DynaScope 7000 Series

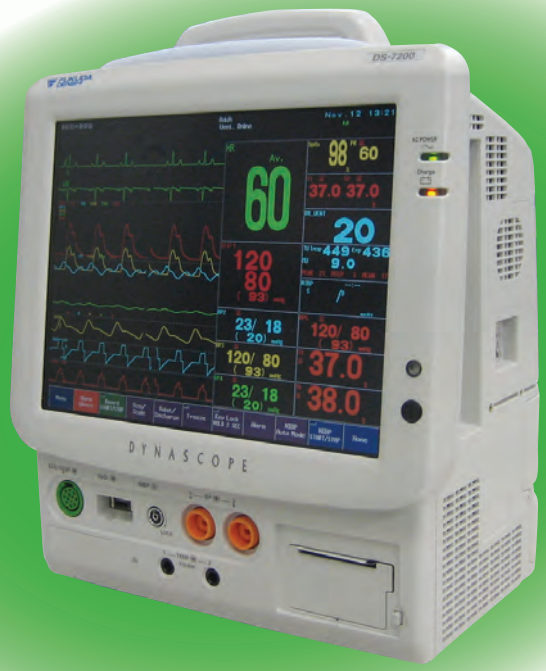
Bedside Monitor

DS-7200 System

Ver.08

Operation Manual

《 General Description 》



- Before using this device, read this operation manual thoroughly.
- Keep this manual near the device for future reference.

FUKUDA DENSHI

This operation manual is for the DS-7200 System Version 08.

⚠CAUTION	FEDERAL LAW RESTRICTS THIS DEVICE TO SALE BY OR ON THE ORDER OF A PHYSICIAN.

CAUTION:

- This device for sale by or on the order of a physician.
- The company and product names used in this manual are trademarks or registered trademarks.
- If this manual has pages missing or out of order, contact Fukuda Denshi for replacement.
- Only physician or persons instructed by physicians are allowed to use the equipment.
- The information contained in this document is subject to change without notice due to improvement in the equipment.

Blood pressure measurements determined with this device are equivalent to those obtained by a trained observer using the cuff/stethoscope auscultation method, within the limits prescribed by the American National Standard, Electronic or automated sphygmomanometers.

Printed in Japan

Preface

Thank you for purchasing this product.
Before using this product, read the following precautions to make sure the product is used correctly and safely.

Composition of This Operation Manual

The DS-7200 System Operation Manual is composed of the following 3 sections.

≪General Description≫

This section is composed of the chapters stating the general description of the device and basic operation procedure.

1. General Description	:	Describes the outline of this equipment.
2. Basic Operation	:	Describes the basic operation for monitoring.
3. Vital Application	:	Describes the procedure for vital application, etc.

≪Monitoring Operation≫

This section is composed of the chapters explaining the detailed monitoring procedures and setup procedures.

4. Monitoring Setup	:	Describes the procedures to set the monitor according to the monitoring purpose.
5. Admit / Discharge of a Patient	:	Describes the procedure to admit or discharge a patient.
6. Parameter Setup	:	Describes the procedure to set the measurement condition, size, scale, etc. for each parameter.
7. Function	:	Describes about the functions such as arrhythmia analysis, trend, recall, etc.
8. System Configuration	:	Describes about the system configuration such as night mode, alarm mode, display mode, etc.

≪Maintenance≫

This section is composed of the chapters describing the installation procedure, maintenance, technical information, accessories, etc.

9. Installation	:	Describes about the environment for use, wireless system, etc.
10. Maintenance	:	Describes about the maintenance, troubleshooting of this equipment.
11. Technical Information	:	Lists the specification, default settings, pin assignments of external connector, etc.
12. Accessories	:	Lists the accessories and optional accessories for this equipment.

Safety Precautions

- Read the “Safety Precautions” thoroughly before use to ensure correct and safe use of the product.
- Be sure to follow the precautions indicated below, as these are important messages related to safety.

⚠DANGER	Failure to follow this message may cause immediate threat of death or serious injury, or complete failure of the equipment.

⚠WARNING	Failure to follow this message may result in death or serious injury, or complete failure of the equipment.

⚠CAUTION	Failure to follow this message may cause injury or failure to the equipment.

NOTE	A note is not related to product safety, but provides information about the correct use and operating procedures to prevent incorrect operation and malfunction of the equipment.

Labels Attached to the Unit

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

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

DS-7200 System

⚠ DANGER

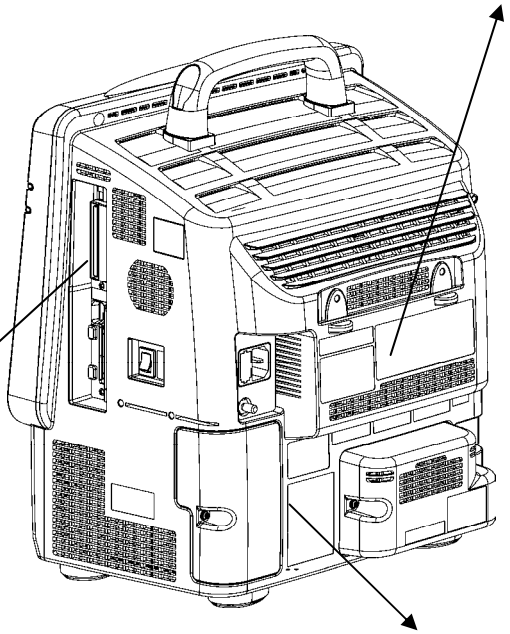
Risk of explosion if used in the presence of flammable anesthetics.

⚠ CAUTION

Before connecting, read instruction manual.

⚠ CAUTION

To reduce the risk of electric shock, do not remove the cover.
Refer servicing to qualified service personnel.



⚠ Do not remove the PC card and the CF card when LED is lit.

⚠ DANGER
• Use only the batteries specified for this device. • Do not disassemble or modify the battery. The battery incorporates protection circuitry for safety purposes.
⚠ WARNING
• Installation of the battery should be performed only by our service representative, to avoid any risk of electric shock to the operator or malfunction of the device.
⚠ CAUTION
• The life cycle of the battery is 1 year. • The battery charges when the power cord is connected to a hospital-grade outlet. • It takes approximately 2.5 hours to fully charge an empty battery.

HU-71/HU-72/HU-73 Option Unit

⚠ DANGER

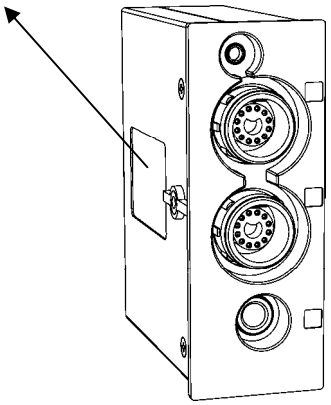
Risk of explosion if used in the presence of flammable anesthetics.

⚠ CAUTION

Before connecting, read instruction manual.

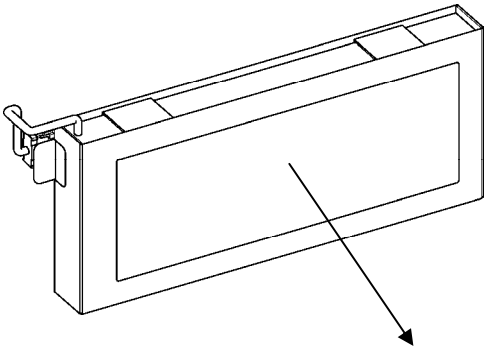
⚠ CAUTION

To reduce the risk of electric shock, do not remove the cover.
Refer servicing to qualified service personnel.



＜HU-71＞

OAO-12B Battery Pack



Li-ion リチウムイオン電池パック　　Li-ion Battery Pack　　CE

形　式 / Type	: OAO-12B	容　量 / Capacity	: 6600mA･h
電　圧 / Voltage	: 14.8V DC	製造番号 / Lot No.	

FUKUDA DENSHI

⚠ 危 険

発熱、発火、破裂、液漏れの危険がありますので次の事項をお守り下さい。
・電池パックを機器に接続するときは、コネクタの向きを確かめて確実に装着して下さい。
・この電池パックは指定の機器以外には使用しないで下さい。
・電池の充電は指定の機器本体のみで行って下さい。
・電極や端子のショートや改造、分解をしないで下さい。
・火中投入、加熱、高温下での放置、充電をしないで下さい。
・クリップ、ピンなど金属製の物と一緒に保管しないで下さい。
・電池には寿命があります。劣化した電池パックは使用しないで下さい。
・電池パックに釘を刺したり、ハンマーで叩いたり、踏みつけたり、外装チューブを剥がしたり、キズをつけないで下さい。
・電池パックに強い衝撃を与えたり、投げつけたりしないで下さい。

⚠ DANGER

Please follow the precautions below, as improper use of the battery may cause heat, fire, explosion, or leakage.
・When installing the battery pack to the equipment, ensure the connector direction is correct.
・Do not use the battery pack with an equipment other than specified.
・The battery must be charged on specified equipment.
・Do not short the electrode or terminal, or remodel/disassemble the battery.
・Do not throw into the fire, heat, or leave/charge the battery under high temperature.
・Do not store the battery with metal such as clip or pin.
・The battery deteriorates with time. Do not use the deteriorated battery pack.
・Do not drive a nail in, hit with a hammer, step on the battery pack, or peel off or scratch the exterior tube.
・Do not apply strong impact or throw the battery pack.

・限りあるこれらの資源の有効活用のため、リサイクルにご協力ください。
リサイクル処理は弊社販売店・代理店に提出いただくか、各自治体の処理方法に従ってください。

To effectively use these limited resources, your cooperation in recycling the battery will be appreciated.
・For recycling procedure, refer to Fukuda Denshi service representative, or follow the local regulations.

発売元　フクダ電子株式会社　　Distributed by　: Fukuda Denshi Co.,Ltd.
製造元　ファルタ･マイクロバッテリー･プライベート･リミテッド　　Manufactured by : VARTA Microbattery Pte.,LTD.

Li-ion　NL　(01)04538612225079　MADE IN KOREA

Measurement Unit for Each Parameter

The measurement units for this equipment are as follows.

Detail	*Parameter*	*Display*	*Unit*	*Default*
Heart Rate / Pulse Rate	ECG	HR	bpm	
	Invasive Blood Pressure	PR_IBP	bpm	
	SpO_2	PR_SpO_2	bpm	
	Non-Invasive Blood Pressure	PR_NIBP	bpm	
ST Level	ECG	ST	mm, mv	mm
VPC	ECG	VPC	bpm	
Respiration Rate	Impedance Respiration	RR_IMP	Bpm	
	CO_2	RR_CO_2	Bpm	
	Ventilator	RR_VENT	Bpm	
Apnea	Impedance Respiration	APNEA	s (second)	
	CO_2	APNEA	s (second)	
	Ventilator	APNEA	s (second)	
Invasive Blood Pressure	Invasive Blood Pressure	BP	mmHg, kPa cmH_2O (CVP only)	mmHg
Non-Invasive Blood Pressure	Non-Invasive Blood Pressure	NIBP	mmHg, kPa	mmHg
Arterial Oxygen Saturation	SpO_2	SpO_2	%	
	Perfusion Index	PI	%	
Temperature	Temperature	TEMP	°C / °F	°C
End-Tidal CO_2 Concentration	CO_2	$EtCO_2$	mmHg, kPa, %	mmHg
Inspiratory CO_2 Concentration	CO_2	$InspCO_2$	mmHg, kPa, %	mmHg
Cardiac Output	Cardiac Output	CO	L/minute	
	Cardiac Index	CI	$L/minute/m^2$	
Blood Temperature	Blood Temperature	Tb	°C / °F	°C
Injectate Temperature	Injectate Temperature	Ti	°C / °F	°C
Airway Flow	Airway Flow	AWF	L/minute	
Airway Pressure	Airway Pressure	AWP	cmH_2O	
Tidal Volume	Expiratory Tidal Volume	E_TV	mL	
	Inspiratory Tidal Volume	I_TV	mL	
	Tidal Volume	TV	mL	
	Inspiratory/Expiratory Ratio	I:E	(none)	
Respiratory Minute Volume	Minute Volume	MV	L/minute	
	Spontaneous Minute Volume	SMV	L/minute	
Compliance	Compliance	COMP	mL/cmH_2O	
	Static Compliance	S_COMP	mL/cmH_2O	
	Dynamic Compliance	D_COMP	mL/cmH_2O	
Airway Resistance	Expiratory Resistance	E_RES	$cmH_2O/L/Sec$	
	Inspiratory Resistance	I_RES	$cmH_2O/L/Sec$	
	Static Airway Resistance	S_RES	$cmH_2O/L/Sec$	
	Dynamic Airway Resistance	D_RES	$cmH_2O/L/Sec$	
Airway Pressure	Mean Airway Pressure	MEAN	cmH_2O	
	Maximum Airway Pressure	PEAK	cmH_2O	
	Pause Airway Pressure	PAUSE	cmH_2O	
	Minimum Airway Pressure	P_Min	cmH_2O	

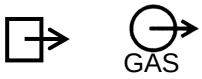
bpm: beats per minute
Bpm: breaths per minute

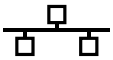
Detail	*Parameter*	*Display*	*Unit*	*Default*
Spontaneous Respiration	Spontaneous Respiration	S_RR	Bpm	
Peak End Expiratory Pressure	Peak End Expiratory Pressure	PEEP	cmH_2O	
Fraction of Inspiratory Oxygen	Fraction of Inspiratory Oxygen	FIO_2	%	
Vigilance Data ・Vigilance ・Vigilance CEDV ・VigilanceII ・Vigileo	Mixed Venous Oxygen Saturation	SvO_2	%	
	Central Venous Oxygen Saturation	$ScvO_2$	%	
	Arterial Oxygen Saturation	SaO_2	%	
	Oxygen Uptake Index	O_2EI	%	
	Oxygen Transport	DO_2	mL/minute	
	Oxygen Consumption	VO_2	mL/minute	
	Stroke Volume	SV	mL	
	Stroke Volume (STAT Mode)	SV_STAT	mL	
	Stroke Volume Index	SVI	mL/m^2	
	Stroke Volume Index (STAT Mode)	SVI_STAT	mL/m^2	
	Heart Rate	HR	bpm (beats per minute)	
	Mean Arterial Pressure	MAP	mmHg	
	Central Venous Pressure	CVP	mmHg	
	Continuous Cardiac Output	CCO	L/minute	
	Continuous Cardiac Output (STAT Mode)	CCO_STAT	L/minute	
	Continuous Cardiac Index	CCI	$L/minute/m^2$	
	Continuous Cardiac Index (STAT Mode)	CCI_STAT	$L/minute/m^2$	
	Systemic Vascular Resistance	SVR	$dynes\text{-}sec/cm^5$	
	Systemic Vascular Resistance Index	SVRI	$dynes\text{-}sec/cm^5$	
	Blood Temperature	BT	°C	
	Ejection Fraction	EF	%	
	Ejection Fraction (STAT Mode)	EF_STAT	%	
	End-Diastolic Volume	EDV	mL	
	End-Diastolic Volume (STAT Mode)	EDV_STAT	mL	
	End-Diastolic Volume Index	EDVI	mL/m^2	
	End-Diastolic Volume Index (STAT Mode)	EDVI_STAT	mL/m^2	
	End-Systolic Volume	ESV	mL	
	End-Systolic Volume Index	ESVI	mL	
	Stroke Volume Variance	SVV	%	
BIS Monitor Data	Bispectral Index	BIS	(no unit)	
	Signal Quality Index	SQI	%	
	Electromyograph	EMG	dB	
	Suppression Ratio	SR	%	

Graphic Symbols

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

Symbols indicated on the equipment

Symbol	*Description*
	Caution; refer to accompanying documents Indicates the need to refer to related accompanying documents before operation.
	Equipotential Terminal Indicates the terminal to equalize the potential difference when interconnecting the devices.
	Inhibition The operation is inhibited. Refer to the instruction.
	Protective Earth Indicates the protective earth inside the equipment.
	Alternating Current (Main Power Input Indicator)
	Direct Current
	Battery Charge (Battery Charge Indicator)
	“OFF” for a Part of an Equipment Indicates the “OFF” condition for a part of an equipment.
	“ON” for a Part of an Equipment Indicates the “ON” condition for a part of an equipment.
	Electrostatic Sensitive Part Directly touching this connector part with hands should be avoided.
	Type CF Applied Part with Defibrillation-Proof Indicates the degree of protection against electric shock is Type CF Applied Part with defibrillation-proof.
	Type BF Applied Part with Defibrillation-Proof Indicates the degree of protection against electric shock is Type BF Applied Part with defibrillation-proof.
	Type BF Applied Part Indicates the degree of protection against electric shock is Type BF Applied Part.
	Signal Output Part
	GAS Output Part

Symbol	*Description*
	Signal Input Part
	Manufactured Date
	TCP/IP Network Connector Connects to TCP/IP network.
	RS-232C Connector Connects the related device.
	Eject Indicates the switch to remove the recorder paper cassette.

Symbols displayed on the screen

Symbol	*Description*
	Battery Mark During battery operation, battery status will be displayed.
	Alarm OFF Indicates the alarm is OFF.
	Heart Rate Synchronization Mark This mark flashes synchronizing to the heartbeat.
	Respiration Synchronization Mark This mark flashes synchronizing to the inspiration.
	Event Key This mark will be displayed when an alarm generates. Whether or not to display this icon can be selected on the monitor setup menu.
	Device Configuration Icon This mark will be displayed when device configuration has changed. Whether or not to display this icon can be selected on the monitor setup menu.
	Message Icon This mark will be displayed inside the parameter key when an alarm message is present for that parameter. Whether or not to display this icon can be selected on the monitor setup menu.
	TCON Antenna Mark Indicates the receiving condition of the Bidirectional Wireless Communication Module (HTC-702).
	SEC Alarm Display Indicates the SEC alarm status.
	Scroll Keys These keys will allow to scroll the screen.
	Laser Printer This mark will be displayed when a laser printer connected to the TCP/IP network is used.
	Laser Printer Output Indicates the current printing progress.

Precautions for Safe Operation of Medical Electrical Equipment

⚠CAUTION	Read the following precautions thoroughly to correctly operate the device. ● Users should have a thorough knowledge of the operation before using this system. ● Pay attention to the following when installing and storing the equipment. • Do not install or store in an area where the equipment will be subject to splashing water. • Do not install or store in an area where the environmental conditions, such as atmospheric pressure, temperature, humidity, ventilation, sunlight, dust, sodium, sulfur, will adversely affect the system. • Place the equipment on a stable surface where there is no inclination, vibration, or shock (including during transportation). • Do not install or store in an area where there are chemical or gasses stored. • Verify the power frequency, voltage and allowable current (or power consumption). • Ensure the grounding is proper by connecting the accompanying power cable to the hospital grade outlet. • Do not install the equipment in a location where it is difficult to unplug the power cable. ● Before operating the system, verify the following items. • Verify the power voltage. • Check the cable connection and polarity to ensure proper operation of the equipment. • Make sure the power system has adequate earth ground. • Ensure that all cables are firmly and safely connected. • Pay special attention when the device is used in conjunction with other equipment as it may cause erroneous judgment and danger. • Ensure all patient connections are proper and secure. ● During operation of the system, verify the following items. • Always observe the system and patient to ensure safe operation of the equipment. • If any abnormality is found on the equipment or patient, take appropriate measures such as ceasing operation of the equipment in the safest way for the patient. • Do not allow the patient to come in contact with the device. ● After using the system, verify the following items. • Unplug all the cables from the patient before turning off the power. • When unplugging the cables, do not apply excessive force by pulling on the cord. Pull by the connector part of the cable. • Clean the accessories and cables, and keep them together in one place. • Keep the unit clean to ensure proper operation of the next use. ● If the equipment is damaged and in need of repair, user should not attempt service. Label the unit “OUT OF ORDER” and contact Fukuda Denshi. ● Do not remodel the equipment. ● Maintenance Check • Make sure to periodically check the equipment, accessories and cables. • Before reusing the device that has been left unused for a while, make sure that the device works normally and safely. ● When using the electrosurgical knives or defibrillator with this equipment, verify proper attachment of patient ground plate, ECG electrode type for the electrosurgical knives, and paste volume, output energy for the defibrillator. Also, verify that proper ground is selected.

Precautions for Safe Operation of Medical Telemetry

⚠CAUTION	Precautions for Safe Operation of Medical Telemetry To operate the device correctly, read the following precautions carefully. ● The medical institution (hereinafter referred as “Institution”) must decide the telemetry installation plan for the medical institution in order to prevent interference and interference between transmitters (telemetry based on destination country’s radio law). ● When using telemetry which requires zone location, the institution is to set up the zones as an operation unit for each transmitter to prevent electronic interference between telemetry throughout the medical institution. ● When using telemetry which requires zone location, display and identify each prepared zone in the equipment. ● When laying receiver antenna for each transmitter, the institution has to be examined so as not to generate electronic interference. ● Based on the above examination result, the institution places each receiver antenna as required. In managing, be sure to follow the precautions below. ● The institution appoints a person to manage the wireless channels for the whole medical institution. And when using telemetry which requires zone location, the institution nominates a person to manage the wireless channels in each zone (a “Zone Manager”). However, when using such telemetry in a local medical institution, one person can perform both functions. ● Select a telemetry manager who understands the characteristics and functionality of telemetry systems, and is skilled in operating telemetry. ● When installing telemetry, the Overall Manager and the Zone Manager have to understand the precautions for use of the telemetry in advance. ● The Overall Manager takes responsibility of wireless channel management and transmitter storage for the whole medical institution by giving proper instruction. ● The Overall Manager creates a management log, list of wireless channels, management status for the whole medical institution (hereinafter referred to as the “management log”). When changing a wireless channel, register it in the log and give proper instructions to the zone manager or to the user. ● The Zone Manager assumes responsibility for managing the wireless channels, storing, and managing telemetry. ● The Zone Manager assigns the transmitter to the user, and provides enough education for use inside the zone. ● The telemetry user verifies operation of the transmitter/receiver before use. ● The telemetry user, if using the telemetry in a zone location, follows the instructions of the zone manager for the zone and gives instructions to the patient if required. ● When interference or breakdown occurs in telemetry communication, the user is required to inform the zone manager and the overall manager of the problems. The zone manager and overall manager are to deal with the problem properly and/or contact their nearest Fukuda Denshi representative for service.

Precautions about the Maintenance

Safety Inspection and Maintenance

For safe operation of the equipment, regular inspection and maintenance is required. Once a year, check all cables, devices, and accessories for damage, earth impedance, earth and leakage currents, and all alarm functions. Also, ensure that all safety labels are legible. Maintain a record of these safety inspections.
Immediate maintenance has to be carried out if ;

- the equipment was subjected to extreme mechanical stress, e.g. after a heavy fall.
- the equipment was subjected to liquid spill.
- the monitoring function is interrupted or disturbed.
- parts of the equipment enclosure are cracked, removed, or lost.
- any connector or cable shows signs of deterioration.

Reference Refer to “10. Maintenance” for details.

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

Maintenance, Modifications, and Repairs

Fukuda Denshi is liable for the safety, reliability, and performance of its equipment only if;

- Maintenance, modifications, and repairs are carried out by authorized personnel.
- Components are used in accordance with Fukuda Denshi operating instructions.

A full technical description of the DS-7200 system is available from your local Fukuda Denshi representative.

Precautions about the Pacemaker

⚠WARNING	● Minute ventilation rate-adaptive implantable pacemakers can occasionally interact with certain cardiac monitoring and diagnostic equipment, causing the pacemakers to pace at their maximum programmed rate. The cardiac monitoring and diagnostic equipment may possibly send wrong information. If such event occurs, please disconnect the cardiac monitoring and diagnostic equipment, or follow the procedures described in the operation manual of the pacemaker. (For more details, contact FUKUDA DENSHI personnel, your institution’s professionals, or your pacemaker distributors.) ➲ Reference “Minute Ventilation Rate-Adaptive Pacemakers” FDA alerts health professionals that minute ventilation rate-adaptive implantable pacemakers can occasionally interact with certain cardiac monitoring and diagnostic equipment, causing pacemakers to pace at their maximum programmed rate. [Based on a safety bulletin issued by FDA Center for Devices and Radiological Health on October 14, 1998] ● Rate meters may continue to count the pacemaker rate during occurrences of cardiac arrest or some arrhythmias. Do not rely entirely upon rate meter alarms. Keep pacemaker patients under close surveillance. See this manual for disclosure of the pacemaker pulse rejection capability of this equipment.

Non-Explosion Proof

⚠DANGER	Never operate the equipment in the presence of flammable anesthetics, high concentration of oxygen, or inside hyperbaric chamber. Also, do not operate the equipment in an environment in which there is a risk of explosion. Explosion or fire may result.

Defibrillation Safety

⚠WARNING	● When defibrillating, keep away from the electrodes or medicament applied to the patient chest. If this is not possible, remove the electrodes or medicament before defibrillating. If the defibrillator paddles directly contact the electrodes or medicament, electrical shock may result by the discharged energy. ● When defibrillating, make sure that the electrodes, sensor cables, or relay cables are firmly connected to the device. Contacting the metal part of the disconnected cable may result in electrical shock by the discharged energy. ● When defibrillating, do not touch the patient and the metal part of the device or cables. Electric shock may result by the discharged energy. ● This equipment will return to standard operating mode within 10 seconds. The stored data will not be affected. The measurement accuracy will temporarily decrease during defibrillation, but it will not compromise the safety of patient and the equipment.

Electrosurgery Safety

⚠WARNING	The monitoring system contains protection against interference generated by electrosurgical instruments. However, operating conditions, surgery site with respect to the location of ECG electrodes, or the type of instrument used, may cause noise on the ECG. The noise is generated at the tip of an electrical knife and is difficult to completely eliminate because of the frequency components of the ECG. To reduce electrosurgical interference, take the following precautions: <u>Location</u> Locate the electrosurgical unit as far as possible from this unit and the patient cable. This will help reduce interference on the ECG through the monitor or cables. <u>Power Supply</u> Connect the electrosurgical unit to a power supply that is different from that of the monitor. This will help prevent interference through the power cable. <u>Electrode Placement</u> The amount of interference is considerably different depending on the electrode position and surgery site. Place the ECG electrodes as far away as possible from the surgery site and the ground plate. Do not place electrodes in the path between the surgery site and the ground plate. If the electrodes are placed in this path, the amount of interference will be quite large. Position (+) and (–) electrodes as close as possible to each other. <u>Ground Plate</u> When using electrosurgical instruments, make sure the contact between the patient and the ground plate is secure. If the connection is incomplete, the patient may suffer a burn at the electrode site.

Precautions about Magnetic Resonance Imaging

⚠WARNING	● Do not operate this equipment in magnetic resonance imaging (MRI) environments. ● When conducting MRI test, remove the electrodes and sensors connected to the patient (test subject). The local heating caused by the induced electromotive force may cause burn injury to the patient (subject). For details, refer to the operation manual for the MRI testing device.

Precautions about Connections to Peripheral Devices

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

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

⚠CAUTION	All the peripheral device connectors on the DS-7200 system are isolated from the power supply. The connecting peripheral devices should comply with IEC 60601-1 or should be isolated with the isolation transformer in compliance with IEC 60601-1. To prevent danger of electric shock, always position the peripheral devices away from the patient.

When connecting peripheral devices to DS-7200 system, it is the user's responsibility to verify that the overall system complies with IEC 60601-1-1, "Collateral Standard: Safety Requirements for Medical Electrical Systems".

Precautions about the Fuse

⚠DANGER	If the fuse blows, contact Fukuda Denshi Service Representative. Do not continue using it as internal damage to the equipment may be considered.

Accessories and Optional Accessories

⚠WARNING	Use only the cables specified by Fukuda Denshi. Not only the DS-7200 cannot deliver its maximum performance but may also result in increase in emission or decrease in immunity.

Precautions about the DS-7200 System

⚠DANGER	When connecting to other device, contact Fukuda Denshi service representative. Danger such as electric shock may result to the patient and operator.

