAL LOSS" message appears on the receiving monitor.	The sending monitor power is off.	Turn on the power of the sending monitor. When operating on battery, change to the fully charged battery.
	Telemetry reception failure.	Contact your Nihon Kohden representative.

12 Lead ECG

Trouble	Possible Cause/Criteria	Action
12 lead analysis result is not correct.	There was body movement when the waveforms for analysis were taken in.	Have the patient relax and perform analysis again.
	Electrodes were detached.	Attach the electrodes properly and perform analysis again.
	Patient's gender is not entered for the patient information.	Enter the patient's gender. When the patient's gender is not specified, the analysis is performed with the patient as male.
	Patient's date of birth is not entered for the patient information.	Enter the patient's date of birth. When the patient's date of birth is not entered, the analysis is performed with the patient as 35 years old.

aEEG

Trouble	Possible Cause/Criteria	Action
EEG waveforms are not displayed on the aEEG window.	EEG is not selected for the parameter to save on the FULL DISC window.	Select the EEG for the parameter to save on the FULL DISC window.

Maintenance

The bedside monitor contains parts which gradually deteriorate with use. Original performance might not be delivered if any part of the bedside monitor is deteriorated. Perform regular maintenance checks to assure continued safe operation.

CAUTION

Before maintenance, cleaning or disinfection, turn the bedside monitor main unit power off and disconnect the power cord from the AC socket. Failure to follow this instruction may result in electrical shock and bedside monitor main unit malfunction.

CAUTION

If fluids are accidentally spilled into the monitor, take the monitor out of service and contact your Nihon Kohden representative. The monitor must be disassembled, cleaned, dried and tested for safety and function.

CAUTION

Never disassemble or repair the monitor. If there is any problem with the monitor, contact your Nihon Kohden representative.

CAUTION

Dispose of Nihon Kohden products according to your local laws and your facility's guidelines for waste disposal. Otherwise, it may affect the environment. If there is a possibility that the product may have been contaminated with infection, dispose of it as medical waste according to your local laws and your facility's guidelines for medical waste. Otherwise, it may cause infection.

NOTE:

- Refer to the manual for each option for cleaning and disinfecting together with this manual.
- Follow the cleaning and disinfecting procedure in this section.
- Follow the directions of the gas provider for disposal of used calibration gas.

MU-631R, MU-651R and MU-671R Main Unit

Cleaning and Disinfecting the Main Unit

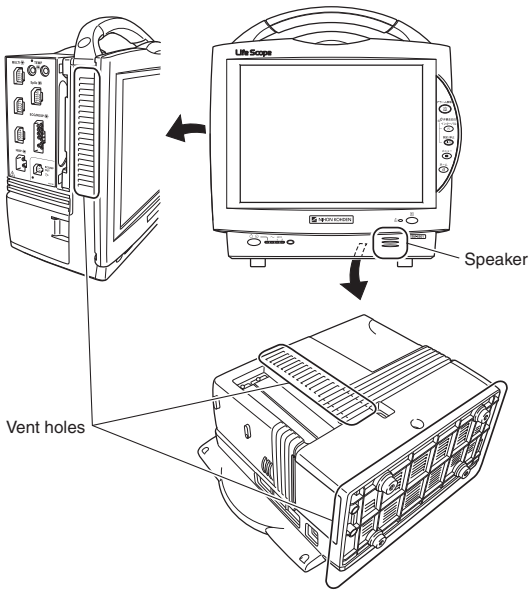
Before cleaning, turn off the main unit and disconnect the power cord.

After cleaning, let dry completely before connecting the power cord and turning on the main unit.

CAUTION

- Do not use volatile liquids such as thinner or benzine, because these will cause the materials to melt or crack.
- The main unit is not waterproof. Be careful not to let any water get inside the main unit.
- Never sterilize the main unit because the materials may deform, crack or discolor.

Cleaning



Clean the surface of the main unit every month with a soft cloth moistened with neutral soap, water or alcohol (15°C (75°F), 76.9 to 81.4% by vol), and wipe with a dry cloth or gauze.

Remove dust from the speaker and vent holes on the panels with a cotton swab.

Disinfecting

To disinfect the outside surface of the main unit, wipe it with a non-abrasive cloth moistened with any of the disinfectants listed below. Use the recommended concentration.

Disinfectant	Concentration (%)
Chlorhexidine gluconate solution	0.5
Benzethonium chloride solution	0.2
Glutaraldehyde solution	2.0
Benzalkonium chloride	0.2
Alkyldiaminoethylglycine hydrochloride	0.5

Cleaning the Touch Screen

Before cleaning the touch screen, disable touch keys.

1. Display the TOUCH KEYS OFF window.
   Press the [Menu] key → TOUCH KEYS OFF key.

2. Touch the YES key to turn the touchkey function off. Touch the NO key to not turn the touchkey function off.

To turn the touchkey function on again, do any of the following.

- Press the [Silence Alarms] key
- Press the [NIBP Interval] key
- Press the [NIBP Start/Stop] key
- Press the [Menu] key
- Press the [Home] key
- Press the [Record] key

When the touchkey function is turned on by pressing a hard key, the function of that hard key is also performed. For example, if the ⏀/⏁ [NIBP Start/Stop] key is pressed, NIBP measurement in manual mode is performed.

Clean the touch screen using a dry soft cloth or a cloth which is moistened with neutral detergent and wrung out.

NOTE:
- Do not use a rough cloth.
- Do not use acidic, alkaline detergents or alcohol other than ethanol or isopropyl.

Disposing of the Main Unit

Remove the battery packs when disposing of the main unit. For detailed information about disposal, contact your Nihon Kohden representative.

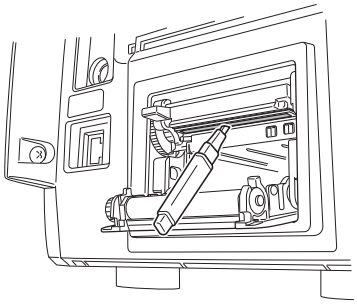
WS-671P Recorder Module

CAUTION

- Do not touch the recording head with any hard object. When the head is tapped with hard object, the head may crack and the heater element wire may break.
- Clean the head surface with the provided head cleaner pen before loading new paper. After a period of usage, paper dust may accumulate between the paper and the head surface and good printing cannot be obtained.
- Be careful not to cut yourself with the paper cutter on the recorder.

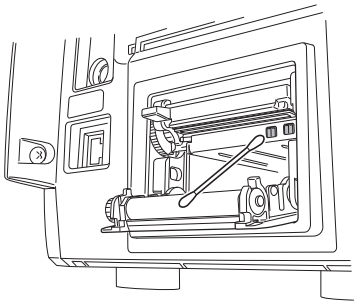
Cleaning the Thermal Head

To protect the thermal head from abrasion or damage and assure optimum performance and long service life, clean the surface of the head with the provided thermal head cleaning pen after every 10 to 15 sets of recording paper.



1. Push up the recorder door release lever and open the recorder door.
2. Clean the gold-colored part of the thermal head with the thermal head cleaning pen.

Cleaning the Sensors



The paper empty sensor and mark sensors are located as shown at the left. Clean the sensor surfaces with a cotton swab.

Disposing of the Recorder Module

For detailed information about disposal, contact your Nihon Kohden representative.

AY Series Input Unit and AA-672P/AA-674P Smart Expansion Unit

Cleaning and Disinfecting the Units

Clean and disinfect the units in the same way as cleaning and disinfecting the MU-631R/MU-651R/MU-671R main unit. Refer to the "MU-631R, MU-651R and MU-671R Main Unit" section.

Disposing of the Units

For detailed information about disposal, contact your Nihon Kohden representative.

BSM-1700 series Bedside Monitor

Refer to the manuals of the BSM-1700 series bedside monitor.

SB-671P Battery Pack

Battery Lifetime

The battery pack can be used for approx. 200 cycles of full discharging/charging or one year whichever comes first.

Replacing the Batteries

Replace the batteries with a new one after 200 cycles of discharging/charging or after one year whichever comes first.

Disposing of Batteries

Before disposing of the batteries, check with your local solid waste officials for details in your area for recycling options or proper disposal. For detailed information about disposal, contact your Nihon Kohden representative.

RY-910P Remote Controller

Cleaning and Disinfecting the Remote Controller

Clean and disinfect the remote control in the same way as cleaning and disinfecting the MU-631R/MU-651R/MU-671R main unit. Refer to the "MU-631R, MU-651R and MU-671R Main Unit" section.

Disposing of the Remote Controller

Follow your local laws for disposing of the remote controller.

Replacing the Batteries

Replace the batteries when the batteries are discharged.

Disposing of Batteries

Before disposing of the batteries, check with your local solid waste officials for details in your area for recycling options or proper disposal.

QF series Interface and IF series Communication Cable

Cleaning and Disinfecting the Interface and Communication Cable

Clean and disinfect the interfaces and communication cables in the same way as cleaning and disinfecting the MU-631R/MU-651R/MU-671R main unit. Refer to the "MU-631R, MU-651R and MU-671R Main Unit" section.

Disposing of the Interface and Communication Cable

For detailed information about disposal, contact your Nihon Kohden representative.

Leads, Cables and Cords

NOTE:

- Do not touch the socket pin.
- Do not wet the socket.

Cleaning the Leads, Cables and Cords

Wipe with a soft cloth moistened with neutral soap, water or alcohol and wipe with a dry cloth or gauze.

Disinfecting the Leads, Cables and Cords

Wipe with a non-abrasive cloth moistened with any of the disinfectants listed below. Use the recommended concentration.

Disinfectant	Concentration (%)
Chlorhexidine gluconate solution	0.5
Benzethonium chloride solution	0.2
Glutaraldehyde solution	2.0
Benzalkonium chloride	0.2
Alkyldiaminoethylglycine hydrochloride	0.5

Disposing of Leads, Cables and Cords

For detailed information about disposal, contact your Nihon Kohden representative.

Electrodes, Probes, Cuffs, Thermistors, Transducers, Catheters and Other Consumables

See the instructions supplied with the item. Do not reuse disposable items. For detailed information about disposal, contact your Nihon Kohden representative.

Periodic Inspection

If the periodic inspection is not performed, degradation or loss of function may go unnoticed and lead to misdiagnosis.

Service personnel should perform the periodic inspection at least once every year. Make sure that the bedside monitor operates properly and replace the consumables.

If you found abnormalities as a result of inspection and the bedside monitor is suspected to be faulty, attach an “Unusable” or “Repair request” label to the bedside monitor and contact your Nihon Kohden representative. For inspection, refer to the Service Manual.

Check the following items every year to keep your monitor in optimal condition.

- Monitor is not dirty, damaged or rusty.
- No key or switch is broken.
- No damage to the sockets on the monitor.
- Power cord is not damaged.
- Grounding lead is properly connected.
- Screen is clean.
- Screen brightness can be adjusted.

- Screen display is correct.
- Clock is correct.
- SYSTEM SETUP settings are correct.
- The specified electrodes, sensors, transducers and probes are used.
- Recorder (option) operates properly when used.
- The specified recording paper is used.
- The printed date is correct.
- Alarm and sync sound can be heard clearly.
- Alarm setting is correct and functions properly.
- Alarm indicator lamps light.
- The sync sound is produced and sync mark is displayed.
- The blood pressure zero balance is performed.
- The blood pressure label is attached to the connection cord connector.
- The correct values are obtained for invasive blood pressure, CO_2 and O_2 in the calibration by the specified mercury manometer and calibration gas.
- No current leakage.
- Supplied voltage is correct.
- Measurement accuracy is within the specified range.
- Only the specified parts are used.

Safety Information for Maintenance on Optional Units

AG-920R, GF-110PA or GF-210R Multigas Unit and GF-120PA or GF-220R Multigas/Flow Unit

CAUTION

Before maintenance, cleaning or disinfection, turn the multigas unit power off and disconnect the power cord from the AC socket. Failure to follow this instruction may result in electrical shock and multigas unit malfunction.

CAUTION

When the monitoring value is not appropriate, perform gas calibration. Perform gas calibration once a year for stable measuring accuracy.

CAUTION

Do not spray detergent or water in the vent hole of the multigas unit. The operator may receive electrical shock or the unit may be damaged.

CAUTION

Follow the CAUTION label on the CO_2 gas cylinder.

CAUTION

Handle the contents of the water trap as you would handle any bodily fluid. Failure to follow this warning causes infection.

NOTE: Follow the directions of the gas provider for disposal of used calibration gas.

AG-400R CO_2 Unit

CAUTION

Before maintenance, cleaning or disinfection, turn the CO_2 unit power off and disconnect the power cord from the AC socket. Failure to follow this instruction may result in electrical shock and CO_2 unit malfunction.

CAUTION

When the monitoring value is not appropriate, perform gas calibration. Perform gas calibration every half year for stable measuring accuracy.

CAUTION

Do not spray detergent or water in the vent hole of the CO_2 unit. The operator may receive electrical shock or the unit may be damaged.

NOTE: Follow the directions of the gas provider for disposal of used calibration gas.

AE-918P Neuro Unit

CAUTION

Before maintenance, cleaning or disinfection, turn the instrument power off and disconnect the power cord from the AC socket. Failure to follow this instruction may result in electrical shock and instrument malfunction.

CAUTION

If fluids are accidentally spilled into the neuro unit, take the neuro unit out of service and contact your Nihon Kohden representative. The neuro unit must be disassembled, cleaned, dried and tested for safety and function.

CAUTION

- Do not use volatile liquids such as thinner or benzine, because these will cause the materials to melt or crack.
- The neuro unit and EEG connection cord are not waterproof. Be careful not to let any water get inside the neuro unit and EEG connection cord.
- Never sterilize the neuro unit and EEG connection cord because the materials may deform, crack or discolor.

Specifications

Measuring Parameters

ECG, respiration in impedance and thermistor method, SpO_2, NIBP, IBP, temperature, cardiac output, O_2, CO_2 in mainstream method and sidestream method, flow/Paw, BIS, anesthetic gas (CO_2, O_2, N_2O, agent), TOF, ventilation, CCO, EEG, $tcPO_2$, $tcPCO_2$, rSO_2

Influence on Measuring Accuracy by Electrosurgery/Defibrillation/Electrostatic Discharge

The bedside monitor returns to the previous operating mode within 10 seconds without loss of any stored data. When performing defibrillation, the filter setting on the bedside monitor must be set to MONITOR on the ECG window to return to the previous operating mode within 10 seconds without loss of any stored data. Measurement accuracy may be temporarily decreased while performing electro-surgery or defibrillation. This does not affect patient or equipment safety.

Display

Display size:	
BSM-6301:	10.4 inch, color TFT type LCD
BSM-6501:	12.1 inch, color TFT type LCD
BSM-6701:	15 inch, color TFT type LCD
Resolution:	
BSM-6301/6501:	800 × 600 dots
BSM-6701:	1024 × 768 dots
Viewing area:	
BSM-6301:	212.2 mm × 159.4 mm
BSM-6501:	246.0 mm × 184.5 mm
BSM-6701:	304.1 mm × 228.1 mm
Waveform display:	ECG (maximum 12 traces), respiration, IBP (maximum 7 traces), SpO_2 pulse wave, CO_2 and CO thermodilution curve, EEG, N_2O concentration, O_2 concentration, anesthetic agent concentration (Halothane, Isoflurane, Enflurane, Sevoflurane, Desflurane), flow, Paw, volume, AP
Waveform display mode:	Non-fade moving or non-fade fixed
Maximum number of waveform trace:	15 traces
Sweep speed:	6.25, 12.5, 25 or 50 mm/s
Respiration sweep speed:	1.56, 6.25, 12.5 or 25 mm/s
Aspect ratio (ECG display sensitivity ratio to sweep speed):	
Standard:	0.4 s/mV
Setting range:	0.05 to 6.4 s/mV
Sweep time (at 25 mm/s sweep speed):	
BSM-6301:	6.0 s
BSM-6501:	6.5 s
BSM-6701:	9.0 s
Display delay time:	
DIAG and MONITOR mode:	≤ 250 ms
MAXIMUM mode:	≤ 1 s
Waveform display color:	12 colors
Numeric data display:	Heart rate, VPC rate, ST level, respiration rate, NIBP (systolic, diastolic, MAP), PWTT, delta PWTT, IBP (systolic, diastolic, mean), SpO_2, pulse rate, temperature, cardiac output, cardiac index, injectate temperature, blood temperature, O_2 concentration, $ETCO_2$, $FiCO_2$, BIS, inspired/expired N_2O concentration, inspired/expired O_2 concentration, inspired/expired anesthetic agent concentration

(Halothane, Isoflurane, Enflurane, Sevoflurane, Desflurane), minimum alveolar concentration, peak airway pressure, positive end expiratory pressure, mean airway pressure, minute volume, expiratory/inspiratory tidal volume, compliance, airway resistance, expiratory/inspiratory airway resistance, inspiration expiration ratio, inspired setO_2, CCO, SVRI, S$\bar{v}O_2$, Tb, EF, ScvO_2, CCI, EDV, SVR, EDVI, PCCO, PCCI, SEF, MDF, PPF, TP, Abs δ, Abs θ, Abs α, Abs β, Abs γ, % δ, % θ, % α, % β, % γ, tcPO_2, tcPCO_2, PPV, SPV, rSO_2

Synchronization mark: Heart rate sync mark, pulse rate sync mark, respiratory sync mark

Numeric display color: 12 colors

Recovery time after defibrillation: ≤ 10 s (at MONITOR mode)

Alarm

Alarm levels:

- Crisis: Patient is in critical condition and the patient's life may be at risk. Immediate action must be taken.
- Warning: Patient is in critical condition. Prompt action should be taken.
- Advisory: Setting or condition is not appropriate for accurate monitoring.

Alarm items:

- Vital sign alarms: HR, PR, ST, RR, APNEA, TEMP, delta TEMP, SpO_2, SpO_2-2, delta SpO_2, NIBP, IBP, $ETCO_2$, CO_2 (I), O_2 (I), O_2 (E), Tb, MV, Ppeak, PEEP, N_2O (I), N_2O (E), Agent (I), Agent (E), SEF, TP, BIS, CCO, CCI
- Arrhythmia alarms: ASYSTOLE, VF, VT, V BRADY, EXT TACHY, EXT BRADY, SV TACHY, VPC RUN, TACHYCARDIA, BRADYCARDIA, COUPLET, EARLY VPC, MULTIFORM, V RHYTHM, PAUSE, BIGEMINY, TRIGEMINY, VPC, IRREGULAR RR, PACER NON-CAPTURE, PROLONGED RR, NO PACER PULSE
- Interbed alarms
- Technical alarms: Alarms concerning instrument and measuring environment such as, connector disconnection alarm, noise alarm, electrode off alarm, waveform detecting alarm, probe off alarm, cuff/hose check alarm, sensor check alarm, low battery alarm, etc.

Alarm indication*: Alarm sound, blinking/lighting alarm indicator, highlighted numeric data/message. Displays the alarmed item at the upper part of the screen.*

* Essential performance in EMC standard

Alarm indicator:

- Crisis: Red blinking: approx. 1.6 Hz (approx. 640 ms), duty 50%
- Warning: Yellow blinking: approx. 0.8 Hz (approx. 1280 ms), duty 50%
- Advisory: Yellow or cyan lighting

Alarm sound:

- Crisis: NK1 (Continuous pip sound), NK2 (Continuous ping sound) or IEC standard
- Warning: NK1 (Continuous bing bong sound), NK2 (Continuous ding ding sound) or IEC standard
- Advisory: NK1 and NK2 (Single beep every 20 or 120 seconds) or IEC standard

Alarm silence: Provided for 1, 2 or 3 min. When another alarm occurs during alarm silence, alarm is indicated.

Alarm suspend: Provided for 1, 2, 3 min or OFF

All alarms off: Provided

Alarm volume:

- Volume range: 45 to 85 dB (A) (Requirement of IEC 60601-2-49: 2001) (at 1 m in front of monitor)
- Volume priority: Crisis ≥ Warning ≥ Advisory

Alarm Delay Time

Includes time to output alarm from the network socket on the monitor when connected to the network.
Includes time to output alarm from the transmitter when the ZS-900P transmitter is connected.

Heart rate:	HR change from 80 to 120 bpm ≤ 10 seconds (upper limit: 100 bpm)
	HR change from 80 to 40 bpm ≤ 10 seconds (lower limit: 60 bpm)
Time to alarm for tachycardia:	Ventricular tachycardia (amplitude 1 mV p-v, heart rate 206 bpm):
	at ×1 gain (Test waveform name: aami4a*): 4 to 10 seconds
	at ×0.5 gain (Test waveform name: aami4a_h*): 4 to 10 seconds
	at ×2 gain (Test waveform name: aami4a_d*): 4 to 10 seconds
	Ventricular tachycardia (amplitude 2 mV p-v, heart rate 195 bpm):
	at ×1 gain (Test waveform name: aami4b*): 4 to 10 seconds
	at ×0.5 gain (Test waveform name: aami4b_h*): 4 to 10 seconds
	at ×2 gain (Test waveform name: aami4b_d*): 4 to 10 seconds * The test waveforms can be downloaded at http://www.physionet.org
Pulse rate:	PR change from 80 to 120 bpm ≤ 35 seconds (upper limit: 100 bpm)
	PR change from 80 to 40 bpm ≤ 35 seconds (lower limit: 60 bpm)
ST:	Approx. 1 second after measurement value reaches alarm threshold (averaged 15-second data)
Respiration rate:	Approx. 5 seconds after measurement value reaches alarm threshold (depends on the setting)
NIBP:	Approx. 1 seconds after measurement value becomes stable
IBP:	IBP change from 100 to 60 mmHg ≤ 15 seconds (at pulse rate 80 bpm, SYS lower limit: 80 mmHg)
SpO_2:	Approx. 0 to 10 seconds after measurement value reaches alarm threshold (depends on the setting)
Blood temperature:	Approx. 1 second after measurement value reaches alarm threshold For catheter response time, refer to the manual for the catheter.
O_2 (when JO-900P FiO_2 connection cord is used):	
	Approx. 1 second after measurement value reaches alarm threshold
	Sensor response time (90%): Maximum 15 seconds
CO_2 (Mainstream method):	
CO_2 (I):	Approx. 20 seconds (when TG-950P or TG-970P CO_2 sensor kit is used)
Upper CO_2 (E):	Approx. 5 seconds
Lower CO_2 (E):	Approx. 5 seconds (when the <$ETCO_2$ MAX HOLD>* is OFF)
	Maximum 15 seconds (when the <$ETCO_2$ MAX HOLD>* is 10 s)
	Maximum 25 seconds (when the <$ETCO_2$ MAX HOLD>* is 20 s)
	* When the TG-950P (depends on the TG-950P software version) or TG-970P CO_2 sensor kit is used. The alarm delay time is approx. 5 seconds for the version which does not have the <$ETCO_2$ MAX HOLD>.
CO_2 (Sidestream method):	
CO_2 (I):	Approx. 20 seconds
CO_2 (E):	Approx. 5 seconds
Gas	
CO_2 (I):	Approx. 20 seconds
CO_2 (E):	Approx. 5 seconds
N_2O, O_2, anesthetic agent:	Approx. 5 seconds
Ppeak, PEEP (FLOW):	Approx. 5 seconds after measurement value reaches alarm threshold (when the next respiration is detected)

MV (FLOW): Approx. 5 seconds after measurement value reaches alarm threshold
(Integrated data from 8 respiration intervals and TV (tidal volume))
Temperature, BIS, SEF, TP (EEG), CCO, CCI:
Approx. 1 second after measurement value reaches alarm threshold
Alarm signal delay in central monitor network: ≤ 4 s

ECG

Complies with IEC 60601-2-27: 2005, ANSI/AAMI EC13: 2002, ANSI/AAMI EC57: 1998.

Leads:	
3-electrode cable:	I, II, III
6-electrode cable:	I, II, III, aVR, aVL, aVF, 2 from V1 to V6
10-electrode cable:	I, II, III, aVR, aVL, aVF, V1 to V6
Defibrillation-proof:	ECG input protected against 400 Ws/DC 5 kV IEC 60601-2-27 17.101 compatible
Electrode offset potential tolerance:	≥ ±500 mV
Input dynamic range:	≥ ±5 mV
Internal noise:	≤ 30 μVp-p (Referred to input)
Noise suppression:	
RL driving gain:	maximum 40 dB
Maximum voltage:	1.23 Vrms
Common mode rejection ratio:	≥ 95 dB
Input bias current:	≤ 100 nA
Frequency response:	
DIAG mode:	0.05 to 150 Hz (–3 dB)
MONITOR mode:	0.3 to 40 Hz (–3 dB)
MAXIMUM mode:	1 to 18 Hz (–3 dB)
AC hum filter:	≤ –40 dB (at 50 or 60 Hz)
Input impedance:	≥ 5 MΩ (at 10 Hz) ≥ 2.5 MΩ (at 0.67 to 40 Hz)
ESU protection:	Provided, recovers within 10 seconds after ESU and acquired data is not lost. IEC 60601-2-27: 2005 compatible
Leads-off sensing:	Each leads has own sensing
Active electrode:	< 100 nA
Reference electrode:	< 900 nA
12 lead ECG interpretation:	ECAPS 12C (BSM) Available when monitoring 12 leads
Interpretation items:	Normal sinus rhythm, TACHYCARDIA, BRADYCARDIA, VPC RUN, COUPLET, EARLY VPC
Display and output:	Screen, recorder module, network printer, printer connected to the central monitor
File storage:	6 files
Waveform display:	
Display sensitivity:	10 mm/mV ±5% (at ×1 sensitivity)
Number of channels:	3 (maximum, with 6 or 10 electrodes on home screen) 12 (maximum, with 10 electrodes at 12 LEAD window)
Sensitivity control:	×1/4, ×1/2, ×1, ×2, ×4, or AUTO
Pacing mark display:	Available
Recording sensitivity:	10 mm/mV ±5% (same as the display sensitivity)
Heart rate count:	
Calculation method:	Moving average/Instantaneous beat to beat

QRS detection (at × 1 sensitivity): Adult: Width: 70 to 120 ms
Amplitude: 0.5 to 5 mV, rate: 30 to 200 beats/min
Child and neonate: Width: 40 to 120 ms
Amplitude: 0.5 to 5 mV, rate: 30 to 250 beats/min

Counting range: 0, 15 to 300 beats/min (±2 beats/min)

Counting accuracy*: ±2 beats/min (0, 15 to 300 beats/min)
* Essential performance in EMC standard

Heart rate display update cycle: Every 3 s or when alarm is generated

Heart rate sync mark delay time: within 100 to 200 ms (when QRS is detected)

Tall T-wave rejection capability: Complies with the heights of T-waves from 0 mV to 1.2 mV specified in ANSI/AAMI EC13 Sect. 4.1.2.1(c)

Heart rate averaging: Calculated by using the most recent 4 or 12 beats.

Heart rate meter accuracy and response to irregular rhythm:
Ventricular bigeminy (Test waveform name: aami3a*): 80 bpm
Slow alternating ventricular bigeminy (Test waveform name: aami3b*): 60 bpm
Rapid alternating ventricular bigeminy (Test waveform name: aami3c*): 120 bpm
Bidirectional systoles (Test waveform name: aami3d*): 90 bpm
* The test waveforms can be download at http://www.physionet.org

Response time of heart rate meter to change in heart rate:
HR change from 80 to 120 bpm: 9 to 12 seconds
HR change from 80 to 40 bpm: 9 to 13 seconds

Time to alarm for tachycardia: Ventricular tachycardia (amplitude 1 mV p-v, heart rate 206 bpm):
at ×1 gain (Test waveform name: aami4a*): 4 to 10 seconds
at ×0.5 gain (Test waveform name: aami4a_h*): 4 to 10 seconds
at ×2 gain (Test waveform name: aami4a_d*): 4 to 10 seconds
Ventricular tachycardia (amplitude 2 mV p-v, heart rate 195 bpm):
at ×1 gain (Test waveform name: aami4b*): 4 to 10 seconds
at ×0.5 gain (Test waveform name: aami4b_h*): 4 to 10 seconds
at ×2 gain (Test waveform name: aami4b_d*): 4 to 10 seconds
* The test waveforms can be download at http://www.physionet.org

Pacemaker pulse detector rejection of fast ECG signals:
Slew rate at which the pacemaker pulse detector responds: 6 to 8 V/s
Tested as specified in ANSI/AAMI EC13 Sect. 4.1.4.3

Pacemaker pulse rejection capability, without overshoot:
Complies with the amplitudes of pacemaker pulses ±2 to ±700 mV and widths 0.1 to 2 ms specified in ANSI/AAMI EC13 Sect. 4.1.4.1

Pacemaker pulse rejection capability, with overshoot:
Overshoot amplitudes and time constants of ±0.12 mV/100 ms to ±2 mV/4 ms (As defined by method B of ANSI/AAMI EC13 Sect. 4.1.4.2, this corresponds to the pacemaker pulses amplitudes and widths of ±4 mV/2 ms to amplitudes ±80 mV/0.1 ms.)

Heart rate alarm: Upper limit range: 16 to 300 beats/min, OFF in 1 beat/min steps
Lower limit range: OFF, 15 to 299 beats/min in 1 beat/min steps
Alarm items: TACHYCARDIA, BRADYCARDIA

Arrhythmia analysis:

Analysis method: Multi-template matching method

Number of channels: 2

VPC counting rate: 0 to 99 VPCs/min

Arrhythmia message: ASYSTOLE, VF, VT, V BRADY, EXT TACHY, EXT BRADY, SV TACHY, VPC RUN, TACHYCARDIA, BRADYCARDIA, COUPLET, EARLY VPC,

	MULTIFORM, V RHYTHM, PAUSE, BIGEMINY, TRIGEMINY, VPC, IRREGULAR RR, PACER NON-CAPTURE, PROLONGED RR, NO PACER PULSE
Other messages:	NOISE, CHECK ELECTRODES, LEARNING
Arrhythmia alarm:	Upper limit range: OFF, 1 to 99 VPC/min
Number of arrhythmia recall files:	8,192 (24 hours)
Storage time per file:	8 s
ST level measurement:	
Number of measurement channels:	3-electrode: 1 ch
	6-electrode: 8 ch
	10-electrode: 12 ch
ST level measuring range:	±2.5 mV
Measurement point:	Manual
ST level alarm:	Upper limit range: –1.99 to 2.00 mV in 0.01 mV steps, OFF
	Lower limit range: OFF, –2.00 to 1.99 mV in 0.01 mV steps
Number of ST recall files:	1,440 files

Respiration (Transthoracic impedance pneumography)

Measuring method:	Transthoracic impedance pneumography
Number of channels:	Selectable from R-F and R-L
Measuring impedance available range:	220 Ω to 4 kΩ
Excitor current:	45 ±10 μArms at 40 kHz (sine wave)
Internal noise:	≤ 0.2 Ω (Referred to input)
Respiration rate counting range:	0 to 150 counts/min
Respiration rate counting accuracy*:	±2 counts/min (0 to 150 counts/min)
	* Essential performance in EMC standard
Frequency response (high frequency cut-off):	
	3 Hz ±1 Hz (–3 dB)
Defibrillation proof:	Respiration input protected against 400 Ws/DC 5 kV
Impedance respiration:	Measurement On/Off available
Heart beat rejection:	Available
Waveform display:	
Display sensitivity:	10 mm/1 Ω ±25% (at ×1 sensitivity)
Sensitivity control:	×1/4, ×1/2, ×1, ×2, ×4
Respiration rate display update cycle:	Every 3 s or when alarm is generated
Alarm:	Upper limit range: 2 to 150 counts/min in 2 counts/min steps, OFF
	Lower limit range: OFF, 0 to 148 counts/min in 2 counts/min steps
Apnea alarm:	OFF, 5 to 40 s in 5 s steps
	Displayed message: APNEA

SpO_2

Complies with ISO 9919: 2005.	
Display:	
Display update cycle:	Every 3 s or when alarm is generated
Sync tone modulation:	Changes tone depending on SpO_2 value
Sweep speed:	6.25, 12.5, 25, 50 mm/s
Waveform sensitivity:	×1/8, ×1/4, ×1/2, ×1, ×2, ×4, ×8 or AUTO
SpO_2:	
Measuring method:	Two wavelength light absorption method

Wavelength range:	AY-631P/AY-633P:	660/905 nm (LNOP tip clip and LNCS tip clip) 663/880 nm (Other clips)
	AY-651P/AY-653P:	660/900 nm
Emitted light energy:	AY-631P/AY-633P:	0.13 mW minimum, 0.79 mW maximum
	AY-651P/AY-653P:	< 15 mW
Data delay time:	≤ 10 s	
Averaging time:	AY-651P/AY-653P:	6 to 7 s (approximately 3 seconds in FAST mode) If the dynamic averaging time exceeds 20 seconds for SpO_2, the SpO_2 and pulse rate will continue to be updated every second.
Display range:	AY-631P/AY-633P/AY-651P/AY-653P:	1 to 100%SpO_2
	AY-660P/AY-661P/AY-663P/AY-671P/AY-673P:	0 to 100%SpO_2
Declared range:	AY-631P/AY-633P/AY-651P/AY-653P:	Depends on probe. Refer to the probe manual.
	AY-660P/AY-661P/AY-663P/AY-671P/AY-673P:	70 to 100%SpO_2
Measuring accuracy*:	AY-631P/AY-633P/AY-651P/AY-653P:	Depends on probe. Refer to the probe manual.
	AY-660P/AY-661P/AY-663P/AY-671P/AY-673P:	70%SpO_2 ≤ %SpO_2 ≤ 80%SpO_2 ±3%SpO_2 80%SpO_2 ≤ %SpO_2 ≤ 100%SpO_2 ±2%SpO_2 SpO_2 accuracy is guaranteed at surrounding temperature of 18 to 40°C (64.4 to 104°F)

* Essential performance in EMC standard

NOTE for SpO_2 Accuracy of AY-660P/AY-661P/AY-663P/AY-671P/AY-673P:

- The SpO_2 accuracy was tested on OLV-3100 pulse oximeter using the TL-201T, TL-260T, TL-271T and TL-631T SpO_2 probes. The testing was performed during induced hypoxia on healthy volunteers (Ethnicity: 10 Caucasians, 2 Africans, 1 Asian and 3 Indians), (Skin: 8 Light, 4 Medium, 4 Dark), (Age: 21 to 34), (5 women and 11 men) under the condition of no motion. Arterial blood was sampled and measured by a CO-oximeter. The difference between SpO_2 measured by the SpO_2 probe and functional SaO_2 measured by a CO-oximeter was calculated using the root-mean-square (rms) according to ISO 9919: 2005. This measurement accuracy figure represents 2/3 of all test measurements.
- A pulse oximeter tester that generates simulated signals can be used to check the difference from the design specification, but it cannot be used as a replacement for human signals for testing accuracy.

NOTE for SpO_2 Accuracy of AY-631P/AY-633P/AY-651P/AY-653P:
The SpO_2 accuracy has been validated in human studies against arterial blood sample reference measured with a CO-oximeter. Pulse oximeter measurement are statistically distributed, only about two-thirds of the measurements can be expected to fall within the specified accuracy compared to CO-oximeter measurements.

NOTE for AY-631P/AY-633P:
The plethysmographic waveform is scaled to a fixed size for signal strengths above 10% or 0.5%.

NOTE for AY-651P/AY-653P:
Nellcor OEM modules communicate a non-normalized depiction of the plethysmographic waveform.

SpO_2 alarm: Upper limit range: 51 to 100%SpO_2 in 1%SpO_2 steps , OFF
Lower limit range: OFF, 50 to 99%SpO_2 in 1%SpO_2 steps

Pulse rate:

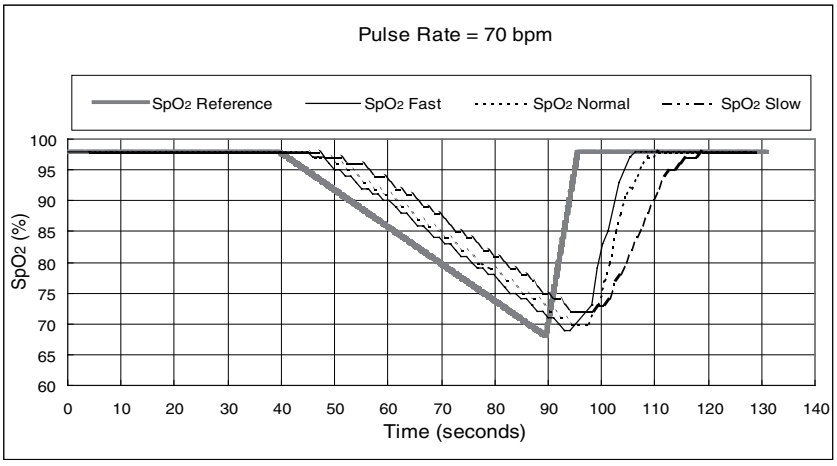
Display range:
AY-631P/AY-633P: 25 to 240 beats/min
AY-651P/AY-653P: 20 to 300 beats/min
AY-660P/AY-661P/AY-663P/AY-671P/AY-673P: 30 to 300 beats/min

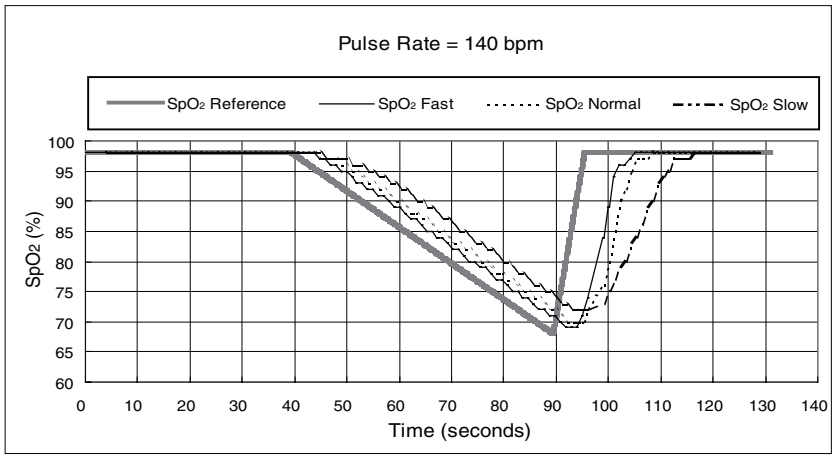
Declared range:
AY-631P/AY-633P: 25 to 240 beats/min
AY-651P/AY-653P: 20 to 300 beats/min
AY-660P/AY-661P/AY-663P/AY-671P/AY-673P: 30 to 300 beats/min

Counting accuracy (rms)*:
AY-631P/AY-633P: ±3 beats/min: No motion
±5 beats/min: Motion
AY-651P/AY-653P: ±3 beats/min
AY-660P/AY-661P/AY-663P/AY-671P/AY-673P: ±3% ±1 beat/min
* Essential performance in EMC standard

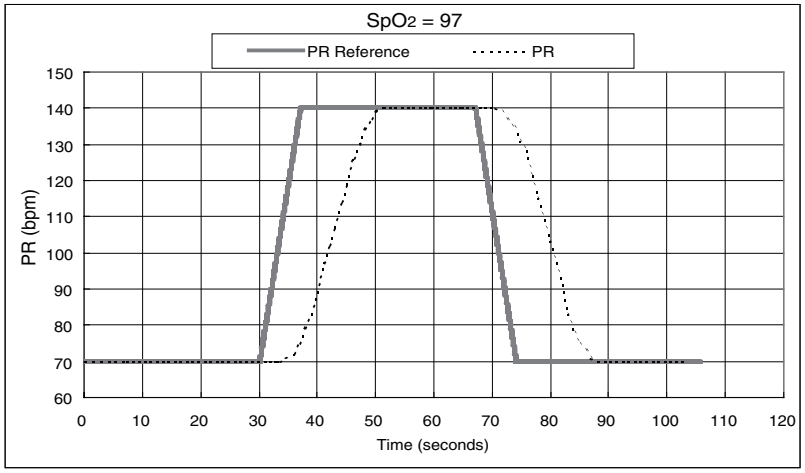
Pulse rate alarm:
Upper limit range: When SYNC SOURCE is set to ECG:
16 to 300 beats/min in 1 beat/min steps, OFF
When SYNC SOURCE is set to PRESS or SpO_2:
31 to 300 beats/min in 1 beat/min steps, OFF
Lower limit range: When SYNC SOURCE is set to ECG:
OFF, 15 to 299 beats/min in 1 beat/min steps
When SYNC SOURCE is set to PRESS or SpO_2:
OFF, 30 to 299 beats/min in 1 beat/min steps

Response time (AY-660P/AY-661P/AY-663P only):
Selectable from “SLOW”, “NORMAL” and “FAST”.
The following graphs show the response time example when SpO_2 changes 0.6%/s.





The following graph shows the response time example when pulse rate changes 10 bpm/s.



Non Invasive Blood Pressure, NIBP

Complies with IEC 60601-2-30: 1999.

Measuring method:	Oscillometric
Measuring range:	0 to 300 mmHg
Cuff pressure display range:	0 to 300 mmHg
Accuracy:	±3 mmHg (0 mmHg ≤ NIBP < 200 mmHg)
	±4 mmHg (200 mmHg ≤ NIBP ≤ 300 mmHg)
Cuff inflation time:	
Adult/Child:	≤ 7 s (700 cc)
Neonate:	≤ 5 s (72 cc)
Measurement mode:	Adult, child or neonate is recognized by connected air hose
Maximum measurement time:	
Adult/Child:	≤ 160 s
Neonate:	≤ 80 s
Operation mode:	Manual, STAT (≤ 15 min), Periodic, PWTT and SIM (depends on the SITE setting)
Auto remeasurement:	1 time
Air leakage:	≤ 3 mmHg/min
Measurement accuracy with a simulator*:	±10 mmHg
	* Essential performance in EMC standard

Initial pressurization value:

Adult:	180 mmHg
Child:	140 mmHg
Neonate:	100 mmHg

Maximum pressurization value:

Adult/Child:	300 mmHg
Neonate:	150 mmHg

Display items:	Systolic (SYS), diastolic (DIA), mean (MAP), cuff pressure during NIBP measurement, delta PWTT
NIBP data display update cycle:	Updated every measurement
Measurement completion sound:	Generated at measurement completion (depends on the setting)

Alarm

Upper limit range:	15 to 260 mmHg in 5 mmHg steps, OFF
Lower limit range:	OFF, 10 to 255 mmHg in 5 mmHg steps

Safety

Maximum pressurization value cuff inflation limiter:	Adult/Child:	300 to 330 mmHg
	Neonate:	150 to 165 mmHg
Cuff inflation time limiter:	Adult/Child:	161 to 165 s
	Neonate:	81 to 84 s
Interval time limiter:	25 to 29 s	
Power discontinuity:	Deflate immediately after power down	

Multi Socket

Input impedance:	≥ 900 kΩ
Excitor output impedance:	≤ 2 Ω
Excitor overcurrent protection:	100 mA
+5 V maximum power output from the socket:	500 mA

Invasive Blood Pressure, IBP

Complies with IEC 60601-2-34: 2000 except for clauses 44.6, 45.101 a) and 45.101 b).

Complied transducer:	P23XL-1 and P10EZ-1 Argon Medical Devices reusable transducers Argon Medical Devices disposable transducers DX series 5 μV/V/mmHg, bridge resistor: 200 Ω to 20 kΩ, defibrillation-proof or the equivalents
Volume displacement:	0.04 mm^3/100 mmHg
Auto zero balancing range:	±200 mmHg
Auto zero balancing accuracy:	±1 mmHg
Measuring range:	–50 to 300 mmHg
Measuring accuracy:	±1 mmHg ±1 digit (–50 mmHg ≤ IBP < 100 mmHg) ±1% ±1 digit (100 mmHg ≤ IBP ≤ 300 mmHg)
Total measuring accuracy*:	±4% or ±4 mmHg (whichever is greater)** * Essential performance in EMC standard ** When used with ANSI/AAMI BP-22-1994 complied equipments
Internal noise:	within ±1 mmHg
Temperature zero drift:	±0.1 mmHg/1°C
Frequency response:	DC to 12 Hz or 20 Hz (selectable)
Display items:	Systolic (SYS), diastolic (DIA), mean (MEAN)
Display update cycle:	Every 3 s or when alarm is generated
BP sync sound:	Systolic value 20 to 120 mmHg, changes in 20 steps every 5 mmHg

Alarm:

Upper limit range:	–48 to 300 mmHg in 2 mmHg steps, OFF	
Lower limit range:	OFF, –50 to 298 mmHg steps in 2 mmHg steps	
Alarm inactivation:	Alarm is inactivated in certain period when zero balancing is performed.	

Pulse rate

Counting range:	0, 30 to 300 beats/min	
Display range:	0 to 300 beats/min	
Counting accuracy (rms):	±2 beats/min (30 beats/min ≤ PR ≤ 300 beats/min)	
Alarm:	Upper limit range:	When SYNC SOURCE is set to ECG:
		16 to 300 beats/min in 1 beat/min steps, OFF
		When SYNC SOURCE is set to PRESS or SpO_2:
		31 to 300 beats/min in 1 beat/min steps, OFF
	Lower limit range:	When SYNC SOURCE is set to ECG:
		OFF, 15 to 299 beats/min in 1 beat/min steps
		When SYNC SOURCE is set to PRESS or SpO_2:
		OFF, 30 to 299 beats/min in 1 beat/min steps

Temperature

Complies with EN 12470-4: 2000 only for clauses 6.2, 6.3 a), 6.5, 6.6, 6.7, 6.8, 6.9, 6.10 and 8.

Thermistor probe:	400 series (YSI)
Number of channels:	Up to 4 (2 channels fixed TEMP sockets and 1 MULTI socket)
Measuring range:	0 to 45°C, 32 to 113°F
Measuring accuracy*:	±0.1°C (25°C ≤ TEMP ≤ 45°C)
	±0.2°C (0°C ≤ TEMP < 25°C)
	* Essential performance in EMC standard
Internal noise:	≤ 0.014°C (at 37°C)
Temperature drift:	within ±0.005°C /°C
Display range:	0 to 45°C (32 to 113°F)
Display update cycle:	Every 3 s or when alarm is generated

Time response delay from probe to monitor display:

≤ 6 seconds (sensor time constant is not included)

Alarm

Upper limit range:	0.1 to 45.0°C (33 to 113°F) in 0.1°C (1°F) steps, OFF
Lower limit range:	OFF, 0.0 to 44.9°C (32 to 112°F) in 0.1°C (1°F) steps

Carbon Dioxide, CO_2 (Mainstream method)

For the TG-900P/TG-920P/TG-950P*/TG-970P CO_2 sensor kit specifications, refer to the kit manual.

* TG-950P is not available for BSM-6000A series.

Calculation method

TG-900P/TG-920P:	semi-quantitative
TG-950P/TG-970P:	quantitative

CO_2 measuring range

TG-900P/TG-920P/TG-950P:	0 to 100 mmHg
TG-970P:	0 to 150 mmHg

CO_2 measuring accuracy**

TG-900P/TG-920P:	±0.4 kPa (0 ≤ CO_2 ≤ 1.33 kPa) (±3 mmHg (0 ≤ CO_2 ≤ 10 mmHg))
	±0.53 kPa (1.33 < CO_2 ≤ 5.33 kPa) (±4 mmHg (10 < CO_2 ≤ 40 mmHg))
	±10% reading (5.33 < CO_2 ≤ 13.3 kPa (40 < CO_2 ≤ 100 mmHg))
	(At 1 atmospheric pressure, air inspiration, no condensation)

TG-950P/TG-970P:	±0.27 kPa ($0 \leq CO_2 \leq 5.33$ kPa) (±2 mmHg ($0 \leq CO_2 \leq 40$ mmHg))
	±5% reading ($5.33 < CO_2 \leq 9.33$ kPa ($40 < CO_2 \leq 70$ mmHg))
	±7% reading ($9.33 < CO_2 \leq 13.3$ kPa ($70 < CO_2 \leq 100$ mmHg))
	(When no condensation)
	** Essential performance in EMC standard
Warm-up time:	
TG-900P/TG-920P:	5 s
TG-950P:	15 s
TG-970P:	10 s
Response time	
TG-900P:	160 ms (typical) for steps from 10 to 90%
TG-920P/TG-950P/TG-970P:	120 ms (typical) for steps from 10 to 90%
Respiration rate counting range	
TG-900P/TG-920P:	3 to 150 counts/min
TG-950P/TG-970P:	0 to 150 counts/min
Respiration rate counting accuracy	
TG-900P/TG-920P:	±10% (3 to 150 counts/min)
TG-950P/TG-970P:	±1 count/min
CO_2 value display update cycle:	Every 3 s or when alarm is generated
CO_2 alarm:	
Upper limit:	CO_2 (I): 1 to 99 mmHg in 1 mmHg steps, OFF
	0.1 to 13.0 kPa in 0.1 kPa steps, OFF
	$ETCO_2$: 2 to 99 mmHg in 1 mmHg steps, OFF
	0.2 to 13.0 kPa in 0.1 kPa steps, OFF
Lower limit:	$ETCO_2$: OFF, 1 to 98 mmHg in 1 mmHg steps
	OFF, 0.1 to 12.9 kPa in 0.1 kPa steps
Respiration rate alarm:	
Upper limit range:	2 to 150 counts/min in 2 counts/min steps, OFF
Lower limit range:	OFF, 0 to 148 counts/min in 2 counts/min steps
Apnea time:	OFF, 5 to 40 s in 5 s steps
	Displayed message: APNEA
Total system response time:	≤ 1.0 second

Inspired Oxygen Fractional Concentration, O_2

Measuring parameters:	Inspired oxygen fraction concentration
Number of channels:	1
Calibration condition:	21 or 100% O_2
Measuring range:	10 to 100% O_2
Accuracy*:	±3% full scale (includes sensor, when calibrated with air)
	* Essential performance in EMC standard
Internal noise:	≤ 0.12% O_2RMS ±0.72% O_2
Temperature drift:	±0.12% O_2/°C
O_2 display update cycle:	Every 3 s or when alarm is generated
Alarm:	
Upper limit range:	19 to 100% in 1% steps, OFF
Lower limit range:	18 to 99% in 1% steps

Cardiac Output, CO

Measuring method:	Thermodilution method
Measuring parameters:	Cardiac output (CO), injectate temperature (Ti), blood temperature (Tb), delta Tb

Number of channel:	1
Measuring range:	
Injectate temperature (Ti):	0°C to 27°C (32 to 81°F)
Blood temperature (Tb):	15°C to 45°C (59 to 113°F)
Thermodilution curve (delta Tb):	0°C to 2.5°C (32 to 37°F)
Cardiac output (CO):	0.5 to 20 L/min
Measuring accuracy:	
Ti:	±0.2°C (0°C to 27°C)
Tb:	±0.1°C (25°C ≤ TEMP ≤ 45°C)
	±0.2°C (15°C ≤ TEMP < 25°C)
CO:	±5%
Internal noise:	
Ti:	≤ 0.025°C RMS
Tb:	≤ 0.016°C RMS (correspond to 37°C)
Delta Tb:	≤ 0.005°C RMS
Temperature drift:	
Ti:	±0.005°C /°C
Tb:	±0.005°C /°C
Frequency response (delta Tb):	DC to 12 Hz (–3 dB)
Injectate volume range:	3, 5, 10 mL
Display update cycle:	Updated every measurement
Tb alarm	
Upper limit range:	15.1 to 45.0°C (60 to 113°F) in 0.1°C (1°F) steps, OFF
Lower limit range:	OFF, 15.0 to 44.9°C (59 to 112°F) in 0.1°C (1°F) steps

Respiration (Thermistor method)

Complied sensor:	TR-900P respiration pickup for nose and TR-910P respiration pickup for airway
Measuring items:	Thermistor respiration curve, respiration rate
Number of channel:	1
APNEA detection:	Available
Respiration rate counting range:	0 to 150 counts/min
Respiration rate counting accuracy*:	±2 counts/min
	* Essential performance in EMC standard
Measurable temperature range:	10 to 40°C
Internal noise:	≤ 2.5 Ω (Referred to input)
Frequency response:	0.1 to 3 Hz (–3 dB)
Waveform display:	
Display sensitivity:	10 mm/100 Ω ±20% (at ×1 sensitivity)
Sensitivity control:	×1/4, ×1/2, ×1, ×2, ×4
Respiration rate display update cycle:	Every 3 s or when alarm is generated
Alarm:	
Upper limit range:	2 to 150 counts/min in 2 counts/min steps, OFF
Lower limit range:	OFF, 0 to 148 counts/min in 2 counts/min steps
Apnea alarm:	OFF, 5 to 40 s in 5 s steps
	Displayed message: APNEA

Bispectral Index, BIS

For the BISx/BIS processor specifications, refer to the BISx/BIS processor manual.