⚠WARNING	● The DS-7200 system is not a life-support equipment. ● The DS-7200 system is not intended for use during patient transport outside a healthcare facility, and is not considered as mobile equipment. ● Do not connect unit or cable not authorized by Fukuda Denshi to any I/O connector. If done so by mistake, the DS-7200 system cannot deliver its maximum performance and the connected units may be damaged, resulting in a safety hazard. ● If the DS-7200 system is used under an environment not fulfilling the specified condition, not only that the equipment cannot deliver its maximum performance, the equipment may be damaged and safety cannot be ensured. If using the equipment under condition other than specified, contact our service representative. ● Use only the supplied 3-way AC power cable. Use of other cables may result in electric shock to the patient and the operator. ● The power cable must be connected to the hospital grade outlet. ● When using multiple ME equipment simultaneously, perform equipotential grounding to prevent potential difference between the equipment. Even a small potential difference may result in electric shock to the patient and the operator. ● The setup for the alarm mode and display mode remains stored even when the power is turned off or when discharging procedure is performed. Before monitoring, make sure the current monitoring mode is suitable for the patient's condition. ● The patient classification selection influences the precision of the QRS detection and NIBP measurement. Make sure the correct selection is made. ● The pacemaker use selection influences the precision of the QRS detection and arrhythmia analysis. Make sure the correct selection is made. ● If the QRS pace mask function is set to OFF, 10ms, or 20ms, the pace pulse may be erroneously be detected as a QRS complex and HR/Asystole Alarms may not generate due to incorrect HR (counting pace pulse as QRS complex). Select OFF, 10ms, or 20ms only if you are sure that pacing failure will not occur, or when the patient can be constantly monitored. ● Be cautious when setting the "SpO_2 Averaging" duration as the SpO_2 alarm is based on the displayed SpO_2 value which is averaged from the duration set in "SpO_2 Averaging". The alarm occurrence time will be affected or may not occur for the transient value of SpO_2 depending on the set duration. (For Masimo® SpO_2 unit) ● When measuring the SpO_2 of patient with high fever or peripheral circulatory insufficiency, check the sensor attachment periodically and change the attachment site. The temperature of the attachment site will rise 2 to 3°C due to the sensor heat which may result in compression necrosis and burn injury. ● For the following case, accurate measurement of SpO_2 may not be possible. • Patient with excessive abnormal hemoglobin (COHb, MetHb) • Patient with the pigment injected to the blood • Patient receiving CPR treatment • When a sensor is applied to a limb with NIBP cuff, arterial catheter, or intracatheter • When measuring at site with venous pulse • Patient with body motion • Patient with small pulse

⚠WARNING	● Use only specified NIBP cuff. Refer to “12. Optional Accessories”, for list of specified NIBP cuffs. These accessories may be purchased from Fukuda Denshi or NIBP cuff manufacturer that Fukuda Denshi recommends. ● Before the NIBP measurement, make sure the patient classification (Adult / Child / Neonate) is properly selected. Otherwise, correct measurement cannot be performed, and congestion or other injury may result. ● Use nonconductive parts for the BP circuit other than the transducer. Otherwise, the operator may get an electric shock if he/she touches a conductive part during defibrillation. ● For MGU-721 with CAPNOSTAT 5® CO_2 sensor, use only specified airway adapter manufactured by “Respironics Novametrix, LLC”. Refer to “12. Optional Accessories”, for list of specified “Respironics Novametrix, LLC” airway adapters. These accessories may be purchased from Fukuda Denshi or any authorized “Respironics Novametrix, LLC” distributor. ● For MGU-722, use only specified breath sampling products manufactured by “Oridion Medical 1987 Ltd.”. Refer to “12. Optional Accessories”, for list of specified “Oridion Medical 1987 Ltd.” FilterLine® sampling products. These accessories may be purchased from Fukuda Denshi or any authorized “Oridion Medical 1987 Ltd.” distributor. ● When monitoring CO_2 (MGU-721/MGU-722), always consider the circumference of the intubation tube when using the airway adapter. If inappropriate airway adapter is used for a patient with low ventilation, CO_2 may mix in to the inspired air resulting in incorrect measurement, or apnea detection may become difficult. ● When the system alarm is suspended, all the alarm will be suspended even if the parameter alarm is set to ON. Also, the alarm event will not be stored as recall. ● If the upper/lower alarm limit of the parameter is set to OFF, or arrhythmia alarm is set to OFF, alarm will not function even if the system alarm is set to ON. Pay attention when setting them OFF. ● When a parameter is in a connector-off condition, the alarm will be generated only on the bedside monitor and not on the central monitor. Make sure that the connector is securely connected. If the waveform/numeric data is not displayed for a monitored parameter, check the patient’s condition and pay attention not to miss the connector-off condition. ● Objective and constant arrhythmia detection is possible through the fixed algorithm incorporated in this monitor. However, excessive waveform morphology change, motion artifact, or the inability to determine the waveform pattern may cause an error, or fail to make adequate detection. Therefore, physicians should make final decisions using manual recording, alarm recording and recall waveform for evaluation. ● The HR/PR alarm will not be generated unless the parameter key corresponded to the selected HR/PR source is displayed. Be sure to display the parameter key for the HR/PR source. ● The alarm for the parameter not selected for the “HR/PR Alarm Source” (ECG/SpO_2/BP) will be set to OFF on the DS-7600 Central Monitor. • The “HR/PR Alarm Source” setting will synchronize between the bedside monitor and the central monitor. • For example, if PR is set as the HR/PR alarm source on the DS-7200, HR alarm will be set to OFF on the central monitor. ● The purpose of the apnea alarm is to alert the user to evaluate for the possible occurrence of apnea events by identifying the absence of respiration. It is not intended to be classified as an “Apnea Monitor” and will not identify the condition creating the possible event. (Central, Obstructive or Mixed.) ● When “Alarm System” setting (IEC/FUKUDA DENSHI) is changed on the Monitor Setup menu, make sure to check the alarm sound and alarm indicator. ● When PURITAN-BENNETT Ventilator is used, APNEA alarm will not generate if ventilator is the RR/APNEA alarm source.

⚠WARNING	● When selecting [Silence], [Time Disp. Only] or [OFF] (Alarm Pole) for the night mode, pay attention not to miss any important alarm by simultaneously monitoring the bed on other monitors such as central monitor. ● For the alarm mode, it is recommended to program the alarm mode in rough classification such as patient's age, monitoring purpose (ICU or surgery), and if necessary, perform unique setup for each patient. ● The RR/APNEA alarm will not be generated unless the parameter key corresponded to the selected RR/APNEA source is displayed. Be sure to display the parameter key for the RR/APNEA source. ● When lifting this device, hold the handle of the main unit. ● The "QRS SYNC" signal (No. 1) of the Status II connector is a delay output. (delay: 30 to 75msec, signal width: 100msec). Do not use it as a synchronizing signal for the defibrillator. Make sure the delay time of QRS SYNC signal fulfills the specifications of the connected device. ● Analog signal is a delay output. (about 35ms for ECG, BP) When connecting to a device using vital signs as trigger signals (ex. IABP), make sure the delay time fulfills the specifications of the connected device. The delay time may differ depending on the waveform shape or artifact interference. ● The slave monitor output of the DS-7200 is not isolated. If connecting a commercially available display unit which does not comply with IEC 60601, use an isolation transformer to ensure there is no excessive electric leakage current for safety of the operator and the patient. ● We cannot assure proper operation if TCP/IP network is connected incorrectly. When changing the network setting or upgrading the printer, contact our service representative. ● Make sure not to duplicate the IP address for DS-7200 system, laser printer, and the server. ● As DS-7200 is not corresponded to DHCP (Dynamic Host Configuration Protocol) IP address, set the IP address excluded at DHCP if DHCP server is in the network configuration. ● Be careful not to confuse the HUB used for the DS-LANII/III network and the HUB for the TCP/IP network. We cannot assure proper operation if used improperly. ● Use a 10M repeater HUB recommended by Fukuda Denshi for the DS-LANII network. If a 100M HUB or a switching HUB is used, a communication error may occur. ● On the network configuration menu, when a setting is changed and [Enter] key is pressed, a caution message will be displayed. All monitoring operation will be suspended until the system is restarted.

⚠CAUTION	● Systems • This equipment is intended to be used for only one patient. • The installation of this equipment and its option unit should be performed by our service representative or a person who is well acquainted with this equipment. • The internal switch setting will be performed by our service representative. Users should not open the maintenance cover. • PC Card Slot will be used by our service representative for maintenance purpose. Users should not use it. • The software upgrading will be performed by our service representative. The users should not attempt it. • Use only the accessories specified for this device. Otherwise, proper function cannot be executed. • Do not reuse a disposable product. • For quality improvement, specifications are subject to change without prior notice. • When the product is used in regions whose voltage is other than 110-120V, a cable appropriate to the regulations and voltage of the country in which the product is being used shall be used. • The display panel utilizes exclusive fluorescent light for the backlight. Since this fluorescent light deteriorates by the life cycle, the display may become dark, scintillate, or may not light by the long term use. In such case, contact your nearest service representative. • Always operate the touch panel with fingers or a touch panel pen. Do not touch with a pen-point or other hard-edged instruments. It may cause malfunction or damage the touch panel. In addition, do not apply pressure to any part of the panel for a prolonged time. • Do not use the touch panel with the film or adhesive tape attached. Malfunction of the touch panel or damage may result. • As the touch panel is made of glass, a strong impact may cause damage. Pay attention not to hit or drop the touch panel. • Do not press the touch panel with strength or twist your finger on the panel. It may cause malfunction or damage the touch panel. • Due to its material characteristic, the touch panel expands/contracts depending on the temperature/humidity. When the touch panel is left unused for a while, or when the ambient temperature is low, the surface film of the touch panel may expand, but this is not an abnormal condition. This expansion will be reduced in few hours or half a day after the power is turned ON. • When changing the CO_2 option unit (MGU-721/MGU-722), it is necessary to perform setting on the “Change Equipment Configuration (CO_2)” of the CONFIGURATION menu. • If not using the monitor for a long time, turn OFF the power switch. • When connecting the BIS monitor, make sure that the power of the patient monitor and the BIS monitor is turned OFF. • The connector of COM (1 to 3), StatusII (1 to 5), and analog output are isolated. • If the power supply is interrupted due to power failure, etc., the following will occur. - If the power supply is resumed within 5 minutes, setup data are backed up and monitoring before the power failure can be resumed. - If the power failure continues for more than 5 minutes, data such as ST data, OCRG data will be initialized. (For details, refer to “11 Technical Information Setup Item”.) - For the CO_2 option unit (MGU-721/ MGU-722), it will be initialized and enter into warm-up state even if the power failure is within 30 seconds. ● ECG Monitoring • Use only the specified relay cables, lead cables, and electrodes. • The conductive parts of electrodes and associated connectors for applied parts, including the neutral electrode, should not contact other conductive parts including earth.

⚠CAUTION	• The indication for continuous use of the electrode is about one day. • Replace the electrode if the skin contact gets loose due to perspiration, etc. • When an electrode is attached to the same location for a long period, some patients may develop skin irritation. Check the patient's skin condition periodically and change the electrode site as required. • For stable arrhythmia detection and ECG monitoring, verify proper electrode placement, lead, waveform size, and filter mode selection. If not properly selected, it may cause erroneous detection. • Always use the same type of electrodes. If different types of electrodes are used at the same time, the difference between the polarization potential from each electrode may interfere monitoring. • The threshold level for arrhythmia detection and QRS detection changes with ECG waveform size. Set a proper waveform size for monitoring. When the waveform size is ×1/4, ×1/2, or ×1, the detection threshold is 250μV. When the waveform size is ×2 or ×4, the detection threshold is 150μV. • When arrhythmia is present, HR measurement accuracy may be degraded. • Select the appropriate lead for ECG1, 2 to be used for arrhythmia detection, telemeter, central monitor transmission, and recording. • The selected lead for ECG1, 2 will be used for recall waveform and recording waveform as well as for arrhythmia analysis. • The QRS detection leads, arrhythmia detection leads, monitoring leads on the central monitor, recording leads are fixed as ECG1 and ECG2. Especially for arrhythmia detection, set the most appropriate leads with high QRS for ECG1 and ECG2. • Automatic size/position of the ECG is effective only at the time the AUTO key is pressed. This does not continually adjust size and position. • The ESIS mode can largely reduce the artifact such as electrosurgery noise and EMG, but it may also reduce the QRS amplitude. The ESIS mode should be selected only during electrosurgery. • There are some cases when the pacemaker pulse can not be detected depending on the pacemaker type, pulse voltage, pulse width, electrode lead type (unipolar, bipolar), or electrode placement which causes the pacemaker pulse amplitude to decrease and disables the pacemaker pulse detection. • If signals similar to a pacemaker pulse are present, such as electric blanket noise or excessive AC frequency noise, these may be erroneously detected and displayed as a pacemaker pulse. • When a spontaneous QRS and pacemaker pulse overlap (as in a fusion beat), QRS detection will be suspended and the heart rate will be reduced. • If a pacemaker pulse is continuously detected due to AC frequency interference, QRS detection will be suspended and the heart rate will be reduced. Also arrhythmia detection will not be possible. ● Respiration Monitoring • When the following relay cables are used, respiration cannot be measured. ・Relay Cable CI-700E-3 (FA) (defibrillation and electrosurgery-proof, 3-electrode) ・Relay Cable CI-700E-4 (FA) (defibrillation and electrosurgery-proof, 4-electrode) ・Relay Cable CI-700E-5 (FA) (defibrillation and electrosurgery-proof, 5-electrode) • When a defibrillator is used during respiration monitoring, a large offset voltage will be placed on the ECG electrodes, which may cause interruption of monitoring for a few seconds.

⚠CAUTION	● SpO_2 Monitoring • If the nail is rough, dirty, or manicured, accurate measurement will not be possible. Change the finger or clean the nail before attaching the probe and sensor. • The Dyna Alert estimates the change in circulatory dynamics from the photoplethysmogram (SpO_2) of the finger. Therefore, if the photoplethysmogram (SpO_2) is measured on the toe or forehead (with MAX-FAST), the Dyna Alert may not function depending on the patient's condition. • If irritation such as skin reddening or skin fit appears with the sensor use, change the attachment site or stop using the sensor. • When fixing the sensor with a tape, do not wind the tape too tight. At the same time, check the blood flow constantly so that congestion is not generated at the peripheral. • Even a short duration of attachment may inhibit the blood flow and generate compression necrosis and burn injury. • Change the sensor attachment site at regular time interval, which is specified for each SpO_2 sensor. The temperature of attachment site will rise 2 to 3°C due to the sensor heat which may result in compression necrosis and burn injury. • As skin for neonate / low birth weight infant is immature, change the sensor attachment site more frequently depending on the condition. • Excessive light may cause inaccurate measurements. In such cases, cover the sensor with opaque material. • When not performing the measurement, unplug the relay cable and sensor from the SpO_2 connector. Otherwise, the measurement data may be erroneously displayed by the ambient light. • The pulse wave is normalized for SpO_2 measurement. It does not indicate perfused blood volume. Check proper probe attachment by observing the pulse wave. • Precautions for Reusable Type Sensors ・The light-emitting part of the sensor should be over the root of the fingernail. Do not insert the finger too far into the sensor as it may hurt the patient. ・The DS-100A is intended for use on finger of adults weighing over 40 kg (approximate). Do not use them on children or neonates. Also do not apply them on the thumb or toe. ・The DS-100A must be moved to a new site at least every 4 hours. Because individual skin condition affects the ability of the skin to tolerate sensor placement, it may be necessary to change the sensor site more frequently with some patients. If skin integrity changes, move the sensor to another site. • Precautions for Single-Patient-Use Type Sensors ・Do not wind the tape too strong. It may obstruct the blood flow. ・The sensor is contraindicated for use on patients who exhibit allergic reactions to the adhesive tape. ・The Nellcor® OxiMax® sensor can be reused on the same patient as long as the adhesive tape attaches without slippage. But do not reuse it on other patients. It is intended for single patient use only. ・The Masimo ®LNOP sensor can be reused on the same patient as long as the light emitting and receiving part is clean, and if it is still adhesive to the skin. But do not reuse it on other patients. It is intended for single patient use only. ・For the Nellcor® single patient use type sensors, the site must be inspected every 8 hours (MAX-FAST®: 12 hours) to ensure adhesion, skin integrity, and correct optical alignment. If skin integrity changes, move the sensor to another site. ・Do not reuse the sensor by resterilizing it. ・Dispose the sensor after use. In the event of damage to the sterile packaging, do not use it.

⚠CAUTION	• For Masimo® sensor, change the sensor attachment site every 4 hours for the reusable sensor, and every 8 hours for the disposable sensor. Exercise extreme caution with poorly perfused patients; skin erosion and pressure necrosis can be caused when the sensor is not frequently moved. Assess site at least every 2 hours with poorly perfused patients. • The SpO_2 patient cables (PC04, PC08, and PC12) are intended for Masimo SET sensors only. Connect them only to DS-7210M. If connected to other device, it will not function properly. • Measuring on a limb with NIBP cuff, arterial catheter, or intracatheter may result in incorrect measurement. • For additional warnings, cautions or contraindications when using sensors with DS-7210 Nellcor® model or DS-7210M Masimo® model, refer to each SpO_2 sensor instruction manual. • If SpO_2measurement failure occurs due to the reason such as sensor detachment from the patient, SpO_2measurement data will be displayed as "– – –". Be cautious as numeric data alarm will not generate in such case. • Precautions for DS-7210M Masimo® Model ・The measurable pulse rate range is 25 to 240bpm. "×××" will be displayed if 25bpm and below or 240bpm and above is measured. ・If [High] is selected for pulse wave sensitivity on the SpO_2 setup menu, the sensor-detached detection will become somewhat inaccurate. ・If [OFF] is selected for "PI Display" under the SpO_2 configuration setup, "SpO_2 Low Perfusion" alarm will be indicated by message display only. The alarm sound will not be generated. ● NIBP Monitoring • Select the appropriate cuff size which best fits the arm circumference. If the cuff size is inappropriate, it may cause measurement error. • Do not use a cuff which is worn out. The cuff may burst during inflation. • Do not reuse the disposable NIBP cuff. • If there is any air leakage, correct NIBP measurement cannot be performed. Make sure that the connection is secure. • Correct NIBP measurement cannot be performed if artificial heart lung machine is used or if the pulse is difficult to detect. • Pay attention when measuring the NIBP of patient with bleeding disorders or hyper coagulation. The cuff inflation may cause petechia or circulatory failure by the blood clot. • Do not apply the cuff to the arm or thigh where vein is secured. The blood may backflow causing the chemical injection to cease. • Pay attention not to bend the cuff hose. • Check the condition of cuff-applied part on the patient during measurement so that the blood circulation will not be blocked over long period of time by the squashed or bent cuff hose. • Check the patient's condition constantly while measuring over long period of time with interval of 2.5 minutes or less. Also, periodically check the blood circulation while performing periodic measurement over long period of time. Congestion may occur at the measuring site. • The following factors may affect the NIBP value. - Body motion, arrhythmia, convulsion - Continuous noise such as cardiac massage - Periodic electromagnetic noise

⚠CAUTION	• When a PTG (SpO_2) sensor is applied to the toe or forehead, the Dyna Alert may not function depending on the patient's condition.
	• When using the Dyna Alert function, be aware of these risks and do not increase the NIBP interval time by relying only on the Dyna Alert function.
	• After the Dyna Alert NIBP measurement, the next Dyna Alert NIBP measurement cannot be performed for 2.5 minutes.
	• The Dyna Alert will not properly function for the following cases.
	  • If peripheral circulatory insufficiency or very low BP is developed.
	  • If highly-frequent arrhythmia is generated.
	  • If an artificial heart lung machine is used.
	  • If a large noise from body movement or electric surgery equipment is interfering.
	  • If autonomic nerve or circulatory dynamics is largely affected by medication.
	• For the following situation, measurements will be terminated.
	When the measurement time has exceeded 160 seconds for adult and child, 80 seconds for neonate.
	When the inflation value has exceeded 300mmHg for adult, 210mmHg for child, and 150mmHg for neonate.
	• If used with the incorrect patient classification, it will not only cause erroneous measurement, but the inflating level for the adult may be applied to child or neonate causing dangerous situation to the patient.
	• The 1-minute interval measurement will always start from 00 second. Pressing the [1min start] key will start the measurement from the next 00 second.
	• The 1-minute interval measurement will automatically stop after 12 minutes.
	• If the mean BP display is set to OFF, the mean BP alarm will not be generated. Also the mean BP will not be displayed for the tabular trend or the NIBP list function if the display is set to OFF.
	● BP Monitoring
	• Do not reuse disposable product for BP measurement.
	• When the main power is turned ON, the BP value will not be displayed until zero balance is performed. However, if the power is turned ON within 5 minutes after the power is turned OFF, the previous zero balance information will be maintained, and the BP value will be displayed.
	• Each time the blood pressure transducer or tubing is replaced, the zero balance procedure is required to ensure accurate measurements.
	• "Perform zero balance" message will not be displayed unless the three-way valves of all pressure transducers are opened to air. If the status is not displayed, or if "Open stop cock to air" message is displayed, check if the three-way valve of pressure transducers are opened to air.
	• "READY" message will not be displayed unless the three-way valve of all pressure transducers are opened to air. If the status is not displayed, or if "MEASURE" message is displayed, check if the three-way valve of pressure transducers are opened to air.
	• The zero balance procedure is required for the following case.
	  • When starting the measurement.
	  • When the position of the heart has changed due to body movement.
	  • When the position of the transducer has changed.
	  • When measuring for a long period of time and there is a possibility of measurement error due to change in ambient temperature, etc.
	  • When the connector is connected / disconnected, or transducer is replaced.
	  • When the power has been turned OFF for more than 5 minutes.

⚠CAUTION	• Note that the Systolic Pressure (SYS) = Peak Systolic Pressure (PSP) for the graphic trend, data base, and alarm setup. • When ECG is not measured, PDP cannot be calculated. • The undisplayed BP data (SYS/DIA/Mean) will not generate a BP alarm or be displayed in the tabular trend. Select the appropriate display type according to the monitoring purpose. ● CO_2 Monitoring (MGU-722) • All FilterLine® sampling products are for single patient use only. • Perform calibration after Initialization Time (max. 180 seconds has elapsed since the power is turned ON. • Do not disconnect the sampling tube during calibration. If disconnected, calibration will cease when the sampling tube is disconnected. • Conduct CO_2 calibration for the following case. If the CO_2 gas calibration is not performed at a specified interval, CO_2 measurement accuracy may be affected and also subsequent gas calibration may not be possible. ・For the following case, a message, “Calibrate the CO_2 unit (MGU-722)” or “The periodic calibration of the CO_2 unit (MGU-722) is approaching” will be displayed at power ON. Conduct CO_2 calibration. When the accumulated measurement time exceeds 1200 hours from first use. When 1 year has elapsed from the last calibration date. When the accumulated measurement time exceeds 4000 hours from the last calibration date. ・When $EtCO_2$ measurement is not stable or accuracy is degraded compared with other measuring device conduct CO_2 calibration. ● CO_2 Monitoring (MGU-721 with CAPNOSTAT® 5 CO_2 sensor) • The airway adapter should be attached with the thicker side facing to the patient. If attached oppositely, it may damage the CO_2 sensor or airway adapter. • The disposable airway adapter should be opened just before use. Do not sterilize it. • Do not reuse the disposable airway adapter. • Do not sterilize the airway adapter using autoclave methods. • When a measurement unit is changed, make sure to set the alarm condition for that unit. The alarm setup is necessary for each measurement unit. ● Alarm • The alarm priority is high for level 1 (life threatening alarm), medium for level 2 (cautionary alarm), and low for level 3 (treatment needed alarm). • Alarm messages will be displayed according to the priority. (Level 1 → Level 2 → Level 3 → Level 4) • For the same alarm level, the alarm message for the newer alarm will be displayed. • On the DS-7200, HR alarm and PR alarm cannot be set to ON at the same time. • The alarm message for the arrhythmia alarm will continue to be displayed for 30 seconds after the alarm is resolved. • While the “LEAD OFF” message is displayed, HR alarm and arrhythmia alarm will not function. Leaving this condition unresolved may result in missing a sudden change of the patient. Promptly check the electrodes when this message is displayed. • Even during “LEARN” status, alarm for HR, ASYSTOLE, VF, TACHY, BRADY will be generated. • Even during “Cannot analyze” alarm generation, alarm for HR, ASYSTOLE, VF, TACHY, BRADY will be generated. • The settings for the “HR Low Limit for VT” and “HR Low Limit for RUN” will be compared with the average HR of continuous VPC. Therefore, the displayed HR value at alarm generation may be lower than the settings if it is just after the VT detection, or if RUN with few continuous VPC is detected.

⚠CAUTION	• Regardless of ON/OFF setting of “Suspend Arrhy. Analysis during Interference” under Hospital Setup (Preset Menu), the “Cannot analyze" alarm will generate when analysis is suspended for more than 30 seconds. • The measurement range and alarm range differs for the following parameters. Be cautious not to set the alarm limit outside the measurement range. Otherwise, the alarm will not generate. ・PR for DS-7210M (Masimo® Model) Measurement Range: 25 to 240bpm (If 25bpm and below or 240bpm and above is measured, “xxx” will be displayed.) Alarm Range: 20 to 300bpm ・NIBP Measurement Range: 10 to 280mmHg Alarm Range: 10 to 300mmHg ・CO_2 for MGU-722 (Microstream® CO_2 Unit) Measurement Range： 0 to 99mmHg/0 to 13.3kPa Alarm Range: 1 to 115mmHg/0.1 to 15.0kPa • For the SpO_2 measurement, whether to use the SEC alarm function and its threshold selection should be based on the patient’s clinical indication portent and medical evaluation. (For Nellcor® SpO_2 unit) • If the SpO_2 alarm and SEC alarm setup is set to OFF, the SEC alarm integral value will be set to 0. (For Nellcor® SpO_2 unit) • The alarm mute ON/OFF setup will remain effective even when the power is turned OFF. Be cautious not to miss any important alarm by leaving the alarm silenced. • Pay attention not to set the alarm volume too low to avoid missing any important alarms. ● System Configuration • When the waveform and numeric data display for each parameter is set to OFF, the alarm generation and tabular/graphic trend for the corresponded parameter will be also set to OFF. • If the display of waveform / numeric data labeled as BP1 or ART is set to OFF, the pulse rate derived from BP will not be displayed either. • When the waveform and numeric data display for SpO_2 is set to OFF, the pulse rate derived from SpO_2 will not be displayed either. • When the waveform and numeric data display for the CO_2 measurement unit (MGU-721 or 722) is set to OFF, the respiration rate measured by the CO_2 measurement unit will not be displayed either. • If the time/date is not correctly set, or changed during monitoring, malfunction may occur to NIBP measurement, periodic recording, trend, NIBP list data, and age calculation from the birth date. • If the time/date is changed, the time/date for the trend, NIBP list, recall data will also change. • If the time/date is changed during monitoring, the patient’s age will not be recalculated. • Do not set the same remote control bed ID to more than one monitors of the same floor. Otherwise, it may cause to remote control more than one monitors at the same time. • After the remote control setup, check that the remote control unit is properly operating. ● Patient Admit / Discharge • If you start monitoring a new patient without performing a discharge procedure for the previous patient, new data will be added to the previous data which will result in inaccuracy. • The setup for alarm mode and display mode remains stored even when the power is turned OFF or when discharging procedure is performed. However, if the built-in backup battery is depleted when the power is turned ON, the alarm mode setting will be initialized to default setting. • Resuming monitoring will resume the alarm in suspension. • After the information for a new patient is acquired by searching the patient data server, make sure to perform the admit process by pressing the Admit as new patient. key.

⚠CAUTION	● ST Measurement • For the lead which the electrode is detached, the reference waveform setup cannot be performed. Check if the electrode is correctly attached, and perform the setup again. ● CF Card • Use only the specified CF card. • Use only the CF card formatted with this device. • Restart the system after reading the setup data from the CF card. The setup data will become effective after the system is restarted. • Reading the patient data from the CF card will erase all previous patient data stored in the patient monitor. ● TCP/IP Network Connection • After setting the IP address, etc. for the laser printer, make sure to turn OFF and back ON the power of the printer. ● Maintenance • The maintenance procedure will be performed by our service representative. Users should not attempt this procedure as malfunction may result to the device. • If stains cannot be removed from the touch panel surface, wipe softly with a dry or ethanol dampened cleaning cloth. Never use strong-acidic cleaning solution. (Neither is it recommended that mild acidic or alkaline cleaning solution to be used.) • A special coating is applied to the surface of the touch panel. Do not wipe the surface with a cloth or gauze with coarse texture. Wipe the surface with a soft cleaning cloth provided as optional accessory or with an eyeglass cleaning cloth. • Clean the equipment frequently so stains can be removed easily. • To prevent injury, it is recommended to wear gloves when cleaning the equipment. • Do not allow liquids such as alcohol or cleaning solution enter the equipment or connectors. • Do not use organic solvents, thinner, toluene and benzene to avoid damaging the resin case. • Do not polish the housing with abrasive or chemical cleaner. • When sterilizing the entire room using a spray solution, pay close attention not to have liquids get into the equipment or connectors. • Use only neutral detergent to clean the housing. Do not use chemical cloth, scrub brush, abrasive, polishing powder, hot water, volatile solvent and chemicals (cleanser, thinner, toluene, benzine, benzol, and synthetic detergent for house and furniture), or sharp-edged tools. The surface resin coating may be damaged, resulting in discoloration, scratches, and other problems. • Do not open the housing. • If you accidentally wet the device, dry it completely and verify it operates safely before usage. • If the patient monitor was stored for some while, leave the monitor at the operating environment (10 to 40°C, 30 to 85%) before usage. • Replace the components periodically as specified.

Precautions about the Wired Network System (DS-LAN II/DS-LANIII)

⚠WARNING	● Do not connect unspecified device to a wired network. ● Do not mix devices with DS-LANII and DS-LANIII setting in the same wired network. The network may cease and proper monitoring may not be possible. ● Before setting the bed ID, make sure that the DS-LAN (DS-LANII/DS-LANIII) is correctly set on the Monitor Setup menu. If not correctly set, the network may cease which may lead to accidents such as not transmitting life threatening alarms to the central monitor.

⚠CAUTION	● When connecting to the DS-LAN network, perform “DS-LAN Setup” in the Monitor Setup menu and restart the system before connecting the LAN cable. ● If performing wired network transmission, configure the display so that the numeric data corresponded to the waveform is displayed. If not, the displayed waveform or numeric data may not be transmitted. ● The Bed ID is factory set to 000. If connected to the wired network with the ID unchanged, monitoring on the central monitor will not be possible. ● When connected to the wired network, make sure that there are no other bedside monitors with the same Bed ID. If there are more than one bedside monitors with the same Bed ID, the duplicated bedside monitors cannot be monitored on the central monitor. ● Make sure to set the bed ID in the following range. • For DS-LANII network: 001 to 048 • For DS-LANIII network: 001 to 100 ● As the DS-7200 does not have the arrhythmia template display and 12-lead ST display function, these displays on the central monitor will not be corresponded. ● If connected to a wired network, time/date will be the same with the central monitor. Even if the time/date is changed on the DS-7200 system, it will be corrected to the time/date of the central monitor. ● On some central monitors depending on the model type or software version, the setups for “HR Low Limit for VT” and “HR Low Limit for Run” cannot be performed. ● On a wired network, the alarm generated on the DS-7200 will be output to the network with a maximum delay of 1 second, and to the central monitor with a total delay of 2.5 seconds. ● In case of DS-LANII network, if the HR/PR source is [BP] (Or, if [Auto] selects BP for HR/PR source), the ECG waveform will not be transmitted on the network. On the central monitor, PR_IBP value will be displayed instead of HR. However, on some central monitor depending on the model type, the HR value from ECG will be displayed on the NIBP list and ST measurement list. Refer to the operation manual for the respective central monitor. In case of DS-LANIII network, refer to the operation manual for the central monitor. ● In case of DS-LANII network, if the RR/APNEA alarm source is other than [Impedance] (Or, if [Auto] selects a setting other than impedance for RR/APNEA alarm source), the respiration waveform will not be transmitted on the network. In addition, if the RR/APNEA alarm source is other than [CO_2] (Or, if [Auto] selects a setting other than CO_2 for RR/APNEA alarm source), the CO_2 waveform will not be transmitted on the network. In case of DS-LANIII network, refer to the operation manual for the central monitor. ● Depending on the central monitor model type, the ST display will be distorted if the ECG lead (ECG1 or ECG 2) is changed on the DS-7200. Redrawing the ST display will return the display to normal.

⚠CAUTION	● On the central monitor, the respiration waveform and RR value based on the RR/APNEA alarm source selected on the DS-7200 will be displayed. The RR and APNEA monitored on the central monitor and the DS-7200 will be the same. ● If the measurement unit of CO_2 concentration is “mmHg”, and 99mmHg is selected for “CO_2 (mmHg) Upper Limit for LAN, Telemetry” on the monitor setup menu, the CO_2 value of 100mmHg or above will be transmitted as 99mmHg. ● There are following restrictions when connecting the DS-7200 system to the DS-LANII network. • Make sure that the “DS-LAN Setup” on all the bedside monitors and central monitors are set to DS-LANII before connecting the monitors to the network. • When DS-5800N/NX/NX^{MB} is used as a central monitor, recall, graphic trend, and tabular trend will not be displayed. Also, Σ recording cannot be performed. For the ST display, overlap waveform will not be displayed on the DS-5800N/NX/NX^{MB} until 15 minutes have passed since the reference waveform is set on the DS-7200. • If the measurement unit for BP (mmHg/kPa) is different between the bedside monitor and the central monitor, the corresponding waveform and numeric data will not be displayed on the central monitor. • If a central monitor which does not support the “kPa” measurement unit is used, and the measurement unit on the bedside monitor is set to “kPa”, BP waveform/numeric data, NIBP data, NIBP list, etc. in “kPa” unit will be treated as not measured data and will not be displayed on the central monitor. Also, the alarm limit setup from the central monitor cannot be performed. • When the temperature unit is °F, the temperature data will not be transmitted. It will be treated as not measured data, and will not be displayed on the central monitor. Also, alarm limit setup on the central monitor cannot be performed. • Arrhythmia alarm of TACHY, BRADY, COUPLET, PAUSE, TRIGEMINY will not be transmitted. • Arrhythmia alarm of “SLOW_VT” will be transmitted as “VT”. • On a wired network, waveform, numeric data, alarm of TEMP3 will not be transmitted. Also, the displayable waveform, numeric data, alarm differs depending on the connected central monitor. Refer to the operation manual for the respective central monitor. • For numeric data displayed as “×××”, maximum or minimum value of measurable range will be transmitted. • The numeric data displayed as “– – –” will be treated as not measured data. • If the SpO_2 (PR_SpO_2) lower alarm limit is set, and “– – –“ is displayed for the SpO_2 (PR_SpO_2) value due to a cause such as SpO_2 sensor off, etc. on the bedside monitor, it will be notified as SpO_2 (PR_SpO_2) lower alarm on some central monitors even if the alarm is not generated on the bedside monitor. • If using a HUB for the DS-LANII network construction, make sure to use a repeater HUB recommended by Fukuda Denshi.

⚠CAUTION	● There are following restrictions when connecting the DS-7200 system to the DS-LANIII network. • In order to connect to the DS-LANIII network, the software version needs to be the version which supports the DS-LANIII. For details, refer to our service representative. • Make sure that the “DS-LAN Setup” on all the bedside monitors and central monitors are set to [DS-LANIII] before connecting the monitors to the network. • If the measurement unit for BP (mmHg/kPa) and temperature (°C/°F) is different between the bedside monitor and the central monitor, the corresponding waveform and numeric data will not be displayed on the central monitor. • If using a HUB for the DS-LANIII network construction, make sure to use a switching HUB recommended by Fukuda Denshi. • The displayable waveform, numeric data, alarm will differ depending on the central monitor model type. Please also refer to the operation manual of the central monitor. ● There are following restrictions when recording the DS-7200 data on the central monitor recorder. • The DS-7200 can not perform the recording with the AU-5500N recorder. • If the measurement unit of BP is kPa, the BP waveform, BP numeric data, and NIBP numeric data will be treated as not measured data. • If the measurement unit of temperature is °F, the temperature data will be treated as not measured data. • When a parameter is not measured, the waveform for that parameter will not be recorded, and measurement data will be recorded as “– – –” or blank. • The measurement data displayed as “×××” will be recorded as “– – –” on the central monitor recorder. • The “S” (QRS symbol) printed on the built-in recorder will be printed as “N” on the central recorder. • For the waveform recording and graphic trend recording, some parameters may not be able to be recorded depending on the scale. • When performing tabular trend recording or graphic trend recording on the central recorder, some numeric data may not be recorded depending on the parameter. Also, there are some graphic trend scales that cannot be recorded. • If the HR/PR source is [BP] (Or, if [Auto] selects BP for HR/PR source), ECG will not be recorded on the central recorder. PR_IBP value will be printed instead for the HR value. • If the RR/APNEA alarm source is other than [Impedance] (Or, if [Auto] selects other than impedance for RR/APNEA alarm source), respiration waveform will not be output on the central recorder. • If the RR/APNEA alarm source is other than [CO_2] (Or, if [Auto] selects other than CO_2 for RR/APNEA alarm source), CO_2 waveform will not be output on the central recorder. • When graphic trend recording, tabular trend recording, or NIBP list recording is output on the central monitor recorder from the DS-7200, HR measurement value from ECG will be recorded for the HR value and ST trend.

Precautions about the Wireless Network System

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

⚠WARNING	● A password can be set to access the channel ID setup menu to allow only the telemetry channel administrator to change the channel ID. ● Some wireless combinations of telemetry transmitters may generate interference with other devices. ● Before selecting a channel, verify that it will not interfere with other channels. ● Make sure the telemetry manager of your system is aware of any changes to the telemetry channels. ● If transmitters are used in a neighboring medical facility, your facility and the neighboring facility must make agreements on the setting of the telemetry channels to prevent telemetry interference.

⚠CAUTION	● On a wireless network, the alarm generated on the DS-7200 will be transmitted to the central monitor with 15 seconds delay. ● If the BP unit is kPa and temperature unit is °F, the measurement value will be converted to mmHg and °C respectively when transmitting to the central monitor. If kPa/°F is used as the unit on the central monitor, the measurement value will be reconverted to kPa/°F. ● If performing telemetry transmission, configure the display so that the numeric data corresponded to the waveform is displayed. If not, the displayed waveform or numeric data may not be transmitted. ● The setup of channel ID and group ID should be performed only by our service representative. Users should not perform this procedure as malfunction of the equipment may occur. ● BP waveform with a scale above the programmed scale can not be properly transmitted. When transmitting the BP waveform, check the displayed BP waveform scale. ● If the measurement unit of CO_2 concentration is “mmHg”, and [99mmHg] is selected for “CO_2 (mmHg) Upper Limit for LAN, Telemetry” on the monitor setup menu, the CO_2 value of 100mmHg or above will be transmitted as 99mmHg.

Precautions for Use of the Bidirectional Wireless Communications (TCON)

⚠CAUTION	● When using the TCON system, pay attention to the following. • The medical institution (hereinafter referred to as “Institution”) must execute investigation required to prevent interference including types of radio waves, frequencies, and antenna power if wireless equipment is already installed and being used in the facility. • Even if this device is installed within the range of radio communication, the communication may not be possible due to noise or multi-path phasing etc. Always consider this thoroughly before use. • Do not install this device in an area where it will be subject to splashing water. Water entering the equipment may cause the equipment to malfunction or be damaged. ● In managing the TCON system, make sure to follow the precautions below. • The Institution should appoint a person (hereinafter referred as the “Overall Manager”) to manage the wireless devices for the whole facility. • When installing the TCON, the Overall Manager has to receive an explanation of the precautions for use of the TCON from the manufacturer or sales representative. • The Overall Manager is responsible for the maintenance and storage of the equipment. • The Overall Manager should create a management log (hereinafter referred to as the “log”), which contains a list of the management status of the wireless channels for the whole facility. When assigning or changing wireless channels, register it in the log, and give proper instructions to the TCON user. • The user needs to verify the transmitting/receiving operation before use. • If interference or breakdown occurs in the communication, the TCON user is required to stop using the TCON and to inform the Overall Manager of the problem. The Overall Manager is to deal with the problem properly and/or contacts the nearest Fukuda Denshi representative for service. ● Precautions for operations The Bidirectional Wireless Communications Module (TCON) uses radio waves to transmit data. Therefore, necessary precautions need to be taken for the characteristics and difficulties of using the device that emits radio waves. The TCON user should fully understand these precautions beforehand, and use the TCON device safely. Furthermore, situations in which interference may occur are outlined below. In such cases, pay special attention to the condition of the patient connected to the bedside monitor, and eliminate the cause of interference. 1. The patient’s data may become mixed with a different patient’s data due to interference. • When there are multiple TCON communication devices set to the same TCON ID and channel (group). 2. When symptoms such as being unable to communicate, unstable communication, or poor reception may occur. • When the radio communication is bad because there are metal, concrete, or other such obstacles between the Bidirectional Wireless Communications Modules (TCON). • When a different wireless device is using the same frequency (channel). • When there are other TCON devices nearby using different channels (groups). • When a cell telephone or other wireless device is being used nearby. • When citizens broadcast bands such as amateur radio or truck radios are used in the vicinity of the TCON operating area.

⚠CAUTION	• When a computer or word processor, or electrical device that has an internal computer, is used near the TCON device antenna. • When the TCON device is installed or moved to a location that is outside the radio communication range. • If a nearby different TCON group is set with a TCON channel frequency that is too close to the channel frequency set for the current TCON group. ● Follow the instructions of the Overall Manager for the wireless channel when setting the TCON ID or channel (group) to prevent interference within the same institution. ● For the TCON ON/OFF setup, if the “OFF” is selected, the message such as “Check TCON Comm.” will not be displayed. ● Check that the TCON radio wave strength between the central monitor and bedside monitor is sufficient. Make sure that “ ” mark is displayed. ● Check that the TCON Channel (Group) is the same for the bedside monitor and the central monitor in the same TCON group. ● Do not move the TCON device during operation. Otherwise, symptoms such as being unable to communicate, unstable communication, or poor reception may occur. ● There are following restrictions when connecting the DS-7200 system to the TCON Network. • If the measurement unit for temperature is “°F”, the central monitor can not receive the measurement data for temperature. In addition, the alarm settings for temperature can not be operated from the central monitor. • If the measurement unit for BP is “kPa”, the central monitor can not receive the measurement data for NIBP, BP1, and BP2. In addition, the alarm settings for NIBP, BP1, and BP2 can not be operated from the central monitor. ● The NIBP measurement cannot be started from the central monitor via TCON system if the NIBP measurement interval is set to [2 min] / [2.5 min] / [3 min] / [5 min] or during the 1-minute measurement. However, it can be stopped. ● If the measurement unit of CO_2 concentration is “mmHg”, the CO_2 value of 100mmHg or above will be transmitted as 99mmHg even within measurement range.

Precautions about the Ventilator Monitoring

⚠WARNING	● The ventilator alarm on this monitor should be used as supplementary function. Check the patient's condition, ventilator alarm sound and message occasionally. ● The ventilator alarm sound is set to OFF at factory default setting. The alarm sound can be turned ON on the volume setup menu. ● If the DS-7200 system does not generate an alarm even though the ventilator is generating an alarm, or if any other malfunction occurs, immediately check the ventilator, DS-7200 system, cable, and replace the cable if necessary. If the malfunction persists, stop using the device. ● After connecting the ventilator and the DS-7200, ensure that "Vent. Online" message is displayed for the connection status. Otherwise, the DS-7200 will not detect the ventilator alarm. ● The alarm generation on the DS-7200 system is not assured if the alarm other than specified generates at the ventilator. ➡See For details of the specified alarms, refer to ⚠WARNING on "2. Basic Operation Ventilator Alarm Input". ● The Evita2dura / Evita4 / EvitaXL / Savina acquires alarm information from the serial port. The ventilator alarm that cannot be acquired from the serial port is not guaranteed. For corresponding alarm, refer to the service representative of the ventilator manufacturer. ● The DS-7200 system will not correspond to the following alarms generated on the Evita 4 / Evita XL / Evita 2 dura. • O_2 monitoring disabled alarm, CO_2 alarm disabled alarm, Oximeter alarm disabled alarm, Neo. volume measurement inoperable alarm, Minute volume alarm disabled alarm, Minute volume alarm low off alarm, Tidal volume alarm high off alarm, Apnea alarm off alarm, Nebulizer active alarm ● There is a communication delay of 3 seconds between the DS-7200 system and the Evita ventilator. Therefore, if the alarm generated at the ventilator is resolved within 3 seconds, the ventilator alarm may not be generated at the DS-7200 system. ● The DS-7200 system will not correspond to the following alarms generated on the Savina. • O_2 monitoring disabled alarm, Minute volume alarm disabled alarm, Minute volume alarm low off alarm, Tidal volume alarm high off alarm, Apnea alarm off alarm, Nebulizer active alarm ● There is a communication delay of 3 seconds between the DS-7200 system and the Savina ventilator. Therefore, if the alarm generated at the ventilator is resolved within 3 seconds, the ventilator alarm may not be generated at the DS-7200 system.

⚠CAUTION	● The ventilator operation should be performed by well-trained and authorized personnel. ● For connecting the DS-7200 system and ventilator, use only the specified connection cable. ● Verify that the DS-7200 system and the ventilator are properly connected. ● When connecting the cable, verify that the main power of the DS-7200 system and the ventilator is OFF. ● For the SV-900, PB, Evita, and Savina ventilator alarm factor cannot be transmitted to the central monitor. ● Depending on the central monitor type and software version, ventilator alarm factor may not be displayed. For details, refer to our service representative. ● Check occasionally the communication status of the DS-7200 and the ventilator. ● Verify that the ventilator alarm is not generated, and the “Vent. Online” message is displayed. ● The “Check external alarm” will be displayed until the proper communication with the ventilator is resumed. When the communication is resumed, the screen will automatically return to the home display. ● When disconnecting the ventilator and the DS-7200, make sure to select OFF on the “Check external alarm” display which appears when the power of the ventilator is turned OFF, or when the cable is disconnected. ● When connecting the PURITAN-BENNETT ventilator, follow the precautions below. • The serial port (RS-232C) of the ventilator should be set as follows. Refer to the service representative of the ventilator manufacturer. Baud Rate : 9600bps Data Bit : 8bit Parity Bit : None (Stop Bit) : (1bit) • The DS-7200 system detects the “ventilator alarm” when the nurse call port on the ventilator outputs the alarm signal. For details of ventilator setup and alarm signal output condition from the nurse call port, refer to the service representative of the ventilator manufacturer. ● When connecting the Evita2dura / Evita4 / Evita XL / Savina ventilator, the serial port (RS-232C) setup of the ventilator should be as follows. Refer to the service representative of the ventilator manufacturer. • For Evita 2 dura / Evita 4 / Evita XL Protocol : Medibus Baud Rate : 19200bps Data Bit : 8bit Parity Bit : Even Stop Bit : 1bit • For Savina Protocol : Medibus Baud Rate : 9600bps Data Bit : 8bit Parity Bit : None Stop Bit : 1bit ● For PURITAN-BENNETT ventilator, AWP and AWF waveform cannot be displayed or recorded. Only the numeric data will be displayed. ● For SV-300 and Servo-i/s, P-V loop and F-V loop cannot be displayed or printed. In addition, Insp Resistance, Exp Resistance, Compliance value cannot be displayed or printed on the ventilator numeric data display. ● For SV-900, P-V loop, F-V loop and numeric data cannot be displayed or printed. Only the alarms will be generated. ● For PURITAN-BENNETT ventilator, P-V loop and F-V loop cannot be displayed or recorded. Only the numeric data will be displayed.

Precautions for Use of SpO_2 Sensor

⚠DANGER	Burn Risk in Using SpO_2 Sensor In SpO_2 monitoring, always use the sensor/relay cable specified by Fukuda Denshi. If any other sensor/relay cable is used, a high temperature rise of the sensor may place the patient in danger of burns. If there are any questions regarding the sensor/relay cable use for SpO_2 measurements of this device, please contact Fukuda Denshi service representative.

Precautions for Masimo® Model: DS-7210M

⚠CAUTION	No Implied License Possession or purchase of this device does not convey any express or implied license to use the device with unauthorized sensors or cables which would, alone, or in combination with this device, fall within the scope of one or more of the patents relating to this device.

Precautions for Use of NIBP Cuff

⚠CAUTION	This product contains natural rubber latex which may cause allergic reactions. (FDA: Medical Alert on Latex Products, "Allergic Reactions to Latex-Containing Medical Devices", Food & Drug Administration, 9200 Corporate Blvd., Rockville, MD 20850, 1991.)

Disposing of Equipment, Accessories, or Components

⚠CAUTION	When disposing of the equipment, accessories, or components, use an industrial waste distributor. Do not dispose of as ordinary waste.

Precautions about Transportation

For transporting the DS-7200 system, pack with specified packing materials.

Reference Refer to "11. Technical Information Specification / Performance" for environmental condition during transportation.

Precautions about RTC or Data Backup

⚠CAUTION	● The DS-7200 system is equipped with a built-in clock. When the power of the DS-7200 system is turned off, this clock is backed up by a lithium primary battery. If incorrect time is displayed when turning on the power, a low battery may be the cause. In such case, contact Fukuda Denshi service representative for replacing the battery. ● To protect the data during voltage dip, short interruptions and voltage variations on power supply input lines or during short duration of power turned OFF, this monitor performs 5-minute (approx.) data backup using the secondary battery. The data may not be protected if the power is turned off within 30 minutes from power on.

Precautions for Use of Lithium-Ion Battery Pack

⚠DANGER	● This battery pack is intended for exclusive use with the DS-7200 system (or other specified equipment). Do not use with other equipment. Otherwise, the performance and life cycle of the battery pack deteriorates, and may cause leakage, heating, fuming, ignition, and explosion of the battery. ● Do not disassemble or remodel the battery pack. If the security apparatus or protector inside the battery pack gets damaged, it may cause leakage, heating, fuming, ignition, and explosion of the battery. ● Do not use the battery pack if leaked or transformed. If the security apparatus inside the battery pack is damaged, it may cause leakage, heating, fuming, ignition, and explosion of the battery. ● When installing the battery to the device, ensure the connector direction is correct. If installed in opposite direction, it may cause leakage, heating, fuming, ignition, and explosion. ● If the leaked solution of the battery gets into the eyes, do not rub the eyes. Wash thoroughly with clean water and immediately receive medical treatment from the doctor. If not treated soon, it may cause serious injury.

⚠WARNING	● If the leaked solution of the battery gets on to the skin or clothes, immediately wash down with rinse water. If not treated soon, it may cause serious injury. ● If the charging operation does not complete within specified time, immediately remove the battery pack from the monitor and unplug the power cable. Otherwise, it may cause leakage or heating of the battery. ● Do not throw the battery pack into fire or apply heat. The insulator may melt, gas exhaust vent or security apparatus may get damaged, or electrolyte may ignite causing leakage, heating, fuming, ignition, and explosion of the battery. ● Do not connect the (+) and (–) terminals of the battery with a wire or any other metal. Also, do not carry or store the battery with any metal such as necklace, hairpins, etc. The battery may short causing excessive current flow which may result in leakage, heating, fuming, ignition, and explosion of the battery, or heating of the metal (wire, necklace, hairpin, etc.) ● Do not directly solder on to the battery pack. The heat may melt the insulator or damage the security apparatus which may result in leakage, heating, fuming, ignition, and explosion of the battery. ● Do not put the battery pack in microwave oven or a pressure cooker. If heated suddenly or if sealed condition breaks, it may result in leakage, heating, fuming, ignition, and explosion of the battery. ● Do not drive a nail in, hit with a hammer, step on the battery pack, or peel off or scratch the exterior tube. The battery may explode and transform causing short-circuit which may result in leakage, heating, fuming, ignition, and explosion of the battery.

⚠WARNING	● Do not apply strong impact or throw the battery pack. This may result in leakage, heating, fuming, breakage, ignition, and explosion of the battery. Also, if the security apparatus incorporated in the battery gets damaged, the battery charges with abnormal current and voltage, which results in leakage, heating, fuming, ignition, and explosion. ● Do not get the battery pack wet with water, sea water or chemicals. If the security apparatus incorporated in the battery gets damaged, it may result in leakage, heating, fuming, ignition, and explosion of the battery pack. ● Do not connect the battery pack directly to power outlet or cigarette heater socket in a car. A high voltage application will cause excessive current flow and abnormal chemical reaction inside the battery. This may result in leakage, heating, fuming, ignition, and explosion of the battery. ● Do not use or leave the battery in a high temperature (80°C or over) such as near the fire or heater. If the resin separator gets damaged by heat, the battery pack may become unusable, or may short causing leakage, heating, fuming, ignition, and explosion. ● If the battery is leaking or generating an abnormal odor, immediately remove the battery away from the fire. The leaked electrolyte may cause heating, fuming, ignition, and explosion.

⚠CAUTION	● Do not peel off or scratch the exterior tube. ● Do not use or leave the battery in high temperature. It may result in leakage or deterioration of the performance / life cycle of the battery. ● Immediately stop using the battery if any abnormality is found during use. ● Do not use / store the battery in reach of infants. ● If not using the device for a long period of time, turn OFF the power of the monitor and unplug the power cable. Otherwise, it may result in leakage of the battery pack. ● When disposing of the Lithium-Ion Battery Pack, use an industrial waste distributor. Do not dispose of as ordinary waste. ● Users should not attempt to install or replace the battery pack. For installation and replacement of the battery pack, contact our service representative.

To Prepare for Emergency Use

1. Accessories / Optional Accessories
   (1) The ECG electrodes are consumable products. Always prepare extra supplies of electrodes.
   (2) Verify that there is no wire break on the patient cable. Check the operation once a week.

2. Battery Pack
   (1) The battery self-discharges even when not in use. If there is any possibility to use the battery in emergency, the power cable should be always connected to the power receptacle. To fully charge the empty battery, it takes approximately 3 hours when the monitor is not operating, and approximately 10 hours when the monitor is operating.

Reference Refer to “2. Basic Operation To Use with the Battery Pack”

   (2) The performance of the battery deteriorates with repeated use. To maintain the initial performance, replace the battery at least once a year. It is recommended to indicate the start usage date on the battery so that the replacing date can be easily recognized.

Electromagnetic Compatibility

The performance of this device under electromagnetic environment complies with IEC 60601-1-2 (2007).

Precautions for Safe Operation under Electromagnetic Influence

⚠CAUTION	If any sorts of electromagnetic wave, magnetic field, or static electricity exist around the device, noise interference or malfunction of the device may occur. If any unintended malfunction or noise occurs during monitoring, check the magnetic influence and take appropriate countermeasures. The following are examples of the common cause and countermeasures. ● Cellular Phone The radio wave may cause malfunction to the device. Cellular phones and radio sets should be turned off in the room (building) where medical device is located. ● Static Electricity In a dry environment (room), static electricity is likely to occur. Take the following countermeasures. • Both operator and patient should remove any static electricity before entering the room. • Humidify the room. ● Lightning • A lightning nearby may induce excessive voltage to the equipment. If any danger is suspected, use the uninterruptible power supply system. ● High frequency noise interference from other device through the power outlet • Check where the noise is originated and remove it using filtering device, etc. • Stop using the device that is originating the noise. • Use other power outlet.

EMC Guidance

This equipment complies with IEC60601-1-2 (2007). However, if portable transmitter or wireless LAN equipment is used extremely nearby, the electromagnetic influence may largely exceed the compliance level and may cause unexpected phenomenon such as noise interference on the waveform, etc. Therefore, this equipment should be used in a location specified by each medical institution.
If any unexpected noise interference on the waveform or failure to the peripheral device occurs, stop using the equipment and follow the instruction of the technician.

The following is the information relating to EMC (Electromagnetic Compatibility).
(When using this equipment, verify that it is used within the environment specified below.)

●Compliance to the Electromagnetic Emissions

The DS-7200 system is intended for use in the electromagnetic environment specified below. The customer or the user of the DS-7200 system should assure that it is used in such an environment.

Emissions Test	***Compliance***	***Electromagnetic Environment - Guidance***
RF Emissions CISPR 11	Group 1	The DS-7200 system uses RF energy only for its internal functioning of the equipment itself. 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	This DS-7200 system is suitable for use in all establishments other than domestic 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	Not applicable	
Voltage Fluctuations/ Flicker Emissions IEC 61000-3-3	Not applicable	

●Compliance to the Electromagnetic Immunity (1)

The DS-7200 system is intended for use in the electromagnetic environment specified below. The customer or the user of the DS-7200 system should assure that it is used in such an environment.