BIS can be monitored with Covidien's BIS monitor.

BIS alarm:

Upper limit range:	2 to 100 in 1 steps, OFF
Lower limit range:	OFF, 0 to 99 in 1 steps

ECG/BP Output

Outputs 100 mmHg/V IBP waveform and the first trace of 1 mV/V ECG waveform. When more than one IBP waveforms are acquired, the IBP waveform of the top MULTI socket is output (when "FIXED POSITION" is set for IBP Analog Output) or the IBP waveform is output following the highest priority label (when "HIGHEST PRIORITY LABEL" is set for IBP Analog Output).

Complied medical electrical equipments

Connecting medical electrical equipment must comply to the following standards:

IEC 60601-1: 1988
IEC 60601-1 Amendment 1: 1991
IEC 60601-1 Amendment 2: 1995
CSA C22.2 No.601.1

Medical electrical equipment must be connected by specified method in following standards:

IEC 60601-1-1: 2000
CSA C22.2 No.60601-1-1-02

Output impedance:

ECG:	≤ 100 Ω
BP:	≤ 100 Ω

Output-waveform:

ECG:	±5.0 V (at 1 mV/V ± 5% sensitivity)
BP:	–0.5 to +3.0 V (at 100 mmHg/V ± 1% sensitivity)
HT:	5.0 to 15.0 V (Open collector output: 0.5 to 50 mA)

Frequency response:

ECG:	≥ 0.5 to 100 Hz (≥ –3 dB) (No reproducibility of pace maker pulse)
BP:	≥ DC to 20 Hz ±3 Hz (–3 dB)

HT pulse width: 15 ms

Gain:

ECG: 1000

Offset:

ECG:	≤ ±50 mV
BP:	≤ ±10 mV

Sensitivity accuracy:

ECG:	±5%
BP:	±1%

Delay:

ECG, HT:	20 ms max
BP:	40 ms max
ART (CCO):	60 ms max

RGB Socket (when QI-631P or QI-671P is connected)

Output signal: Analog RGB signal, 0.7 Vp-p

Resolution:

BSM-6301/BSM-6501:	800 × 600 dots
BSM-6701:	1024 × 768 dots

RS-232C Socket (when QI-631P or QI-671P is connected)

Serial communication:	RS-232C complies
Baud rate:	9600, 19200, 38400 bps

Alarm Socket (when QI-632P or QI-671P is connected)

Nurse call output:	Open collector output (Low active)

When WS-671P Recorder Module is Connected

Recording method:	Thermal array recording
Number of channels:	3 traces (maximum)
Recording width:	≥ 46 mm
Paper speed:	12.5, 25, 50 mm/s Recording mode: Manual, periodic, alarm
Recording density:	
Amplitude direction:	8 dots/mm
Feeding direction:	40 dots/mm (≤ 25 mm/s)
	20 dots/mm (50 mm/s)
Recording paper:	FQW-50-2-100

When ZS-900P Transmitter is Connected

ZS-900P transmitter is not available for BSM-6000A series.

Frequency capacity deviation:	≤ ±3 ppm (15 to 35°C)
Transmission power:	1.0 mW +5%, –40% (15 to 35°C)
Spurious emission strength:	≤ 2.5 µW (5 MHz to 1.5 GHz)
Occupied bandwidth:	5.0 to 8.5 kHz
Adjacent channel leaking power:	≥ 40 dBR
Transmission frequency range:	420.0500 to 449.6625 MHz
Modulation method:	Frequency shift keying

Gas

Gas can be monitored with the AG-920R, GF-110PA or GF-210R multigas unit or GF-120PA or GF-220R multigas/flow unit. For the AG-920R, GF-110PA or GF-210R multigas unit or GF-120PA or GF-220R multigas/flow unit specifications, refer to the manual.

Measurement method:	Sidestream gas sampling
Measured parameters:	Inspired/expired CO_2 partial pressure, inspired/expired N_2O concentration, inspired expired O_2 concentration, inspired/expired anesthetic agent concentration (Halothane, Isoflurane, Enflurane, Sevoflurane, Desflurane), respiration rate, minimum alveolar concentration
Warm-up time:	
AG-920R, GF-110PA/120PA:	within 45 seconds to first measurement
	within 10 minutes to measurement with guaranteed accuracy
GF-210R/220R:	about 1 minute to CO_2 measurement
	about 6 minutes to measurement with guaranteed accuracy
Sampling rate:	70 to 100 mL/min ±10 mL/min
	100 to 200 mL/min ±10%rel
Total system response time:	
AG-920R, GF-110PA/120PA:	≤ 5.0 seconds (when sampling volume is 200 mL/min, using adult sampling tube and adult water trap)
GF-210R/220R:	≤ 5.0 seconds (when YG-610P sampling line is connected)
CO_2 measurement:	

Measurement method:	Non-dispersive infrared ray absorption		
Measuring range:	AG-920R, GF-110PA/120PA:		0 to 76 mmHg, 0 to 10.13 kPa
	GF-210R/220R:		0 to 10 vol%
Measuring accuracy:	AG-920R, GF-110PA/120PA:		±2 mmHg ($0 \leq CO_2 \leq 40$ mmHg), ±0.27 kPa ($0 \leq CO_2 \leq 5.33$ kPa)
			±3 mmHg ($40 \leq CO_2 \leq 55$ mmHg), ±0.40 kPa ($5.33 \leq CO_2 \leq 7.33$ kPa)
			±4 mmHg ($55 < CO_2 \leq 76$ mmHg), ±0.53 kPa ($7.33 < CO_2 \leq 10.13$ kPa)

NOTE for AG-920R and GF-110PA/120PA:
CO_2 measurement accuracy is maintained up to a respiratory rate of 60 bpm with I:E ratio of 1:3, 1:2, 1:1 and 2:1.

	GF-210R/220R:		± (0.43 vol% + 8%rel)

NOTE for GF-210R and GF-220R:
CO_2 measurement accuracy is maintained up to a respiratory rate of 60 bpm with I:E ratio of 1:2.

Response time (10 to 90%):	AG-920R, GF-110PA/120PA:		≤ 250 ms (under the condition of sampling flow is 200 mL/min and sampling line for adult and water trap for adult is connected)
Alarm:	Upper limit:	CO_2(I):	1 to 99 mmHg in 1 mmHg steps, OFF
			0.1 to 13.0 kPa in 0.1 kPa steps, OFF
		$ETCO_2$:	2 to 99 mmHg in 1 mmHg steps, OFF
			0.2 to 13.0 kPa in 0.1 kPa steps, Off
	Lower limit:	$ETCO_2$:	OFF, 1 to 98 mmHg in 1 mmHg steps
			OFF, 0.1 to 12.9 kPa in 0.1 kPa steps

N_2O measurement:

Measurement method:	Non-dispersive infrared ray absorption		
Measuring range:	AG-920R, GF-110PA/120PA:		0 to 100%
	GF-210R/220R:		0 to 100 vol%
Measuring accuracy:	AG-920R, GF-110PA/120PA:		±3%

NOTE for AG-920R and GF-110PA/120PA:
N_2O measurement accuracy is maintained up to a respiratory rate of 30 bpm with I:E ratio of 1:3, up to a respiratory rate of 40 bpm with I:E ratio of 1:2 and up to a respiratory rate of 60 bpm with I:E ratio of 1:1 and 2:1.

	GF-210R/220R:		±(2vol% + 8%rel)

NOTE: N_2O measurement accuracy is maintained up to a respiratory rate of 60 bpm with I:E ratio of 1:2.

Response time (10 to 90%):	AG-920R, GF-110PA/120PA:		≤ 250 ms (under the condition of sampling flow is 200 mL/min and sampling line for adult and water trap for adult is connected)
Alarm (N_2O(I), N_2O(E)):	Upper limit: 1 to 100% in 1% steps, OFF		
	Lower limit: OFF, 0 to 99% in 1% steps		

O_2 measurement:

Measurement method:	Paramagnetic		
Measuring range:	0 to 100%		
Measuring accuracy:	AG-920R, GF-110PA/120PA:		±2% ($0 \leq O_2 \leq 55\%$)
			±3% ($55 < O_2 \leq 100\%$)
	GF-210R/220R:		±(2.5 vol% + 2.5%rel)

NOTE for GF-210R/220R:

O_2 measurement accuracy is maintained up to a respiratory rate of 60 bpm with I:E ratio of 1:2.

Response time (10 to 90%):	AG-920R, GF-110PA/120PA:	≤ 500 ms (under the condition of sampling flow is 200 mL/min and sampling line for adult and water trap for adult is connected)
Alarm:	Upper limit:	O_2(I): 19 to 100% in 1% steps, OFF
		O_2(E): 11 to 100% in 1% steps, OFF
	Lower limit:	O_2(I): 18 to 99% in 1% steps
		O_2(E): OFF, 10 to 99% in 1% steps

Anesthetic agent measurement:

Measurement method:	Non-dispersive infrared ray absorption	
Measured items:	HAL (Halothane), ISO (Isoflurane), ENF (Enflurane), SEV (Sevoflurane), DES (Desflurane)	
Measuring range:	AG-920R, GF-110PA/120PA:	HAL, ISO, ENF 0 to 5% SEV 0 to 8% DES 0 to 18%
	GF-210R/220R:	HAL, ISO 0 to 8.5 vol% ENF, SEV 0 to 10 vol% DES 0 to 20% vol%
Measuring accuracy:	AG-920R, GF-110PA/120PA:	±0.2% (0 ≤ GAS ≤ 5%) ±0.4% (5 < GAS ≤ 10%) ±0.6% (10 < GAS ≤ 15%) ±1.0% (15 < GAS ≤ 18%)

NOTE for AG-920R, GF-110PA and GF-120PA:
Anesthetic agent accuracy is maintained up to a respiratory rate of 60 bpm with I:E ratio of 1:3, 1:2, 1:1 and 2:1.

	GF-210R/220R:	± (0.2 vol% +15%rel)

NOTE for GF-210R/220R:
Anesthetic agent accuracy is maintained up to a respiratory rate of 60 bpm with I:E ratio of 1:2.

Response time (10 to 90%):	AG-920R, GF-110PA/120PA:	≤ 300 ms (HAL, ISO, SEV, DES) ≤ 500 ms (ENF) (under the condition of sampling flow is 200 mL/min and sampling line for adult and water trap for adult is connected)
Alarm:	Upper limit:	Agent(I), Agent(E) (HAL, ISO, SEV, ENF): 0.1 to 7.0% in 0.1% steps, OFF DES(I), DES(E): 0.1 to 20.0% in 0.1% steps, OFF
	Lower limit:	Agent(I), Agent(E) (HAL, ISO, SEV, ENF): OFF, 0.0 to 6.9% in 0.1% steps, OFF DES(I), DES(E): OFF, 0.0 to 19.9% in 0.1% steps

MAC:

Uncorrected MAC:	When AG-920R multigas unit is connected
	Uncorrected MAC = %Et(AA1)/x(AA1) + %Et(AA2)/x(AA2) + %Et(N_2O)/x(N_2O)
	%Et(AA1): End tidal concentration of primary anesthetic agent
	%Et(AA2): End tidal concentration of secondary anesthetic agent
	%Et(N_2O): End tidal concentration of N_2O

x(AA1): Uses the following values with the MAC of primary anesthetic agent
HAL = 0.77%, ENF = 1.7%, ISO = 1.15%, SEV = 2.1%, DES = 6.0%*

x(AA2): Uses the following values with the MAC of secondary anesthetic agent
HAL = 0.77%, ENF = 1.7%, ISO = 1.15%, SEV = 2.1%, DES = 6.0%*

$x(N_2O)$: Uses 105% with the MAC of N_2O

* NOTE: DES value is 7.3% if the BSM-6000 series bedside monitor has software version 04-14 or earlier. When using two or more AG-920R multigas units in a facility, use bedside monitors with the same software version.

For the GF-110PA or GF-210R multigas unit and GF-120PA or GF-220R multigas/flow unit, refer to the manual.

Ambient pressure corrected MAC: For GF-110PA or GF-210R multigas unit and GF-120PA or GF-220R multigas/flow unit, refer to the manual.

Enhanced MAC correction: For GF-110PA or GF-210R multigas unit and GF-120PA or GF-220R multigas/flow unit, refer to the manual.

Respiration rate:

Measuring range:	0, 4 to 60 counts/min
Measuring accuracy:	±1 count/min
Alarm:	Upper limit: 2 to 150 counts/min in 2 counts/min steps, OFF
	Lower limit: OFF, 0 to 148 counts/min in 2 counts/min steps
Apnea alarm:	OFF, 5 to 40 s in 5 s steps
	Displayed message: APNEA

Carbon Dioxide, CO_2 (Sidestream method)

CO_2 in sidestream method can be monitored with the AG-400R CO_2 unit.
For the AG-400R CO_2 unit specifications, refer to the AG-400R CO_2 unit manual.

Sampling flow:	50 mL/min +15/−7.5 mL/min
Warm up time:	30 s average (from power on to the measurable state)
Measuring range:	0 to 99 mmHg
Total measuring accuracy:	Whichever greater in following measuring accuracy
Measuring accuracy:	0 to 38 mmHg ±2 mmHg
	39 to 99 mmHg ± [5 + 0.08 × (χ − 39)] % of reading
	χ: CO_2 partial pressure of a standard gas with a known CO_2 partial pressure (mmHg)
$ETCO_2$ and CO_2(I) alarm:	
Upper limit:	CO_2(I) : 1 to 99 mmHg in 1 mmHg steps, OFF
	0.1 to 13.0 kPa in 0.1 kPs steps, OFF
	$ETCO_2$: 2 to 99 mmHg in 1 mmHg steps, OFF
	0.2 to 13.0 kPa in 0.1 kPa steps, OFF
Lower limit:	$ETCO_2$: OFF, 1 to 98 mmHg in 1 mmHg steps
	OFF, 0.1 to 12.9 kPa in 0.1 kPa steps
Respiration rate measuring range:	0 to 150 counts/min
Respiration rate measuring accuracy:	101 to 150 counts/min: ±5%
	71 to 100 counts/min: ±3%
	41 to 70 counts/min: ±2 counts/min
	0 to 40 counts/min: ±1 count/min
Respiration rate alarm:	
Upper limit range:	2 to 150 counts/min in 2 counts/min steps, OFF
Lower limit range:	OFF, 0 to 148 counts/min in 2 counts/min steps
Apnea alarm:	OFF, 5 to 40 s in 5 s steps
	Displayed message: APNEA
Total system response time:	≤ 4 seconds

FLOW/Paw

Flow/Paw can be monitored with the GF-120PA or GF-220R multigas/flow unit. For the GF-120PA or GF-220R multigas/flow unit specifications, refer to the GF-120PA or GF-220R multigas/flow unit manual.

FLOW measurement:		
Measurement method:	Differential pressure method (fixed orifice)	
Measuring range:	–3 to +3 L/s	
Measuring accuracy:	±3% rel or ±0.005 L/s whichever is greater	
	Applicable when 10 minutes or more has elapsed	
Paw measurement:		
Ppeak, Pmean, PEEP:	Measuring range:	–20 to +100 cmH_2O, hPa
	Measuring accuracy:	±1 cmH_2O, hPa
	Applicable when 10 minutes or more has elapsed	
Ppeak alarm:	Upper limit range:	1 to 100 cmH_2O, hPa in 1 cmH_2O, hPa steps, OFF
	Lower limit range:	OFF, 0 to 99 cmH_2O, hPa in 1 cmH_2O, hPa steps
PEEP alarm:	Upper limit range:	1 to 50 cmH_2O, hPa in 1 cmH_2O, hPa steps, OFF
	Lower limit range:	OFF, 0 to 49 cmH_2O, hPa in 1 cmH_2O, hPa steps
Volume measurement:		
Measuring range:	0 to 3000 mL	
Measuring accuracy:	±5% rel or ±10 mL whichever is greater	
	Applicable when 10 minutes or more has elapsed	
TVe, TVi measurement:		
Measuring range:	0 to 3000 mL	
Display range:	0 to 9999 mL	
Measuring accuracy:	±5% rel or ±10 mL whichever is greater	
	Applicable when 10 minutes or more has elapsed	
	Not applicable when TVi and TVe is less than 100 mL	
MV measurement:		
Display range:	0 to 99.9 L/min	
Alarm:	Upper limit range:	0.1 to 30.0 L/min in 0.1 L/min steps, OFF
	Lower limit range:	OFF, 0.0 to 29.9 L/min in 0.1 L/min steps
C measurement:		
Display range:	0.0 to 999.9 mL/cmH_2O	
R, Ri, Re measurement:		
Display range:	0.0 to 999.9 cmH_2O/L/s	
Respiration rate measurement:		
Counting range:	0, 4 to 60 counts/min	
Counting accuracy:	±1 counts/min	
Alarm:	Upper limit range:	2 to 150 counts/min in 2 counts/min steps, OFF
	Lower limit range:	OFF, 0 to 148 counts/min in 2 counts/min steps
Apnea time:	OFF, 5 to 40 s in 5 s steps	
	Displayed message:	APNEA

EEG

EEG can be monitored with the AE-918P neuro unit. For the AE-918P neuro unit specifications, refer to the AE-918P neuro unit manual.

Number of channels:	8

Measuring range:

SEF, MDF, PPF:	0.0 to 62.5 Hz
TP:	0.01 to 9.99 nW
ABS δ, ABS θ, ABS α, ABS β, ABS γ:	1 to 9999 pW
% δ, % θ, % α, % β, % γ:	0 to 100%
CSA:	0 to 60 Hz
DSA:	0 to 60 Hz
aEEG trace:	0.0 to 100.0 μV
aEEG value:	0.0 to 3276.7 μV
Data display update cycle:	Every 3 s or when alarm is generated
Electrode impedance check:	> 10 kΩ within ±20%
Sensitivity:	10 μV/1 mm within ±5%
Non distorted maximum input:	> ±2 mV
Polarization voltage:	> ±700 mV
Input impedance:	> 15 MΩ at 10 Hz
CMRR:	> 110 dB (in isolation mode)
Frequency characteristics:	
High range:	70 Hz at 70% amplitude (−3 dB) within ±20%
Low range:	2 s ±20% or 0.08 Hz at 70% amplitude (−3 dB) within ±20%
AC filter:	attenuation ratio > 26 dB
Noise:	within 3 μVp-p
SEF alarm:	
Upper limit range:	1.0 to 60.0 Hz in 0.5 Hz steps, OFF
Lower limit range:	OFF, 0.5 to 59.5 Hz in 0.5 Hz steps
TP alarm:	
Upper limit range:	0.02 to 9.99 nW in 0.01 nW steps, OFF
Lower limit range:	OFF, 0.01 to 9.98 nW in 0.01 nW steps

CCO

For the APCO/IBP processor specifications, refer to the APCO/IBP processor manual.

CCO alarm:

Upper limit range:	1.1 to 20.0 L/min in 0.1 L/min steps, OFF
Lower limit range:	OFF, 1.0 to 19.9 L/min in 0.1 L/min steps
CCI alarm:	
Upper limit range:	1.1 to 20.0 L/min/m^2 in 0.1 L/min/m^2 steps, OFF
Lower limit range:	OFF, 1.0 to 19.9 L/min/m^2 in 0.1 L/min/m^2 steps

Battery (SB-671P Battery Pack)

Type of battery:	Nickel-metal hydride
Number of batteries:	2
Battery lifetime:	1 year or 200 cycles of full discharging/charging
Battery operation time:	
BSM-6301/6501:	90 minutes
BSM-6701:	60 minutes
	(new battery, fully charged and no options are used in normal temperature)
DC voltage:	9.6 V
Charging current:	360 mA ±50 mA (normal use)

Charging time:	
During monitoring:	10 hours
During non-monitoring:	6 hours (two battery at the same time)
Battery status indication:	Battery lamps on the front panel, screen message and alarm sound, alarm indicator
Operating environment:	
Charging temperature:	10 to 55°C (50 to 131°F)
Discharging temperature:	5 to 50°C (41 to 122°F)
Humidity:	30 to 85% RH (noncondensing)
Atmospheric pressure:	700 to 1060 hPa
Transport and storage environment:	When the battery pack is stored more than 6 months, charge and discharge or charge the battery once every 6 months.
Temperature:	–20 to +60°C (–4 to +140°F) (within 30 days) –20 to +45°C (–4 to +113°F) (within 90 days) –20 to +35°C (–4 to +95°F) (more than 90 days)
Humidity:	20 to 85% RH (noncondensing)
Atmospheric pressure:	700 to 1060 hPa

Power Requirement

Line voltage:	
AC:	AC 100 to 240 V ±10%
DC (SB-671P):	8.5 to 12.6 V
Line frequency:	50 or 60 Hz
Power input:	
BSM-6301:	AC 140 VA
BSM-6501:	AC 90 VA
BSM-6701:	AC 100 VA

Clock Accuracy

At operating temperature 25°C:	approx. ±2 min 40 s/month maximum
At storage temperature –20 to +60°C:	approx. ±6 min/month maximum

Environment

Operating environment:	
Temperature:	10 to 40°C (50 to 104°F) SpO_2 accuracy is guaranteed at surrounding temperature of 18 to 40°C (60 to 104°F)
Humidity:	30 to 85% RH (10 to 40°C, noncondensing)
Atmospheric pressure:	700 to 1060 hPa
Transport and storage environment:	
Temperature:	–20 to +65°C (–4 to +149°F) –15 to +55°C (Recording paper)
Humidity:	10 to 95% RH
Atmospheric pressure:	700 to 1060 hPa

Mechanical Strength

Mechanical strength:	Indoor mobile type

Electromagnetic Compatibility

IEC 60601-1-2: 2001
IEC 60601-1-2 Amendment 1: 2004

Safety Standard

Safety standard:

CAN/CSA C22.2 No. 601-1 M90 (BSM-6501A, BSM-6701A)
CAN/CSA C22.2 No. 601-1S1-94 (BSM-6501A, BSM-6701A)
CAN/CSA C22.2 No. 601-1B-98 (BSM-6501A, BSM-6701A)
CAN/CSA C22.2 No. 60601-1-1-02 (BSM-6501A, BSM-6701A)
CAN/CSA C22.2 No. 601.2.27-98 (BSM-6501A, BSM-6701A)
CAN/CSA C22.2 No. 60601-2-30-02 (BSM-6501A, BSM-6701A)
CAN/CSA C22.2 No. 60601-2-34-02 (BSM-6501A, BSM-6701A)
CAN/CSA C22.2 No. 60601-2-49-04 (BSM-6501A, BSM-6701A)
EN 12470-4: 2000*[1]
IEC 60601-1: 1988
IEC 60601-1 Amendment 1: 1991
IEC 60601-1 Amendment 2: 1995
IEC 60601-1-1: 2000
IEC 60601-1-2: 2001
IEC 60601-1-2 Amendment 1: 2004
IEC 60601-1-6: 2010
IEC 60601-1-8: 2006*[2]*[3]
IEC 60601-2-27: 2005 - Particular requirements for the safety, including essential performance, of electrocardiographic monitoring equipment
IEC 60601-2-30: 1999 - Particular requirements for the safety of automatic cycling in in-direct blood pressure monitoring equipment
IEC 60601-2-34: 2000 - Particular requirements for the safety of direct blood pressure monitoring equipment*[4]
IEC 60601-2-49: 2001 - Particular requirements for the safety of multifunction patient monitoring equipment
ISO 21647: 2004
ISO 9919: 2005

*[1] This monitor complies with EN 12470-4: 2000 only for clauses 6.2, 6.3 a), 6.5, 6.6, 6.7, 6.8, 6.9, 6.10 and 8.

*[2] Only the "IEC standard" alarm sound complies with clause 6.3.3.2.

*[3] This monitor complies with IEC 60601-1-8: 2006 except for interbed alarm.

*[4] This monitor complies with IEC 60601-2-34: 2000 except for clauses 44.6, 45.101 a) and 45.101 b).

Type of protection against electrical shock:

CLASS I EQUIPMENT (AC Powered)
Internally Powered EQUIPMENT (BATTERY Powered)

Degree of protection against electrical shock

Defibrillator-proof type CF applied part:

AY-631P, AY-633P, AY-651P, AY-653P, AY-661P, AY-663P, AY-671P and AY-673P: ECG, Respiration (impedance and thermistor method), IBP, Temperature, SpO_2, SpO_2-2, CO_2, O_2, NIBP, BIS, CCO (APCO)

AY-660P: ECG, Respiration (impedance method), IBP, Temperature, SpO_2, CO_2, NIBP

AA-672P, AA-674P, JA-694P: Respiration (thermistor method), IBP, Temperature, SpO_2-2, CO_2, O_2, BIS, CCO (APCO)

BSM-1700 series: ECG, Respiration (impedance method), IBP, Temperature, SpO_2, SpO_2-2, CO_2, NIBP, BIS

CF applied part:

AY-631P, AY-633P, AY-651P, AY-653P, AY-661P, AY-663P, AY-671P, AY-673P, AA-672P, AA-674P, JA-694P and BSM-1700 series: CO

Degree of protection against harmful ingress of water:
IPX0 (non-protected)

Degree of safety of application in the presence of FLAMMABLE ANAESTHETIC MIXTURE WITH AIR, OR WITH OXYGEN OR NITROUS OXIDE: Equipment not suitable for use in the presence of FLAMMABLE ANAESTHETIC MIXTURE WITH AIR, OR WITH OXYGEN OR NITROUS OXIDE

Mode of operation: CONTINUOUS OPERATION

Dimensions and Weight (approximate)

MU-631R main unit: Dimensions: 316 W × 325 H × 188 D mm (excluding protruding parts)
Weight: 5.3 kg

MU-651R main unit: Dimensions: 342 W × 353 H × 183 D mm (excluding protruding parts)
Weight: 7.0 kg

MU-671R main unit: Dimensions: 415 W × 392 H × 191 D mm (excluding protruding parts)
Weight: 9.0 kg

AY-631P/AY-633P/AY-651P/AY-653P/AY-660P/AY-661P/AY-663P/AY-671P/AY-673P input unit:
Dimensions: 83 W × 176 H × 145 D mm (excluding protruding parts)
Weight: 1.3 kg

AA-672P/AA-674P smart expansion unit: Dimensions: 38 W × 165 H × 145 D mm (excluding protruding parts)
Weight: 0.5 kg

WS-671P recorder module: Dimensions: 77 W × 73 H × 120 D mm (excluding protruding parts)
Weight: 0.35 kg

QI-631P interface: Dimensions: 28.5 W × 94 H × 106 D mm (excluding protruding parts)
Weight: 0.1 kg

QI-632P/QI-634P interface: Dimensions: 27 W × 94 H × 106 D mm (excluding protruding parts)
Weight: 0.1 kg

QI-671P interface: Dimensions: 29 W × 173 H × 112 D mm (excluding protruding parts)
Weight: 0.16 kg

QI-672P interface: Dimensions: 26 W × 173 H × 107 D mm (excluding protruding parts)
Weight: 0.15 kg

RY-910PA remote controller: Dimensions: 45 W × 35 H × 135 D mm
Weight: 0.08 kg

Interface QF series: Dimensions: 65 W × 23 H × 44 D mm (excluding cables)
Weight: 0.13 kg

Communication cable IF series: Dimensions: 65 W × 23 H × 44 D mm (excluding cables)
Weight: 0.13 kg

JA-690PA/JA-694PA data acquisition unit: Dimensions: 145 mm W × 205 mm H × 190 mm D
Weight: 1.8 kg (JA-690PA), 2.0 kg (JA-694PA)

BSM-1700 series bedside monitor: Refer to the manuals of the BSM-1700 series bedside monitor.

Electromagnetic Emissions

The BSM-6000's essential performances in EMC standard satisfy the following criteria.

This Model BSM-6000 is intended for use in the electromagnetic environment specified below.
The customer or the user of the BSM-6000 should assure that it is used in such an environment.

BSM-6301 and BSM-6501 (JA-690PA or JA-694PA data acquisition unit, QE-910P BIS processor, AE-918P neuro unit, JP-911P IBP interface isolation cable, QI-320PA or QI-420PA wireless LAN station and QI-670P interface are not connected)

Emissions test	Compliance	Electromagnetic environment - guidance
RF emissions CISPR 11	Group 1	The BSM-6301 and BSM-6501 (JA-690PA/JA-694PA, QE-910P, AE-918P, JP-911P, QI-320PA/QI-420PA and QI-670P are not connected) use RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class B*[1]	The BSM-6301 and BSM-6501 (JA-690PA/JA-694PA, QE-910P, AE-918P, JP-911P, QI-320PA/QI-420PA and QI-670P are not connected) are suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Class A*[2]	
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Complies	

*[1] BSM-6301 and BSM-6501 (when ZS-900P is connected) are CLASS A equipment if the equipments comply with IEC 60601-1-2: 2001 36.201.1 5 in the countries which do not have national wireless rule.

*[2] BSM-6301 is not applicable.

BSM-6301, BSM-6501 (JA-690PA or JA-694PA data acquisition unit, QE-910P BIS processor, AE-918P neuro unit, JP-911P IBP interface isolation cable, QI-320PA or QI-420PA wireless LAN station or QI-670P interface is connected) and BSM-6701

Emissions test	Compliance	Electromagnetic environment - guidance
RF emissions CISPR 11	Group 1	The BSM-6301, BSM-6501 (JA-690PA/JA-694PA, QE-910P, AE-918P, JP-911P, QI-320PA/QI-420PA or QI-670P is connected) and BSM-6701 use RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class A	The BSM-6301, BSM-6501 (JA-690PA/JA-694PA, QE-910P, AE-918P, JP-911P, QI-320PA/QI-420PA or QI-670P is connected) and BSM-6701 are suitable for use in all establishments, excluding domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Class A*	
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Complies	

* BSM-6301 is not applicable.

Electromagnetic Immunity

The BSM-6000's essential performances in EMC standard satisfy the following criteria.

This Model BSM-6000 is intended for use in the electromagnetic environment specified below.
The customer or the user of the BSM-6000 should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±6 kV contact ±8 kV air	±6 kV contact ±8 kV air	Floors should be wood, concrete or ceramic tiles. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/ burst IEC 61000-4-4	±2 kV for power supply lines ±1 kV for input/output lines	±2 kV for power supply lines ±1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV differential mode ±2 kV common mode	±1 kV differential mode ±2 kV common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5% U_T (>95% dip in U_T) for 0.5 cycles 40% U_T (60% dip in U_T) for 5 cycles 70% U_T (30% dip in U_T) for 25 cycles <5% U_T (>95% dip in U_T) for 5 s	<5% U_T (>95% dip in U_T) for 0.5 cycles 40% U_T (60% dip in U_T) for 5 cycles 70% U_T (30% dip in U_T) for 25 cycles <5% U_T (>95% dip in U_T) for 5 s	Mains power quality should be that of a typical commercial or hospital environment. If the user of the BSM-6000 requires continued operation during power mains interruptions, it is recommended that the BSM-6000 be powered from an uninterruptible power supply or a battery.
Power frequency (50/60 Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
NOTE: U_T is the AC mains voltage prior to application of the test level.			

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
			Portable and mobile RF communications equipment should be used no closer to any part of the BSM-6000 including cables than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. **Recommended separation distance**
Conducted RF IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3 Vrms	$d = 1.2\sqrt{P}$
Radiated RF IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m 80 MHz to 2.5 GHz	$d = 1.2\sqrt{P}$ 80 MHz to 800 MHz $d = 2.3\sqrt{P}$ 800 MHz to 2.5 GHz where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey*[1], should be less than the compliance level in each frequency range*[2]. Interference may occur in the vicinity of equipment marked with the following symbol: 

NOTE 1: At 80 MHz and 800 MHz, the higher frequency range applies.
NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

*[1] Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the BSM-6000 is used exceeds the applicable RF compliance level above, the BSM-6000 should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-orienting or relocating the BSM-6000.

*[2] Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

Recommended Separation Distances between Portable and Mobile RF Communications Equipment

The BSM-6000 is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the BSM-6000 can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the BSM-6000 as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter (W)	Separation distance according to frequency of transmitter (m)		
	150 kHz to 80 MHz $d = 1.2\sqrt{P}$	80 MHz to 800 MHz $d = 1.2\sqrt{P}$	800 MHz to 2.5 GHz $d = 2.3\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

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

NOTE 1: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

System Composition for EMC Test

The BSM-6000 bedside monitor is tested to comply with IEC 60601-1-2: 2001 and Amendment 1: 2004 with the following composition. If any part which is not specified by Nihon Kohden is used, the EMC specifications might not comply.

Units	Cable length
MU-631R/MU-651R/MU-671R main unit	—
AY-633P/AY-660P/AY-673P input unit	—
QM-600P memory unit	—
AA-674P smart expansion unit	—
QI-631P/QI-632P/QI-634P/QI-671P/ QI-672P interface	—
QI-670P interface	—
BJ-900P ECG patient cable	3.8 m
JL-900P SpO_2 connection cord	2.5 m
JL-500P1 SpO_2 adapter	2.5 m
TL-201T finger probe	1.6 m
JL-650P SpO_2 connection cord	3.0 m
JL-630P SpO_2 connection cord	3.0 m
LNOP-DCI Masimo adult reusable sensor	—
YN-921P air hose for neonate	3.5 m
YP-821P disposable cuff for neonate	0.2 m
YN-901P air hose for adult/child	3.5 m
YP-963T cuff for adult	0.15 m
JP-900P IBP connection cord	3.5 m
JP-911P IBP connection cord	0.8 m
DX-300 monitoring kit	—
JT-950P CO connection cord	2.0 m
TC-704MU Argon Medical Devices catheter soft type	1.1 m
SP-5030 bath probe	1.5 m
JT-900P temperature connection cord	0.3 m
401J thermistor probe for adult	3.5 m
402J thermistor probe for child	3.5 m
TG-900P CO_2 sensor kit	3.0 m
TG-920P CO_2 sensor kit	3.5 m
TG-950P CO_2 sensor kit	4.0 m
TG-970P CO_2 sensor kit	3.5 m
JO-900P FiO_2 connection cord	3.0 m
074705 oxygen sensor	0.6 m
TR-900P respiration pickup for nose	3.0 m
YJ-671P BISx connection cord	0.3 m
QE-910P BIS processor	—
AE-918P neuro unit	0.4 m
JE-906P EEG connection cord	3.0 m

Units	Cable length
NE-114A EEG disk electrode	0.8 m
YJ-910P ECG/BP output cable	5.0 m
JP-600P APCO/IBP processor	2.72 m
MHD8S FloTrac sensor	0.39 m
QF-901P interface (including a cable for Drager ventilator)	—
QF-902P interface (including a cable for A-2000 BIS monitor)	—
QF-903P interface (including a cable for Vigilance CCO monitor)	—
QF-904P interface (including a cable for AG-920R multigas unit)	—
QF-905P interface (including a cable for AG-400R CO_2 unit)	—
YS-080P3 RGB cable	10 m
YS-089P2 serial connection cable	10 m
Basic optical mouse	—
SB-671P battery pack	—
ZS-900P transmitter	—
YS-089P7 network connection cable	0.7 m
QW-100Y (HIT-100) hyper isolation transformer	—
RY-910PA remote controller	—
Power cord W	2.5 m
Power cord H	2.5 m
Power cord N	2.4 m
Power cord UL	2.5 m
Power cord GB	2.5 m
Grounding lead	—
QI-320PA wireless LAN station	—
YS-095P3 wireless LAN mounting set	0.19 m/0.22 m
QI-420PA wireless LAN station	0.2 m/0.22 m
QI-600P interface unit	—
JA-690PA/JA-694PA data acquisition unit	—
YS-096P2/YS-096P3 unit connection cable	2.5 m/5.0 m
YS-096P5 multi-link cable	0.27 m

NOTE

When the following units are used, IEC 60601-1-2: 1993 complies.

- Multigas unit AG-920R
- CO_2 unit AG-400R

Factory Default Settings

The factory default settings of the SYSTEM CONFIGURATION screen and SYSTEM SETUP window are listed in the “Factory Default Settings” in Section 4, Administrator’s Guide. Other default settings are listed in this manual.

OK: The setting remains in memory even when the power is turned off.

30 min: When <DATA TRANSPORT USING INPUT UNIT> is set to DISABLE, and <SHOW ADMIT CONFIRMATION WINDOW> is turned off in the SYSTEM CONFIGURATION screen, the setting remains in memory for about 30 minutes after turning the power off. After that, the setting changes back to the default setting.
When <DATA TRANSPORT USING INPUT UNIT> is set to ENABLE or <SHOW ADMIT CONFIRMATION WINDOW> is turned on in the SYSTEM CONFIGURATION screen, the setting always remains in memory.

Master: When <DATA TRANSPORT USING INPUT UNIT> is set to DISABLE, and <SHOW ADMIT CONFIRMATION WINDOW> is turned off in the SYSTEM CONFIGURATION screen, the setting remains in memory for about 30 minutes after turning the power off. After that, the setting changes back to the master setting. After that, the setting changes back to the default setting for the default patient type. This setting also changes to the setting for the patient type when the patient type is changed on the ADMIT DISCHARGE window.
When <DATA TRANSPORT USING INPUT UNIT> is set to ENABLE or <SHOW ADMIT CONFIRMATION WINDOW> is turned on in the SYSTEM CONFIGURATION screen, the setting always remains in memory.

When initializing the settings, all the settings other than NETWORK window and CHANGE PASSWORD window of the SYSTEM CONFIGURATION screen change back to the default settings of ICU mode. If the site setting is changed, the settings are not initialized. Only the settings that are different for each site change back to the default settings; the settings that are common to all sites do not change.

Event Bar

Item		Setting Items	Default Setting	Backup
EVENT BAR	UPPER LEFT	ARRHYTHMIA, TECHNICAL, LIMIT, OPERATION, NONE	ARRHYTHMIA	OK
	LOWER LEFT		TECHNICAL	
	UPPER RIGHT		LIMIT	
	LOWER RIGHT		OPERATION	
EVENT BAR INTERVAL(s)		1, 2, 4, 8, 24	4	

TREND Window

Window	Page	Item		Setting Items	Default Setting	Backup
TREND	GRAPH 1 GRAPH 2 GRAPH 3	TRENDGRAPH DISPLAY FORMAT		MAX-MIN, MEAN	MEAN	OK
		APNEA TREND TIME(s)		5, 10, 15, 20, 25, 30, 35, 40	20	
		SCALE	HR, PR	0-300 beats/min	ADULT, CHILD: 0-100 beats/min NEONATE: 0-200 beats/min	30 min
			VPC	0-100 count/min	0-20 count/min	OK
			RR	0-150 breaths/min	ADULT, CHILD: 0-50 breaths/min NEONATE: 0-150 breaths/min	30 min
			APNEA-T	0-180 s	0-120 s	OK
			APNEA-F	0-12 s	0-6 s	
			NIBP	0-300 mmHg	ADULT: 0-200 mmHg CHILD: 0-160 mmHg NEONATE: 0-100 mmHg	30 min
				0-40.0 kPa	ADULT: 0-26.5 kPa CHILD: 0-21.5 kPa NEONATE: 0-13.5 kPa	
			CO_2(E)	0-150 mmHg	0-40 mmHg	OK
				0.0-20.0 kPa	0.0-5.5 kPa	
			CO_2(I)	0-100 mmHg	0-5 mmHg	
				0.0-13.0 kPa	0.0-0.7 kPa	
			O_2(E)	0-100%	30-60%	
			O_2(I)	0-100%	30-60%	
			SpO_2, SpO_2-2	0-100%SpO_2	80-100%SpO_2	
			PI (SpO_2, SpO_2-2)	0.01-100% (fixed)		
			Tb	0.0-45.0°C	34.0-40.0°C	
				0.0-115.0°F	95.0-105.0°F	
			ST-I to ST-V6	±20.0 mm	±5.0 mm	
				±2.00 mV	±0.5 mV	
			ART, ART2, RAD, DORS, AO, LVP, FEM, P1 to P7	0-300 mmHg	ADULT: 0-200 mmHg CHILD: 0-160 mmHg NEONATE: 0-100 mmHg	30 min
				0.0-40.0 kPa	ADULT: 0-26.5 kPa CHILD: 0-21.5 kPa NEONATE: 0-13.5 kPa	
			UA	0-300 mmHg	0-100 mmHg	OK
				0.0-40.0 kPa	0.0-13.5 kPa	
			PAP, CVP, RAP, UV, RVP, LAP, ICP, ICP2 to ICP4	0-300 mmHg	0-50 mmHg	
				0.0-40.0 kPa	0.0-6.5 kPa	
			PPV	0-50%	0-25%	
			SPV	0-50%	0-25%	
			Tskin, Tskin2, Tskin3, Trect, Tcore, Tnaso, Teso, Ttymp, Tblad, Taxil, T1 to T4	0.0-45.0°C	34.0-40.0°C	
				0.0-115.0°F	95.0-105.0°F	
			N_2O(E), N_2O(I)	0-100%	50-80%	
			HAL(E), HAL(I), ISO(E), ISO(I), ENF(E), ENF(I), DES(E), DES(I), SEV(E), SEV(I)	0.0-20.0%	0.0-8.0%	
			BIS	0-100	0-100	
			SQI (BIS)	0-100%	0-100%	
			SR	0-100%	0-100%	
			EMG	0.0-80.0 dB	30.0-80.0 dB	

Window	Page	Item		Setting Items	Default Setting	Backup
TREND	GRAPH 1 GRAPH 2 GRAPH 3	SCALE	PWTT	0-500 ms	100-400 ms	OK
			CCO	0.00-20.00 L/min	4.00-6.00 L/min	
			CCI	0.00-20.00 L/min/m^2	4.00-6.00 L/min/m^2	
			SV	0-300 mL	0-160 mL	
			SVI	0-200 mL/m^2	0-80 mL/m^2	
			$S\bar{v}O_2$	0-100%	60-80%	
			$ScvO_2$	0-100%	60-80%	
			EDV	0-800 mL	50-250 mL	
			CF	0-10.0	0.000-2.000	
			SVR	0-3000 dyn•s/cm^5	0-2000 dyn•s/cm^5	
				0.0-300.0 kPa•s•m^2/L	0.0-200.0 kPa•s•m^2/L	
			SVRI	0-30000 dyn•s•m^2/cm^5	0-4000 dyn•s•m^2/cm^5	
				0-3000.0 kPa•s/L	0.0-400.0 kPa•s/L	
			SVV	0.0-50.0%	0.0-20.0%	
			HRV	0-100%	0-30%	
			PCCO	0.00-20.00 L/min	4.00-6.00 L/min	
			PCCI	0.00-20.00 L/min/m^2	4.00-6.00 L/min/m^2	
			DO_2*	0-1200 mL/min	200-800 mL/min	
			DO_2I*	0-1200 mL/min/m^2	200-800 mL/min/m^2	
			VO_2*	0-500 mL/min	100-200 mL/min	
			VO_2I*	0-500 mL/min/m^2	100-200 mL/min/m^2	
			TOFrat	0-200%	0-100%	
			TOFcnt	0-4 times	0-4 times	
			PTC	0-15 times	0-15 times	
			MV*	0.0-30.0 L/min	0.0-12.0 L/min	
			TVe*	0-2000 mL	0-1000 mL	
			C*	0-200 mL/cmH_2O/L/s, mL/hPa	0-100 mL/cmH_2O/L/s, mL/hPa	
			R*	0-100 cmH_2O/L/s, hPa/L/s	0-50 cmH_2O/L/s, hPa/L/s	
			Re*	0-100 cmH_2O/L/s, hPa/L/s	0-50 cmH_2O/L/s, hPa/L/s	
			Ri*	0-100 cmH_2O/L/s, hPa/L/s	0-50 cmH_2O/L/s, hPa/L/s	
			Ppeak*	0-150 cmH_2O, hPa	0-50 cmH_2O, hPa	
			Pmean*	0-150 cmH_2O, hPa	0-20 cmH_2O, hPa	
			PEEP*	0-150 cmH_2O, hPa	0-10 cmH_2O, hPa	
			$tcPO_2$	0-800 mmHg	0-200 mmHg	
				0.0-100.0 kPa	0.0-26.5 kPa	
			$tcPCO_2$	0-120 mmHg	0-80 mmHg	
				0.0-16.0 kPa	0.0-10.5 kPa	
			rSO_2-1 to rSO_2-4	0-100%	30-100%	
		SETTINGS		HR, PR, VPC, RR, APNEA-T, APNEA-F, NIBP, CO_2(E), CO_2(I), O_2(E), O_2(I), SpO_2, PI (SpO_2), SpO_2-2, PI (SpO_2-2), Tb, ST-I to ST-V6, ART, ART2, RAD, DORS, AO, FEM, UA, UV, PAP, CVP, RAP, RVP, LAP, LVP, ICP, ICP2 to ICP4, P1 to P7, PPV, SPV, Tskin, Tskin2, Tskin3, Trect, Tcore, Tnaso, Teso, Ttymp, Tblad, Taxil, T1 to T4, N_2O(E), N_2O(I), HAL(E), HAL(I), ISO(E), ISO(I), ENF(E), ENF(I), DES(E), DES(I), SEV(E), SEV(I), BIS, SQI (BIS), SR, EMG, PWTT, CCO, CCI, SV, SVI, $S\bar{v}O_2$, $ScvO_2$, EDV, CF, SVR, SVRI, SVV, HRV, PCCO, PCCI, DO_2*, DO_2I*, VO_2*, VO_2I*, TOFrat, TOFcnt, PTC, MV*, TVe*, C*, R*, Re*, Ri*, Ppeak*, Pmean*, PEEP*, $tcPO_2$, $tcPCO_2$, rSO_2-1 to rSO_2-4, NONE	GRAPH 1 LEFT1: HR LEFT2, 3: NONE RIGHT1: SpO_2 RIGHT2, 3: NONE GRAPH2 LEFT1: NIBP LEFT2, 3: NONE RIGHT1: ART RIGHT2, 3: NONE GRAPH3 LEFT1: T1 LEFT2, 3: NONE RIGHT1: T2 RIGHT2, 3: NONE	

* Not available for BSM-6000A series.

Window	Page	Item		Setting Items	Default Setting	Backup
TREND	TABLE 1 TABLE 2 TABLE 3	SETTINGS	PARAMETER SETUP	HR, PR, VPC, RR, NIBP-SYS, NIBP-DIA, NIBP-MAP, NIBP-PR, CO_2(E), CO_2(I), O_2(E), O_2(I), SpO_2, PI (SpO_2), SpO_2-2, PI (SpO_2-2), Tb, ST-I to ST-V6, ART-SYS, ART-DIA, ART-MEAN, ART2-SYS, ART2-DIA, ART2-MEAN, RAD-SYS, RAD-DIA, RAD-MEAN, DORS-SYS, DORS-DIA, DORS-MEAN, AO-SYS, AO-DIA, AO-MEAN, FEM-SYS, FEM-DIA, FEM-MEAN, UA-SYS, UA-DIA, UA-MEAN, UV-MAX, UV-MIN, UV-MEAN, PAP-SYS, PAP-DIA, PAP-MEAN, CVP-MAX, CVP-MIN, CVP-MEAN, RAP-MAX, RAP-MIN, RAP-MEAN, RVP-SYS, RVP-DIA, RVP-MEAN, LAP-MAX, LAP-MIN, LAP-MEAN, LVP-SYS, LVP-DIA, LVP-MEAN, ICP-MAX, ICP2-MAX to ICP4-MAX, ICP-MIN, ICP2-MIN to ICP4-MIN, ICP-MEAN, ICP2-MEAN to ICP4-MEAN, P1-SYS to P7-SYS, P1-DIA to P7-DIA, P1-MEAN to P7-MEAN, PPV, SPV, Tskin, Tskin2, Tskin3, Trect, Tcore, Tnaso, Teso, Ttymp, Tblad, Taxil, T1 to T4, N_2O(E), N_2O(I), HAL(E), HAL(I), ISO(E), ISO(I), ENF(E), ENF(I), DES(E), DES(I), SEV(E), SEV(I), O_2 LEV, HAL LEV, ISO LEV, ENF LEV, DES LEV, SEV LEV, BIS, SQI (BIS), SR, EMG, CCO, CCI, SV, SVI, $S\bar{v}O_2$, $ScvO_2$, EDV, EDVI, ESV, ESVI, EF, CF, SVR, SVRI, SVV, HRV, PCCO, PCCI, DO_2*, DO_2I*, VO_2*, VO_2I*, TOFrat, TOFcnt, PTC, MV*, TVe*, C*, R*, Re*, Ri*, Ppeak*, Pmean*, PEEP*, $tcPO_2$, $tcPCO_2$, rSO_2-1 to rSO_2-4, NONE	TABLE 1 1. HR, 2. PR, 3. RR, 4. SpO_2, 5. ART-SYS, 6. ART-DIA, 7. ART-MEAN, 8. CVP-MEAN, 9. T1, 10. T2, 11. CO_2(E), 12. O_2(I), 13. SEV(E), 14. SEV(I), 15. NONE TABLE2 1. HR, 2. PR, 3. VPC, 4. ST-II, 5. RR, 6. SpO_2, 7. ART-SYS, 8. ART-DIA, 9. ART-MEAN, 10. CVP-MEAN, 11. T1, 12. T2, 13. to 15. NONE TABLE3 1. HR, 2. PR, 3. RR, 4. SpO_2, 5. O_2(I), 6. T1, 7. to 15. NONE	OK
		INTERVAL	INTERVAL SETUP	1 min, 5 min, 10 min, 15 min, 30 min, 1h	1 min	
	NIBP TREND	SETTINGS	PARAMETER SETUP	HR, PR, VPC, RR, NIBP-SYS, NIBP-DIA, NIBP-MAP, NIBP-PR, CO_2(E), CO_2(I), O_2(E), O_2(I), SpO_2, PI (SpO_2), SpO_2-2, PI (SpO_2-2), Tb, ST-I to ST-V6, ART-SYS, ART-DIA, ART-MEAN, ART2-SYS, ART2-DIA, ART2-MEAN, RAD-SYS, RAD-DIA, RAD-MEAN, DORS-SYS, DORS-DIA, DORS-MEAN, AO-SYS, AO-DIA, AO-MEAN, FEM-SYS, FEM-DIA, FEM-MEAN, UA-SYS, UA-DIA, UA-MEAN, UV-MAX, UV-MIN, UV-MEAN, PAP-SYS, PAP-DIA, PAP-MEAN, CVP-MAX, CVP-MIN, CVP-MEAN, RAP-MAX, RAP-MIN, RAP-MEAN, RVP-SYS, RVP-DIA, RVP-MEAN, LAP-MAX, LAP-MIN, LAP-MEAN, LVP-SYS, LVP-DIA, LVP-MEAN, ICP-MAX, ICP2-MAX to ICP7-MAX, ICP-MIN, ICP2-MIN to ICP4-MIN, ICP-MEAN, ICP2-MEAN to ICP4-MEAN, P1-SYS to P7-SYS, P1-DIA to P7-DIA, P1-MEAN to P7-MEAN, PPV, SPV, Tskin, Tskin2, Tskin3, Trect, Tcore, Tnaso, Teso, Ttymp, Tblad, Taxil, T1 to T4, N_2O(E), N_2O(I), HAL(E), HAL(I), ISO(E), ISO(I), ENF(E), ENF(I), DES(E), DES(I), SEV(E), SEV(I), O_2 LEV, HAL LEV, ISO LEV, ENF LEV, DES LEV, SEV LEV, BIS, SQI (BIS), SR, EMG, CCO, CCI, SV, SVI, $S\bar{v}O_2$, $ScvO_2$, EDV, EDVI, ESV, ESVI, EF, CF, SVR, SVRI, SVV, HRV, PCCO, PCCI, DO_2*, DO_2I*, VO_2*, VO_2I*, TOFrat, TOFcnt, PTC, MV*, TVe*, C*, R*, Re*, Ri*, Ppeak*, Pmean*, PEEP*, $tcPO_2$, $tcPCO_2$, rSO_2-1 to rSO_2-4, NONE	1. NIBP-SYS, 2. NIBP-DIA, 3. NIBP-MAP, 4. NIBP-PR, 5. HR, 6. PR, 7. VPC, 8. ST-II, 9. RR, 10. SpO_2, 11. ART-SYS, 12. ART-DIA, 13. ART-MEAN, 14. CVP-MEAN, 15. T1	

Window	Page	Item	Setting Items	Default Setting	Backup
TREND	HEMO TREND	SETTINGS	HR/PR, CO, CI, CCO, CCI, ART-MEAN, PAP-MEAN, PCWP, PCWP TIME, CVP, SV, SVI, LVSW, LVSWI, SVR, SVRI, SVV, PVR, PVRI, RVSW, RVSWI, $ScvO_2$	HR, CO, CI, CCO, CCI, ART-MEAN, PAP-MEAN, PCWP, PCWP TIME, CVP, SV, SVI, LVSW	OK

* Not available for BSM-6000A series.