Immunity Test	***IEC60601-1-2 Test Level***	***Compliance Level***	***Electromagnetic Environment - Guidance***
Electrostatic Discharge (ESD) IEC 61000-4-2	±6kV contact ±8kV air	±6kV contact ±8kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient / burst IEC 61000-4-4	±2kV for power supply lines ±1kV for input/output lines	±2kV for power supply lines ±1kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1kV: differential mode ±2kV: common mode	±1kV: differential mode ±2kV: common mode	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	<5% U_T (>95% dip in U_T) for 0.5 cycle 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 5sec.	<5% U_T (>95% dip in U_T) for 0.5 cycle 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 5sec.	Mains power quality should be that of a typical commercial or hospital environment. If the user of the DS-7200 system requires continued operation during power mains interruptions, it is recommended that the DS-7200 system is equipped with an internal battery (option) or is powered from an uninterruptible power supply.
Power Frequency (50/60Hz) Magnetic Field IEC 61000-4-8	3A/m	3A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

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

●Compliance to the Electromagnetic Immunity (2)

The DS-7200 system is intended for use in the electromagnetic environment specified below. The customer or the user of the DS-7200 system should assure that it is used in such an environment.

Immunity Test	***IEC 60601-1-2 Test Level***	***Compliance Level***	***Electromagnetic Environment - Guidance***
Conducted RF IEC 61000-4-6	3Vrms 150kHz to 80MHz	3Vrms	Portable and mobile RF communications equipment should be used no closer to any part of the DS-7200 system, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended Separation Distance d = $1.2\sqrt{P}$
Radiated RF IEC 61000-4-3	3V/m 80MHz to 2.5GHz	3V/m	d = $1.2\sqrt{P}$ 80MHz to 800MHz d = $2.3\sqrt{P}$ 800MHz to 2.5GHz Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey[a)], should be less than the compliance level in each frequency range[b)]. Interference may occur in the vicinity of equipment marked with the following symbol: 

Note 1 : At 80Mhz and 800MHz, 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.

[a] 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 DS-7200 system is used exceeds the applicable RF compliance level above, the DS-7200 system should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the DS-7200 system.

[b] Over the frequency range 150kHz to 80MHz, field strength should be less than 3V/m.

●Recommended Separation Distances between Portable and Mobile RF Communications Equipment and the DS-7200 System

The DS-7200 system is intended for use in an environment in which radiated RF disturbances are controlled. The customer or the user of the DS-7200 system can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the DS-7200 system 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)***		
	150kHz to 80MHz $d = 1.2\sqrt{P}$	80MHz to 800MHz $d = 1.2\sqrt{P}$	800MHz to 2.5GHz $d = 2.3\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be determined using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

Note 1 : At 80MHz and 800MHz, the separation distance for the higher frequency range applies.
Note 2 : These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

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Contents

Preface

1. General Description

2. Basic Operation

3. Vital Application

4. Monitoring Setup

5. Admit / Discharge of a Patient

6. Parameter Setup

7. Function

8. System Configuration

9. Installation

10. Maintenance

11. Technical Information

12. Accessories

Chapter 1
General Description

This chapter explains the general description of this equipment.

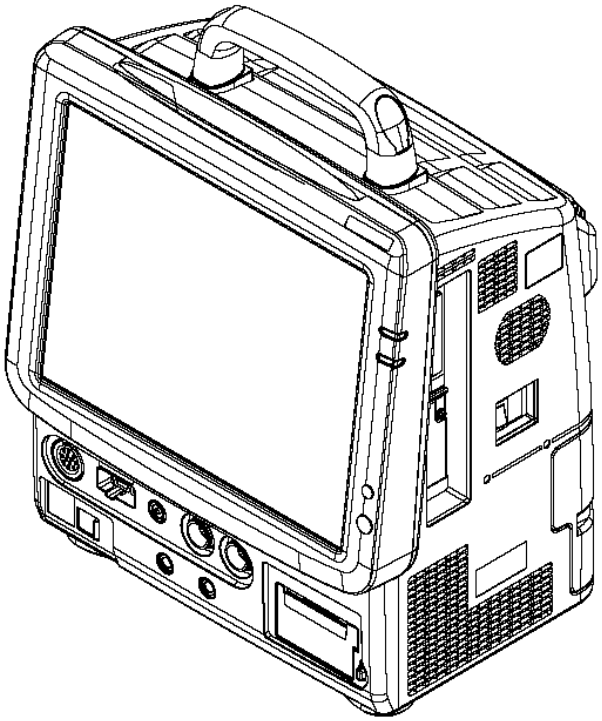
General Description

The DS-7200 is a patient monitor with 12.1-inch screen which is capable of measuring 12-lead ECG, respiration, SpO_2, 2 channels of BP, NIBP, and 2 channels of temperature.

By attaching an option unit (HU-71/HU-72/HU-73), BP (1 to 3 channels), cardiac output, temperature (1 channel) can be additionally monitored.

Network connection with the central monitor using the Ethernet LAN, Telemetry Transmitter Module, and Bidirectional Wireless Communication Module (HTC-702) is also possible.

By using the optional RGM interface unit (Mainstream CO_2 interface unit) (MGU-721) or Microstream® CO_2 unit (MGU-722), CO_2 measurement can be also performed.



Combination of Option Unit and Measurement Parameter

There are following types of option units.

【Lineup of Option Unit】

Model Type	***Measurement Parameter***		
	BP	TEMP	Cardiac Output
HU-71 BP/TEMP Unit	2ch	1ch	No
HU-72 BP Unit	3ch	No	No
HU-73 BP/TEMP/CO Unit	1ch	1ch	Yes
MGU-721 RGM Interface Unit (Mainstream CO_2 Interface Unit)	CO_2 Concentration with CAPNOSTAT® 5 CO_2 sensor		
MGU-722 Microstream® CO_2 Unit	CO_2 Concentration		

One unit from HU-71/HU-72/HU-73, and one unit from MGU-721/MGU-722 can be attached.

The parameters that can be measured with the respective option unit are as follows.

Model Type	***Additional Optional Unit***	***Measurement Parameters***				
		Fixed Parameters	Additional Measurement Parameters			CO_2 concentration*3 (Optional)
			BP*2	TEMP*2	Cardiac Output	
DS-7210*1 or DS-7210M	None	ECG RESP ×1 BP×2 TEMP×2 NIBP×1 SpO_2×1	2ch	2ch	No	Mainstream or Microstream® method
	HU-71		4ch	3ch	No	
	HU-72		5ch	2ch	No	
	HU-73		3ch	3ch	Yes	

*1 DS-7210: SpO_2 measurement is performed with built-in Nellcor® module.
DS-7210M: SpO_2 measurement is performed with built-in Masimo® module.

*2 The number of channels include the channels incorporated in the main unit.

*3 CO_2 measurement: Either one from the following can be attached for CO_2 monitoring.
MGU-721: RGM Interface Unit (Mainstream CO_2 interface unit), which has a capability with serial communication to connect to the Respironics Novametrix, LLC. CAPNOSTAT® 5 CO_2 sensor.
MGU-722: Microstream® CO_2 unit, using “Oridion Medical 1987 Ltd.” technology.

Features

- The DS-7200 is a patient monitor of all-in-one type which consists of a display part, recording part, and measurement part.
  In addition to AC power operation, battery operation is also possible which allows to use the monitor during transportation.

- On the 12.1-inch color LCD, a maximum of 10 waveforms (maximum of 14 waveforms when 12-lead ECG is monitored) can be displayed. Also, the numeric data display can be enlarged for easier view.

- By connecting the option unit, maximum of 5 channels of BP, maximum of 3 channels of temperature and cardiac output can be monitored.

- Two types of CO_2 measurement method can be selected by the option unit types.
  One is the Microstream® method which is less influenced by the anesthetic gas (MGU-722), and the other is the Mainstream method which allows long stable measurement (MGU-721).

- The monitor is equipped with an alarm indicator (alarm pole) which the flash pattern can be set corresponding to each alarm level.

- Remote control function is available. (Optional)

- Wired network (DS-LANII/DS-LANIII) is possible via the Ethernet LAN cable.
  DS-LANII is a network based on 10BASE-T with transmission speed of 10Mbps and maximum transmission distance of 100m.
  DS-LANIII is a network based on 100BASE-TX with transmission speed of 100Mbps and maximum transmission distance of 100m.

- Through the TCP/IP network connection, laser printer can be used.

- By connecting a ventilator, airway flow, airway pressure waveform, minute ventilation, airway resistance, etc. can be monitored. Also, ventilator alarm can be notified to the central monitor via telemetry system and wired network. The following ventilators can be connected.
  - ・Servo Ventilator 900C/900D/900E, 300/300A, Servo-i/Servo-s
  - ・PURITAN-BENNETT Ventilator 7200ae/7200e, 740/760, 840
  - ・Evita 4, Evita XL, Evita 2 dura, Savina

- Wireless network construction is possible using the optional telemetry transmitter module (HLX-561/HLX-801).

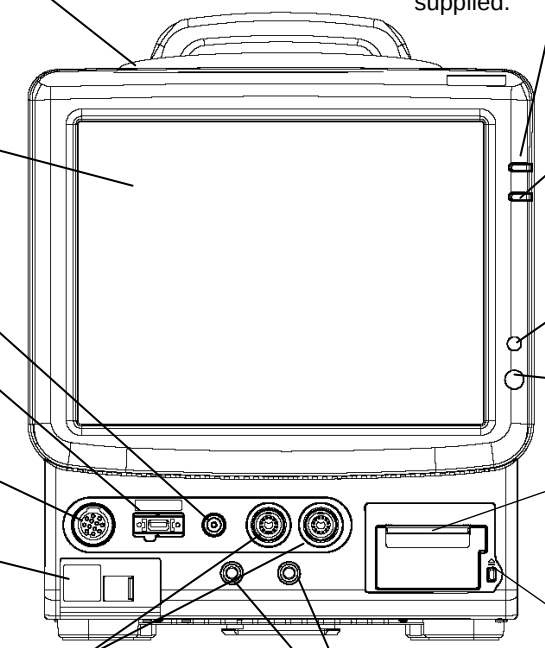
- By connecting an oximeter to the DS-7200, SvO_2, CO, etc, can be monitored. The following device can be connected.
  - ・Oximeter / CCO Measurement Device; Vigilance, Vigilance CEDV, Vigilance II, Vigileo
  - ・SO_2/CO Computer; OXIMETRIX3
  - ・CCO/CO Computer; Q-vue
  - ・CCO/SO_2 Monitor; Q2 Computer

- By connecting the A-2000 BIS Monitor manufactured by ASPECT® MEDICAL SYSTEMS to the main unit, the patient's wakeful state can be monitored.

Names of Parts and Their Functions

DS-7200 Main Unit

【Front Side】



Power Supply LED
Indicates the power supply status.
Lights when the AC power is supplied.
Power switch ON : Green
Power switch OFF: Orange
Light will be off when the AC power is not supplied.

Alarm Indicator (Alarm Pole)
Lights when the alarm generates or lights synchronizing to the heartbeat depending on the setup.

Charge Lamp
Indicates the charge status
Orange: Charging is in process
Green: Charging is complete

LCD Touch Panel
Operation is performed using the touch keys.

NIBP Cuff Connector
Connects the air hose.

Ambient Light Sensor
Detects the ambient light.

SpO_2 Input Connector
Connects the SpO_2 relay cable.

Remote Control Sensor
Sensor for infrared remote control.

ECG/RESP Input Connector
Connects the ECG relay cable.

Paper Cassette
Stores the recording paper.

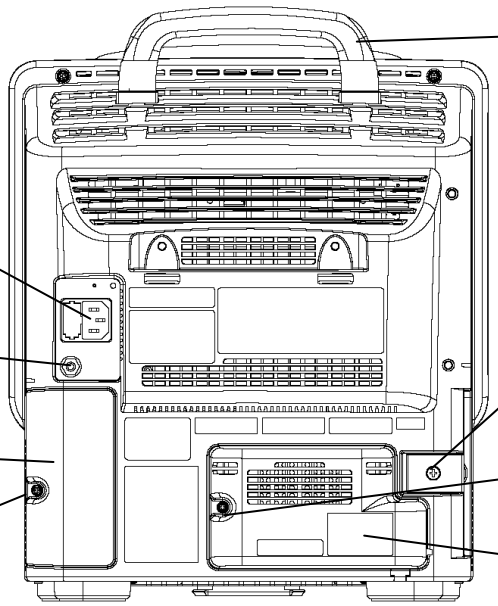
CO_2 Connector (Optional)
Connects the sampling line, nasal cannula, or Capnostat 5 (mainstream CO_2 sensor).

Paper Cassette Eject Button
Press here to remove the cassette.

BP Input Connector
Connects the BP interface cable.

TEMP Input Connector
Connects the temperature probe.

【Rear Side】



Handle
Can be used to carry the monitor.

Power Supply Connector (with fuse holder)
Connects the power supply cable.
(Fuse is installed inside the holder.)

Potential Equalization Terminal
Use for equipotential grounding.

Fixing Screw for Option Unit

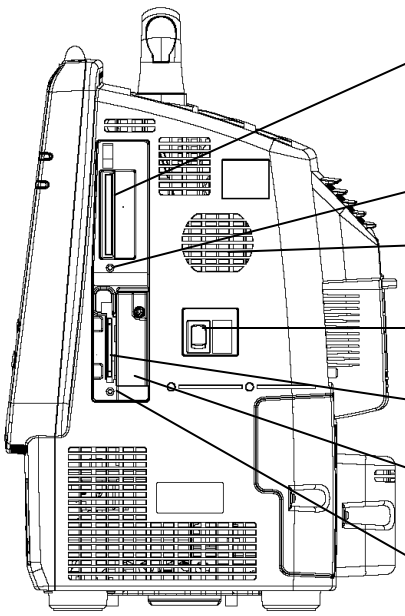
Battery Cover
Battery is installed here.

Screw for Option Unit

Screw for Battery Pack Holder

MGU-721/MGU-722 Attaching Part

【Right Side】



PC Card Slot
Insert the specified extended I/O card or flash memory card here for maintenance purpose.

PC Card Access Indicator
Indicates PC card access status.

Speaker
Generates synchronized sound, key sound, alarm sound.

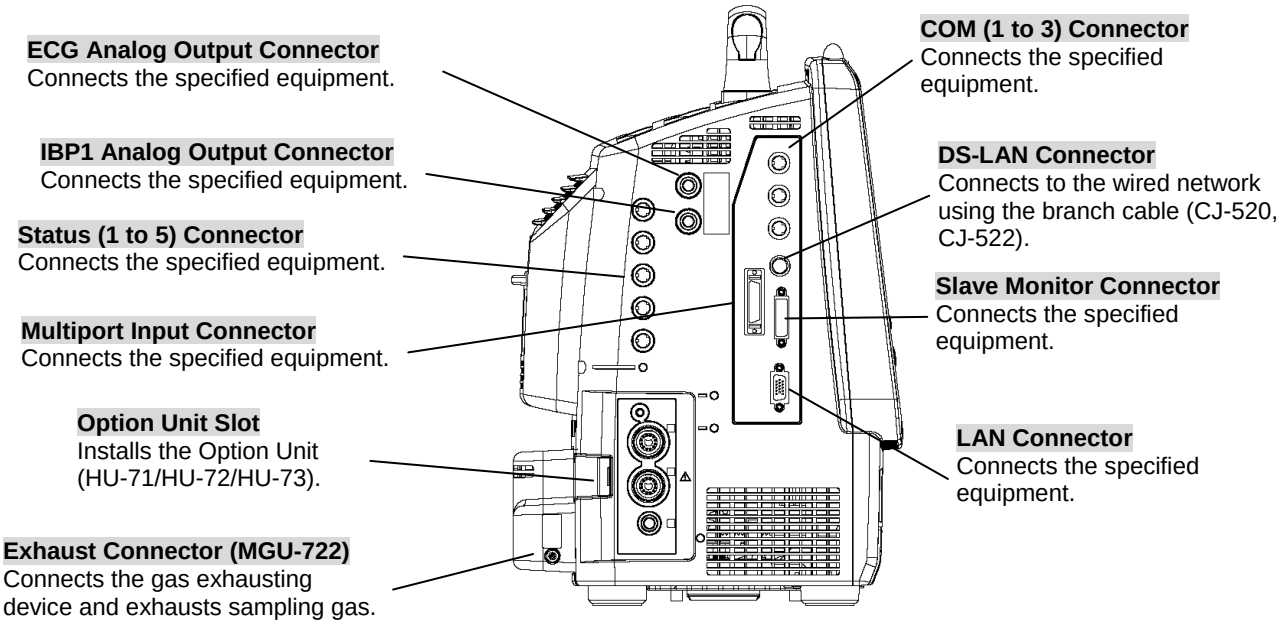
Power Supply Switch
Turns ON/OFF the power.

CF Card Slot
Insert the specified CF memory card here.

Maintenance Cover
Open this cover when performing maintenance/setting.

CF Card Access Indicator
Indicates CF card access status.

【Left Side】



ECG Analog Output Connector
Connects the specified equipment.

IBP1 Analog Output Connector
Connects the specified equipment.

Status (1 to 5) Connector
Connects the specified equipment.

Multiport Input Connector
Connects the specified equipment.

Option Unit Slot
Installs the Option Unit (HU-71/HU-72/HU-73).

Exhaust Connector (MGU-722)
Connects the gas exhausting device and exhausts sampling gas.

COM (1 to 3) Connector
Connects the specified equipment.

DS-LAN Connector
Connects to the wired network using the branch cable (CJ-520, CJ-522).

Slave Monitor Connector
Connects the specified equipment.

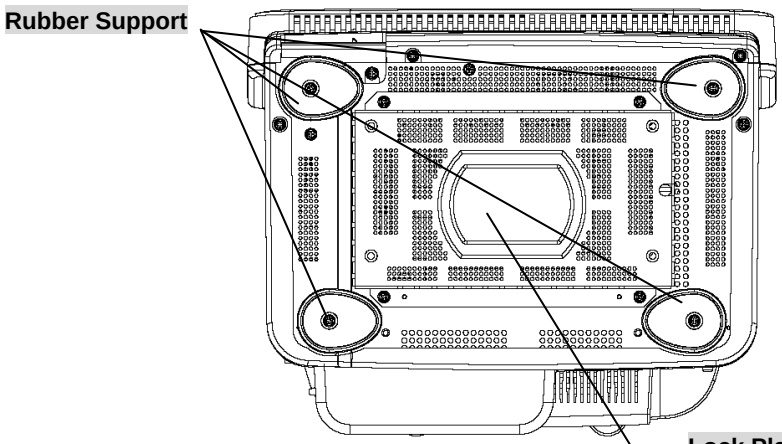
LAN Connector
Connects the specified equipment.

NOTE	Status II-5 connector and multiport input connector cannot be used simultaneously.

Reference

The selection of which connector to use can be made on the Hospital Setup of the preset menu.
→Refer to “8. System Configuration　Hospital Setup　●External Device Connection Setup”

【Bottom】



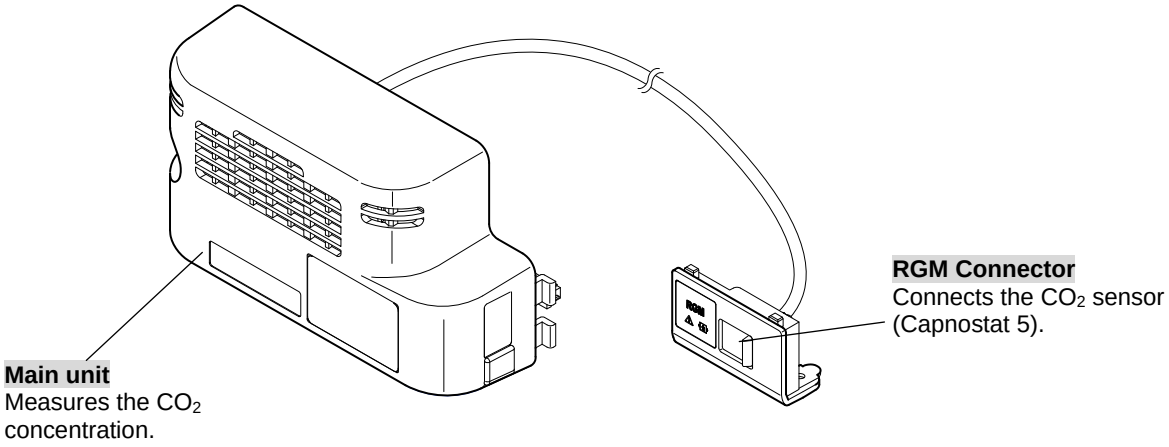
⚠WARNING	Do not connect unit or cable not authorized by Fukuda Denshi to any I/O connector. If done so by mistake, the device cannot deliver its maximum performance and the connected units may be damaged, resulting in a safety hazard.

⚠CAUTION	● The internal switch setting will be performed by our service representative. Users should not open the maintenance cover. ● PC Card Slot will be used by our service representative for maintenance purpose. Users should not use it.

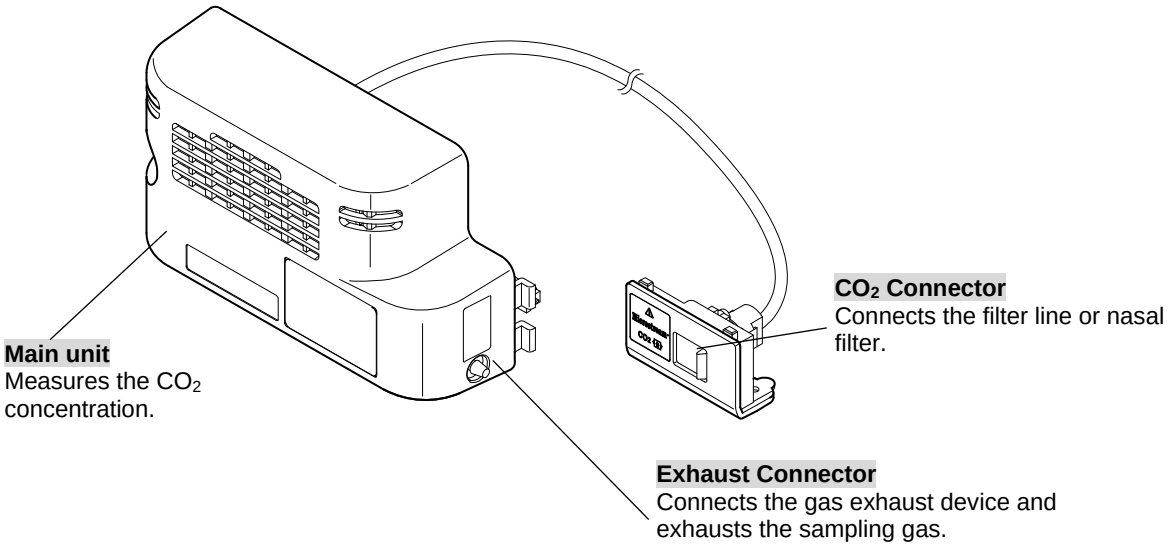
NOTE	The display panel utilizes exclusive fluorescent light for the backlight. Since this fluorescent light deteriorates with its life cycle, the display may become dark, scintillate, or may not light in long term use. In such case, contact your nearest service representative.

Option Unit: MGU-721/MGU-722

【MGU-721 RGM Interface Unit】



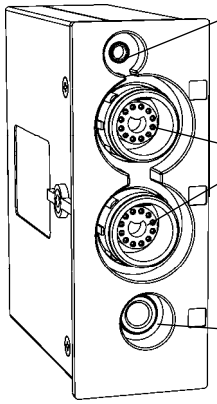
【MGU-722 Microstream® CO_2 Unit】



Option Unit: HU-71/HU-72/HU-73

【Front Side】

HU-71

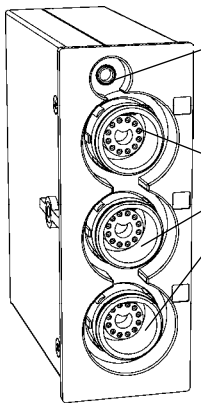


Analog Output Connector
Outputs the BP waveform.

IBP Connector
Connects the BP interface cable.

TEMP Connector
Connects the TEMP sensor cable.

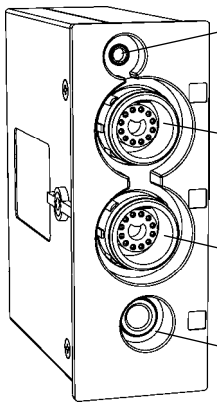
HU-72



Analog Output Connector
Outputs the BP waveform.

IBP Connector
Connects the BP interface cable.

HU-73



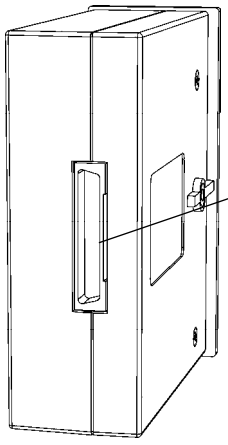
Analog Output Connector
Outputs the BP waveform.

IBP Connector
Connects the BP interface cable.

CO Connector
Connects the catheter relay cable.

TEMP Connector
Connects the TEMP sensor cable.

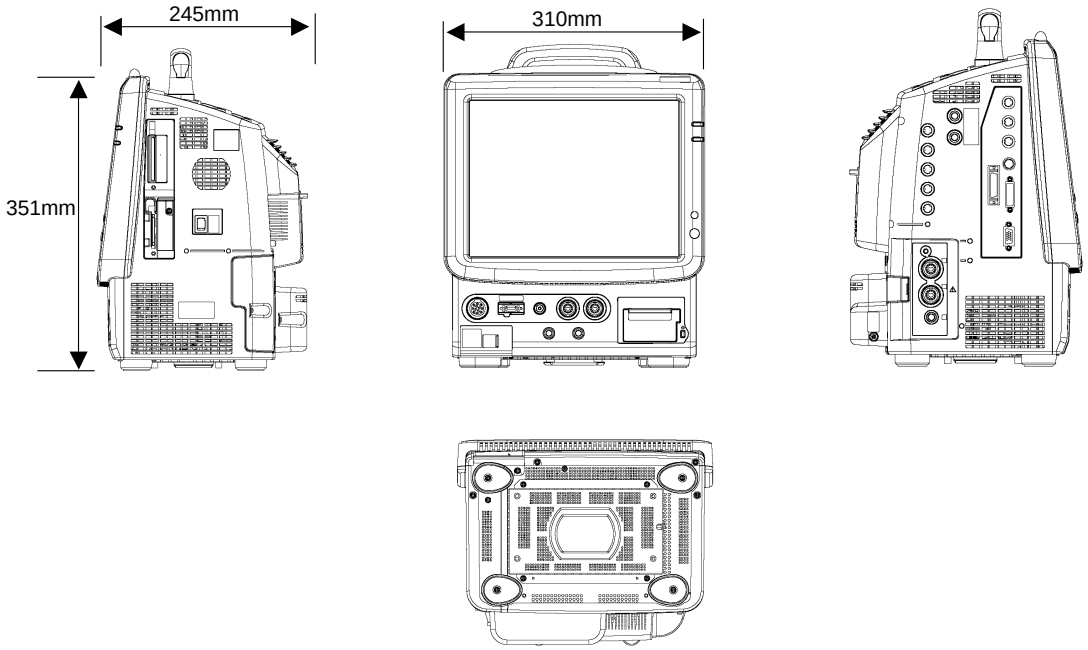
【Rear Side】



Main Unit Connector
Connects to the main unit (DS-7200).

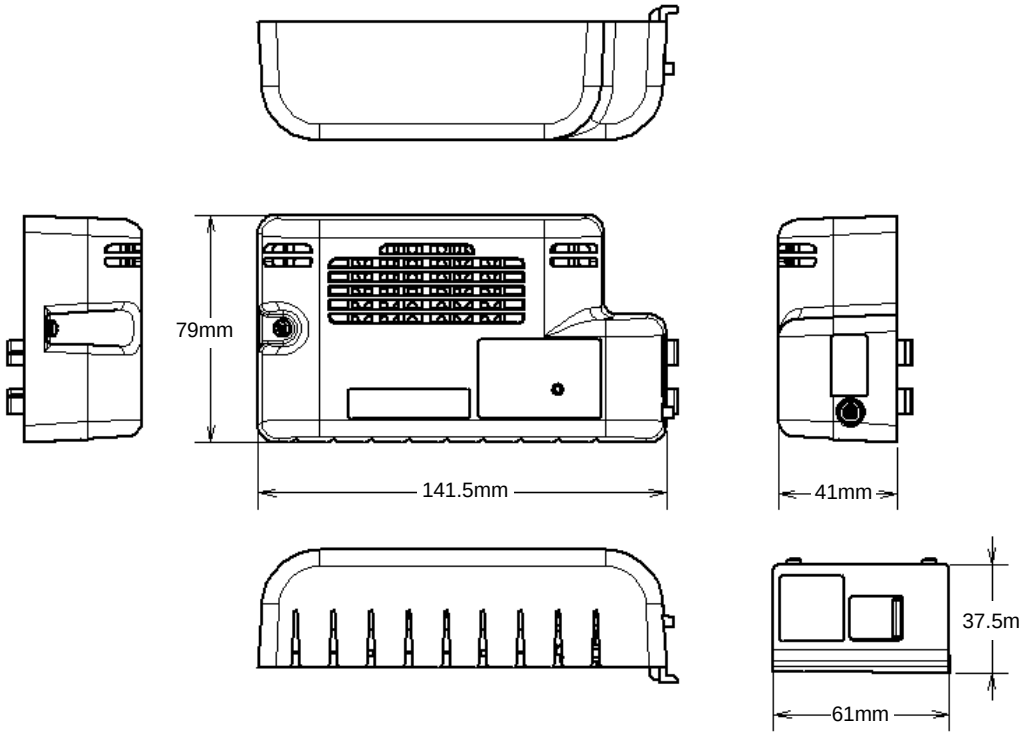
External Appearance

●DS-7200



Weight: 9.9kg±1kg

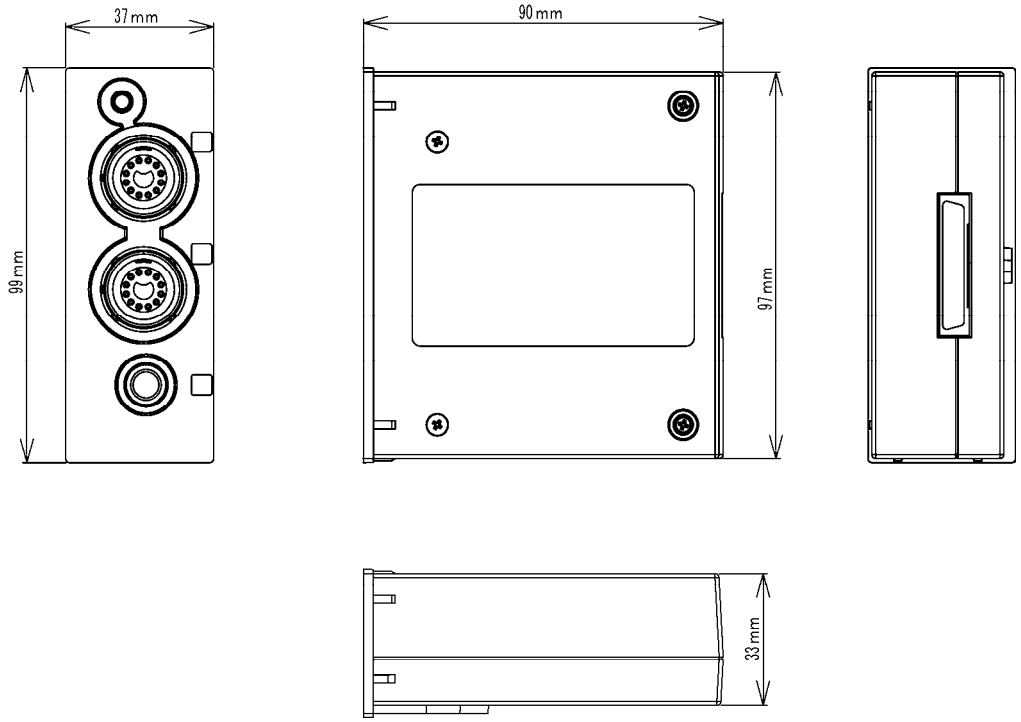
●Option Unit MGU-721/MGU-722



Weight: MGU-721 200g±50g
MGU-722 260g±50g

●Option Unit HU-71/HU-72/HU-73

The illustration is HU-71.



Weight: 180g±20g

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Chapter 2

Basic Operation

This chapter describes the basic operation for monitoring.

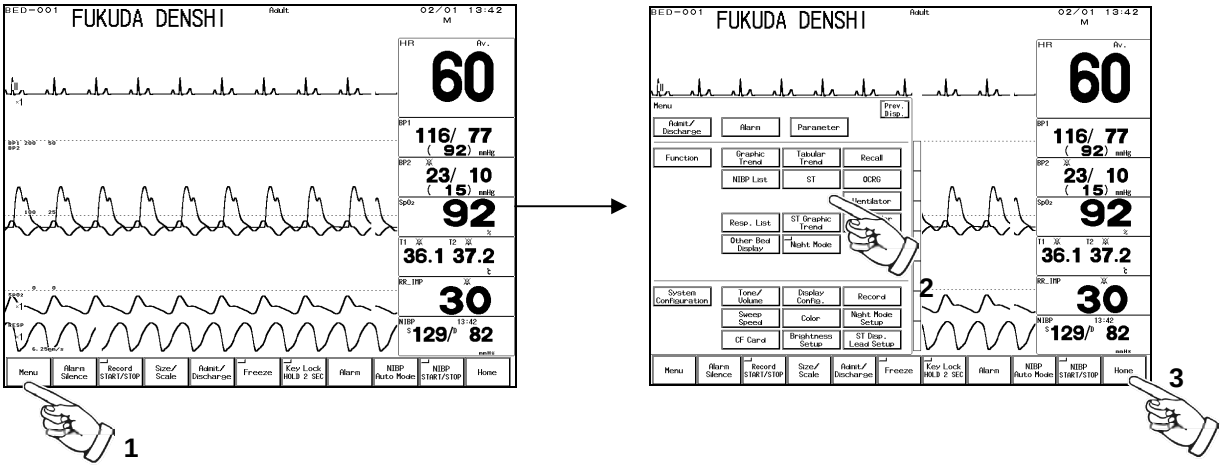
NOTE	For few seconds after the power is turned ON, the speaker will perform self-diagnosis causing a unfamiliar sound. Please note that this is not a malfunction of the equipment.

Touch Keys

All operation of this equipment is performed using touch panel.

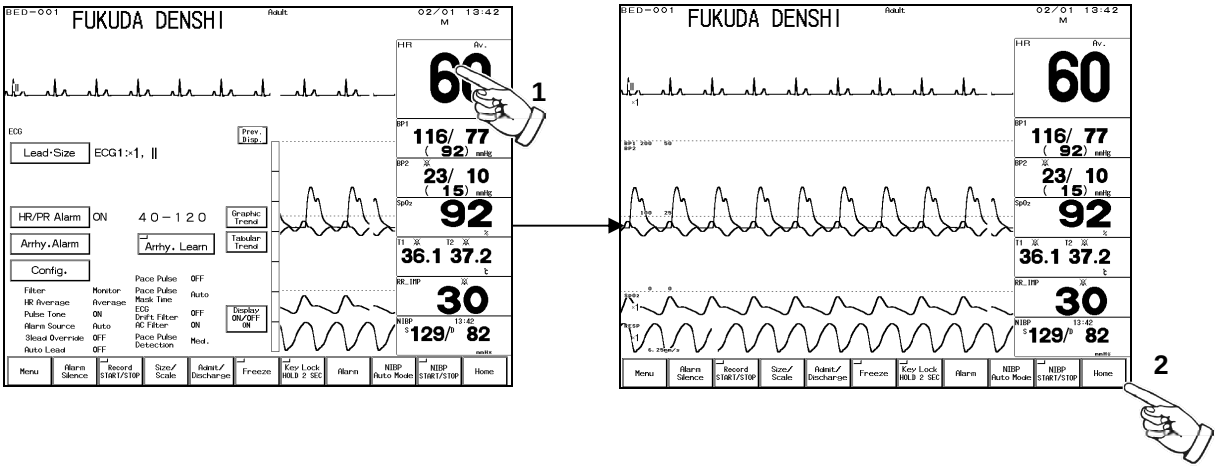
⚠CAUTION	● Always operate the touch panel with fingers or a touch panel pen. Do not touch with a pen-point or other hard-edged instruments. It may cause malfunction or damage the touch panel. In addition, do not apply pressure for a prolonged time to any part of the panel. ● Do not use the touch panel with the film or adhesive tape attached. Malfunction of the touch panel or damage may result. ● As the touch panel is made of glass, a strong impact may cause damage. Pay attention not to hit or drop the touch panel. ● Do not press the touch panel with strength or twist your finger on the panel. It may cause malfunction or damage the touch panel. ● Due to its material characteristic, the touch panel expands/contracts depending on the temperature/humidity. When the touch panel is left unused for a while, or when the ambient temperature is low, the surface film of the touch panel may expand, but this is not an abnormal condition. This expansion will be reduced in few hours or half a day after the power is turned ON.

●General Key Control



1. Pressing the Menu key will switch the display with a pip sound.
2. The touch key will respond by pressing any part of the key.
3. Pressing the Home key at any time will return the display to the home display.

●Key Control for Each Parameter



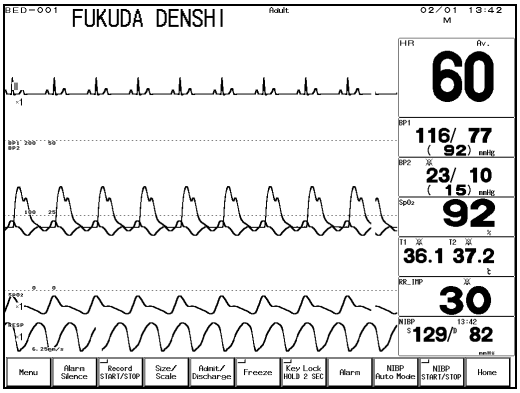
1. The touch key will respond by pressing any part of the numeric display frame (parameter key).
2. Pressing the Home key at any time will return the display to the home display.

Reference

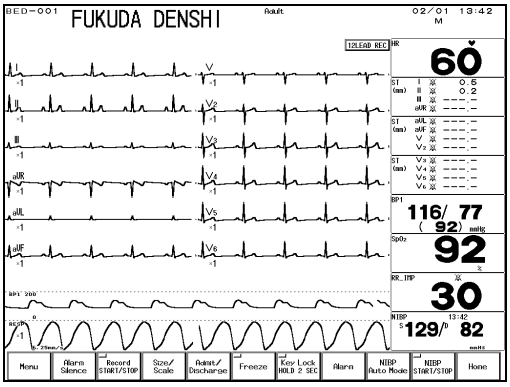
Frequently used keys can be set as user key. For details, refer to “4. Monitoring Setup　Key Setup　To Set the User Keys”.

About the Home Display

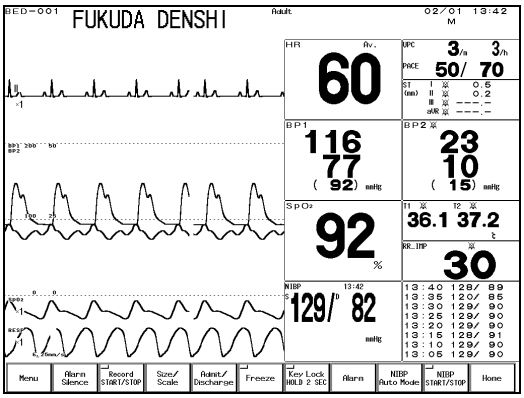
The display can be configured according to the monitoring purpose. There are 5 basic display modes, which are Standard, 12-lead, Ext. 1, Ext. 2, and Enlarged. For the standard mode, function display of graphic trend, tabular trend, NIBP list, ventilator, OCRG, block cascade can be simultaneously displayed.



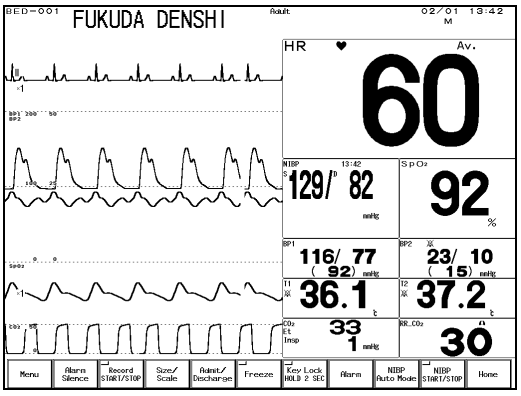
<Standard>



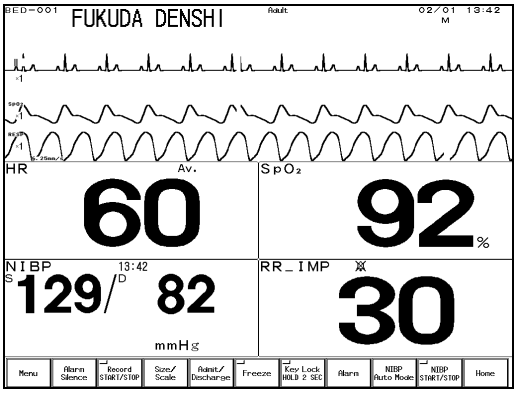
<12-lead>



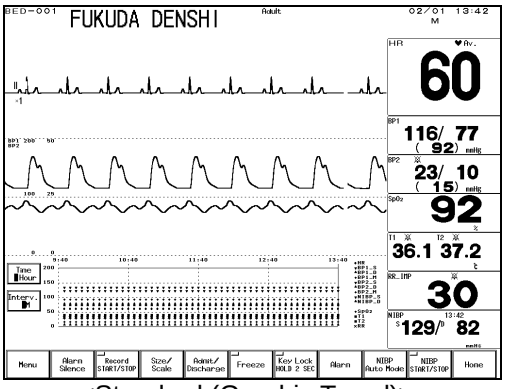
<Extended 1>



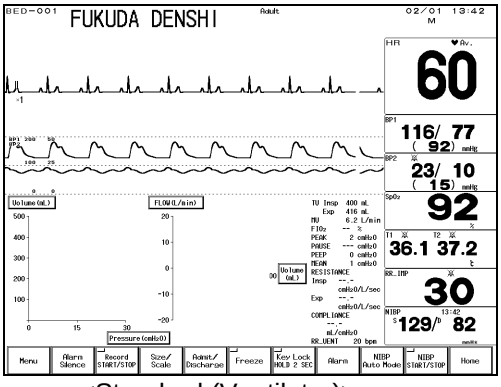
<Extended 2>



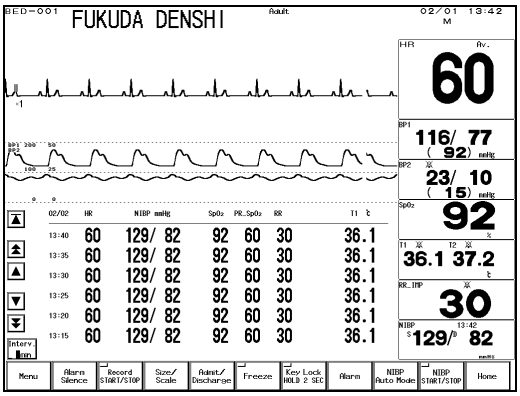
<Enlarged Numeric Data>



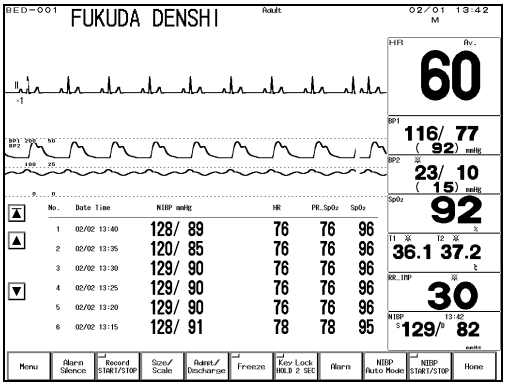
<Standard (Graphic Trend)>



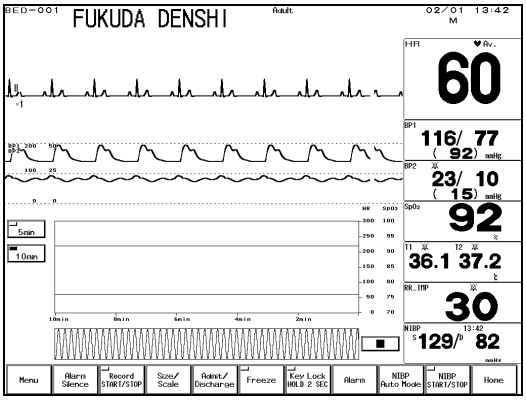
<Standard (Ventilator)>



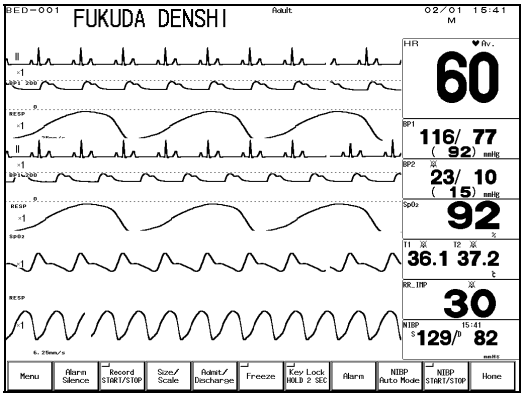
<Standard (Tabular Trend)>



<Standard (NIBP List)>



<Standard (OCRG)>



<Block Cascade>

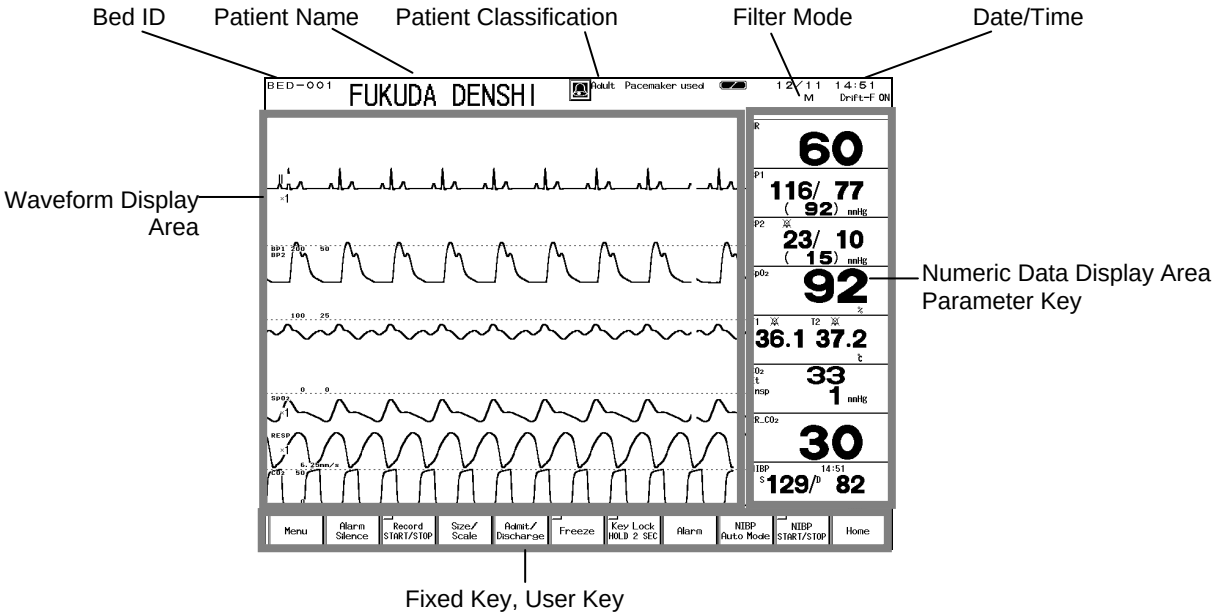
Reference

The display can be configured by selecting the waveform and numeric data to be displayed. The configured display can be programmed.
Refer to “4. Monitoring Setup Display Configuration” for details.

The Description of the Display

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

●Numeric Data, Waveform, Patient Name, etc.

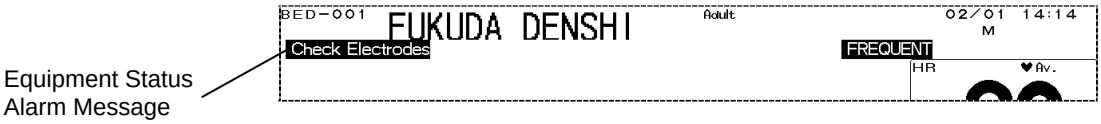


●Alarm Message for Numeric Data / Arrhythmia

There are 2 types of alarm messages, numeric data alarm message and arrhythmia alarm message. If both alarms occur at the same time, the numeric alarm message and arrhythmia alarm message will be displayed alternately in 2-seconds intervals.

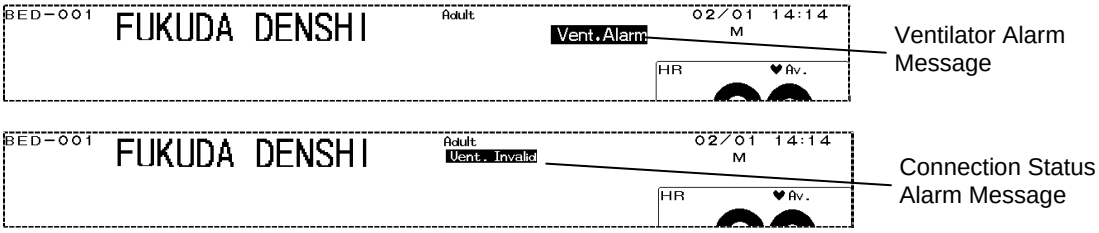
●Equipment Status Alarm Message

The equipment status alarm message will be displayed when proper monitoring cannot be performed.



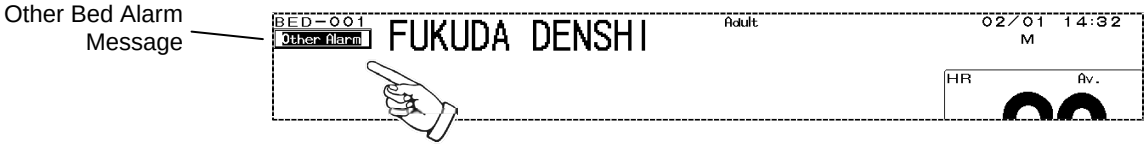
●Ventilator Alarm Message

When ventilator is connected, ventilator alarm and connection status alarm message will be displayed.

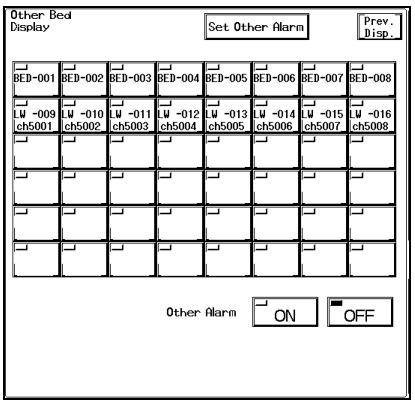


●Other Bed Alarm Message

When the monitor is connected to the network, and other bed alarm is turned ON, the alarm occurring at the other bedside monitors will be notified.



The other bed alarm message will function as a control key. By pressing the message display, the window to select the alarm generating bed will appear.



The Room/Bed ID key for the alarm generating bed will be indicated in red.
By pressing the Room/Bed ID key for the alarm generating bed, the numeric data and waveforms will be displayed.

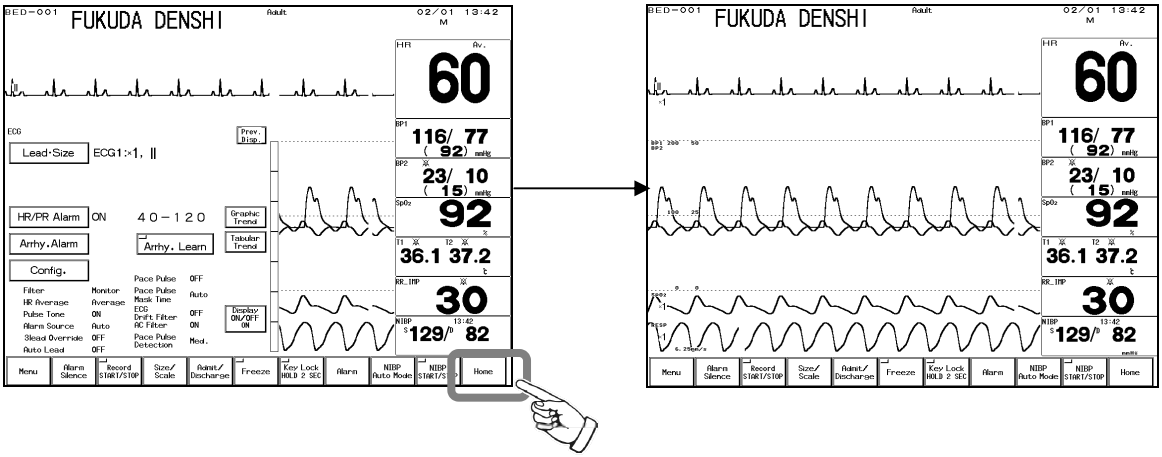
Reference Refer to “7. Function Other Bed Display” for details.

NOTE	When other bed alarm message is displayed, telemeter channel ID and TCON ID will not be displayed.

To Return the Display

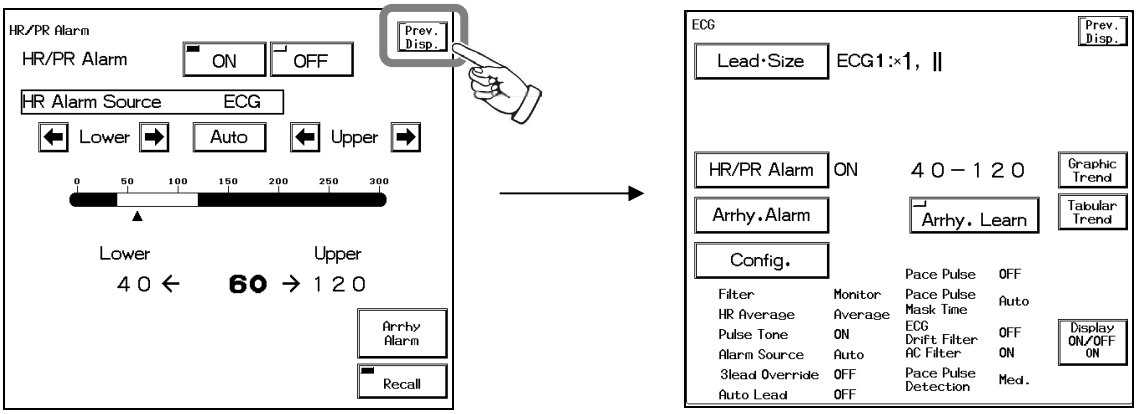
【To Return to the Home Display】

By pressing the Home key, the display will return to the home display.



【To Return to the Previous Display】

By pressing the Prev. Disp. key which will be displayed on each setup window, the previous display will appear.



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

⚠CAUTION	If the power supply is interrupted due to power failure, etc., the following will occur. • For the DS-7200, if the power supply is resumed within 5 minutes, setup data are backed up and monitoring before the power failure can be resumed. If the power failure continues for more than 5 minutes, data such as ST data, OCRG data will be initialized. (For details, refer to "11 Technical Information Setup Item".) • For the CO_2 option unit (MGU-721/ MGU-722), it will be initialized and enter into warm-up state even if the power failure is within 30 seconds.

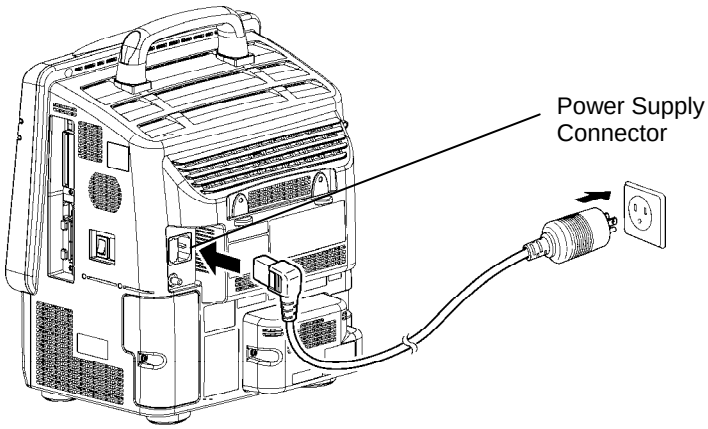
NOTE	Equipotential Grounding When connecting multiple devices, electrical potential difference may be generated between the devices. This may result in electric shock to the patient connected to these devices. Pay special attention for use in the operating room, ICU, CCU, Cardiac Catheter Laboratory,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

Reference For procedures to connect each part, refer to "9. Installation System Construction".