RECALL Window

Window	Page	Item		Setting Items	Default Setting	Backup
RECALL	ARRHYTH HISTORY	ARRHYTHMIA EVENT SETUP	ARRHYTHMIA ITEMS	ASYSTOLE, VF, VT, EXT TACHY*, EXT BRADY*, V BRADY*, VPC RUN, SV TACHY*, TACHYCARDIA, BRADYCARDIA, PAUSE*, V RHYTHM*, COUPLET, EARLY VPC, MULTIFORM*, BIGEMINY, TRIGEMINY*, VPC, IRREGULAR RR*, PROLONGED RR*, NO PACER PULSE*, PACER NON-CAPTURE*, ALL	ALL	OK

* Available only when “EXTENDED” is selected for arrhythmia type on the SYSTEM SETUP window.

FULL DISC Window

Window	Page	Item			Setting Items	Default Setting	Backup
FULL DISC	FULL DISC	SETTINGS	DISPLAY/ SAVE	DISPLAYED WAVES	–	1. TRACE1 2. NONE 3. NONE 4. NONE	OK
				SAVED WAVES	Select from <SELECT THE WAVE TO SAVE AND DISPLAY>	TRACE1, TRACE2, RESP(IMP), SpO_2, ART	
			WAVE-FORMS	SELECT THE WAVE TO SAVE AND DISPLAY	TRACE1, TRACE2, I, II, III, aVR, aVL, aVF, V1 to V6, SpO_2, SpO_2-2, RESP(IMP), RESP(THM), CO_2, CO_2(GAS), CO_2(EXT), ART, ART2, RAD, DORS, AO, FEM, UA, UV, PAP, CVP, RAP, RVP, LAP, LVP, ICP, ICP2 to ICP4, P1 to P7, EEG1(BIS), EEG2(BIS), FLOW*, Paw*, VOL*, EEG1 to EEG8	TRACE1, TRACE2, RESP(IMP), SpO_2, ART	

* Not available for BSM-6000A series.

ST Window

Window	Page	Items		Setting Items	Default Setting	Backup
ST	ST INTERVAL	SETTINGS	ST POINT	ON, OFF	ON	OK
			ST WAVE ON HOME SCREEN	ON, OFF	OFF	
			ST REF WAVE ON HOME SCREEN	ON, OFF	OFF	
			LEAD	TRACE1 to TRACE3, I, II, III, aVR, aVL, aVF, V1 to V6	TRACE1	
					TRACE2	
					TRACE3	

OCRG Window

Window	Page	Item		Setting Items	Default Setting	Backup
OCRG	OCRG	SETTINGS		1 cm/min, 3 cm/min	1 cm/min	OK
		SCALE	HR	210-60, 160-80, 220-100	210-60	
			SpO_2	100-60, 100-80	100-60	
			RESP (IMP)	×1/4, ×1/2, ×1, ×2, ×4	×1	

aEEG Window

aEEG window is not available for BSM-6301A/K.

Window	Page	Item	Setting Items	Default Setting	Backup
aEEG	aEEG	SETTINGS	1, 3, 6, 9, 12 cm/h	6 cm/h	OK

ADMIT DISCHARGE Window

Window	Page	Item		Setting Items	Default Setting	Backup
ADMIT DISCHARGE	ADMIT	PATIENT TYPE		ADULT, CHILD, NEONATE	OR, ICU: ADULT NICU: NEONATE	Master
		PATIENT ID		Up to 16 characters	–	30 min
		NAME		Up to 15 characters		
		DATE OF BIRTH		254 YEARS 11 MONTHS 30 DAYS before to the present date		
		AGE (calculated automatically)		0 YEAR 0 MONTH 0 DAY to AGE 254 YEARS 11 MONTHS 30 DAYS		
		HEIGHT/ WEIGHT	HEIGHT	0.1 to 299.9 cm		
				0 ft 0.1 in to 9 ft 11.9 in		
			WEIGHT	0.1 to 449.9 kg		
				0.1 to 654.9 lb		
		BSA (calculated automatically)		Related to input height and weight data		
		GENDER		MALE, FEMALE, –	– (blank)	
		PACEMAKER		YES, NO	OR, ICU: YES NICU: NO	

ALARM LIMITS Window

Vital Signs Alarms

Window	Page	Setting Item	Settings Range		Step	Default Setting	Backup
ALARM LIMITS	MAIN ALARMS	HR/PR (When SYNC SOURCE is set to ECG)	Upper	OFF, 16 to 300*1*4*5	1	ADULT: 140 beats/min CHILD: 170 beats/min NEONATE: 200 beats/min	Master
			Lower	OFF, 15 to 299*2*4*5		ADULT: 50 beats/min CHILD: 75 beats/min NEONATE: 100 beats/min	
		HR/PR (When SYNC SOURCE is set to SpO_2 or PRESS)	Upper	OFF, 31 to 300*1*4*5		ADULT: 140 beats/min CHILD: 170 beats/min NEONATE: 200 beats/min	
			Lower	OFF, 30 to 299*2*4*5		ADULT: 50 beats/min CHILD: 75 beats/min NEONATE: 100 beats/min	
		RR	Upper	OFF, 2 to 150 counts/min*4*5	2	OFF	
			Lower	OFF, 0 to 148 counts/min*4*5			
		APNEA	Upper	OFF, 5 to 40 s*4*5	5	20 s	
		CO_2	Upper	OFF, 2 to 99 mmHg*4*5	1	OFF	
				OFF, 0.2 to 13.0 kPa*4*5	0.1		
			Lower	OFF, 1 to 98 mmHg*4*5	1	OFF	
				OFF, 0.1 to 12.9 kPa*4*5	0.1		
		SpO_2, SpO_2-2*3	Upper	OFF, 51 to 100%SpO_2*4*5	1	ADULT, CHILD: OFF NEONATE: 95%SpO_2	
			Lower	OFF, 50 to 99%SpO_2*4*5		ADULT, CHILD: 90%SpO_2 NEONATE: 85%SpO_2	
		ΔSpO_2	Upper	OFF, 1 to 50%SpO_2	1	5%SpO_2	
		NIBP-SYS	Upper	OFF, 15 to 260 mmHg	5	ADULT: 180 mmHg CHILD: 140 mmHg NEONATE: 100 mmHg	
				OFF, 1.5 to 35.0 kPa	0.5	ADULT: 24.0 kPa CHILD: 18.5 kPa NEONATE: 13.5 kPa	
			Lower	OFF, 10 to 255 mmHg	5	ADULT: 80 mmHg CHILD: 65 mmHg NEONATE: 50 mmHg	
				OFF, 1.0 to 34.5 kPa	0.5	ADULT: 10.5 kPa CHILD: 8.5 kPa NEONATE: 6.5 kPa	
		NIBP-DIA	Upper	OFF, 15 to 260 mmHg	5	OFF	
				OFF, 1.5 to 35.0 kPa	0.5		
			Lower	OFF, 10 to 255 mmHg	5	OFF	
				OFF, 1.0 to 34.5 kPa	0.5		
		NIBP-MAP	Upper	OFF, 15 to 260 mmHg	5	OFF	
				OFF, 1.5 to 35.0 kPa	0.5		
			Lower	OFF, 10 to 255 mmHg	5	OFF	
				OFF, 1.0 to 34.5 kPa	0.5		
		BIS	Upper	OFF, 1 to 100	1	OFF	
			Lower	OFF, 0 to 99		40	

*1 When EXT TACHY alarm setting is ON, HR setting range is 16 (or 31) to EXT TACHY limit, OFF.

*2 When EXT BRADY alarm setting is ON, HR setting range is EXT BRADY limit to 299, OFF.

*3 Available only when AY-661P, AY-663P, AY-671P or AY-673P input unit or the BSM-1700 series bedside monitor is used.

*4 On BSM-6000A series, if <CRISIS VITAL ALARM MANAGEMENT> on the SYSTEM CONFIGURATION screen is turned on and "ALARM PRIORITY" on the SYSTEM SETUP window is set to CRISIS, the alarm setting is set to the alarm master setting.

*5 On BSM-6000A series, if <ALARM CAP> on the SYSTEM CONFIGURATION screen is turned on, the alarm setting is affected by the "ALARM CAP" setting on the SYSTEM SETUP window.

Window	Page	Setting Item	Settings Range		Step	Default Setting	Backup
ALARM LIMITS	ECG ALARMS	HR/PR	Upper	OFF, 16 to 300 beats/min*2*3	1	ADULT: 140 beats/min CHILD: 170 beats/min NEONATE: 200 beats/min	Master
			Lower	OFF, 15 to 299 beats/min*2*3		ADULT: 50 beats/min CHILD: 75 beats/min NEONATE: 100 beats/min	
		VPC*1	Upper	OFF, 1 to 99 beats/min	1	OFF	
		ST-I to ST-V6	Upper	OFF, –1.99 to 2.00 mV	0.01	OFF	
				OFF, –19.9 to 20.0 mm	0.1		
			Lower	OFF, –2.00 to 1.99 mV	0.01	OFF	
				OFF, –20.0 to 19.9 mm	0.1		
	PRESS1 ALARMS	P1-SYS to P7-SYS	Upper	OFF, –48 to 300 mmHg	2	OFF	
				OFF, –6.0 to 40.0 kPa	0.5		
			Lower	OFF, –50 to 298 mmHg	2	OFF	
				OFF, –6.5 to 39.5 kPa	0.5		
		P1-DIA to P7-DIA	Upper	OFF, –48 to 300 mmHg	2	OFF	
				OFF, –6.0 to 40.0 kPa	0.5		
			Lower	OFF, –50 to 298 mmHg	2	OFF	
				OFF, –6.5 to 39.5 kPa	0.5		
		P1-MEAN to P7-MEAN	Upper	OFF, –48 to 300 mmHg	2	OFF	
				OFF, –6.0 to 40.0 kPa	0.5		
			Lower	OFF, –50 to 298 mmHg	2	OFF	
				OFF, –6.5 to 39.5 kPa	0.5		
	PRESS2 ALARMS	ART-SYS, ART2-SYS	Upper	OFF, –48 to 300 mmHg*3	2	OFF	
				OFF, –6.0 to 40.0 kPa*3	0.5		
			Lower	OFF, –50 to 298 mmHg*3	2	ADULT: 80 mmHg CHILD: 66 mmHg NEONATE: 50 mmHg	
				OFF, –6.5 to 39.5 kPa*3	0.5	ADULT: 10.5 kPa CHILD: 8.5 kPa NEONATE: 6.5 kPa	
		ART-DIA, ART2-DIA	Upper	OFF, –48 to 300 mmHg*3	2	OFF	
				OFF, –6.0 to 40.0 kPa*3	0.5		
			Lower	OFF, –50 to 298 mmHg*3	2	OFF	
				OFF, –6.5 to 39.5 kPa*3	0.5		
		ART-MEAN, ART2-MEAN	Upper	OFF, –48 to 300 mmHg*3	2	OFF	
				OFF, –6.0 to 40.0 kPa*3	0.5		
			Lower	OFF, –50 to 298 mmHg*3	2	ADULT: 60 mmHg CHILD: 46 mmHg NEONATE: 30 mmHg	
				OFF, –6.5 to 39.5 kPa*3	0.5	ADULT: 8.0 kPa CHILD: 6.0 kPa NEONATE: 4.0 kPa	
		RAD-SYS, AO-SYS, FEM-SYS	Upper	OFF, –48 to 300 mmHg	2	OFF	
				OFF, –6.0 to 40.0 kPa	0.5		
			Lower	OFF, –50 to 298 mmHg	2	ADULT: 80 mmHg CHILD: 66 mmHg NEONATE: 50 mmHg	
				OFF, –6.5 to 39.5 kPa	0.5	ADULT: 10.5 kPa CHILD: 8.5 kPa NEONATE: 6.5 kPa	
		RAD-DIA, AO-DIA, FEM-DIA	Upper	OFF, –48 to 300 mmHg	2	OFF	
				OFF, –6.0 to 40.0 kPa	0.5		
			Lower	OFF, –50 to 298 mmHg	2	OFF	
				OFF, –6.5 to 39.5 kPa	0.5		

*1 Available only when <ARRHYTHMIA ANALYSIS> on the ECG window is set to ON.

*2 On BSM-6000A series, if <CRISIS VITAL ALARM MANAGEMENT> on the SYSTEM CONFIGURATION screen is turned on and "ALARM PRIORITY" on the SYSTEM SETUP window is set to CRISIS, the alarm setting is set to the alarm master setting.

*3 On BSM-6000A series, if <ALARM CAP> on the SYSTEM CONFIGURATION screen is turned on, the alarm setting of HR/PR, ART-SYS, ART-DIA and ART-MEAN is affected by the "ALARM CAP" setting.

Window	Page	Setting Item	Settings Range		Step	Default Setting	Backup
ALARM LIMITS	PRESS2 ALARMS	RAD-MEAN, AO-MEAN, FEM-MEAN	Upper	OFF, –48 to 300 mmHg	2	OFF	Master
				OFF, –6.0 to 40.0 kPa	0.5		
			Lower	OFF, –50 to 298 mmHg	2	ADULT: 60 mmHg CHILD: 46 mmHg NEONATE: 30 mmHg	
				OFF, –6.5 to 39.5 kPa	0.5	ADULT: 8.0 kPa CHILD: 6.0 kPa NEONATE: 4.0 kPa	
		DORS-SYS	Upper	OFF, –48 to 300 mmHg	2	ADULT: OFF CHILD: 200 mmHg NEONATE: OFF	
				OFF, –6.0 to 40.0 kPa	0.5	ADULT: OFF CHILD: 26.5 kPa NEONATE: OFF	
			Lower	OFF, –50 to 298 mmHg	2	ADULT: 80 mmHg CHILD: 66 mmHg NEONATE: 50 mmHg	
				OFF, –6.5 to 39.5 kPa	0.5	ADULT: 10.5 kPa CHILD: 9.0 kPa NEONATE: 6.5 kPa	
		DORS-DIA	Upper	OFF, –48 to 300 mmHg	2	OFF	
				OFF, –6.0 to 40.0 kPa	0.5	OFF	
			Lower	OFF, –50 to 298 mmHg	2	OFF	
				OFF, –6.5 to 39.5 kPa	0.5	OFF	
		DORS-MEAN	Upper	OFF, –48 to 300 mmHg	2	ADULT: OFF CHILD: 186 mmHg NEONATE: OFF	
				OFF, –6.0 to 40.0 kPa	0.5	ADULT: OFF CHILD: 25.0 kPa NEONATE: OFF	
			Lower	OFF, –50 to 298 mmHg	2	ADULT: 60 mmHg CHILD: 46 mmHg NEONATE: 30 mmHg	
				OFF, –6.5 to 39.5 kPa	0.5	ADULT: 8.0 kPa CHILD: 6.0 kPa NEONATE: 4.0 kPa	
		UA-SYS	Upper	OFF, –48 to 300 mmHg	2	OFF	
				OFF, –6.0 to 40.0 kPa	0.5		
			Lower	OFF, –50 to 298 mmHg	2	OFF	
				OFF, –6.5 to 39.5 kPa	0.5		
		UA-DIA	Upper	OFF, –48 to 300 mmHg	2	OFF	
				OFF, –6.0 to 40.0 kPa	0.5		
			Lower	OFF, –50 to 298 mmHg	2	OFF	
				OFF, –6.5 to 39.5 kPa	0.5		
		UA-MEAN, UV-MEAN	Upper	OFF, –48 to 300 mmHg	2	OFF	
				OFF, –6.0 to 40.0 kPa	0.5		
			Lower	OFF, –50 to 298 mmHg	2	OFF	
				OFF, –6.5 to 39.5 kPa	0.5		
	PRESS3 ALARMS	PAP-SYS	Upper	OFF, –48 to 300 mmHg*	2	OFF	
				OFF, –6.0 to 40.0 kPa*	0.5		
			Lower	OFF, –50 to 298 mmHg*	2	OFF	
				OFF, –6.5 to 39.5 kPa*	0.5		
		PAP-DIA	Upper	OFF, –48 to 300 mmHg*	2	OFF	
				OFF, –6.0 to 40.0 kPa*	0.5		
			Lower	OFF, –50 to 298 mmHg*	2	OFF	
				OFF, –6.5 to 39.5 kPa*	0.5		
		PAP-MEAN, CVP-MEAN	Upper	OFF, –48 to 300 mmHg*	2	OFF	
				OFF, –6.0 to 40.0 kPa*	0.5		
			Lower	OFF, –50 to 298 mmHg*	2	OFF	
				OFF, –6.5 to 39.5 kPa*	0.5		

* On BSM-6000A series, if <ALARM CAP> on the SYSTEM CONFIGURATION screen is turned on, the alarm setting is affected by the "ALARM CAP" setting on the SYSTEM SETUP window.

Window	Page	Setting Item	Settings Range		Step	Default Setting	Backup
ALARM LIMITS	PRESS3 ALARMS	RVP-SYS, LVP-SYS	Upper	OFF, –48 to 300 mmHg	2	OFF	Master
				OFF, –6.0 to 40.0 kPa	0.5		
			Lower	OFF, –50 to 298 mmHg	2	OFF	
				OFF, –6.5 to 39.5 kPa	0.5		
		RVP-DIA, LVP-DIA	Upper	OFF, –48 to 300 mmHg	2	OFF	
				OFF, –6.0 to 40.0 kPa	0.5		
			Lower	OFF, –50 to 298 mmHg	2	OFF	
				OFF, –6.5 to 39.5 kPa	0.5		
		RAP-MEAN, RVP-MEAN, LAP-MEAN, LVP-MEAN, ICP-MEAN, ICP2-MEAN to ICP4-MEAN	Upper	OFF, –48 to 300 mmHg	2	OFF	
				OFF, –6.0 to 40.0 kPa	0.5		
			Lower	OFF, –50 to 298 mmHg	2	OFF	
				OFF, –6.5 to 39.5 kPa	0.5		
	TEMP ALARMS	T1 to T4, Tskin, Tskin2, Tskin3, Trect, Tcore, Tnaso, Teso, Ttymp	Upper	OFF, 0.1 to 45.0°C	0.1	ADULT: 38.0°C CHILD: 38.5°C NEONATE: 39.0°C	
				OFF, 33.0 to 113.0°F	1.0	ADULT: 100°F CHILD: 101°F NEONATE: 102°F	
			Lower	OFF, 0.0 to 44.9°C	0.1	OFF	
				OFF, 32.0 to 112.0°F	1.0		
		Tblad, Taxil	Upper	OFF, 0.1 to 45.0°C	0.1	ADULT: 38.0°C CHILD: 38.5°C NEONATE: 39.0°C	
				OFF, 33.0 to 113.0°F	1.0	ADULT: 100°F CHILD: 101°F NEONATE: 102°F	
			Lower	OFF, 0.0 to 44.9°C	0.1	OFF	
				OFF, 32.0 to 112.0°F	1.0		
		Tb	Upper	OFF, 15.1 to 45.0°C	0.1	ADULT: 38.0°C CHILD: 38.5°C NEONATE: 39.0°C	
				OFF, 51.0 to 113.0°F	1.0	ADULT: 100°F CHILD: 101°F NEONATE: 102°F	
			Lower	OFF, 15.0 to 44.9°C	0.1	OFF	
				OFF, 50.0 to 112.0°F	1.0		
		ΔT, ΔT2	Upper	OFF, 0.1 to 45.0°C	0.1	OFF	
				OFF, 1.0 to 113.0°F	1.0		
	GAS ALARMS	RR	Upper	OFF, 2 to 150 counts/min*1*2	2	OFF	
			Lower	OFF, 0 to 148 counts/min*1*2		OFF	
		APNEA	Upper	OFF, 5 to 40 s*1*2	5	20 s	
		CO_2(E)	Upper	OFF, 2 to 99 mmHg*1*2	1	OFF	
				OFF, 0.2 to 13.0 kPa*1*2	0.1		
			Lower	OFF, 1 to 98 mmHg*1*2	1	OFF	
				OFF, 0.1 to 12.9 kPa*1*2	0.1		
		CO_2(I)	Upper	OFF, 1 to 99 mmHg	1	ADULT OR, CHILD: 3 mmHg ADULT ICU/NICU, NEONATE: OFF	
				OFF, 0.1 to 12.9 kPa	0.1	ADULT OR, CHILD: 0.4 kPa ADULT ICU/NICU, NEONATE: OFF	
		O_2(E)	Upper	OFF, 11 to 100%	1	OFF	
			Lower	OFF, 10 to 99%		OFF	
		O_2(I)	Upper	OFF, 19 to 100%	1	OFF	
			Lower	18 to 99%		18%	

*1 On BSM-6000A series, if <CRISIS VITAL ALARM MANAGEMENT> on the SYSTEM CONFIGURATION screen is turned on and "ALARM PRIORITY" on the SYSTEM SETUP window is set to CRISIS, the alarm setting is set to the alarm master setting.

*2 On BSM-6000A series, if <ALARM CAP> on the SYSTEM CONFIGURATION screen is turned on, the alarm setting is affected by the "ALARM CAP" setting on the SYSTEM SETUP window.

Window	Page	Setting Item	Settings Range		Step	Default Setting	Backup
ALARM LIMITS	GAS ALARMS	N_2O(E)	Upper	OFF, 1 to 100%	1	OFF	Master
			Lower	OFF, 0 to 99%		OFF	
		N_2O(I)	Upper	OFF, 1 to 100%	1	80%	
			Lower	OFF, 0 to 99%		OFF	
		HAL(E)	Upper	OFF, 0.1 to 7.0%	0.1	OFF	
			Lower	OFF, 0.0 to 6.9%		OFF	
		HAL(I)	Upper	OFF, 0.1 to 7.0%	0.1	4.0%	
			Lower	OFF, 0.0 to 6.9%		OFF	
		ISO(E)	Upper	OFF, 0.1 to 7.0%	0.1	OFF	
			Lower	OFF, 0.0 to 6.9%		OFF	
		ISO(I)	Upper	OFF, 0.1 to 7.0%	0.1	5.0%	
			Lower	OFF, 0.0 to 6.9%		OFF	
		ENF(E)	Upper	OFF, 0.1 to 7.0%	0.1	OFF	
			Lower	OFF, 0.0 to 6.9%		OFF	
		ENF(I)	Upper	OFF, 0.1 to 7.0%	0.1	5.0%	
			Lower	OFF, 0.0 to 6.9%		OFF	
		SEV(E)	Upper	OFF, 0.1 to 7.0%	0.1	OFF	
			Lower	OFF, 0.0 to 6.9%		OFF	
		SEV(I)	Upper	OFF, 0.1 to 7.0%	0.1	6.0%	
			Lower	OFF, 0.0 to 6.9%		OFF	
		DES(E)	Upper	OFF, 0.1 to 20.0%	0.1	OFF	
			Lower	OFF, 0.0 to 19.9%		OFF	
		DES(I)	Upper	OFF, 0.1 to 20.0%	0.1	12.0%	
			Lower	OFF, 0.0 to 19.9%		OFF	
	OTHER ALARMS	MV*	Upper	OFF, 0.1 to 30.0 L/min	0.1	ADULT: 10.0 CHILD: 6.0 NEONATE: OFF	
			Lower	OFF, 0.0 to 29.9 L/min		ADULT, CHILD: 2.0 NEONATE: OFF	
		Ppeak*	Upper	OFF, 1 to 100 cmH_2O	1	ADULT, CHILD: 40 NEONATE: OFF	
			Lower	OFF, 0 to 99 cmH_2O		ADULT, NEONATE: OFF CHILD: 8	
		PEEP*	Upper	OFF, 1 to 50 cmH_2O	1	ADULT, CHILD: 10 NEONATE: OFF	
			Lower	OFF, 0 to 49 cmH_2O		ADULT, CHILD: 2 NEONATE: OFF	
		SEF	Upper	OFF, 1.0 to 60.0 Hz	0.5	OFF	
			Lower	OFF, 0.5 to 59.5 Hz		OFF	
		TP	Upper	OFF, 0.02 to 9.99 nW	0.01	OFF	
			Lower	OFF, 0.01 to 9.98 nW		OFF	
		CCO*	Upper	OFF, 1.1 to 20.0 L/min	0.1	OFF	
			Lower	OFF, 1.0 to 19.9 L/min		OFF	
		CCI*	Upper	OFF, 1.1 to 20.0 $L/min/m^2$		OFF	
			Lower	OFF, 1.0 to 19.9 $L/min/m^2$		OFF	

* Not available for BSM-6000A series.

Arrhythmia Alarms

Window	Page	Setting Item	Settings Range	Step	Default Setting	Backup
ARRHYTH ALARMS	ARRHYTH	ASYSTOLE	ON fixed 3 to 10 s	1	ADULT, CHILD: 5 s NEONATE: 3 s	Master
		VF	ON fixed	–	ON	
		VT*	ON fixed	–	ON	
			V BRADY alarm limit to 300 bpm	1	ADULT, CHILD: 100 bpm NEONATE: 140 bpm	
			Value set in VPC RUN to 9 beats	1	6 beats	
		EXT TACHY*	ON, OFF	–	BSM-6000A: ON BSM-6000K: OFF	
			Upper heart rate alarm limit to 300 bpm	1	ADULT: 160 bpm CHILD: 190 bpm NEONATE: 220 bpm	
		EXT BRADY*	ON, OFF	–	BSM-6000A: ON BSM-6000K: OFF	
			15 to lower heart rate alarm limit	1	ADULT: 40 bpm CHILD: 60 bpm NEONATE: 80 bpm	
		V BRADY*	ON, OFF	–	ADULT OR: OFF ICU/ NICU: ON CHILD, NEONATE: OFF	
			15 to 299 bpm	1	ADULT, CHILD: 50 bpm NEONATE: 60 bpm	
		VPC RUN	ON, OFF	–	ADULT OR: OFF ICU/ NICU: ON CHILD, NEONATE: OFF	
			16 to 300 bpm*	1	ADULT, CHILD: 100 bpm NEONATE: 140 bpm	
			3 to 8 beats	1	3 beats	
		SV TACHY*	ON, OFF	–	OFF	
			16 to 300 bpm	1	ADULT, CHILD: 170 bpm NEONATE: 210 bpm	
			3 to 9 beats	1	6 beats	
		PAUSE*	ON, OFF	–	ON	
			1.0 to 3.0 s	0.1	ADULT, CHILD: 3.0 s NEONATE: 1.5 s	
		V RHYTHM*	ON, OFF	–	ADULT OR: OFF ICU/ NICU: ON CHILD, NEONATE: OFF	
		COUPLET	ON, OFF	–	OFF	
		EARLY VPC	ON, OFF	–	OFF	
		MULTIFORM*	ON, OFF	–	OFF	
		BIGEMINY	ON, OFF	–	OFF	
		TRGEMINY*	ON, OFF	–	OFF	
		IRREGULAR RR*	ON, OFF	–	OFF	
		PROLONGED RR*	ON, OFF	–	OFF	
		NO PACER PULSE*	ON, OFF	–	OFF	
		PACER NON-CAPTURE*	ON, OFF	–	OFF	
			40 to 480 ms	4	400 ms	

* Available only when “EXTENDED” is selected for arrhythmia type on the SYSTEM SETUP window.

DATE Window

Window	Page	Item	Setting Items	Default Setting	Backup
DATE	DATE	YEAR	2000 to 2099	–	OK
		MONTH	1 to 12		
		DAY	1 to 31		
		HOUR	0 to 23		
		MINUTE	0 to 59		

VOLUME Window

Window	Page	Item	Setting Items	Default Setting	Backup
VOLUME	VOLUME	SYNC SOUND VOLUME	ON, OFF	ON	OK
			0 to 7 (8 steps)	3	
		ALARM VOLUME	1 to 7 (7 steps)	5	

DISPLAY Window

Window	Page	Item	Setting Items	Default Setting	Backup
DISPLAY	BRIGHT	BRIGHTNESS	0 to 7 (8 steps)	7	OK
	WAVES	NO.ECG WAVES	1, 2, 3	1	
		PRESS SCALE	SEPARATE, COMMON, DUAL	COMMON	
		SWEEP SPEED	6 mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s	25 mm/s	
		RESP/CO_2 SWEEP SPEED	1 mm/s, 6 mm/s, 12.5 mm/s, 25 mm/s	OR: 6 mm/s ICU: 25 mm/s NICU: 1 mm/s	
		WAVE DISPLAY	SpO_2, SpO_2-2, EEG, EEG2, FLOW*, Paw*, VOL*, P1 to P7	All	

* Not available for BSM-6000A series.

RECORD Window

Window	Page	Item	Setting Items	Default Setting	Backup
RECORD	REC PARAMS	TRACES	ECG, ECG2, ECG3, RESP, SpO_2, SpO_2-2, measuring PRESS labels, CO_2, O_2, N_2O, AGENT1, AGENT2, FLOW*, Paw*, VOL*, EEG1 (BIS), EEG2 (BIS), FLOW(EXT), Paw(EXT), NONE	TRACE 1: ECG TRACE 2: NONE TRACE 3: NONE	OK
	OTHER	ALARM RECORDING	ON, OFF	OFF	
		RECORDING SPEED	12.5 mm/s, 25 mm/s, 50 mm/s	25 mm/s	
		PERIODIC REC INTERVAL (min)	OFF, FREE, 30, 60, 120, 5(OCRG), 15(OCRG)	OFF	

* Not available for BSM-6000A series.

ECG Window

Window	Page	Item		Setting Items	Default Setting	Backup
ECG	MAIN	SENSITIVITY		×1/4, ×1/2, AUTO, ×1, ×2, ×4	×1	OK
		LEAD		I, II, III, aVR, aVL, aVF, V1 to V6	II	
		ALARMS	HR/PR	The setting items and default setting are the same as the ALARM LIMITS setting in ECG ALARMS page.		Master
			VPC			
			ST			
	ST ALARMS	ALARMS	ST-I to ST-V6			
	ARRHYTH	The item, setting items and default setting are the same as the ALARM LIMITS setting in ARRHYTH ALARMS page.				
	OTHER	FILTERS	–	DIAG, MONITOR, MAXIMUM	OR, NICU: MAXIMUM ICU: MONITOR	OK
			HUM FILTER	ON, OFF	OFF	
		HR DISPLAY MODE		AVERAGE, INSTANT	AVERAGE	
		AUTO LEAD CHANGE		ON, OFF	OFF	
		PACING	DETECT	ON, OFF	ADULT, CHILD: ON NEONATE: OFF	30 min
			MARK	ON, OFF	OFF	OK
		NUMBER OF ELECTRODES		STANDARD, INDIV 6, INDIV 10	STANDARD	
		ECG MEASUREMENT		ON, OFF	ON	
		SYNC PITCH		FIXED, PRESS, SpO_2, SpO_2-2	FIXED	
		SYNC SOURCE	–	ECG, PRESS, SpO_2	ECG	
			PR DISPLAY	ON, OFF	OFF	
	ARRHYTH ANALYSIS	ARRHYTHMIA ANALYSIS		ON, OFF	ON	Master
		ARRHYTHMIA ANALYSIS METHOD		SINGLE, MULTIPLE	SINGLE	OK
		QRS DETECTION TYPE		ADULT, CHILD, NEONATE	OR, ICU: ADULT NICU: NEONATE	Master
	ECG2/3 WAVES	NO. ECG WAVES		1, 2, 3	1	OK
		ECG2 SENSITIVITY		×1/4, ×1/2, ×1, ×2, ×4	×1	
		ECG2 LEAD		I, II, III, aVR, aVL, aVF, V1 to V6	V4	
		ECG3 SENSITIVITY		×1/4, ×1/2, ×1, ×2, ×4	×1	
		ECG3 LEAD		I, II, III, aVR, aVL, aVF, V1 to V6	V5	
	V-LEADS	FREE LEAD a (Ca/Va)		V1 to V6	V4	
		FREE LEAD b (Cb/Vb)		V1 to V6	V5	
	ST POINT	ISO POINT		R –: 248 to 0 ms	ADULT: 80 ms CHILD, NEONATE: 56 ms	30 min
		J POINT		R +: 0 to 340 ms	ADULT: 48 ms CHILD NEONATE: –	
		ST POINT		R +: 0 to * ms	60 ms	

* When J point is set to R +: 340 ms, ST point is J + 0 ms.

RESP/CO_2 Window

Window	Page		Item		Setting Items	Default Setting	Backup
RESP/CO_2	MAIN		IMPEDANCE RESP LEAD		R-L, R-F	R-F	OK
			SENSITIVITY		×1/4, ×1/2, ×1, ×2, ×4	×1	
			ALARMS	RR	The setting items and default setting are the same as the ALARM LIMITS setting in MAIN ALARMS page.		Master
				APNEA			
				CO_2			
	SCALE	CO_2	–		0-40, 0-60, 0-80, 0-120, 0-150 mmHg or 0 (fixed) to 150 mmHg	0-40 mmHg	OK
			–		0.0-5.5, 0.0-8.0, 0.0-10.5, 0.0-16.0, 0.0-20.0 kPa or 0.0 (fixed) to 20.0 kPa	0.0-5.5 kPa	
	GAS COMP		GAS COMPOSITION	–	AIR, O_2+AIR, O_2+N_2O	OR: O_2+N_2O ICU, NICU: O_2+AIR	OK
				PERCENTAGE OF INSPIRED O_2	0 to 100%	21.0%	
	OTHER		IMPEDANCE MEASUREMENT		ON, OFF	OR: OFF ICU, NICU: ON	OK
			RESP/CO_2 SWEEP SPEED		1 mm/s, 6 mm/s, 12.5 mm/s, 25 mm/s	OR: 6 mm/s ICU: 25 mm/s NICU: 1 mm/s	
			$ETCO_2$ MAX HOLD		10 s, 20 s, OFF	10 s	
			DISPLAY IMP-RR AS SECOND PARAMETER		ON, OFF	OFF	

SpO_2 Window

Window	Page		Item		Setting Items	Default Setting	Backup
SpO_2	MAIN	SpO_2	SENSITIVITY		×1/8, ×1/4, ×1/2, ×1, AUTO, ×2, ×4, ×8	AUTO	OK
			ALARMS	SpO_2	The setting items and default setting are the same as the ALARM LIMITS setting in MAIN ALARMS page.		Master
				HR/PR			
		SpO_2-2*1	SENSITIVITY		×1/8, ×1/4, ×1/2, ×1, AUTO, ×2, ×4, ×8	AUTO	OK
			ALARMS	SpO_2-2	The setting items and default setting are the same as the ALARM LIMITS setting in MAIN ALARMS page.		Master
				ΔSpO_2			
	OTHER		SYNC SOURCE	–	ECG, PRESS, SpO_2	ECG	OK
				PR DISPLAY	ON, OFF	OFF	
			SYNC PITCH		FIXED, PRESS, SpO_2, SpO_2-2	FIXED	
			RESPONSE*2		FAST, NORMAL, SLOW	NORMAL	
			PARAMETER FOR 2ND CURRENT TREND		OFF, PI	OFF	
			AVERAGE TIME(S)*3		2, 4, 8, 10, 12, 14, 18	8	
			SENSITIVITY MODE*3		MAX, NORMAL, APOD	NORMAL	
			SpO_2 SENSITIVITY MODE*2		MAX, NORMAL	NORMAL	30 min
			SpO_2-2 SENSITIVITY MODE*6		MAX, NORMAL	NORMAL	
			FAST SAT*3		ON, OFF	OFF	OK
	NUMERIC DISPLAY		NUMERIC DISPLAY ON HOME SCREEN FOR SpO_2*4	PR	ON, OFF	OFF	OK
				PI*5	ON, OFF	OFF	
				SQI*6	ON, OFF	OFF	
			NUMERIC DISPLAY ON HOME SCREEN FOR SpO_2-2	PR*7	ON, OFF	OFF	
				ΔSpO_2	ON, OFF	OFF	
				PI*5	ON, OFF	OFF	

*1 SpO_2-2 page is displayed when a JL-500P1 or JL-500P2 SpO_2 adapter is connected to an AY-661P, AY-663P, AY-671P or AY-673P input unit or BSM-1763 or BSM-1773 bedside monitor, or an IF-919P or IF-925P communication cable is used. The PR alarm setting is not available when the IF-919P or IF-925P communication cable is used. The JL-500P2 SpO_2 adapter, AY-660P, AY-661P and AY-663P input units, and BSM-1763 bedside monitor are not available for BSM-6000A series.

*2 Available only when an AY-660P, AY-661P, AY-663P, AY-671P or AY-673P input unit or BSM-1763 or BSM-1773 bedside monitor is used.
*3 Available only when an AY-631P or AY-633P input unit or BSM-1700 series bedside monitor is used.
*4 Available only when an AY-631P, AY-633P, AY-660P, AY-661P, AY-663P, AY-671P or AY-673P input unit or BSM-1700 series bedside monitor is used.
*5 Available only when an AY-631P, AY-633P, AY-660P, AY-661P, AY-663P, AY-671P or AY-673P input unit or BSM-1700 series bedside monitor, or IF-925P communication cable is used.
*6 Available only when the SpO_2 module version is 02-01 or later, the bedside monitor software version is 05-01 or later, and the AY-600P series input unit version 02-01 or later.
*7 Available only when an JL-500P1 or JL-500P2 SpO_2 adapter is connected to the AY-661P, AY-663P, AY-671P or AY-673P input unit or BSM-1763 or BSM-1773 bedside monitor.

NIBP Window

Window	Page	Item		Setting Items	Default Setting	Backup
NIBP	MAIN	INITIAL CUFF PRESSURE TYPE		ADULT, CHILD, NEONATE	ADULT: ADULT CHILD: CHILD NEONATE: NEONATE	30 min
		MEASUREMENT INTERVAL		MANUAL, STAT, SIM, 1 min, 2 min, 2.5 min, 5 min, 10 min, 15 min, 30 min, 1 h, 2 h, 4 h, 8 h	MANUAL	Master
		ALARMS	SYS	The setting items and default setting are the same as the ALARM LIMITS setting in MAIN ALARMS page.		
			DIA			
			MAP			
	PWTT*1	PWTT MEASUREMENT		ON, OFF	OFF	OK
	OTHER	INITIAL CUFF PRESSURE	ADULT	100 to 280 mmHg	180 mmHg	–
				13.0 to 37.0 kPa	24.0 kPa	
			CHILD	100 to 280 mmHg	140 mmHg	
				13.0 to 37.0 kPa	19.0 kPa	
			NEONATE	70 to 145 mmHg	100 mmHg	
				9.0 to 19.0 kPa	13.0 kPa	
		DISPLAY OSCILLATION GRAPH		ON, OFF	ON	OK
		INFLATE MODE*1, *2		ON, OFF	OFF	

*1 Not available for BSM-6000A series.
*2 Available only when the BSM-1700 series bedside monitor is mounted.

PRESS Window

Window	Page		Item		Setting Items	Default Setting	Backup
PRESS	MAIN		ALARMS	SYS	The setting items and default setting are the same as the PRESS1 to PRESS3 ALARMS settings of ALARM LIMITS in MAIN ALARMS page.		Master
				DIA			
				MEAN			
				HR/PR			
	SCALE	ART, ART2, RAD, DORS, AO, LVP, FEM, P1 to P7	–		0-20, 0-50, 0-100, 0-160, 0-200, 0-300 mmHg or 0 to 300 mmHg	ADULT: 0-200 mmHg CHILD: 0-160 mmHg NEONATE: 0-100 mmHg	30 min
					0.0-2.5, 0.0-6.5, 0.0-13.5, 0.0-21.5, 0.0-26.5, 0.0-40.0 kPa or 0.0 to 40.0 kPa	ADULT: 0.0-26.5 kPa CHILD: 0.0-21.5 kPa NEONATE: 0.0-13.5 kPa	
		UA	–		0-20, 0-50, 0-100, 0-160, 0-200, 0-300 mmHg or 0 to 300 mmHg	0-100 mmHg	OK
					0.0-2.5, 0.0-6.5, 0.0-13.5, 0.0-21.5, 0.0-26.5, 0.0-40.0 kPa or 0.0 to 40.0 kPa	0.0-13.5 kPa	
		PAP, CVP, RAP, UV, RVP, LAP, ICP ICP2 to ICP4	–		0-20, 0-50, 0-100, 0-160, 0-200, 0-300 mmHg or 0 to 300 mmHg	0-50 mmHg	
					0.0-2.5, 0.0-6.5, 0.0-13.5, 0.0-21.5, 0.0-26.5, 0.0-40.0 kPa or 0.0 to 40.0 kPa	0.0-6.5 kPa	
PRESS	LABEL		SELECTABLE ITEMS	P1 to P7, ART, ART2, RAD, DORS, AO, FEM, UA, UV, PAP, CVP, RAP, RVP, LAP, LVP, ICP, ICP2 to ICP4	–	–	–
	OTHER		SYNC SOURCE	–	ECG, PRESS, SpO_2	ECG	OK
				PR DISPLAY	ON, OFF	OFF	
			CALCULATION METHOD		STANDARD, PEAK	STANDARD	
			CPP DISPLAY		ON, OFF	OFF	
			SYNC PITCH		FIXED, PRESS, SpO_2, SpO_2-2	FIXED	
			PRESS SCALE		SEPARATE, COMMON, DUAL	COMMON	
			NUMERIC DISPLAY	ART, ART2, RAD, DORS, AO, FEM, PAP, RVP, LVP, P1 to P7	SYS/DIA (MEAN), MEAN	SYS/DIA (MEAN)	
				UA	MAX/MIN (MEAN), MEAN	MAX/MIN (MEAN)	
				UV, CVP, RAP, LAP, ICP, ICP2 to ICP4		MEAN	
			PPV/SPV DISPLAY		PPV, SPV, OFF	OFF	
			PPV/SPV AVERAGE TIME		1 min, 5 min	1 min	
			CVP AUTO ET MODE		ON, OFF	OFF	

TEMP Window

Window	Page	Item		Setting Items	Default Setting	Backup
TEMP	MAIN	ALARMS	Measuring label, ΔT, ΔT2	The setting items and default setting are the same as the ALARM LIMITS setting in TEMP ALARMS page.		Master
	LABEL	SELECTABLE ITEMS		T1 to T4, Tskin, Tskin2, Tskin3, Tcore, Tnaso, Teso, Tblad, Trect, Ttymp, Taxil, Tb, NONE	–	–
	OTHER	ΔT SITES		T1 to T4, Tskin, Tskin2, Tskin3, Tcore, Tnaso, Teso, Tblad, Trect, Ttymp, Taxil, Tb, NONE	T1 – T2	OK
		ΔT2 SITES		T1 to T4, Tskin, Tskin2, Tskin3, Tcore, Tnaso, Teso, Tblad, Trect, Ttymp, Taxil, Tb, NONE	T3 – T4	

BIS Window

Window	Page	Item		Setting Items	Default Setting	Backup
BIS	MAIN	SENSITIVITY		10, 20, 30, 50, 70, 100, 150, 200	30	OK
		ALARMS	BIS	The setting items and default setting are the same as the ALARM LIMITS setting in MAIN ALARMS page.		Master
	OTHER	FILTER		ON, OFF	ON	OK
		SMOOTHING RATE		10 s, 15 s, 30 s	15 s	
		AUTO CHECK		ON, OFF	ON	30 min
		EEG SWEEP SPEED		6 mm/s, 12.5 mm/s, 25 mm/s, 50 mm/s	25 mm/s	OK
		PARAMETER FOR 2ND CURRENT TREND		OFF, EMG, SQI, SR	EMG	

CO Window

Window	Page	Item		Setting Items	Default Setting	Backup
CO	CATHETER	CATHETER		Edwards, Argon, CONSTANT	Edwards	OK
		INJECTATE TEMPERATURE MEASURING METHOD		BATH, INLINE	BATH	
		INJECTATE VOLUME		10 cc, 5 cc, 3 cc	10 cc	
		CATHETER SIZE	Edwards	8 F, 7.5 F, 7 F, 6 F, 5.5 F	7.5 F	
			Argon	7.5 F, 7 F, 6 F, 5 F		
		CONSTANT		0.001 to 1.000	0.564	
	HEIGHT/WEIGHT	HEIGHT		0.0 to 299.9 cm	–	–
				0.1 to 118.0 inch (9 ft 11.9 inch)		
		WEIGHT		0.00 to 449.9 kg		
				0.1 to 654.9 pound		
	ALARMS	Tb		The setting items and default setting are the same as the ALARM LIMITS setting in TEMP ALARMS page.		Master

GAS Window

Window	Page		Item	Setting Items	Default Setting	Backup
GAS	SCALE	CO_2	–	0-40, 0-60, 0-80, 0-120, 0-150 mmHg or 0 (fixed) to 150 mmHg	0-40 mmHg	OK
			–	0.0-5.5, 0.0-8.0, 0.0-10.5, 0.0-16.0, 0.0-20.0 kPa or 0.0 (fixed) to 20.0 kPa	0.0-5.5 kPa	
		O_2	–	30-60, 0-60, 0-100% or 0 to 100%	0-100%	
		N_2O	–	0-80, 0-100, 50-80% or 0 to 100%	50-80%	
		HAL, ISO, ENF, SEV, DES	–	0.0-4.0, 0.0-8.0, 0.0-20.0 mmHg or 0.0 to 20.0 mmHg	0.0-8.0 mmHg	
	ALARMS*1		RR, APNEA, CO_2(E), CO_2(I), O_2(E), O_2(I), N_2O(E), N_2O(I), HAL(E), HAL(I), ISO(E), ISO(I), ENF(E), ENF(I), SEV(E), SEV(I), DES(E), DES(I)	The setting items and default setting are the same as the ALARM LIMITS settings in GAS ALARMS page.		Master
	SAMPLING*1*2		SAMPLING MODE	AUTO, MANUAL	AUTO	–
			SAMPLING VOLUME	ADULT: 120 to 200 mL/min NEONATE: 70 to 120 mL/min	ADULT: 120 mL/min NEONATE: 70 mL/min	
	OTHER		NUMERIC DISPLAY	O_2(E), O_2(I), N_2O(E), N_2O(I), AGENT1(E), AGENT1(I), AGENT2(E), AGENT2(I), MAC, NONE	RR (fixed), CO_2(E) (fixed), O_2(I), AGENT1(I), NONE	OK
			CO_2(I) DISPLAY	ON, OFF	OFF	
			GAS MEASUREMENT*3	ON, OFF	ON	

*1 The ALARMS and SAMPLING page are not displayed when an anesthetic machine is connected.
*2 SAMPLING page is not displayed when the GF-210R multigas unit or GF-220R multigas/flow unit is connected to the monitor.
*3 Available only when a GF-110PA or GF-210R multigas unit or GF-120PA or GF-220R multigas/flow unit is used.

O_2 Window

Window	Page	Item		Setting Items	Default Setting	Backup
O_2	MAIN	ALARMS	O_2(I)	The setting items and default setting are the same as the ALARM LIMITS settings in GAS ALARMS page.		Master

VENT Window

Window	Page		Item	Setting Items	Default Setting	Backup
VENT	SCALE	Paw	–	0-10, 0-20, 0-50, 0-100, 0-150 or 0 (fixed) to 150	0-50	OK
		FLOW	–	−1.0-+1.0, −2.0-+2.0, −3.0-+3.0 or –3.0-+3.0	-1.0-+1.0	
		VOL*1	–	0-150, 0-300, 0-500, 0-1000, 0-2000	0-500	
	LOOP*2	P-V	Paw	0-10, 0-20, 0-30, 0-50, 0-100	0-30	
			VOL	0-150, 0-300, 0-500, 0-800, 0-1000, 0-2000	0-800	
		F-V	FLOW	−0.3-+0.3, −0.5-+0.5, −1.0-+1.0, −1.5-+1.5, −3.0-+3.0	−1.5-+1.5	
			VOL	0-150, 0-300, 0-500, 0-800, 0-1000, 0-2000	0-800	
		SETTINGS	SHOW LOOPS ON HOME SCREEN	P-V, F-V, OFF	P-V	
	OTHER		NUMERIC DISPLAY	Pmean, MV, PEEP, O_2(I), Ppeak, set O_2(I), TV, set Freq, set AMP, set SV, MAP, %Leak, AMP, NONE	MV, TV, O_2(I), Pmean	

*1 Available only when using the IF-928P, IF-938P or IF-943P communication cable.
*2 Available only when using the IF-943P communication cable or connecting Metran R100 with the IF-938P communication cable.

CCO Window

Window	Page	Item		Setting Items	Default Setting	Backup
CCO	PATIENT INFO	DATE OF BIRTH		The setting items and default setting are the same as the settings in PATIENT INFO window.		OK
		HEIGHT/WEIGHT				
		GENDER				
	MAIN	ALARMS	CCO	The setting items and default setting are the same as the ALARM LIMITS settings in OTHER ALARMS page.		Master
			CCI			
	WAVEFORM	SCALE		0-20, 0-50, 0-100, 0-160, 0-200, 0-300	0-200	OK
	OTHER	NUMERIC DISPLAY		CCO, CCI, SV, SVI, SVR, SVRI, SVV, NONE	CCO, NONE, NONE, NONE	
		PARAMETER FOR CURRENT TREND		CCO, CCI	CCO	
		AVERAGE TIME		20 s, 5 min	20 s	
CCO (CCO, CCO/$S\bar{v}O_2$)	OTHER	NUMERIC DISPLAY		CCO, SVRI, $S\bar{v}O_2$, Tb, EF, $ScvO_2$, CCI, EDV, SVR, EDVI, NONE	CCO, SVR, EF, Tb	
CCO (PiCCO)	OTHER	NUMERIC DISPLAY		ABSOLUTE, INDEX	INDEX	

FLOW/Paw Window

FLOW/Paw monitoring is not available for BSM-6000A series.