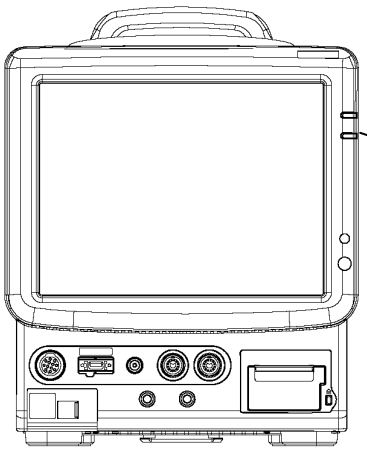
Connecting the Power Cable

●Main Unit

Connect the accessory power cable (CS-34) to the power supply connector on the rear side of the main unit. Connect the other end of the power cable to the 3-way outlet with ground terminal.



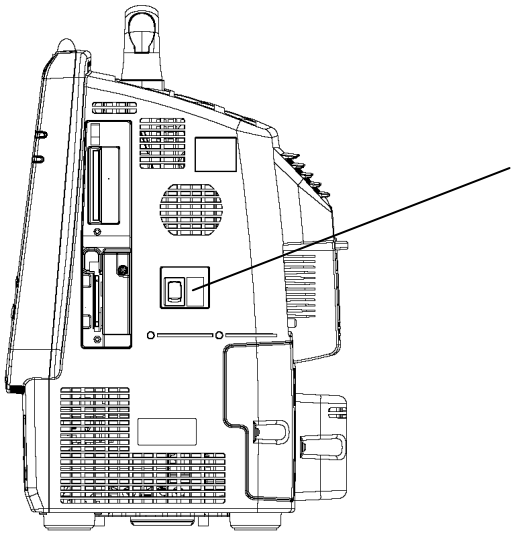
When the power cable is connected, power supply LED will light in orange. If the optional battery is installed, charging will start. When the power supply switch of the monitor is turned ON, the power supply LED will light in green.



Power Supply LED
Lights when the AC power is supplied.
When the power switch is OFF: Orange
When the power switch is ON: Green
Light will be off when the AC power is not supplied.

To Turn ON/OFF the Power Switch

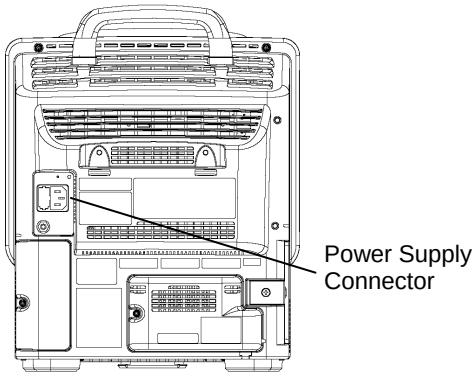
Turn ON the power switch. The screen will be displayed, and monitoring will start.



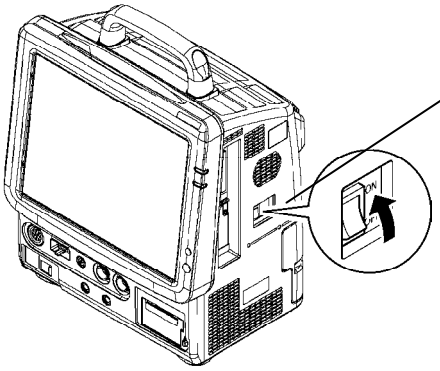
⚠CAUTION	If not using the monitor for a long time, turn OFF the power switch.

To Use with the Battery Pack

By using the OAO-12B Lithium-Ion Battery Pack (optional), the monitor can be used during transportation.

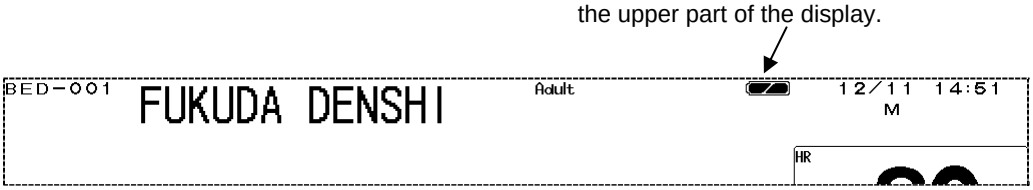


Unplug the power cable from the power supply connector located at the rear side of the monitor.
If the power cable is unplugged with the power turned ON, the monitor will also automatically change to battery operation mode.



Turn ON the power switch located at the right side of the monitor.

During battery operation, a battery mark will be displayed on the upper part of the display.



Battery Mark	***Battery Condition***	***Indication of Operation Time***	
		Standard Mode	***Power Saving Mode***
	Full	About 3 to 2 hours	About 4 to 2 hours
	The remaining battery is less than half.	About 2 hours to 20 minutes	About 2 hours to 20 minutes
	The battery is almost empty. Connect to the AC power source immediately.	About 20 min. or less	About 20 min. or less

Reference

Refer to “8. System Configuration Monitor Setup” for power saving mode.

Indication of Charging Time (Empty condition to fully charged condition)	
When the power cable is connected and the power is turned OFF	About 3 hours
When the power cable is connected and the power is turned ON	About 10 hours

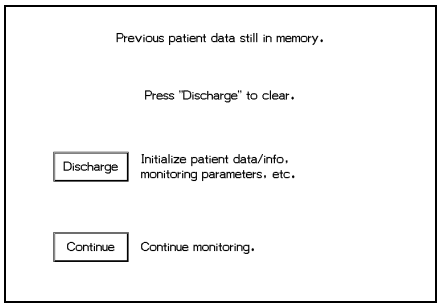
⚠CAUTION	● The above operation time indicates the time with a new battery pack performing ECG measurement, NIBP periodic measurement (5-minute interval). Note that the battery pack degrades with continuous use and shortens the usable time. ● When the DS-7200 system is operated by battery, and if empty mark is displayed for the battery condition, IC card format, read/write process cannot be performed.

To Start Monitoring

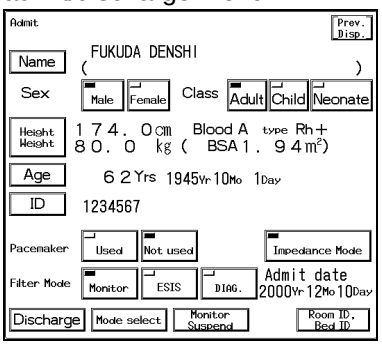
Discharge Confirmation at Power ON

The monitor retains the graphic trend and NIBP list data for fixed amount of time even when the power is turned OFF. To start monitoring a new patient, discharge procedure on the patient admit / discharge menu should be performed.

To start monitoring a new patient, press the [Discharge] key. The data before turning ON the power will be erased and starts monitoring. Pressing the [Continue] key will retain the data before turning ON the power and starts monitoring.



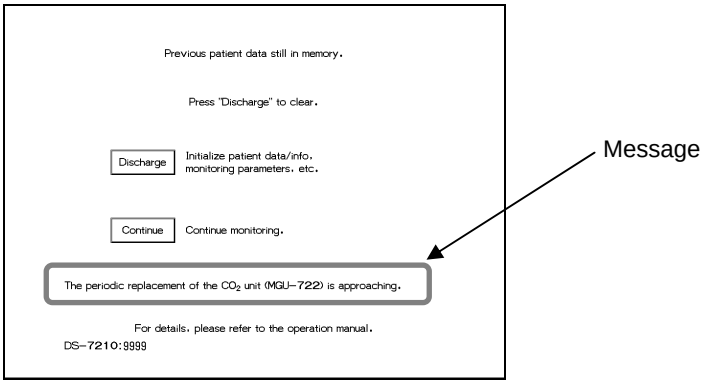
If the power was turned OFF for less than 30 seconds, this discharge confirmation screen will not be displayed. In such case, press the [Discharge] key on the patient admit/discharge menu.



Reference

ON/OFF of this confirmation display can be selected.
Refer to "8. System Configuration Monitor Setup" for details.
The discharge process can be also performed on the patient admit/discharge menu.
Refer to "5. Admit/Discharge of a Patient Discharging a Patient ●Discharging Procedure"

When the periodic replacement period approaches for the MGU-722, NIBP unit, or short-term backup battery, a message will be displayed on the "Check Discharge at Power ON" screen to notify the user.



When the periodic replacement period approaches, "Check Discharge at Power ON" screen will be displayed regardless of the ON/OFF setting on the Monitor Setup menu. After checking the message, press the [Continue] key to start monitoring. Even if the key is not pressed, monitoring will automatically start after 30 seconds.

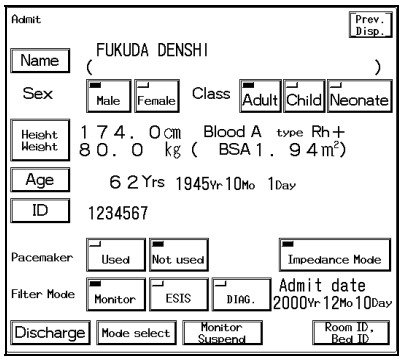
Reference

For details of periodic replacement, refer to "10. Maintenance Maintenance Check ●Periodic Replacement Parts".

To Admit a Patient

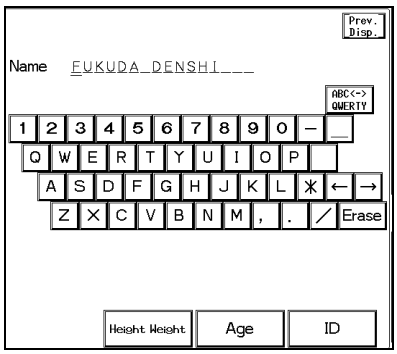
Enter the patient information on the patient admit / discharge menu.

●Display the patient admit / discharge menu.



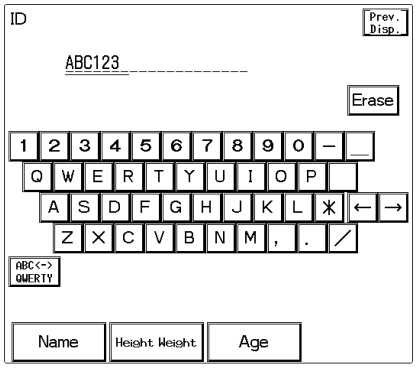
Press the Menu → Admit / Discharge key.
The patient admit / discharge menu will be displayed.

●Enter the patient name.



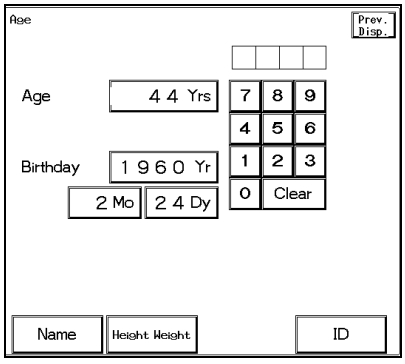
Press the Name key.
Enter the name using the displayed numeric keys.
The entered name will be displayed large on the upper part of the display.

●Enter the patient ID.



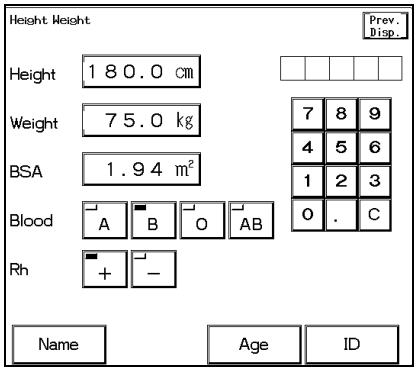
Press the ID key.
Enter the ID number using the displayed numeric keys.

●Enter the patient's birth date.



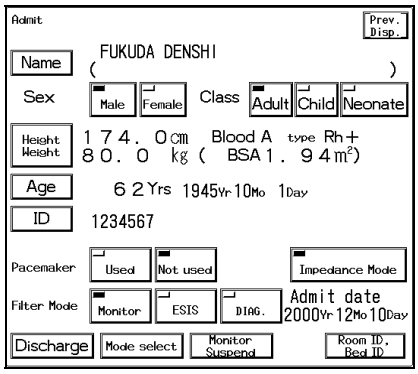
Press the Age key.
Enter the birth date using the displayed numeric keypad.
The age will be automatically calculated from the birth date.

●Enter the patient's height and weight.



Press the [Height Weight] key
Enter the height and weight from the 10-keys.
BSA will be automatically calculated.
Select the blood type and Rh.

●Select the patient classification, and pacemaker use.



Select the patient classification from [Adult], [Child], or [Neonate].
Select the pacemaker use from [Used], [Not used].

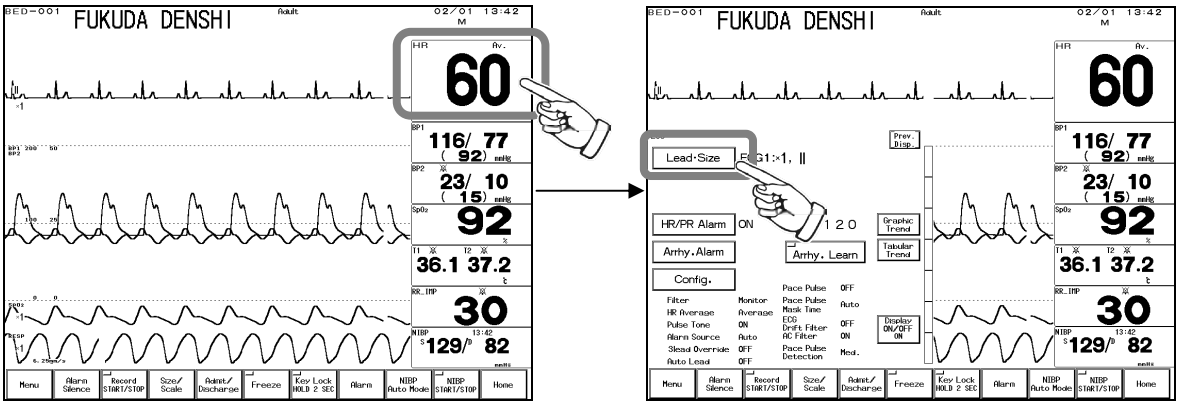
⚠WARNING	The patient classification and pacemaker use must be selected. The patient classification selection influences the precision of the QRS detection and NIBP measurement. Make sure the correct selection is made.

Basic Operation

Adjusting the Waveform Size, Baseline Position (Parameter Key Operation)

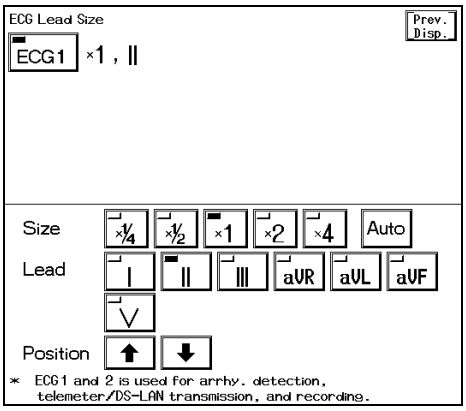
1 **Select the parameter to perform the setup. (Ex.: ECG)**

Press the parameter key where heart rate is displayed.

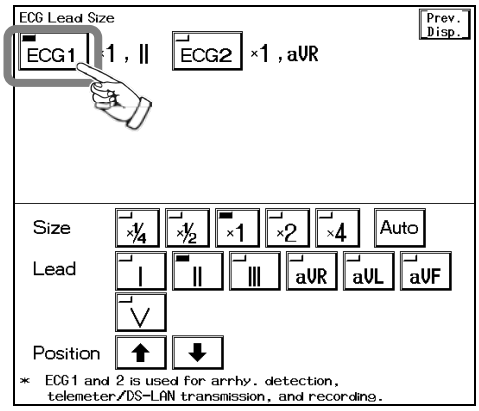


2 **Adjust the waveform size and baseline position.**

Press the Lead·Size key to display the lead, size setup menu. Select the ECG channel to perform the setup.



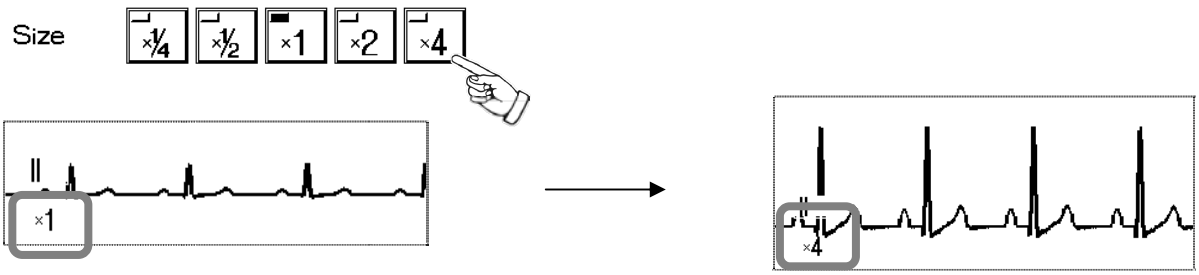
<1-lead Display>



<2-lead Display>

3 **Adjust the waveform size.**

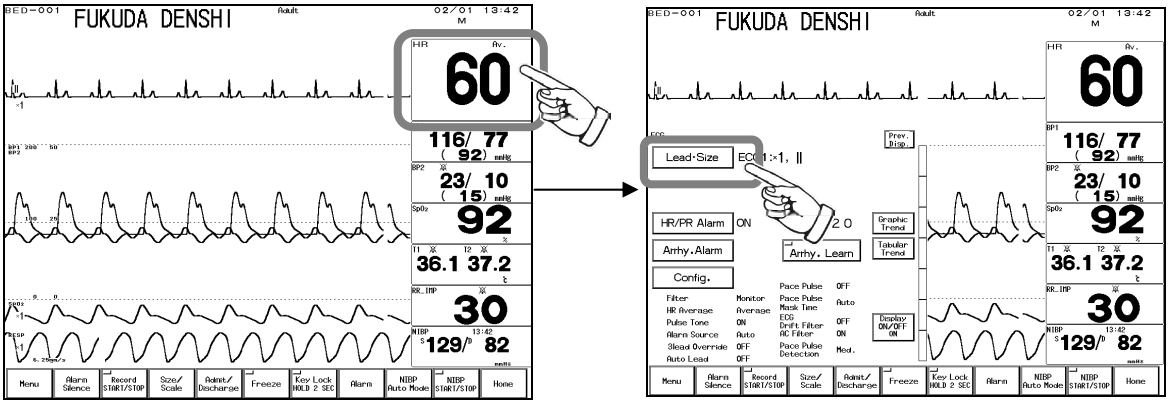
Select an appropriate waveform size for monitoring.



CAUTION	The arrhythmia detection level is related with the displayed waveform size. Select an appropriate size for monitoring.

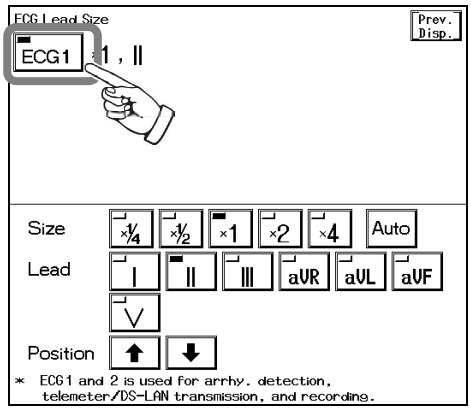
Selecting the ECG Lead (Parameter Key Operation)

1 Press the ECG parameter key.

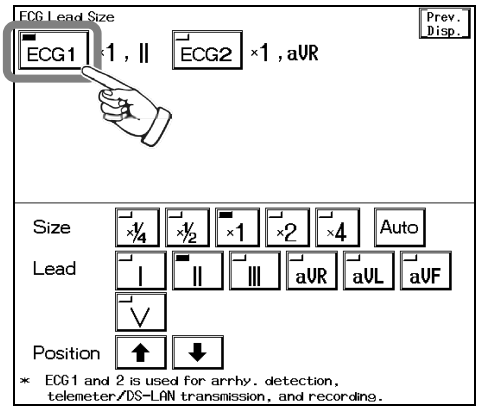


2 Press the [Lead·Size] key to display the lead, size setup menu.

Select the ECG channel to perform the setup.

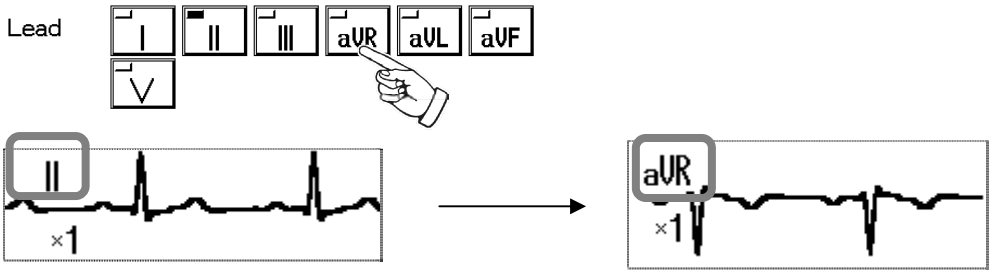


<1-lead Display>



<2-lead Display>

3 Select the appropriate lead for monitoring.

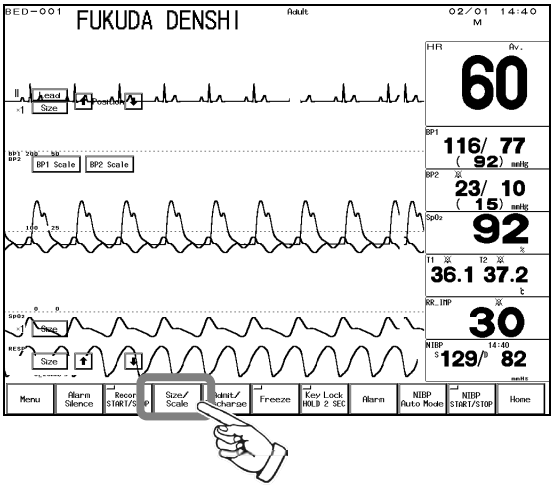


⚠CAUTION	● The ECG lead selection will be applied to arrhythmia detection, telemetry / wired network transmission, and recording. ● The ECG lead selection will be applied to recall waveform and recording waveform as well as arrhythmia detection.

Reference

The same procedure is used for other parameters.
Refer to the corresponded section of “6. Parameter Setup” for details.

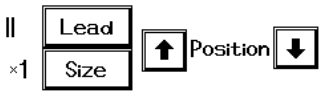
Scale, Lead, Baseline Position Setup (User Key Operation)



Pressing the Size/Scale key will display the arrow keys on the home display to adjust the waveform size, scale, lead, baseline position.

1 Select the waveform size, lead, baseline position for ECG waveform.

Adjust the waveform suitable for monitoring.



Pressing the Lead key will sequentially change the lead in the following order.

3-electrode: Ⅰ→Ⅱ→Ⅲ→Ⅰ

4-electrode: Ⅰ→Ⅱ→Ⅲ→aVR→aVL→aVF→Ⅰ

5-electrode: Ⅰ→Ⅱ→Ⅲ→aVR→aVL→aVF→V→Ⅰ

10-electrode:

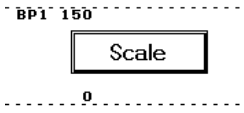
Ⅰ→Ⅱ→Ⅲ→aVR→aVL→aVF→V1→V2→V3→V4→V5→V6→Ⅰ

Pressing the Size key will sequentially change the size in the following order.

×1/4→×1/2→×1→×2→×4→×1/4

Use the ↑, ↓ keys to adjust the baseline position up or down.

2 Select the scale for BP, CO_2 waveform.



Pressing the Scale key will sequentially switch the scale.

3 Select the waveform size for impedance respiration waveform, SpO_2 waveform.

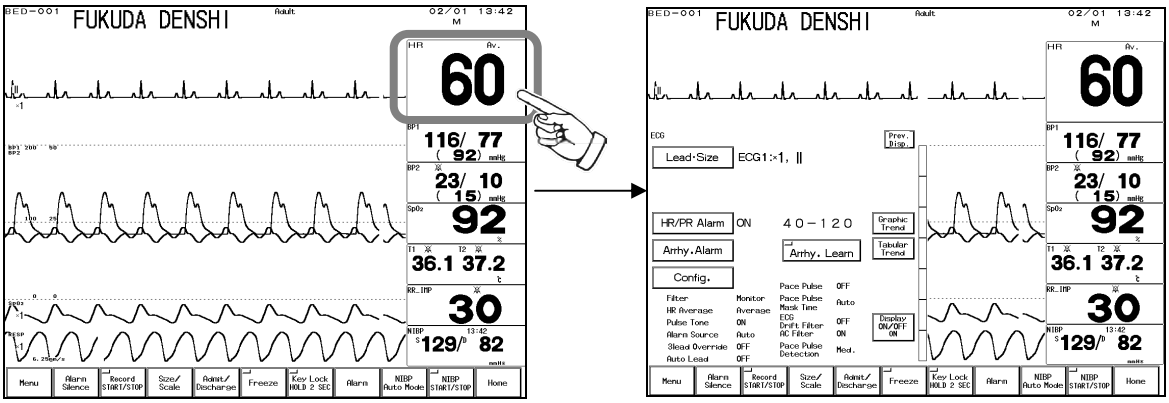
Pressing the Size key will sequentially change the size in the following order.

×1/4→×1/2→×1→×2→×4→×1/4

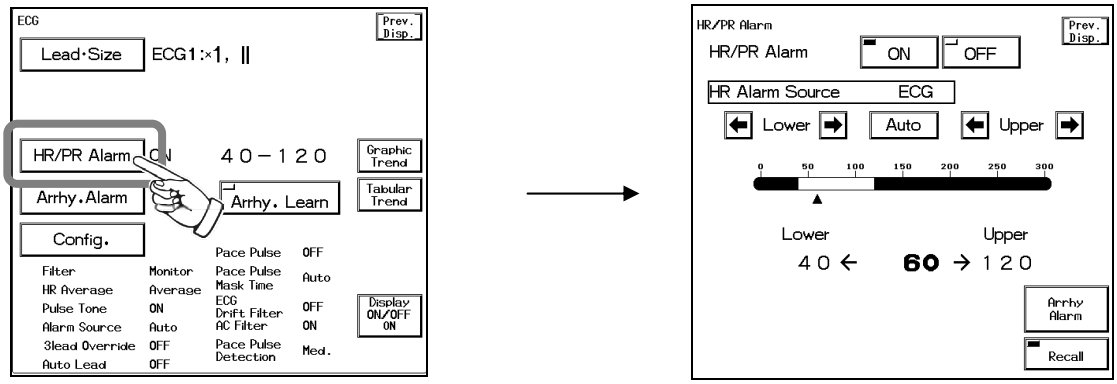
Alarm Setup for Each Parameter

The alarm can be set for each parameter. By pressing the selected parameter key, upper and lower alarm limit and ON/OFF of alarm can be set.

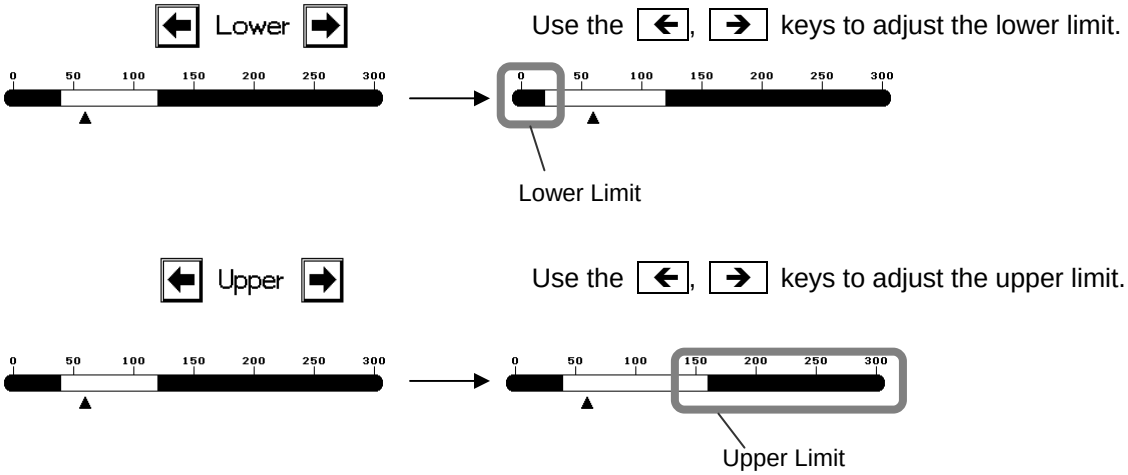
1 Select the parameter to set the alarm. (Ex.: HR alarm)



2 Press the [HR Alarm] key. The menu to adjust the alarm limit will be displayed.



3 Set the upper and lower alarm limit.



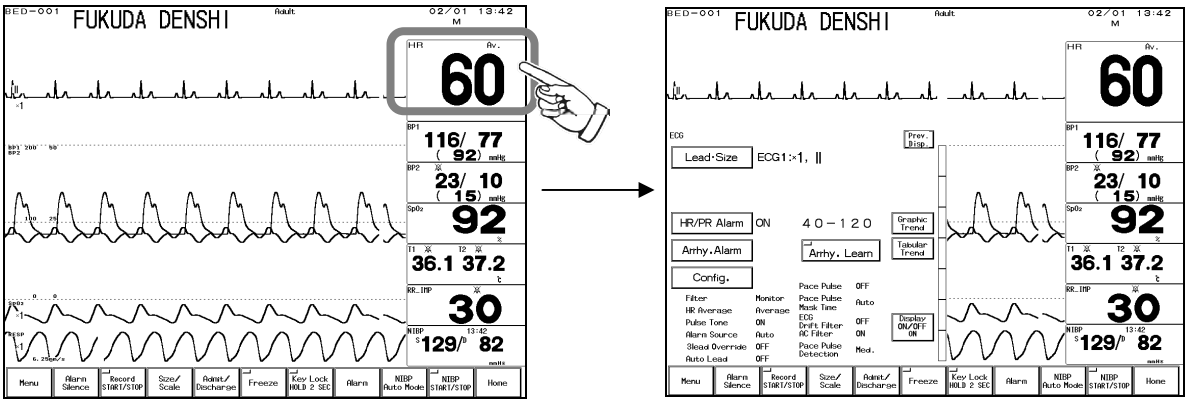
Reference

Use the same procedure for the setup of each parameter.
Refer to the corresponding section in “6. Parameter Setup”.