Window	Page		Item		Setting Items	Default Setting	Backup
FLOW/Paw	SCALE	FLOW	–		–0.3-+0.3, –0.5-+0.5, –1.0-+1.0, –2.0-+2.0, –3.0-+3.0,	–1.0-+1.0	OK
		Paw	–		0-10, 0-20, 0-50, 0-100	0-50	
		VOL	–		0-150, 0-300, 0-500, 0-1000, 0-2000	0-500	
	ALARM		ALARMS	MV	The setting items and default setting are the same as the ALARM LIMITS settings in OTHER ALARMS page.		Master
				Ppeak			
				PEEP			
				RR			
				APNEA			
	LOOPS	P-V	SCALE		The setting items and default settings are the same as the SCALE page.	Scale of VOL and Paw.	OK
			NUMERIC DISPLAY		Ppeak, TVe, C, Pmean, TVi, R, PEEP, MV, Re, RR, I:E, Ri, NONE	Ppeak, MV, C, PEEP, I:E, R	
		F-V	SCALE		The setting items and default settings are the same as the SCALE page	Scale of FLOW and VOL.	
			NUMERIC DISPLAY		Ppeak, TVe, C, Pmean, TVi, R, PEEP, MV, Re, RR, I:E, Ri, NONE	Ppeak, MV, C, PEEP, I:E, R	
		REFERENCE	LOOP TYPE		P-V, F-V	P-V	
			REFERENCE LOOPS		ON, OFF	ON	
			SCALE		The setting items and default setting are the same as the SCALE page.	Scale of VOL and Paw.	
		SETTINGS	SHOW LOOPS ON HOME SCREEN		P-V, F-V, OFF	P-V	
			NUMBER OF LOOP		1, 3	1	
	GAS COMP		GAS COMPOSITION		O_2	21.0%	
					N_2O	0.0%	
					HAL, ISO, ENF, SEV, DES	0.0%	
					N_2	79.0%	
			TEMPERATURE AND HUMIDITY		TEMP	37.0°C	
					HUMIDITY	100.0%	
	OTHER		NUMERIC DISPLAY		The settings items are the same as the LOOPS page.	MV, TVe, Ppeak, PEEP, C, R	

EEG Window

Window	Page	Item			Setting Items	Default Setting	Backup
EEG	MEASURE	SENSITIVITY			1, 2, 3, 5, 7, 10, 15, 20, 30, 50, 75, 100, 150, 200 µV/mm	10 µV/mm	OK
	ALARM	ALARMS		SEF	The setting items and default setting are the same as the ALARM LIMITS settings in OTHER ALARMS page.		Master
				TP			
	CSA	SCALE	VOLTAGE SPECTRUM		0.2, 0.5, 1, 2, 5, 10, 20, 50, 100, 200, 500, 1000, 2000 µV	200 µV	OK
			POWER SPECTRUM		1, 2, 5, 10, 20, 50, 100, 200, 500, 1000, 2000, 5000 pW	1000 pW	
			FREQUENCY		0-15, 0-30, 0-60 Hz	0-30 Hz	
	DSA	SCALE	VOLTAGE SPECTRUM		0.2, 0.5, 1, 2, 5, 10, 20, 50, 100, 200, 500, 1000, 2000 µV	200 µV	
			POWER SPECTRUM		1, 2, 5, 10, 20, 50, 100, 200, 500, 1000, 2000, 5000 pW	1000 pW	
			FREQUENCY		0-15, 0-30, 0-60 Hz	0-30 Hz	
			DSA COLOR SCALE		Type 1, Type 2	Type 1	
	MONTAGE	IMP CHECK	IMPEDANCE THRESHOLD		2, 5, 10, 20, 50 kΩ	10 kΩ	
		OTHER	1 10 ELECTRODES	ELECTRODE POSITION	A1, A2, T3, T4, T5, T6, F7, F8, F3, F4, Fz, Fp1, Fp2, C3, C4, Cz, P3, P4, Pz, O1, O2, Oz	1-A1, 2-A2, 3-F3, 4-F4, 5-C3, 6-C4, 7-P3, 8-P4, 9-O1, 10-O2	
				MONTAGE	A1, A2, T3, T4, T5, T6, F7, F8, F3, F4, Fz, Fp1, Fp2, C3, C4, Cz, P3, P4, Pz, O1, O2, Oz, 0V	EEG1: F3-A1, EEG2: F4-A2, EEG3: C3-A1, EEG4: C4-A2, EEG5: P3-A1, EEG6: P4-A2, EEG7: O1-A1, EEG8: O2-A2	
			2 10 ELECTRODES	ELECTRODE POSITION	A1, A2, T3, T4, T5, T6, F7, F8, F3, F4, Fz, Fp1, Fp2, C3, C4, Cz, P3, P4, Pz, O1, O2, Oz	1-A1, 2-A2, 3-Fp1, 4-Fp2, 5-F7, 6-F8, 7-T3, 8-T4, 9-T5, 10-T6	
				MONTAGE	A1, A2, T3, T4, T5, T6, F7, F8, F3, F4, Fz, Fp1, Fp2, C3, C4, Cz, P3, P4, Pz, O1, O2, Oz, 0V	EEG1: Fp1-A1, EEG2: Fp2-A2, EEG3: F7-A1, EEG4: F8-A2, EEG5: T3-A1, EEG6: T4-A2, EEG7: T5-A1, EEG8: T6-A2	
			3 10 ELECTRODES	ELECTRODE POSITION	A1, A2, T3, T4, T5, T6, F7, F8, F3, F4, Fz, Fp1, Fp2, C3, C4, Cz, P3, P4, Pz, O1, O2, Oz	1-A1, 2-A2, 3-Fp1, 4-Fp2, 5-C3, 6-C4, 7-O1, 8-O2, 9-T3, 10-T4	
				MONTAGE	A1, A2, T3, T4, T5, T6, F7, F8, F3, F4, Fz, Fp1, Fp2, C3, C4, Cz, P3, P4, Pz, O1, O2, Oz, 0V	EEG1: Fp1-A1, EEG2: Fp2-A2, EEG3: C3-A1, EEG4: C4-A2, EEG5: O1-A1, EEG6: O2-A2, EEG7: T3-A1, EEG8: T4-A2	
	MONTAGE	OTHER	4 10 ELECTRODES	ELECTRODE POSITION	A1, A2, T3, T4, T5, T6, F7, F8, F3, F4, Fz, Fp1, Fp2, C3, C4, Cz, P3, P4, Pz, O1, O2, Oz	1-A1, 2-A2, 3-Fp1, 4-Fp2, 5-C3, 6-C4, 7-O1, 8-O2, 9-T3, 10-T4	
				MONTAGE	A1, A2, T3, T4, T5, T6, F7, F8, F3, F4, Fz, Fp1, Fp2, C3, C4, Cz, P3, P4, Pz, O1, O2, Oz, 0V	EEG1: Fp1-0V, EEG2: Fp2-0V, EEG3: C3-0V, EEG4: C4-0V, EEG5: O1-0V, EEG6: O2-0V, EEG7: T3-0V, EEG8: T4-0V	
			5 4 ELECTRODES	ELECTRODE POSITION	A1, A2, T3, T4, T5, T6, F7, F8, F3, F4, Fz, Fp1, Fp2, C3, C4, Cz, P3, P4, Pz, O1, O2, Oz	1-C3, 2-A1, 3-C4, 4-A2	
				MONTAGE	A1, A2, T3, T4, T5, T6, F7, F8, F3, F4, Fz, Fp1, Fp2, C3, C4, Cz, P3, P4, Pz, O1, O2, Oz, 0V	EEG1: C3-A1, EEG2: C4-A2	

Window	Page	Item		Setting Items	Default Setting	Backup
EEG	DISPLAY	NUMERIC DISPLAY	CHANNELS PAIR	EEG1, EEG2, EEG3, EEG4, EEG5, EEG6, EEG7, EEG8	EEG1, EEG2	OK
			PARAMETERS PAIR	SEF, MDF, PPF, TP, ABS DELTA, ABS THETA, ABS ALPHA, ABS BETA, ABS GAMMA, %DELTA, % THETA, % ALPHA, % BETA, % GAMMA	SEF, TP	
	OTHER	SEF		90, 95%	95%	
		AMPLITUDE LIMIT		ON, OFF	OR: ON ICU, NICU: OFF	
		LOW CUT FILTER		0.08, 0.16, 0.27, 0.53, 1.6, 5.3 Hz	0.53 Hz	
		AC FILTER		ON, OFF	OFF	
		HIGH CUT FILTER		15, 30, 35, 60, 70 Hz, OFF	30 Hz	
		CSA/DSA UPDATE INTERVAL		12, 20, 32, 40, 60, 120 s	32 s	
		PARAMETER		VOLTAGE, POWER	VOLTAGE	

ANALOG Window

Window	Page	Item	Setting Items	Default Setting	Backup
ANALOG	WAVEFORM	SENS	×1/8, ×1/4, ×1/2, ×1, AUTO, ×2, ×4, ×8	×1	OK
		SENS	×1/8, ×1/4, ×1/2, ×1, AUTO, ×2, ×4, ×8	×1	

rSO_2 Window

Window	Page	Item	Setting Items	Default Setting	Backup
rSO_2	OTHER	NUMERICS ON HOME SCREEN	2 CH, 4 CH	4 CH	OK

12 LEAD ANALYSIS Window

Window	Page	Item		Setting Items	Default Setting	Backup
12 LEAD ANALYSIS	12 LEAD ANALYSIS	–		5 mm/mV, 10 mm/mV, 20 mm/mV	10 mm/mV	OK
		PATIENT INFORMATION	DATE OF BIRTH	254 YEARS 11 MONTHS 30 DAYS before to the present date	–	30 min
			AGE (calculated automatically)	0 YEAR 0 MONTH 0 DAY to AGE 254 YEARS 11 MONTHS 30 DAYS		
			GENDER	MALE, FEMALE, NONE	NONE	

DRUG Window

Window	Page	Item		Setting Items	Default Setting	Backup
DRUG	DRUG	AMRINONE	DRUG AMOUNT (mg)	0.01 to 2000.00	500.00	OK
			BASE VOLUME (mL)	1 to 1000	250	
			DOSE (mcg/kg/min)	0.01 to 500.00	–	30 min
			SAMPLE RATE (mL/h)	0.1 to 600.0		
			WEIGHT (kg)	0.1 to 449.9		
			DOSE STEP	0.01, 0.05, 0.10, 1.00, 10.00	0.10	OK
		AMINOPHYLLINE	DRUG AMOUNT (mg)	0.01 to 2000.00	500.00	
			BASE VOLUME (mL)	1 to 1000	250	
			DOSE (mg/kg/h)	0.01 to 500.00	–	30 min
			SAMPLE RATE (mL/h)	0.1 to 600.0		
			WEIGHT (kg)	0.1 to 449.9		
			DOSE STEP	0.01, 0.05, 0.10, 1.00, 10.00	0.10	OK
		BRETYLIUM	DRUG AMOUNT (mg)	0.01 to 2000.00	2000.00	
			BASE VOLUME (mL)	1 to 1000	250	
			DOSE (mg/min)	0.01 to 500.00	1.00	
			SAMPLE RATE (mL/h)	0.1 to 600.0	7.5	
			DOSE STEP	0.01, 0.05, 0.10, 1.00, 10.00	0.10	
		DOBUTAMINE	DRUG AMOUNT (mg)	0.01 to 2000.00	250.00	
			BASE VOLUME (mL)	1 to 1000	250	
			DOSE (mcg/kg/min)	0.01 to 500.00	–	30 min
			SAMPLE RATE (mL/h)	0.1 to 600.0		
			WEIGHT (kg)	0.1 to 449.9		
			DOSE STEP	0.01, 0.05, 0.10, 1.00, 10.00	0.10	OK
		DOPAMINE	DRUG AMOUNT (mg)	0.01 to 2000.00	800.00	
			BASE VOLUME (mL)	1 to 1000	250	
			DOSE (mcg/kg/min)	0.01 to 500	–	30 min
			SAMPLE RATE (mL/h)	0.1 to 600.0	7.5	
			WEIGHT (kg)	0.1 to 449.9	–	
			DOSE STEP	0.01, 0.05, 0.10, 1.00, 10.00	0.10	OK
		EPINEPHRINE	DRUG AMOUNT (mg)	0.01 to 2000.00	4.00	
			BASE VOLUME (mL)	1 to 1000	250	
			DOSE (mcg/min)	0.01 to 500.00	1.00	
			SAMPLE RATE (mL/h)	0.1 to 600.0	3.8	
			DOSE STEP	0.01, 0.05, 0.10, 1.00, 10.00	0.10	
		HEPARIN	DRUG AMOUNT (units)	100 to 150000	25000	
			BASE VOLUME (mL)	1 to 1000	250	
			DOSE (units/h)	10 to 15000	1000	
			SAMPLE RATE (mL/h)	0.1 to 600.0	10.0	
			DOSE STEP	10, 50, 100, 500	50	
		INSULIN	DRUG AMOUNT (units)	0.01 to 2000.00	100.00	
			BASE VOLUME (mL)	1 to 1000	100	
			DOSE (units/h)	0.01 to 500.00	1.00	
			DOSE STEP	0.01, 0.05, 0.10, 1.00, 10.00	0.10	
		ISOPROTERENOL	DRUG AMOUNT (mg)	0.01 to 2000.00	2.00	
			BASE VOLUME (mL)	1 to 1000	250	
			DOSE (mcg/kg/min)	0.01 to 500.00	–	30 min
			SAMPLE RATE (mL/h)	0.1 to 600.0		
			WEIGHT (kg)	0.1 to 449.9		
			DOSE STEP	0.01, 0.05, 0.10, 1.00, 10.00	0.10	OK

Window	Page	Item			Setting Items	Default Setting	Backup
DRUG	DRUG	LIDOCAINE PROCAINAMIDE	DRUG AMOUNT (mg)		0.01 to 2000.00	2000.00	OK
			BASE VOLUME (mL)		1 to 1000	250	
			DOSE (mg/min)		0.01 to 500.00	2.00	
			SAMPLE RATE (mL/h)		0.1 to 600.0	15.0	
			DOSE STEP		0.01, 0.05, 0.10, 1.00, 10.00	0.10	
		NITROGLYCERIN	DRUG AMOUNT (mg)		0.01 to 2000.00	50.00	
			BASE VOLUME (mL)		1 to 1000	250	
			DOSE (mcg/min)		0.01 to 500.00	100.00	
			SAMPLE RATE (mL/h)		0.1 to 600.0	30.0	
			DOSE STEP		0.01, 0.05, 0.10, 1.00, 10.00	0.10	
		NITROPRUSSIDE	DRUG AMOUNT (mg)		0.01 to 2000.00	50.00	
			BASE VOLUME (mL)		1 to 1000	250	
			DOSE (mcg/kg/min)		0.01 to 500.00	–	30 min
			SAMPLE RATE (mL/h)		0.1 to 600.0		
			WEIGHT (kg)		0.1 to 449.9		
			DOSE STEP		0.01, 0.05, 0.10, 1.00, 10.00	0.10	OK
		NOREPINEPHRINE	DRUG AMOUNT (mg)		0.01 to 2000.00	4.00	
			BASE VOLUME (mL)		1 to 1000	250	
			DOSE (mcg/min)		0.01 to 500.00	2.00	
			SAMPLE RATE (mL/h)		0.1 to 600.0	7.5	
			DOSE STEP		0.01, 0.05, 0.10, 1.00, 10.00	0.10	
		PHENYLEPHRINE	DRUG AMOUNT (mg)		0.01 to 1500000.00	300.00	
			BASE VOLUME (mL)		1 to 1000	250	
			DOSE (mcg/min)		0.01 to 1500000.00	100.00	
			DOSE STEP		0.01, 0.05, 0.10, 1.00, 10.00	0.10	
		STREPTOKINASE	DRUG AMOUNT (IU)		1000 to 1500000	750000	
			BASE VOLUME (mL)		1 to 1000	250	
			DOSE (IU/h)		1000 to 1500000	30000	
			SAMPLE RATE (mL/h)		0.1 to 600.0	10.0	
			DOSE STEP		5000, 10000, 50000	5000	
		tPA	DRUG AMOUNT (mg)		0.01 to 2000.00	100.00	
			BASE VOLUME (mL)		1 to 1000	200	
			DOSE (mg/h)		0.01 to 500.00	20.00	
			SAMPLE RATE (mL/h)		0.1 to 600.0	40.0	
			DOSE STEP		0.01, 0.05, 0.10, 1.00, 10.00	0.10	
		DRUG A to DRUG D	DRUG NAME		Up to 16 alphanumeric characters	Drug A, Drug B, Drug C, Drug D	
			DOSE UNIT		mg/h, mg/min, mg/kg/h, mg/kg/min, mcg/h, mcg/min, mcg/kg/h, mcg/kg/min, units/h, IU/h	mcg/kg/min	
			DRUG AMOUNT	mg	0.01 to 2000.00	500.00	
				units	100 to 150000	–	
				IU	1000 to 1500000		
			BASE VOLUME (mL)		1 to 1000	250	
			DOSE		mg/h, mg/min, mcg/h, mcg/min	0.01 to 500.00	
					mg/kg/h, mg/kg/min, mcg/kg/h, mcg/kg/min		30 min
					units/h	10 to 15000	OK
					IU/h	1000 to 1500000	
			SAMPLE RATE (mL/h)		0.1 to 600.0	–	
			WEIGHT (kg)		0.1 to 449.9		30 min

Window	Page	Item		Setting Items	Default Setting	Backup
DRUG	DRUG	DRUG A to DRUG D	DOSE STEP	0.01, 0.05, 0.10, 1.00, 10.00, 10, 50, 100, 500, 5000, 10000, 50000	0.10	OK

LUNG FUNCTION Window

Window	Page	Item	Setting Items	Default Setting	Backup
LUNG FUNCTION	DATA ENTRY	HEIGHT	0.1 to 299.9 cm/inch	–	–
		WEIGHT	0.1 to 499.9 kg/pound		
		CO	1 to 20.0 L/min		
		O_2	1 to 100%		
		ATM	235 to 795 mmHg/kPa		
		$PaCO_2$	0 to 200 mmHg/kPa		
		Hb	0.1 to 50.0 g/dL/mmol/L		
		PaO_2	0 to 800 mmHg/kPa		
		SaO_2	1 to 100%		
		$P\bar{v}O_2$	1 to 100 mmHg/kPa		
		$S\bar{v}O_2$	0 to 99%		

INTERBED Window

Window	Page	Item	Setting Items	Default Setting	Backup
INTERBED	SETTINGS	AUTO INTERBED DISPLAY	ON, OFF	OFF	OK
	SELECT BED	SELECTED BEDS	Select from up to 20 beds	NONE	
		GROUP	General, CCU, CCU-1, CCU-2, ER, ICU, ICU-1, ICU-2, OR, Post CCU, Recovery, Tele-1 to Tele-5	General	

CAR SEAT CHALLENGE Window

Window	Page		Item		Setting Items	Default Setting	Backup
CAR SEAT CHALLENGE	TEST		TEST DURATION		10 min to 24 hour	90 min	30 min
	RESULTS	REPORT SETTINGS	REPORT ITEMS	TABULAR TREND	ON, OFF	ON	OK
				TREND GRAPH	ON, OFF	ON	
				FULL DISCLOSURE	ON, OFF	ON	
			TREND INTERVAL		1 min, 5 min, 10 min, 15 min, 30 min, 1h	1 min	
			TEST PERFORMED BY		Up to 16 characters	–	30 min
			COMMENTS		Up to 256 characters	–	
			TEST RESULT		PASS, FAIL	–	

Standard Accessories

MU-631RA/MU-651RA/MU-671RA Main Unit

Name	Qty	Code No.	Supply Code
Power cord UL	1	094577	–
Operator's Manual	1	0614-900685R	–
BSM-6000 series Manuals CD-ROM	1	0644-900031Q	–

MU-631RK/MU-651RK/MU-671RK Main Unit

Name	Qty	Code No.	Supply Code
Operator's Manual	1	0614-900685R	–
BSM-6000 series Manuals CD-ROM	1	0644-900031Q	–

Options/Consumables

Each component has its own options.

CAUTION

Only use Nihon Kohden specified electrodes, probes, transducers, thermistors and catheters. Otherwise, the maximum performance from the monitor cannot be guaranteed.

NOTE:

- Only use Nihon Kohden specified parts and accessories to assure maximum performance from your instrument.
- The parts which are marked with * have not been checked for compliance with the MDD (Medical Device Directive). For EC member countries, Nihon Kohden recommends the use of parts that comply with MDD.

Accessory Set

CE marking (as of Feb 2015)

Items \ Model	YO-60IY1 (IEC type)	YO-60IY2 (IEC type)	YO-60IY3 (IEC type)	YO-60IY4 (IEC type)	YO-60AY1 (AHA type)	YO-60AY2 (AHA type)	YO-60AY3 (AHA type)	YO-60AY4 (AHA type)
ECG electrode lead (3 electrodes), BR-903P	✓	✓	✓	✓	–	–	–	–
ECG electrode lead (3 electrodes), BR-903PA	–	–	–	–	✓	✓	✓	✓
ECG connection cord (3/6 electrodes), JC-906P	✓	✓	✓	✓	–	–	–	–
ECG connection cord (3/6 electrodes), JC-906PA	–	–	–	–	✓	✓	✓	✓
Disposable electrode, Vitrode L-150	✓	✓	✓	✓	✓	✓	✓	✓
SpO_2 connection cord, JL-900P	✓	✓	–	–	✓	✓	–	–
Air hose for adult/child (3.5 m), YN-901P	✓	✓	✓	✓	✓	✓	✓	✓
Cuff for adult, standard, YP-963T	✓	–	✓	–	✓	–	✓	–
Cuff for adult, large, YP-964T	–	✓	–	✓	–	✓	–	✓

MU-631RA/MU-651RA/MU-671RA Main Unit

CE marking (as of Feb 2015)

Name	Qty	Model/Code No.	Supply Code
Isolation transformer	1	SM-800RJ	–
		SM-800RK	
Recorder module	1	WS-671P	–
Recording paper	10	FQW50-2-100	A721
Thermal head cleaner pen	5	–	Y011
Battery pack	1	SB-671P	–

Name	Qty	Model/Code No.	Supply Code
Battery charger	1	SB-610RA	–
Touch pen	1	577297	–
Remote controller	1	RY-910PA	–
Alkaline batteries, AAA	40	–	X093A
Mouse, Basic Optical Mouse	1	908109	–
Bar code reader, Symbol LS2208	1	–	–
Memory card	1	QM-601P	–
Upgrade software for upgrading the system software and language of a BSM-6000A series bedside monitor	1	QS-028PA	–
Upgrade software for upgrading the SpO_2 software	1	QS-042P	–
Administrator's Guide	1	0614-901238R	–
User's Guide Part I	1	0614-900676Q	–
User's Guide Part II	1	0614-901229Q	–
Service Manual	1	0634-900184J	–
ECAPS12C User's Guide	1	0614-006465A	–

MU-631RK/MU-651RK/MU-671RK Main Unit

CE marking (as of Feb 2015)

Name	Qty	Model/Code No.	Supply Code
Power cord GB	1	483415	–
Power cord H	1	186656	–
Power cord N	1	314839	–
Power cord W	1	936257	–
Grounding lead	1	544582	–
Isolation transformer	1	SM-800RJ	–
		SM-800RK	
Recorder module	1	WS-671P	–
Recording paper	10	FQW50-2-100	A721
Thermal head cleaner pen	5	–	Y011
Battery pack	1	SB-671P	–
Battery charger	1	SB-610RK	–
Touch pen	1	577297	–
Transmitter	1	ZS-900PG	–
		ZS-900PK	
Remote controller	1	RY-910PA	–
Alkaline batteries, AAA	40	–	X093A
Mouse, Basic Optical Mouse	1	908109	–
Bar code reader, Symbol LS2208	1	–	–
Memory card	1	QM-601P	–
Upgrade software for upgrading the system software and language of a BSM-6000K series bedside monitor	1	QS-028PK	–
Upgrade software for upgrading the SpO_2 software	1	QS-042P	–
Administrator's Guide	1	0614-901238R	–
User's Guide Part I	1	0614-900676Q	–
User's Guide Part II	1	0614-901229Q	–

Name	Qty	Model/Code No.	Supply Code
Service Manual	1	0634-900184J	–
ECAPS12C User's Guide	1	0614-006465A	–

Units and Modules

CE marking (as of Feb 2015)

Name	Qty	Model	Supply Code
Input unit (with 1 MULTI socket and Masimo SpO_2 socket)	1	AY-631P	–
Input unit (with 1 MULTI socket and Nellcor SpO_2 socket)	1	AY-651P	–
Input unit (with 1 MULTI socket, 1 TEMP socket and Nihon Kohden SpO_2 socket)	1	AY-660P*3	–
Input unit (with 1 MULTI socket and Nihon Kohden SpO_2 socket)	1	AY-661P*2	–
	1	AY-671P*2	–
Input unit (with 3 MULTI socket and Masimo SpO_2 socket)	1	AY-633P	–
Input unit (with 3 MULTI socket and Nellcor SpO_2 socket)	1	AY-653P	–
Input unit (with 3 MULTI sockets and Nihon Kohden SpO_2 socket)	1	AY-663P*2	–
	1	AY-673P*2	–
Memory unit	1	QM-600P	–
Smart expansion unit (2 MULTI sockets)	1	AA-672P	–
Smart expansion unit (4 MULTI sockets)	1	AA-674P	–
CO_2 unit	1	AG-400RK	–
Multigas unit	1	AG-920RA	–
		AG-920RK	
Multigas unit	1	GF-110PA	–
Multigas unit	1	GF-210R	–
Multigas/flow unit	1	GF-120PA*3	–
Multigas/flow unit	1	GF-220R*3	–
BIS processor	1	QE-910P	–
Neuro unit	1	AE-918P	–
APCO/IBP processor	1	JP-600P	–
		JP-600PK*4	
Handle for input unit	1	DH-600P	–
Data acquisition unit	1	JA-690PA	–
		JA-694PA	
Multi-link cable for connecting data acquisition unit	1	YS-096P5	–
Unit connection cable 2.5 m for connecting data acquisition unit	1	YS-096P2	–
Unit connection cable 5 m for connecting data acquisition unit	1	YS-096P3	–
Bedside monitor (with 3 MULTI sockets and Masimo SpO_2 socket)	1	BSM-1733	–
Bedside monitor (with 3 MULTI sockets and Nellcor SpO_2 socket)	1	BSM-1753	–
Bedside monitor (with 3 MULTI sockets and Nihon Kohden SpO_2 socket)	1	BSM-1763*3	–
		BSM-1773	

*2 For the differences between AY-661P and AY-671P, and AY-663P and AY-673P, contact your Nihon Kohden representative.
*3 Not available for BSM-6000A series.
*4 JP-600PK is not available for BSM-6000A series. JP-600PK can be purchased through Nihon Kohden Europe. For other areas, JP-600P is available.

Network

CE marking (as of Feb 2015)

Name	Qty	Model	Supply Code
Hyper isolation transformer	1	QW-100Y (HIT-100)	–
Serial connection cable	1	YS-089P2	–
Wireless LAN station	1	QI-320PA	–
Wireless LAN station	1	QI-420PA	–
Wireless LAN station	1	QI-610PA	–

Interfaces and Cables for External Instruments

CE marking (as of Feb 2015)

Name	Qty	Cable Length (m)	Model
Interface for BSM-6301A/K (1 RS-232C socket, 1 RGB socket)	1	–	QI-631P
Interface for BSM-6301A/K (1 USB socket, 1 Multi-link socket, 1 Alarm socket)	1	–	QI-632P
Interface for BSM-6301A/K (1 USB socket, 1 Multi-link socket)	1	–	QI-634P
Interface for TEC-5600 series or TEC-8300 series defibrillator	1	–	QI-670P*2
Interface for BSM-6501A/K and BSM-6701A/K (1 Multi-link socket, 1 RS-232C socket, 1 Alarm socket, 1 RGB socket)	1	–	QI-671P
Interface for BSM-6501A/K and BSM-6701A/K (2 USB sockets, 4 Multi-link sockets)	1	–	QI-672P
Interface unit for data acquisition unit	1	–	QI-600P
Interface for Covidien Microstream® Micropod™ capnography module	1	Interface cable: 1.35 Multi-link cable: 0.65	QF-801P
Interface for Dräger Medical ventilator	1	2.7	QF-901P
Interface for Covidien BIS™ monitor	1	2.7	QF-902P
Interface for Edwards Lifesciences oximeter/continuous cardiac output measuring device	1	2.7	QF-903P
Interface for AG-920RA/K multigas unit	1	2.7	QF-904P
Interface for AG-400RK CO_2 unit	1	2.7	QF-905P*2
Interface for Covidien Puritan Bennett™ 740, 760 or 840 ventilator	1	2.7	QF-907P
Interface for MAQUET ventilator	1	2.7	QF-908P
Interface for Merck & Co./MSD neuromuscular transmission monitor	1	2.7	QF-909P
Interface for Pulsion Medical Systems PiCCO monitor	1	2.7	QF-911P
Interface for Oridion Microcap® portable bedside monitor	1	2.7	QF-921P*3
Communication cable for external device which outputs analog voltage signal	1	2.7	IF-912P
Communication cable for Radiometer MicroGas 7650 *rapid* transcutaneous monitor	1	2.7	IF-913P
Communication cable for Radiometer TCM4, TCM40 or TCM CombiM transcutaneous monitor	1	2.7	IF-914P
Communication cable for Newport Medical Instruments ventilator	1	2.7	IF-916P
Communication cable for Hamilton Medical ventilator	1	2.7	IF-917P
Communication cable for Heinen + Löwenstein Leon Plus anesthesia workstation	1	2.7	IF-918P*2

Name	Qty	Cable Length (m)	Model
Communication cable for Covidien Nellcor OxiMax™ N-600x™ pulse oximeter	1	2.7	IF-919P
Communication cable for Dräger Medical anesthesia workstation	1	2.7	IF-920P
Communication cable for ICU Medical oxygen saturation and continuous cardiac output monitor	1	2.7	IF-922P
Communication cable for Covidien Puritan Bennett™ 7200 ventilator	1	2.7	IF-923P
Communication cable for Masimo pulse oximeter	1	2.7	IF-925P
Communication cable for CareFusion ventilator	1	2.7	IF-927P
Communication cable for Dräger Medical Babylog® 8000 plus ventilator	1	2.7	IF-928P
Communication cable for GE Healthcare anesthesia delivery system	1	2.7	IF-930P
Communication cable for Air Liquide Medical Systems Felix Dual, Felix Visio or Felix AlnOC anesthesia system	1	2.7	IF-931P*2
Communication cable for MAQUET FLOW-i anesthesia system	1	2.7	IF-932P
Communication cable for ResMed Elisee 150, 250 or 350 ventilator	1	2.7	IF-933P*2
Communication cable for Air Liquide Medical Systems Monnal T75 ventilator	1	2.7	IF-934P*2
Communication cable for GE Healthcare ventilator	1	2.7	IF-935P
Communication cable for Heinen + Löwenstein Elisa ventilator	1	2.7	IF-936P*2
Communication cable for Covidien INVOS 5100C cerebral/ somatic oximeter	1	2.7	IF-937P
Communication cable for Metran ventilator	1	2.7	IF-938P
Communication cable for GE Healthcare Centiva/5 Critical Care ventilator	1	2.7	IF-939P
Communication cable for Dräger Medical Evita Infinity® V500 ventilator	1	2.7	IF-942P
Communication cable for Dräger Medical Babylog® VN500 ventilator	1	2.7	IF-943P
Communication cable for Hamilton Medical HAMILTON-C1 or HAMILTON-T1 ventilator	1	2.7	IF-944P
Communication cable for ACOMA Medical Industry PRO-next+i or PRO-next+s anesthesia apparatus	1	2.7	IF-945P*2
Communication cable for LiDCOrapid or LiDCOplus hemodynamic monitor	1	2.7	IF-946P
Communication cable for Edwards Lifesciences clinical platform EV1000	1	2.7	IF-948P
Communication cable for Dräger Medical Perseus® A500 anesthesia workstation	1	2.7	IF-950P*2
Communication cable for Dräger Medical Zeus® Infinity® Empowered anesthesia workstation	1	2.7	IF-952P*2

*2 QI-670P and QF-905P interfaces and IF-918P, IF-931P, IF-933P, IF-934P, IF-936P, IF-945P, IF-950P and IF-952P communication cables are not available for BSM-6000A series.

*3 QF-921P interface is not available for BSM-6000K series.

Cart and Attaching Parts

CE marking (as of Feb 2015)

Name	Qty	Model
Cart	1	KC-600P
Counter top mount	1	KG-600P
Wall mount kit	1	KG-951P
Holder for transmitter	1	DI-590P
Mount adapter for mounting bedside monitor on the GF-210R multigas unit or GF-220R multigas/flow unit	1	DH-220P
Unit mount for mounting GF-210R multigas unit or GF-220R multigas/flow unit on the KC-600P cart	1	DH-223P

For ECG and Respiration (Impedance Method) Monitoring

CE marking (as of Feb 2015)

Name	Purpose		Length (m)	Qty	Model	Supply Code
Electrode lead	3 electrodes	IEC, clip type	0.8	1	BR-903P	K911
					BR-963P	K916
		AHA, clip type			BR-903PA	K911A
	6 electrodes	IEC, clip type			BR-906P	K912
		AHA, clip type			BR-906PA	K912A
ECG connection cord	3/6 electrodes (IEC)		3		JC-906P	K922
	3/6 electrodes (AHA)				JC-906PA	K922A
	3/6 electrodes (IEC)		1.5		JC-916P	K925
	10 electrodes (IEC)		3		JC-900P	K921
	10 electrodes (AHA)				JC-900PA	K921A
ECG patient cable	10 electrodes (IEC)		3.8		BJ-900P	K901
	10 electrodes (AHA)				BJ-900PA	K901A
ECG/BP output cable	Connects to other equipment for signal output (5 m)		–	1	YJ-910P	K974
	Connects to other equipment for signal output (0.3 m, horn jack type)				YJ-920P	K975
Disposable electrodes, Vitrode	General		–	3 × 50	F-150M	G210D
				3 × 20	G-600	G221
				30 × 5	L-150	G203
	General, X-ray			30 × 5	L-150X	G207
	General with DIN type lead		1.0	3 × 30	V-090M3	G272A
			1.5		V-09IO3	G278A
			1.0	4 × 10	V-040M4	G272B
			1.5		V-04IO4	G273A
			1.0	6 × 10	V-060M6	G272C
			1.5		V-06IO6	G274A
	For neonates and premature infants For NICU		–	3 × 50	F-150S	G210C
	For neonates and premature infants For NICU with DIN type lead		0.6	3 × 40	V-120S3	G271A
				3 × 10	N-03IS3	G300A

For Respiration Monitoring (Thermistor Method)

CE marking (as of Feb 2015)

Name	Length (m)	Qty	Model	Supply Code
Respiration pickup for nose	3	1	TR-900P*	P901
Respiration pickup for airway	3	1	TR-910P	P902
Airway adapter	–	1	YG-001P	V911

For CO_2 Monitoring (Mainstream Method)

CE marking (as of Feb 2015)

Name	Length (m)	Qty	Model/Code No.	Supply Code
CO_2 sensor kit (CO_2 adapter + CO_2 sensor) for semi-quantitative method	3	1	TG-900P	P903
CO_2 adapter for TG-900P	2		JG-900P	K981
CO_2 sensor for TG-900P	1		TG-101T	P922A
Airway adapter for TG-900P	–	50	YG-101T	R801
CO_2 sensor kit (CO_2 adapter + CO_2 sensor) for semi-quantitative method	3.5	1	TG-920P	P907
CO_2 adapter for TG-920P	2		JG-920P	K984
CO_2 sensor for TG-920P	1.5		TG-121T	P923
Nasal adapter for TG-920P (nasal breathing)	–	30	YG-120T	V921
Nasal adapter for TG-920P (naso-oral breathing)			YG-121T	V922
Nasal adapter for TG-920P (oxygen cannula adjustment)			YG-122T	V923
Airway adapter for TG-920P			YG-111T	R804
Surgical tape	–	1	#1527	Y242
CO_2 sensor kit (CO_2 adapter + CO_2 sensor) for quantitative method	4	1	TG-950P*[2]	P905
CO_2 adapter for TG-950P	2		JG-950P*[2]	K982
CO_2 sensor for TG-950P			TG-201T*[2]	P921
Airway adapter for adult and children (Weight 10 kg), TG-950P	–	30	YG-201T*[2]	R802
Airway adapter for children and neonates (Weight 3 to 10 kg), TG-950P			YG-202T*[2]	R803
CO_2 sensor kit (CO_2 adapter + CO_2 sensor) for quantitative method	3.5	1	TG-970P	P909
CO_2 adapter for TG-970P	0.5		JG-970P	K987
CO_2 sensor for TG-970P	3		TG-221T	P924
Airway adapter for adults and children (Weight 7 kg or more), TG-970P	–	30	YG-211T	R805
Airway adapter for neonates and children (Weight 2 to 7 kg), TG-970P			YG-213T	R806
Airway adapter for neonates and children (Weight 2.5 to 7 kg), TG-970P			YG-214T	R807

*[2] TG-950P CO_2 sensor kit, JG-950P CO_2 adapter, TG-201T CO_2 sensor, YG-201T and YG-202T airway adapters are not available for BSM-6000A series.

For SpO_2 Monitoring

CE marking (as of Feb 2015)

Name		Length (m)	Qty	Model/Code No.	Supply Code
SpO_2 connection cord (for Masimo SpO_2 probe)	for LNOP series probe	3.6	1	JL-630P	–
	for LNCS series probe	3.0		JL-631P	
SpO_2 connection cord (for Nellcor SpO_2 probe)		3.0		JL-650P	
SpO_2 connection cord (for Nihon Kohden SpO_2 probe)		2.5		JL-900P	K931
SpO_2 adapter		2.5		JL-500P1*3	–
				JL-500P2*3	–
Finger probe		1.6		TL-201T	P225F
Multi-site probe				TL-220T	P225G
Finger probe (for 50 kg or more, adults or children)				TL-630T3*2	P310C
Finger probe (for 20 kg or more, adults or children)				TL-631T3	P311C
Multi-site Y probe (for adults, children and neonates, disposable)			5	TL-260T*2	P205A
SpO_2 probe (for adult, disposable)		0.8	24	TL-271T	P203A
		1.6		TL-271T3	P203E
SpO_2 probe (for child, disposable)		0.8		TL-272T	P203B
		1.6		TL-272T3	P203F
SpO_2 probe (for neonate/adult, disposable)		0.8		TL-273T	P203C
		1.6		TL-273T3	P203G
SpO_2 probe (for child/infant, disposable)		0.8		TL-274T	P203D
		1.6		TL-274T3	P203H
Disposable probe (for adults and neonates)		0.8	5	TL-051S	P228A
		1.6		TL-052S	P228B
Disposable probe (for adults, children and infants)		0.8		TL-061S	P229A
		1.6		TL-062S	P229B
COTTONY tape		–	20	340703*	P259
Probe fastener			30	YS-093P2	P267
Attachment tape			3 × 30	–	P263
Sponge attachment tape S for TL-260T multi-site Y probe*2			24		P260A
Sponge attachment tape L for TL-260T multi-site Y probe*2					P260B
Clip adapter for TL-260T multi-site Y probe*2			1		P256
Foam tape for TL-051S/052S/061S/062S disposable probes			4 × 25		P260
SpO_2 check plate for TL-201T finger probe			1	6114-121095	–

*2 TL-260T multi-site Y probe, sponge attachment tapes and clip adapter for TL-260T multi-site Y probe and TL-630T3 finger probe are not available for BSM-6000A series.

*3 For the differences between JL-500P1 and JL-500P2, contact your Nihon Kohden representative.

For NIBP Monitoring

CE marking (as of Feb 2015)

Name		Width (cm)	Length (m)	Qty	Model/Code No.	Supply Code
Air hose for adults/children		–	1.5	1	YN-900P	S901
			3.5		YN-901P	S902
Extension air hose			1.5		YN-990P	S903
Cuff for infants		5	0.15		YP-960T	S943A
					YP-710T	S951A
Cuff for children	Small	7			YP-961T	S943B
					YP-711T	S951B
	Standard	10			YP-702T	S949A
					YP-962T	S943C
Cuff for adult	Small	10			YP-712T*2	S951C
	Standard	13			YP-703T	S949B
					YP-713T*2	S951D
					YP-963T	S944B
	Large	15			YP-964T	S944C
		16			YP-714T*2	S951E
Cuff for thigh		19			YP-715T*2	S951F
					YP-965T	S944D
Disposable cuff for infants		6	0.17	20	YP-810P	S945C
Disposable cuff for children		8			YP-811P	S945D
Disposable cuff for adults	Small	10			YP-812P	S946E
	Standard	14	0.2		YP-813P	S946F
	Medium large	15			YP-814P	S946G
	Large	17			YP-815P	S946H
	Extra large	18			YP-816P	S946I
Disposable cuff for thigh		20			YP-817P	S946J
Air hose for neonates		–	1.5	1	YN-920P	S904
			3.5		YN-921P	S905
Disposable cuff for neonates		2	0.2	10	YP-820P	S948A
		3			YP-821P	S948B
		4			YP-822P	S948C
		4.5			YP-823P	S948D
		5			YP-824P	S948E
Sterilized disposable cuffs for neonates		3	0.21	1	No. 11*	S260
		4			No. 12*	S260A
		5			No. 13*	S260B

*2 Can be used for inflation method measurement. The inflation method measurement is not available for BSM-6000A series bedside monitors.

For IBP Monitoring

Argon Medical Devices Reusable Transducers

CE marking (as of Feb 2015)

Name	Length, Description	Qty	Model	Supply Code
IBP connection cord	For P23XL-1, P10EZ-1 and Argon Medical Devices transducers, 3.5 m	1	JP-900P	K951
IBP connection cord	For Argon Medical Devices transducers, 0.3 m	1	JP-910P	K952
IBP transducer	–	1	P23XL-1	–
IBP transducer	–	1	P10EZ-1	–
Monitoring kit	For P23XL-1	5	SCK-520*	S571
Super dome	–	10	TA-1015T	–
Dome	With membrane, rotatory lure lock	12	TA-1010ND	–
Criti flo	3 cc	10	TA-4004	–
Criti flo	30 cc	10	TA-4005*	–
Transducer holder	–	1	ZY-101U*	S238
Transducer holder	For P23XL-1	1	TA-9010*	–
Adapter 2	For P23XL-1, used with ZY-101U	1	–	S239
Pressure tubing	15 cm	25	PT-06	–
Pressure tubing	30 cm	25	PT-12	–
Pressure tubing	60 cm	25	PT-24	–
Pressure tubing	90 cm	25	PT-36	–
Pressure tubing	120 cm	25	PT-48	–
Pressure tubing	150 cm	25	PT-60	–

Argon Medical Devices Disposable Transducers

CE marking (as of Feb 2015)

Name	Length, Description	Qty	Model	Supply Code
IBP connection cord	3.5 m	1	JP-900P	K951
IBP connection box	2.7 m, for 4 channels	1	JP-940P	–
Monitoring kit	For cerebral pressure	10	DX-100*	–
Monitoring kit	For neonates	10	DX-200*	–
Monitoring kit	With flush device	10	DX-300*	–
Monitoring kit	For arm mounting	5	DX-312*	–
Monitoring kit	For pole mounting	5	DX-360*	–
Monitoring kit	For pole mounting	5	DX-360R*	–
Monitoring kit	For triple line	3	DX-360TT*	–
Monitoring kit	For pole mounting	5	DX-360SD*	–
Transducer fixing plate	–	1	G-TBG2	–
Transducer fixing plate	–	1	G-TMM	–
Transducer fixing plate	–	1	G-UMM	–
Safe needle	For DX-360SD	50	TA-BPN*	–

Edwards Lifesciences (Baxter) Disposable Transducers

Edwards Lifesciences (Baxter) blood pressure transducers are available direct from Edwards Lifesciences (Baxter) (www.edwards.com) or their suppliers.

CE marking (as of Feb 2015)

Name	Length, Description	Qty	Model	Supply Code
IBP connection cord	For Edwards Lifesciences (Baxter) transducers, 3.5 m	1	JP-920P	L901

Other

CE marking (as of Feb 2015)

Name	Length, Description	Qty	Model/Code No.	Supply Code
IBP connection cord	For Biosensor, 3.5 m	1	JP-960P	K957
IBP connection cord	For Integra NeuroSciences Camino® MPM-1 multi-parameter monitor	1	JP-911P	–
ECG/BP output cable	Connects to other equipment for signal output (5 m)	1	YJ-910P	K974
	Connects to other equipment for signal output (0.3 m, horn jack type)	1	YJ-920P	K975
Pressure bag	–	1	ACS-223*	S160A
Disposable 3-way stopcock	–	50	318434*	S180
3-way stopcock	3 core	1	MF-3F*	S314
3-way stopcock	5 core	1	MF-5F*	S315
Holder	For 5 core stopcock	1	–	S226

For Temperature Monitoring

CE marking (as of Feb 2015)

Name	Purpose	Length (m)	Qty	Model/Code No.	Supply Code
Temperature connection cord	For reusable probe/ disposable probe	0.3 m	1	JT-900P	K961
Reusable thermistor probe	For adult rectum	3.5 m	1	401J*2	P240A
	For child rectum			402J*2	P241A
	Disc type			409J*2	P242D
Probe cover	For 401J	–	10	–	P249A
Temperature insulation pad	For 409J	–	5 dozens	336468	P252
Extension cable	For disposable probes	3 m	1	5-15801	L280A

*2 These thermistor probes are available direct from YSI, Yellow Springs Instrument Inc., Yellow Springs Ohio 45387, USA; Phone +1 937-767-7241.
The temperature disposable probes are available direct from Kendall Healthcare Products Company (www.kendallhq.com) or their suppliers.

For BIS Monitoring (Using the BIS Processor/BISx)

Covidien patient interface cable and BIS sensors are available direct from Covidien (www.covidien.com) or their suppliers.

CE marking (as of Feb 2015)

Name	Length, Description	Qty	Model	Supply Code
BISx connection cable	0.3 m	1	YJ-671P	–

For CO Monitoring

CE marking (as of Feb 2015)

Name	Measuring Method and Catheter	Length (m)	Qty	Model	Supply Code
CO connection cord	Bath probe and inline sensor methods	2.0	1	JT-950P	K962
Bath probe	Any catheter, bath probe method	1.5	1	SP-5030	–
Inline sensor	Argon Medical Devices catheter inline sensor method	–	25	SP-5045	–
Inline sensor connection cable			1	SP-4045	–
Inline iced injectate kit			4	SP-4500	–
Life kit	Bath probe and inline sensor methods	–	5	DX-336DT*	–

Argon Medical Devices Thermodilution Catheters

Model	Specifications	Thickness (F)	Lumen	Total length (m)	Qty	Supply Code
TC-664MP*	Made of polyurethane	6	4	1.1	1	–
TC-704MU*	Soft type	7				–
TC-774MP*	Made of polyurethane	7				–

Edwards Lifesciences (Baxter) Catheters

Edwards Lifesciences (Baxter) catheters are available direct from Edwards Lifesciences (Baxter) (www.edwards.com) or their suppliers.

For O_2 Monitoring

CE marking (as of Feb 2015)

Name	Length (m)	Qty	Model/Code No.	Supply Code
FiO_2 connection cord	3	1	JO-900P	K941
O_2 sensor	0.6	1	074705	P911
T shaped adapter	–	1	110774	V912

For CCO Monitoring

FloTrac system and sensors are available direct from Edwards Lifescience (Baxter) (www.edwards.com) or their suppliers.

For CO_2 Sidestream Monitoring

Refer to the AG-400R CO_2 Unit, Oridion Portable Bedside Monitor Microcap®, or Covidien Microstream® Micropod™ Capnography Module Operator's Manual.

For BIS Monitoring (Using the BIS Monitor)

Refer to the BIS Monitor Operator's Manual.

For Anesthetic Agent Monitoring

Refer to the AG-920R, GF-110PA or GF-210R Multigas Unit or GF-120PA or GF-220R Mutigas/Flow Unit Operator's Manual.

For FLOW/Paw Monitoring

Refer to the GF-120PA Multigas/Flow Unit Operator's Manual.

For EEG Monitoring

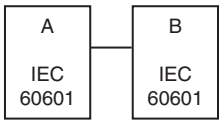
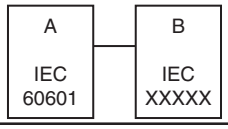
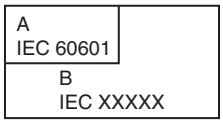
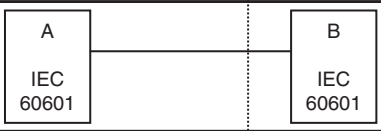
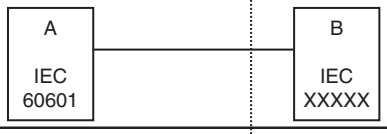
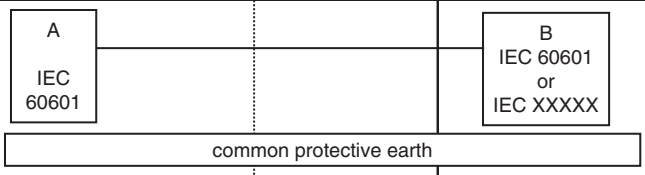
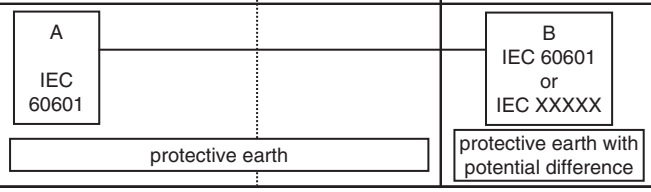
Refer to the AE-918P Neuro Unit Operator's Manual.

General Requirements for Connecting Medical Electrical Systems

When more than one electrical instrument is used, there may be electrical potential difference between the instruments. Potential difference between instruments may cause current to flow to the patient connected to the instruments, resulting in electrical shock. Therefore, electrical instruments must be appropriately installed as specified in IEC 60601-1-1: 2000.

The following is an extract from IEC 60601-1-1 “Medical electrical equipment Part 1: General requirements for safety”. For details, refer to IEC 60601-1-1 and consult with a biomedical engineer.

Examples of combinations of MEDICAL ELECTRICAL EQUIPMENT and non-medical electrical equipment

Situation No.		Medically used room		Non-medically used room	Feasible solution (See clause 19 in all situations)
		Inside the PATIENT ENVIRONMENT	Outside the PATIENT ENVIRONMENT		
1	1a Items A and B in PATIENT ENVIRONMENT				
	1b Items A and B in PATIENT ENVIRONMENT				For B: Additional protective earth or separating transformer
	1c Item A powered from specified power supply in item B in PATIENT ENVIRONMENT				For B: Additional protective earth or separating transformer
2	2a Item A in PATIENT ENVIRONMENT and item B in medically used room				
	2b Item A in PATIENT ENVIRONMENT and item B in medically used room				For B: See 19.201 and its rationale
3	3a Item A in PATIENT ENVIRONMENT and item B in non-medically used room				For B: See 19.201 and its rationale
	3b Item A in PATIENT ENVIRONMENT and item B in non-medically used room				For B: Additional protective earth or SEPARATION DEVICE

KEY TO TABLE

- Additional protective earth: If necessary, provide additional protective earthing, which is permanently connected (see also 58.201).
  NOTE: Equipment modification may be required.
- Separating transformer: If necessary, limit the ENCLOSURE LEAKAGE CURRENT, by using an additional separating transformer according to annex EEE.
  NOTE 1: No equipment modification is required.
  NOTE 2: A separating transformer is a transformer with one or more input winding(s) separated from the output winding(s) by at least basic insulation [IEC 60989].
- SEPARATION DEVICE: If necessary, apply SEPARATION DEVICE.
- IEC 60601: MEDICAL ELECTRICAL EQUIPMENT in compliance with IEC 60601.
- IEC XXXXX: Non-medical equipment in compliance with relevant IEC safety standards.

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Contact information is accurate as of Jan 2015. Visit www.nihonkohden.com for the latest information.

The model and serial number of your instrument are identified on the rear or bottom of the unit.
Write the model and serial number in the spaces provided below. Whenever you call your representative concerning this instrument, mention these two pieces of information for quick and accurate service.

Model _____ Serial Number _____

Your Representative