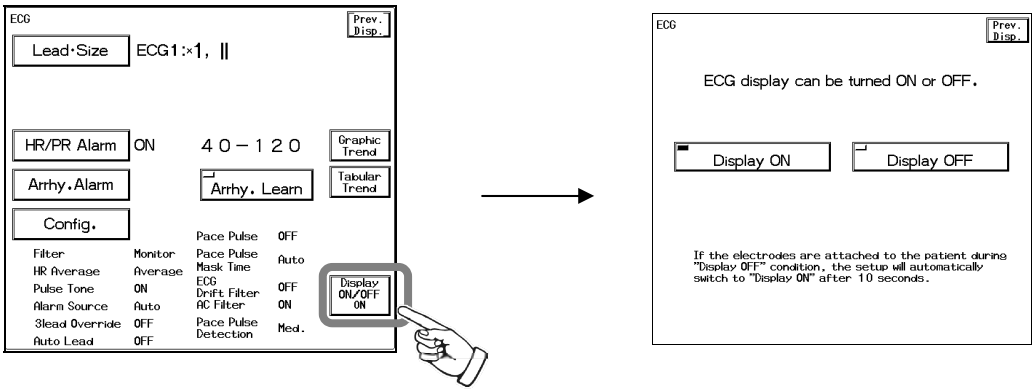
The waveform and numeric data display for each parameter can be turned ON or OFF without changing the display configuration.

If not performing the ECG or SpO_2 measurement while the ECG cable or SpO_2 sensor is connected to the monitor, the equipment status alarm such as “Lead Off” will generate. Removing ECG or SpO_2 from the display configuration will not generate such alarm, but this function may be more useful as it allows to turn off the measurement without changing the display configuration.
This function is not available for NIBP monitoring.

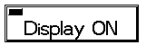
1 Select the parameter to turn off the display. (Ex.: ECG)

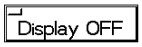


2 Press the Display ON/OFF key. The confirmation display for ON/OFF of ECG display will appear.

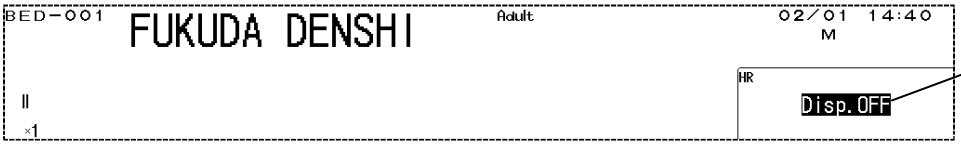


3 Select Display ON or Display OFF.





Display ON key will display the waveform and numeric data.
Display OFF key will not display the waveform and numeric data.



The Display OFF message will be displayed inside the parameter key.

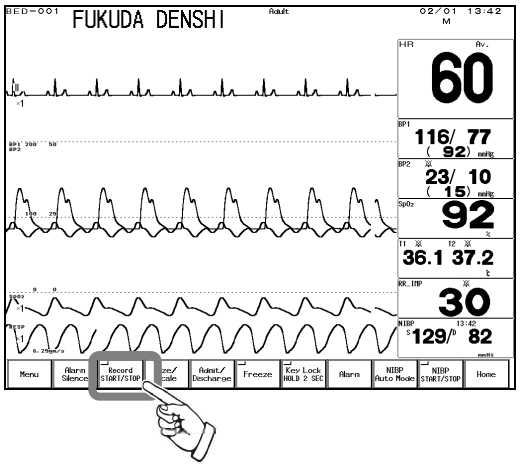
4 Automatic reset

For ECG, impedance RESP, SpO_2, CO_2, properly connecting the electrode or sensor will automatically set the display ON/OFF function to “Display ON”.

Reference For automatic reset condition, refer to Display ON/OFF section for each parameter in “6. Parameter Setup”.

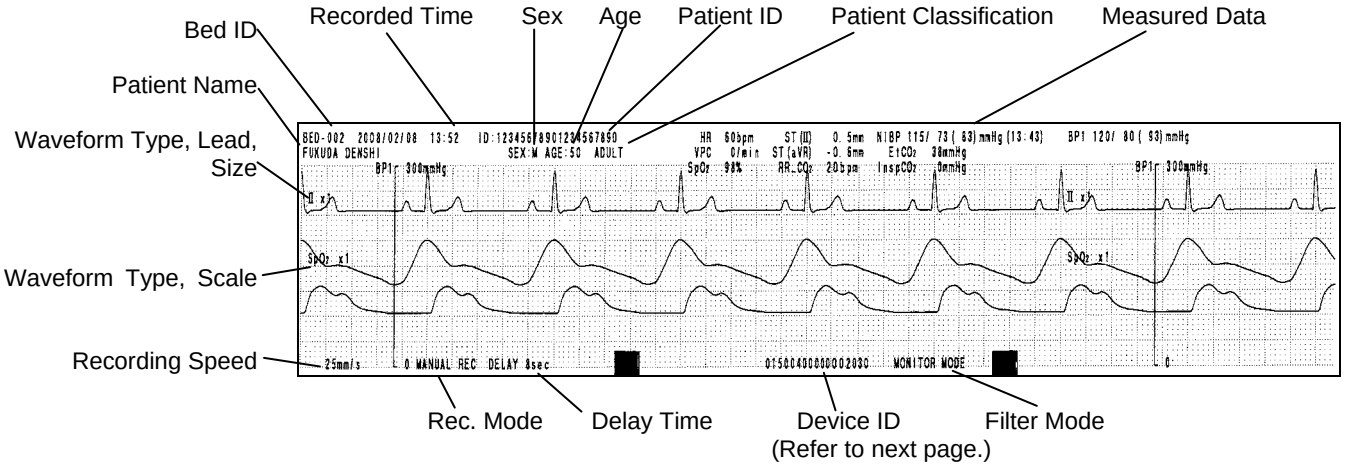
Recording

●Start / Stop of Waveform Recording



Pressing the [Record START/STOP] key on the home display will start the waveform recording.
Up to 3 waveforms can be recorded.

【Example of Recording】



For manual recording, number of recording waveforms and recording duration can be set.
Refer to “4. Monitoring Setup　Manual Recording” for details.

For alarm recording, number of recording waveforms, recording duration, and alarm factor can be set.

Reference

Refer to “4. Monitoring Setup　Alarm Recording” for details

For periodic recording, number of recording waveforms, recording duration, recording intervals can be set.
Refer to “4. Monitoring Setup　Periodic Recording” for details.

The monitoring data of the patient such as graphic trend and tabular trend can be also recorded.
Refer to sections on graphic trend and tabular trend in “7. Function”.

【Device ID】

The 19-digit value printed at the bottom of the recording paper indicates the monitor setup codes, which are described as follows.

0 0 3 1 0 4 0 0 0 0 0 0 0 2 1 1 3 20
(1) (2) (3) (4) (5) (6) (7) (8) (9)

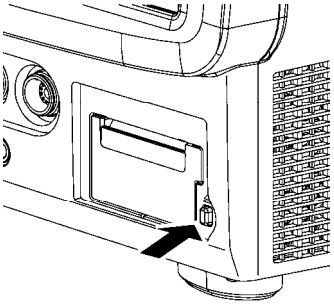
	Digits	***Description***
(1)	1 to 4	DS-7200 serial number in 4 digits.
(2)	5 to 6	Indicates the ECG lead type. '00' : not connected '01' : 3-electrode '02' : 4-electrode '03' : 5-electrode '04' : 10-electrode '81' : 3-electrode (defibrillation and electrosurgery-proof) '82' : 4-electrode (defibrillation and electrosurgery-proof) '83' : 5-electrode (defibrillation and electrosurgery-proof)
(3)	7 to 9	Indicates ECG lead condition (lead-off) in hexadecimal form. 0: Normal 1: Lead-Off

Bit	3-electrode	4-electrode	5-electrode	10-electrode
B0	LL	LL	LL	LL
B1	RA	RA	RA	RA
B2	LA	LA	LA	LA
B3	—	—	V	V1
B4	—	—	—	V2
B5	—	—	—	V3
B6	—	—	—	V4
B7	—	—	—	V5
B8	—	—	—	V6
B9	—	RL	RL	RL
B10 to B11	—	—	—	—

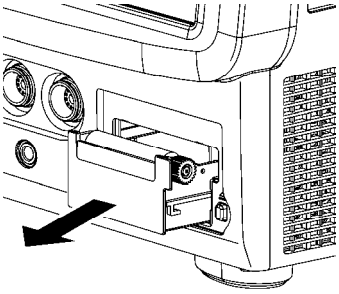
(4)	10 to 12	Indicates ECG lead condition (attachment) in hexadecimal form. The bit definition is the same as ECG lead-off condition.
(5)	13 to 14	Indicates ECG setup in hexadecimal form. B1 : AC filter (1: ON, 0: OFF) B3 : ECG drift filter (1: ON, 0: OFF) B0, B2, B4 to B15: 0 (Reserved)
(6)	15	Indicates the setup information relating to arrhythmia analysis in hexadecimal form. B0: Arrhy. Analysis Filter (1: Fixed, 0: Disp Waveform) B1: Suspend Arrhy. Analysis during Noise Interference (1: ON, 0: OFF) B2 to B7: 0 (Reserved)
(7)	16	Indicates model type of SpO_2 and CO_2 measurements in codes. '0' : SpO_2[Nellcor] '1' : SpO_2[Masimo] '2' : SpO_2[Nellcor] + CO_2[Microstream] '3' : SpO_2[Nellcor] + CO_2[Capnostat] '4' : SpO_2[Masimo] + CO_2[Microstream] '5' : SpO_2[Masimo] + CO_2[Capnostat]
(8)	17	Indicates option unit type in codes. '0' : None '1' : HU-71 (IBP×2, TEMP) '2' : HU-72 (IBP×3) '3' : HU-73 (IBP, CO, TEMP)
(9)	18 to 19	Reserved (2 digits)

To Install the Paper

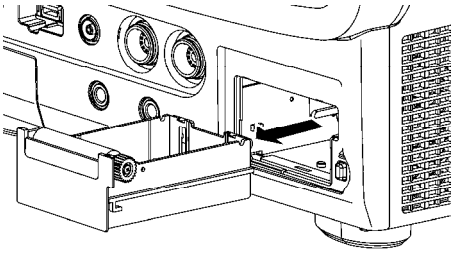
1 **Press the button located on the right side of the paper cassette.**



2 **The paper cassette will come out.**

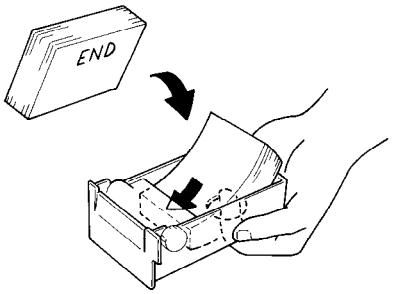


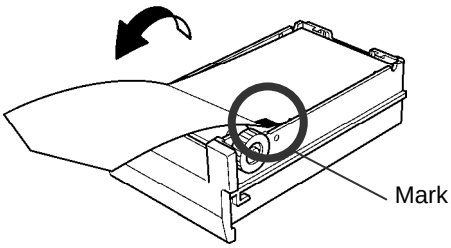
3 **Pull out the paper cassette.**



4 **Set the recording paper.**

The side with “END” printed is the backside of the recording paper. Face the backside to the bottom of the cassette and place it under the holding plate. Flip the top page, and check if the thermal printing side (side with the black mark) is on the front right side of the paper.



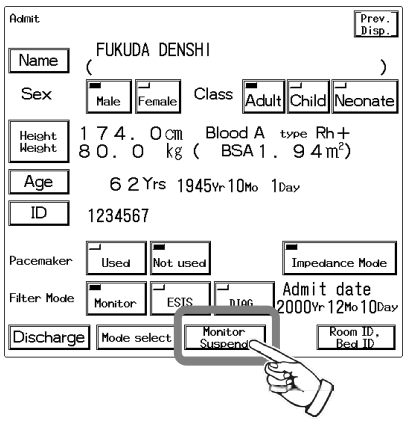


5 **Place the cassette back in. Push in until it locks into place with a click sound.**

To Suspend Monitoring

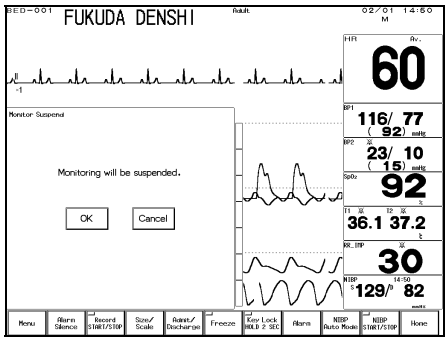
When not monitoring for a while, turning OFF the power will erase the recall data, ST measurement, OCRG data.
However, using the monitoring suspend function allows suspension of data measurement, alarm generation, automatic measurement, automatic recording without erasing the data or setup details.

1 Press the [Monitor Suspend] key on the admit / discharge menu.



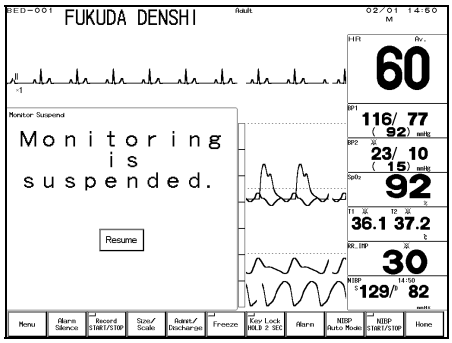
Press the [Menu] → [Admit / Discharge] → [Monitor Suspend] key.

2 Suspend monitoring.



Pressing the [OK] key on the confirmation display will suspend monitoring.
Pressing the [Cancel] key will return to the previous display.

3 Verify that the monitoring is suspended.



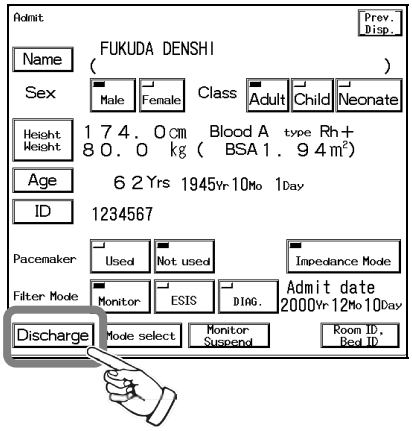
The [Resume] key will be displayed on the home display. On the home display, numeric data and waveform display will be suspended, and all the key operation except the [Resume] key will become ineffective.

NOTE	If monitoring is suspended when telemetry module is used, telemetry transmission will be ceased. In such case, too far condition will be observed on the central monitor.

Discharging Procedure

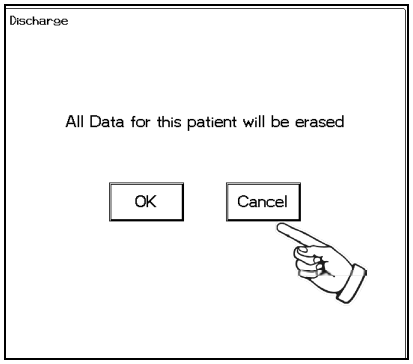
This procedure will erase the past data, such as patient name, ID, age, tabular / graphic trend, and recall.

1 Press the [Discharge] key on the admit / discharge menu.



Press the [Menu] → [Admit / Discharge] → [Discharge] key.

2 Perform the discharge procedure.



[OK] key will discharge the patient.
[Cancel] key will return to the previous display.

3 When the discharge procedure is performed, and [Suspend] is selected for "Discharge Mode" (Monitor Setup), the following window will be displayed on the home display.

Pressing the [Admit] key will start monitoring.

By connecting the ventilator to the DS-7200 with multiport relay cable, or status connector (1 to 5) or serial connector (COM3), the DS-7200 is capable of monitoring ventilator measurements and ventilator alarm, and notifying them to the central monitor via telemetry, wired network, or TCON system.

⚠WARNING

- The ventilator alarm on this monitor should be used as supplementary function. Check the patient's condition, ventilator alarm sound and message occasionally.
- If the DS-7200 system does not generate an alarm even though the ventilator is generating an alarm, or if any other malfunction occurs, immediately check the ventilator, DS-7200 system, cable, and replace the cable if necessary. If the malfunction persists, stop using the device.
- The alarm generation on the DS-7200 system is not assured if the alarm other than the following generates at the ventilator.
  - SV-900
    gas supply alarm, power failure alarm, expiratory minute volume alarm, airway pressure upper limit alarm, apnea alarm, O_2 concentration alarm
  - SV-300
    airway pressure upper limit alarm, high continuous pressure alarm, O_2 concentration lower limit alarm, expiratory minute volume upper/lower limit alarm, apnea alarm, gas supply alarm, air supply alarm, O_2 supply alarm, battery alarm, limited battery alarm, no battery alarm, overrange alarm
  - Servo-i
    airway pressure upper limit alarm, high continuous pressure alarm, O_2 concentration lower limit alarm, expiratory minute volume upper/lower limit alarm, apnea alarm, gas supply alarm, O_2 supply alarm, battery alarm, no battery alarm, limited battery alarm, overrange alarm, expiratory cassette disconnected alarm, backup ventilation alarm, regulation pressure limited alarm, respiratory rate alarm, PEEP low alarm, $EtCO_2$ upper limit alarm, $EtCO_2$ lower limit alarm
  - Servo-s
    airway pressure upper limit alarm, high continuous pressure alarm, O_2 concentration lower limit alarm, expiratory minute volume upper/lower limit alarm, apnea alarm, gas supply alarm, air supply alarm, O_2 supply alarm, backup ventilation alarm, respiratory rate alarm, PEEP low alarm
  - PB-740/ PB-760/ PB-840/ PB-7200
    The alarm information is acquired from the nurse call port. The ventilator alarm that cannot be acquired from the nurse call port is not guaranteed. For corresponding alarm, refer to the service representative of the ventilator manufacturer.
- The DS-7200 system will not correspond to the following alarms generated on the Evita 4 / Evita XL / Evita 2 dura.
  - O_2 monitoring disabled alarm, CO_2 alarm disabled alarm, Oximeter alarm disabled alarm, Neo. volume measurement inoperable alarm, Minute volume alarm disabled alarm, Minute volume alarm low off alarm, Tidal volume alarm high off alarm, Apnea alarm off alarm, Nebulizer active alarm
- There is a communication delay of 3 seconds between the DS-7200 system and the Evita ventilator. Therefore, if the alarm generated at the ventilator is resolved within 3 seconds, the ventilator alarm may not be generated at the DS-7200 system.
- The DS-7200 system will not correspond to the following alarms generated on the Savina.
  - O_2 monitoring disabled alarm, Minute volume alarm disabled alarm, Minute volume alarm low off alarm, Tidal volume alarm high off alarm, Apnea alarm off alarm, Nebulizer active alarm
- There is a communication delay of 3 seconds between the DS-7200 system and the Savina ventilator. Therefore, if the alarm generated at the ventilator is resolved within 3 seconds, the ventilator alarm may not be generated at the DS-7200 system.

⚠CAUTION	● The ventilator operation should be performed by well-trained and authorized personnel. ● For connecting the DS-7200 system and ventilator, use only the specified connection cable. ● Verify that the DS-7200 system and the ventilator are properly connected. ● When connecting the cable, verify that the main power of the DS-7200 system and the ventilator is OFF.

●Multiport Relay Cable Connection

Connect the CJM-01SR0.6 multiport relay cable (optional accessory) to the multiport input connector on the left side of the monitor.

●Ventilator Connection

Connect the monitor and ventilator with a ventilator cable (optional accessory) connected to port A or B of the multiport relay cable or status connector (1 to 5), serial connector (COM3).

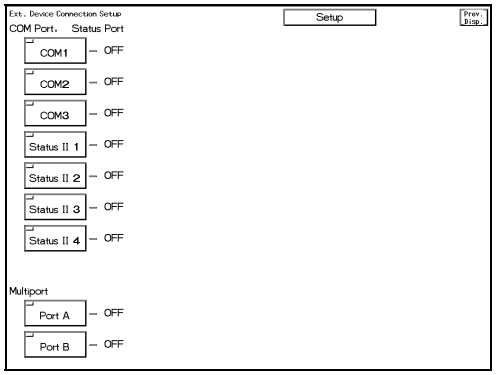
Ventilator	***Ventilator Cable***		
	For Multiport Relay Cable Connection	***For StatusII Connector (1 to 5) Connection***	***For COM Connector (COM3) Connection***
Servo Ventilator 900C/900D/900E	(connection not possible)	CJ-400RI-70SV9	CJ-500
Servo Ventilator 300/300A	CJ-514	CJ-401RI-70SV3	CJ-501
Servo Ventilator Servo-i/Servo-s	CJ-584	CJ-402RI-70SVI	CJ-502
PURITAN-BENNETT Ventilator 7200ae/7200e	CJ-518, CJ-525A (Qty. 1 each)	(connection not possible)	(connection not possible)
PURITAN-BENNETT Ventilator 740/760/840	CJO-02RR4, CJ-527 (Qty. 1 each)	CJ-403RI-70PB	CJ-504
Dräger Medical® Ventilator Evita 4/Evita XL/Evita 2 dura/ Savina	CJ-583	CJ-402RI-70SVI	CJ-502

Reference For connecting procedure, refer to “9. Installation Ventilator Data and Alarm”.

NOTE	● Only one ventilator can be connected for each DS-7200 system. ● StatusII-1 connector does not have the communication function for Evita 4 / XL / 2 dura /Savina. Connect the connection cable to StatusII-2 to 5 connector when communicating with Evita 4 / XL / 2 dura / Savina through the StatusII connector.

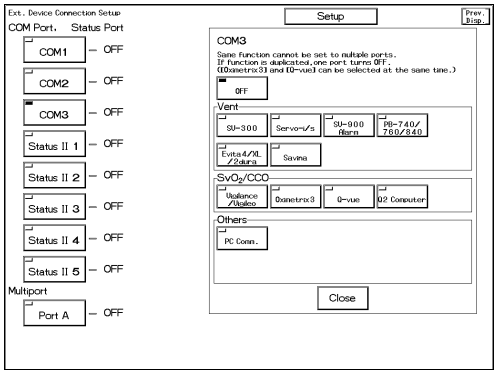
●Ventilator Selection

1 Press the [Menu] → [System Configuration] → [Pre-Set] → [Hospital Setup] → [Ext. Device Connection] keys.



The multiport connection setup menu will be displayed.
Select the port from [COM3] / [StatusII] (1 to 5) / [Port A] / [Port B].

2 Select the ventilator.



< When [COM3] is selected >

NOTE	● If communication with ventilator is already established through the corresponding connector, it is necessary to disconnect the communication in order to change the selection on this menu. ● StatusII-5 connector and multiport connector cannot be used at the same time. The selection of which connector to use can be performed on the External Device Connection Setup menu. For procedure, refer to "8. System Configuration Hospital Setup ●External Device Connection Setup".

●Ventilator Alarm Message

Ventilator alarm and ventilator connection status alarm can be generated on the monitor.
When wired or wireless network is constructed, ventilator alarm can be notified to the central monitor.
For the SV-300, Servo-i, Servo-s, ventilator alarm factor can be also notified to the central monitor.

【Ventilator Alarm Message】

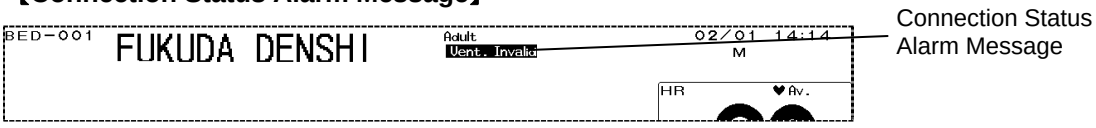
Ventilator Alarm Message

Life Threatening Alarm (Alarm Level 1)

Equipment	*Message*
Ventilator	"Vent. Alarm"

⚠WARNING	The ventilator alarm sound is set to OFF at factory default setting. For procedure to turn ON the alarm sound, refer to "4. Monitoring Setup Volume Setup".

【Connection Status Alarm Message】



Life Threatening Alarm (Alarm Level 1)

Equipment	***Message***
Ventilator	"Vent. Invalid"

Notification Alarm (Alarm Level 4)

Equipment	***Message***
Ventilator	"Vent. Disable"
	"Vent. Online"

⚠WARNING	After connecting the ventilator and the DS-7200, ensure that "Vent. Online" message is displayed for the connection status. Otherwise, the DS-7200 will not detect the ventilator alarm.

【Ventilator Alarm Factor】

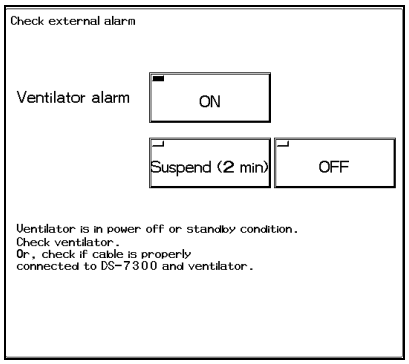
For the SV-300, Servo-i, Servo-s, ventilator alarm factor if specified will be notified and displayed on the central monitor.

Displayed Alarm Message	***Description***
VENT AWP	Airway Pressure Alarm
VENT MV	Minute Ventilation Alarm
VENT APNEA	Apnea Alarm
VENT CONT. HP	Continuous High Pressure Alarm
VENT Upper FiO_2	FiO_2 Upper Limit Alarm
VENT Lower FiO_2	FiO_2 Lower Limit Alarm
VENT Upper CO_2	$EtCO_2$ Upper Limit Alarm
VENT Lower CO_2	$EtCO_2$ Lower Limit Alarm
VENT Upper RR	RR Upper Limit Alarm
VENT Lower RR	RR Lower Limit Alarm
VENT PEEP	PEEP Low Alarm
VENT COMM	Power OFF, Cable disconnected, Standby condition, etc.
VENT URGENT	Other high level alarm
VENT	Other ventilator alarm

⚠CAUTION	● For the SV-900, PB, Evita, and Savina ventilator alarm factor cannot be transmitted to the central monitor. ● Depending on the central monitor type and software version, ventilator alarm factor may not be displayed. For details, refer to our service representative. ● The ventilator alarm factor listed above are displayed only on the central monitor. These will not be displayed on the bedside monitor.

●Check External Alarm

A confirmation display will appear when the ventilator cable is disconnected from the multiport relay cable or ventilator, or when the power of the ventilator is turned OFF.



ON will continue communication with the ventilator during ventilator alarm condition. Check the ventilator power and cable connection.

Suspend (2 min) will suspend the ventilator alarm for 2 minutes. If the ventilator alarm condition remains after 2 minutes, the alarm will generate again.

OFF will cancel the ventilator alarm until the ventilator connection condition returns to normal.

⚠CAUTION	● Check occasionally the communication status of the DS-7200 and the ventilator. ● Verify that a ventilator alarm is not generated, and that the “Vent. Online” message is displayed. ● The “Check external alarm” window will be displayed until proper communication with the ventilator is resumed. When the communication is resumed, the screen will automatically return to the home display. ● When disconnecting the ventilator and the DS-7200, make sure to select OFF on the “Check external alarm” window which appears when the power of the ventilator is turned OFF, or when the cable is disconnected.

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Chapter 3

Vital Application

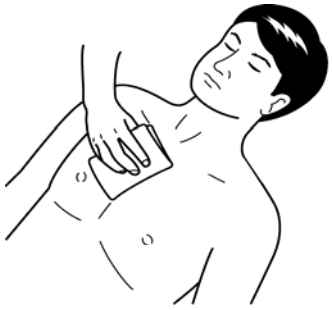
This chapter describes the procedure for vital application.

To Acquire ECG Waveform

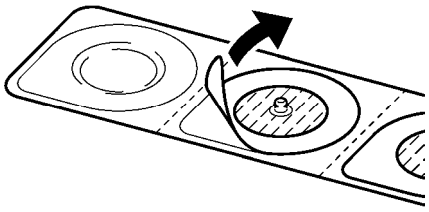
Before Attaching the Electrodes

⚠CAUTION	Always use the same type of electrodes. If different types of electrodes are used at the same time, the difference between the polarization potential from each electrode may interfere monitoring.

1 **Clean the electrode sites with alcohol wipes or other skin preparation. If necessary, shave the electrode sites to remove excessive hair.**



2 **Remove the disposable electrode from its packing.**



Pay attention not to touch the electrode gel.

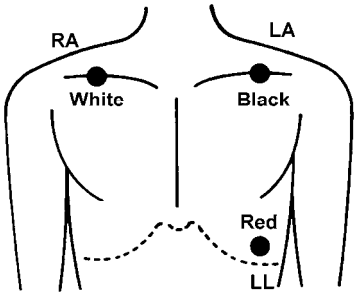
Electrode Placement

There are 3-electrode, 4-electrode, 5-electrode, 10-electrode application depending on the cable type. Using the 4-electrode, 5-electrode or 10-electrode application allows simultaneous monitoring of 2 ECG waveforms, and high accuracy of arrhythmia analysis can be attained.
Also, the displayed lead type can be changed.

For 3-electrode lead (1 waveform monitoring)

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

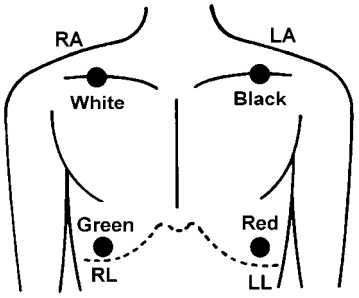
Symbol	*Color*	*Electrode Site*
RA	White	On the right infraclavicular fossa
LA	Black	On the left infraclavicular fossa
LL	Red	On the left midclavicular line, near the supracrestal line.



For 4-electrode lead (Max. Simultaneous 6 waveforms monitoring)

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

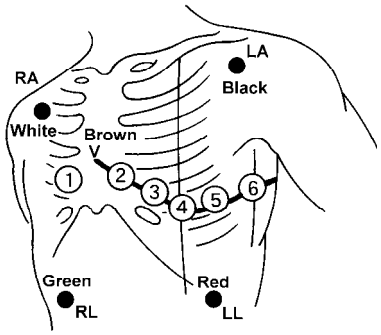
Symbol	*Color*	*Electrode Site*
RA	White	On the right infraclavicular fossa
LA	Black	On the left infraclavicular fossa
LL	Red	On the left midclavicular line, near the supracrestal line.
RL	Green	On the right midclavicular line at the same height as LL.



For 5-electrode lead (Max. Simultaneous 7 waveforms monitoring)

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

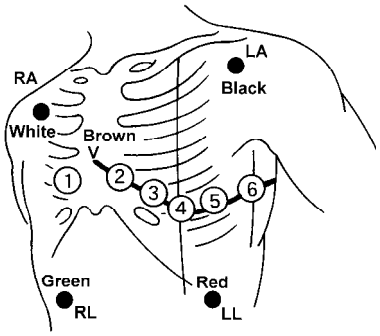
Symbol	*Color*	*Electrode Site*
RA	White	On the right infraclavicular fossa
LA	Black	On the left infraclavicular fossa
LL	Red	On the left midclavicular line, near the supracrestal line.
RL	Green	On the right midclavicular line at the same height as LL.
V	Brown	Chest Lead (V1 to V6)



For 10-electrode lead (Max. Simultaneous 12 waveforms monitoring)

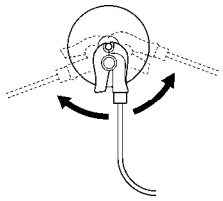
Lead Type [Ⅰ] / [Ⅱ] / [Ⅲ] / [aVR] / [aVL] / [aVF] / [V1] / [V2] / [V3] / [V4] / [V5] / [V6]

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



Connection to the Patient Monitor

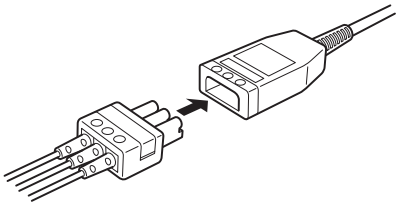
1 Connect the lead cable to the electrode.



Attach the lead cable end to the electrode (convex part).
Turn right and left to verify that it is securely attached.

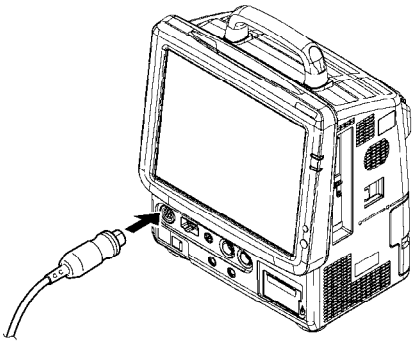
⚠CAUTION	● The indication for continuous use of the electrodes is about one day. ● Replace the electrode if the skin contact gets loose due to perspiration, etc. ● When an electrode is attached to the same location for a long period, some patients may develop skin irritation. Check the patient's skin condition periodically and change the electrode site as required.

2 Connect the lead cable to the relay cable.

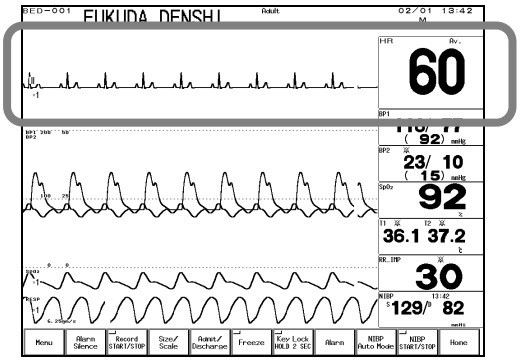


⚠CAUTION	Use only the ECG lead/relay cable specified by Fukuda Denshi. If the specified lead/relay cable is not used when using a defibrillator, performance degradation or damage of the equipment may be caused.

3 Plug in the relay cable to the ECG input connector (green) of the DS-7200.



4 Verify that the ECG waveform is displayed on the monitor.

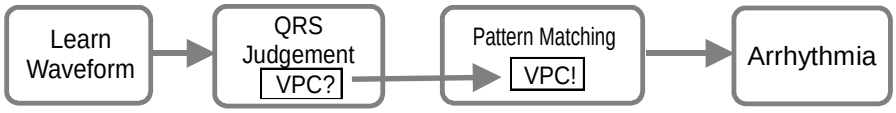


Adjust the waveform size and position.
The monitoring lead can be also changed.

Reference Refer to " 6. Parameter Setup ECG" for waveform size / lead setup.

About the Arrhythmia Analysis

Arrhythmia Analysis Flow



The arrhythmia detection algorithm learns the normal waveform of the patient and compares the waveform (QRS pattern) and RR interval for each heartbeat to determine the VPC. It compares the parameters such as QRS amplitude, QRS width, QRS polarity, RR interval, and selects abnormal QRS. Then the QRS with suspected VPC is pattern matched to distinguish the noise and VPC. This will finally determine the VPC and generate the arrhythmia alarm.

●QRS Classification

Each QRS will be classified to the following pattern.

N (Normal)	Normal QRS beat
V (VPC)	Ventricular Extrasystole
S (SVPC)	Supraventricular Extrasystole
P (Pacing Beat)	Pacing beat
F (Fusion Beat)	Fusion beat of pacing and spontaneous beat
? (Undetermined Beat)	Learning arrhythmia, or beat not matching any pattern

●Arrhythmia Type

With the above QRS judgment, the following 12 types of arrhythmia alarm can be generated.

Type	***Meaning***	***Detection Criteria***
ASYSTOLE	Cardiac Arrest	Cardiac arrest is detected for more than the preprogrammed time.
VF	Ventricular Fibrillation	A random, rapid electrical activity of the heart is detected.
VT	Ventricular Tachycardia	HR is same or above the preprogrammed value (140bpm or 120bpm), and 9 or more continuous ventricular beats are detected.
SLOW_VT		9 or more continuous ventricular beats are detected. (HR: below 140bpm / 120bpm)
TACHY	Tachycardia	HR is over the upper alarm limit.
BRADY	Bradycardia	HR is below the lower alarm limit.
RUN	Consecutive VPC	HR is same or above the preprogrammed value (0 to 100bpm), and continuous VPC exceeding the preprogrammed value (2 to 8 beats) is detected.
COUPLET	Couplet Ventricular Extrasystole	2 continuous beats of VPC are detected.
PAUSE		Cardiac arrest exceeding the preprogrammed value is detected.
BIGEMINY	Ventricular Bigeminy	3 or more continuous QRS pattern of V-N is detected.
TRIGEMINY	Ventricular Trigeminy	3 or more continuous QRS pattern of V-N-N is detected.
FREQUENT	Frequent VPC	VPC exceeding the preprogrammed value is detected within 1 minute.

⚠CAUTION	When arrhythmia is present, HR measurement accuracy may be degraded.

Filter Selection

●Filter Mode Setup

The waveform frequency characteristic can be selected from Monitor Mode, ESIS Mode, or Diagnosis Mode according to the monitoring purpose.

1. Monitor Mode Frequency Characteristic Adult/Pediatric: 0.5 to 40Hz Neonate: 1.6 to 40Hz

This is the standard mode for ECG monitoring. The upper frequency is set to 40Hz to reduce artifact caused by EMG, etc.

2. ESIS Mode Frequency Characteristic Adult/Pediatric/Neonate: 1.6 to 15Hz

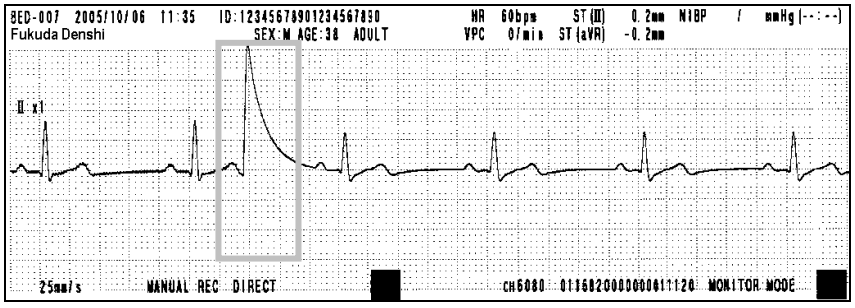
By selecting this mode when using electrosurgical instrument, electrical noise can be largely reduced.

⚠CAUTION	The ESIS mode can largely reduce the artifact such as electrosurgery noise and EMG, but it may also reduce the QRS amplitude. The ESIS mode should be selected only during electrosurgery.

3. Diagnosis Mode Frequency Characteristic For 3-electrode Adult/Pediatric/Neo: 0.05 to 100Hz
For 4, 5, 10-electrode Adult/Pediatric/Neo: 0.05 to 150Hz

Select this mode when monitoring ECG with high frequency characteristic.

NOTE	When the filter setup is changed, a notch will appear on the ECG waveform due to the change in frequency characteristic. This will appear on the display, recording, and recall waveform.

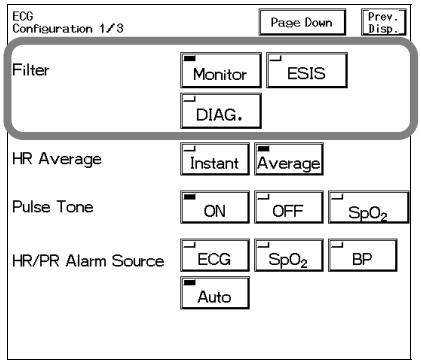


Reference Refer to ”6. Parameter Setup ECG” for details of filter mode.

●Procedure for Filter Mode Selection

1 **Press the ECG parameter key to display the ECG configuration menu.**

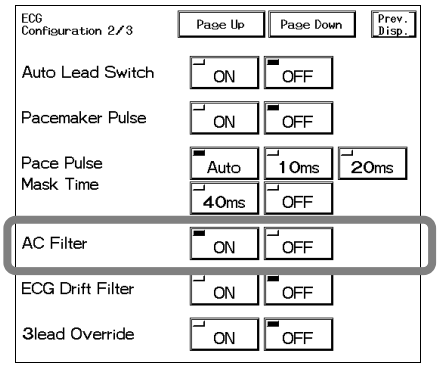
2 **Press the [Config.] key.**



3 **Select the filter mode from the 3 selections.**

●AC Filter

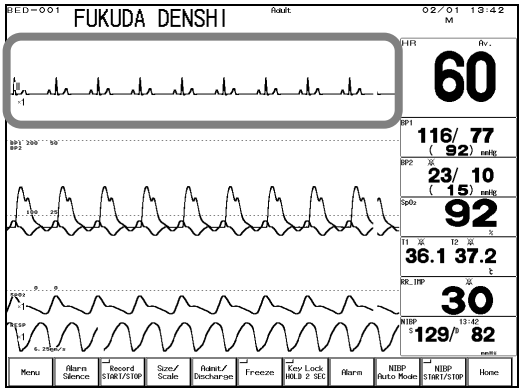
By setting the “AC Filter” to ON (Page 2/3 of ECG Configuration), the frequency component (50Hz or 60Hz) can be cut off from the ECG waveform.



Respiration (Impedance Measurement)

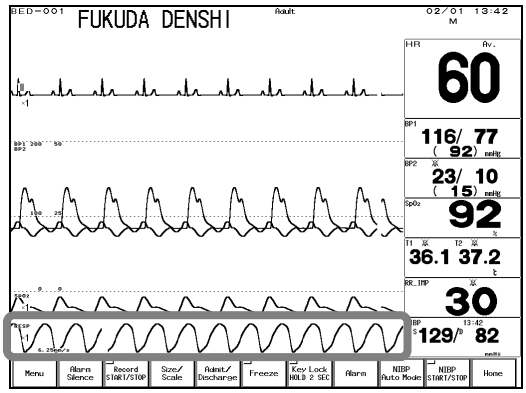
⚠CAUTION	● When the following ECG relay cables are used, respiration cannot be measured. • Relay Cable CI-700E-3 (FA) (Defibrillation and electrosurgery-proof, 3-electrode) • Relay Cable CI-700E-4 (FA) (Defibrillation and electrosurgery-proof, 4-electrode) • Relay Cable CI-700E-5 (FA) (Defibrillation and electrosurgery-proof, 5-electrode) ● When a defibrillator is used during respiration monitoring, a large offset voltage will be placed on the ECG electrodes, which may cause interruption of monitoring for a few seconds.

1 Verify that the ECG waveform is properly acquired.



The respiration waveform is detected from lead II of ECG mentioned in the previous section. Therefore if stable ECG is acquired, the respiration waveform can be acquired at the same time.

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



Adjust the waveform size, baseline position and sweep speed.

Reference

Refer to “6. Parameter Setup Respiration” for waveform scale / baseline setup.
Refer to ”8. System Configuration Sweep Speed” for waveform sweep speed setup.

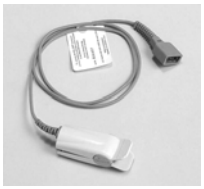
To Measure the SpO_2 (Nellcor® Model: DS-7210)

This section explains the procedure for SpO_2 measurement when the Nellcor® SpO_2 unit is used.

1 Prepare an appropriate probe or sensor for the patient.

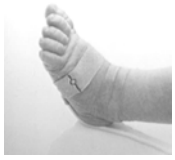
Sensor Types

Probe Type (Reusable type, for adult finger)

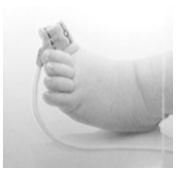


Durasensor® DS-100A
For adult with weight of 40kg and over.
This is for temporary use. When continuously using it for a long period of time, use the following single patient use type.

Single-Patient-Use Type



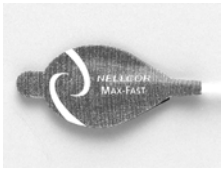
OxiMax® MAX-N (for neonate toe/adult finger)
For neonate with weight of less than 3kg or adult with weight of 40kg and over



OxiMax® MAX-I (for infate toe)
For pediatric with weight of 3 to 20kg

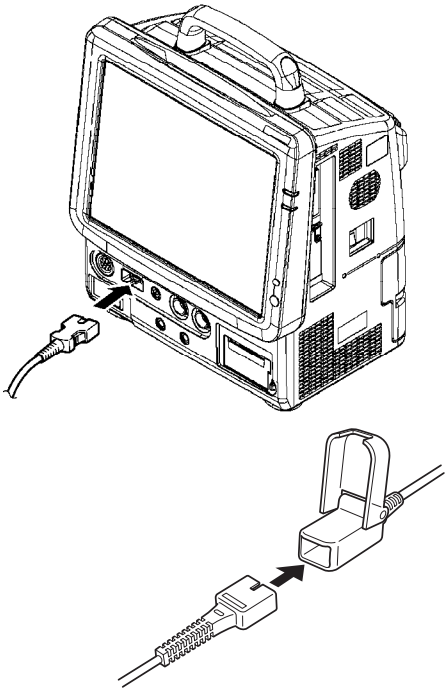
OxiMax® MAX-P (for pediatric finger)
For pediatric or adult with weight of 10 to 50kg

OxiMax® MAX-A (for adult finger)
For adult with weight of 30kg and over.



OxiMax® MAX-FAST (for adult/pediatric forehead)
For adult/pediatric with weight of 10kg and over.
With the use of new technology of NELLCOR®, OxiMax®, stable monitoring during body motion / low perfusion is possible.

2 Connect the sensor to the patient monitor.



(1) Connect the SpO_2 relay cable (DOC-10) to the SpO_2 connector on the patient monitor.

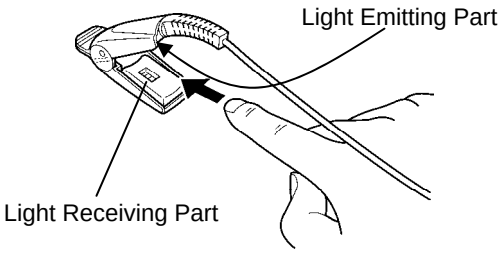
(2) Insert the sensor into the SpO_2 relay cable connector, and lock it with the transparent cover.

⚠CAUTION	The SpO_2 patient cables (PC04, PC08, and PC12) are intended for Masimo SET sensors only. Do not connect them to DS-7210. If connected to other device, it will not function properly.

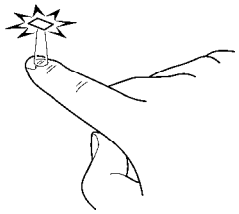
3 Attach the sensor to the patient.

⚠CAUTION	● If the nail is rough, dirty, or manicured, accurate measurement will not be possible. Change the finger or clean the nail before attaching the probe and sensor. ● The Dyna Alert estimates the change in circulatory dynamics from the photoplethysmogram (SpO_2) of the finger. (Refer to "6. Parameter Setup/Non-Invasive Blood Pressure/NIBP Monitoring Condition Setup/Dyna Alert Function".) Therefore, if the photoplethysmogram (SpO_2) is measured on the toe or forehead (with MAX Fast), the Dyna Alert may not function depending on the patient's condition.

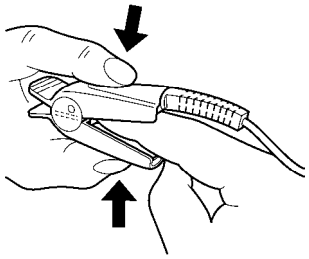
【Probe Type Sensor】



(1) Attach the probe as shown on the left.
The probe cable should be on the nail side.



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

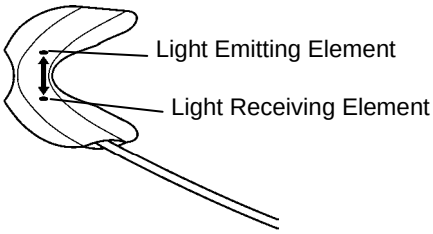


(3) Press the probe lightly so that the finger and the rubber cover are in contact.
This is to stabilize the probe, and to avoid ambient light to get in.

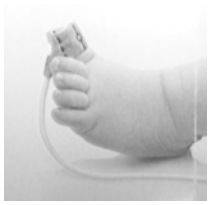
【Single-Patient-Use Type】

(1) Clean the attachment site with alcohol, etc.

(2) Align the light emitting element and light receiving element of the sensor with the measuring site in between when attaching the sensor to patient.



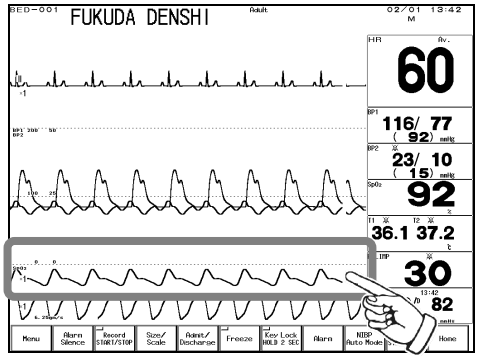
(3) Secure the cable with surgical tape so that the sensor does not come off when the cable is pulled.



Attachment to the toe

Attachment to the finger

4 Verify that the SpO_2 is displayed.



Press the [HOME] key on the lower part of the display. Verify that the SpO_2 measurement and SpO_2 waveform are displayed on the home display.

⚠WARNING	● When measuring the SpO_2 of patient with high fever or peripheral circulatory insufficiency, check the sensor attachment periodically and change the attachment site. The temperature of the attachment site will rise 2 to 3°C due to the sensor heat which may result in compression necrosis and burn injury. ● For the following case, accurate measurement may not be possible. • Patient with excessive abnormal hemoglobin (COHb, MetHb) • Patient with the pigment injected to the blood • Patient receiving CPR treatment • When a sensor is applied to a limb with NIBP cuff, arterial catheter, or intracatheter • When measuring at site with venous pulse • Patient with body motion • Patient with small pulse

⚠CAUTION	● If irritation such as skin reddening appears with the sensor use, change the attachment site or stop using the sensor. ● When fixing the sensor with a tape, do not wind the tape too tight. At the same time, check the blood flow constantly so that congestion is not generated at the peripheral. ● Even a short duration of attachment may inhibit the blood flow and generate compression necrosis and burn injury. ● As the skin of neonate / low birth weight infant is immature, change the sensor attachment site more frequently depending on the condition. ● Excessive light may cause inaccurate measurements. In such cases, cover the sensor with opaque material. ● When not performing the measurement, unplug the relay cable and sensor from the SpO_2 connector. Otherwise, the measurement data may be erroneously displayed by the ambient light. ● The pulse wave is normalized for SpO_2 measurement. It does not indicate perfused blood volume. Check proper probe attachment by observing the pulse wave. ● If "– – –" is displayed for the SpO_2 numeric data, make sure that the sensor is properly attached.

⚠CAUTION	Precautions for Reusable Type Sensor (DS-100A) • The light-emitting part of the sensor should be over the root of the fingernail. Do not insert the finger too far into the sensor as it may hurt the patient. • The DS-100A is intended for use on finger of adults weighing over 40 kg (approximate). Do not use them on children or neonates. Also do not apply them on the thumb or toe. • The DS-100A must be moved to a new site at least every 4 hours. Because individual skin condition affects the ability of the skin to tolerate sensor placement, it may be necessary to change the sensor site more frequently with some patients. If skin integrity changes, move the sensor to another site. • For additional warnings, cautions, or contraindications when using sensors with DS-7210 Nellcor® model, refer to each SpO_2 sensor instruction manual.

⚠CAUTION	Precautions for Single-Patient-Use Type Sensors • Do not wind the tape too strong. It may obstruct the blood flow. • The sensor is contraindicated for use on patients who exhibit allergic reactions to the adhesive tape. • The sensor can be reused on the same patient as long as the adhesive tape attaches without slippage. But do not reuse on other patients. It is intended for single patient use only. • For the single patient use type sensors, the site must be inspected every 8 hours (MAX-FAST: 12 hours) to ensure adhesion, skin integrity, and correct optical alignment. If skin integrity changes, move the sensor to another site. • Do not reuse the sensor by resterilizing it. • Dispose the sensor after use. In the event of damage to the sterile packaging, do not use it. • For additional warnings, cautions, or contraindications when using sensors with DS-7210 Nellcor® model, refer to each SpO_2 sensor instruction manual.

To Measure the SpO_2 (Masimo® Model: DS-7210M)

This section explains the procedure for SpO_2 measurement when the Masimo® SpO_2 unit is used.

1 Prepare an appropriate probe or sensor for the patient.

Sensor Types

Reusable Sensor

This is intended for temporary use. Change the sensor attachment site every 4 hours.
If continually using for long hours, use the single patient use type sensor.

LNOP® DCI
For adult and pediatric weighing more than 30kg.
Attach to ring or middle finger of non-dominant hand.

Single-Patient-Use Type Sensor

The sensor can be reused on the same patient as long as the light emitting and receiving part is clean, and if it is still adhesive to the skin.
Change the sensor attachment site every 8 hours.

LNOP® Neo
For neonates and infants weighing less than 10kg.
For neonates weighing under 3kg: Attach across the foot or alternatively across the palm & back of hand.
For infants weighing over 3kg: Attach to the thumb or the great toe.

LNOP® Neo-L
For neonates and infants weighing less than 10kg.
Attach across the foot or alternatively across the palm & back of hand.

LNOP® NeoPt
For premature infant weighing less than 1 kg.
Attach across the foot or alternatively across the palm & back of hand.

LNOP® NeoPt-L
For premature infant weighing less than 1kg.
Attach across the foot or alternatively across the palm & back of hand.

LNOP® Inf-L
For infant weighing 3 to 10kg.
Attach to the big toe or thumb.

LNOP® Pdt
For pediatric or adult weighing 10 to 50kg.
Attach to the ring or middle finger of non-dominant hand.

LNOP® Adt
For adult and pediatric weighing more than 30kg.
Attach to the ring or middle finger of non-dominant hand.

LNOP® Adt Long
For adult and child weighing more than 30kg.
Attach to the ring or middle finger of non-dominant hand.

2 Connect the patient cable to the monitor.

⚠CAUTION	The SpO_2 patient cables (PC04, PC08, PC12) are intended for Masimo SET sensors only. Connect them only to DS-7210M. If connected to other device, it will not function properly.

3 Select the sensor attachment site.

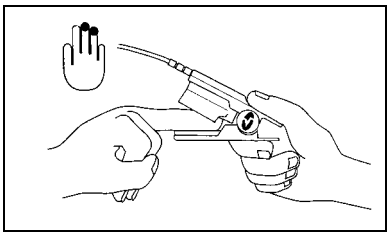
- Select a site with good perfusion, and where it will not obstruct the patient's movement. If possible, select a non-dominant hand.
- Verify the light receiving part of the sensor is completely covered by the finger.
- Before attaching the sensor, clean the attachment site.

4 Attach the sensor to the patient.

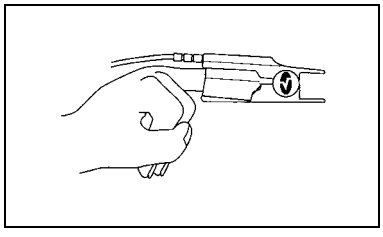
The attachment procedure is different for each sensor.

⚠CAUTION	● If the nail is rough, dirty, or manicured, accurate measurement will not be possible. Change the finger or clean the nail before attaching the probe and sensor. ● The Dyna Alert estimates the change in circulatory dynamics from the photoplethysmogram (SpO_2) of the finger. (Refer to "6. Parameter Setup/Non-Invasive Blood Pressure/NIBP Monitoring Condition Setup/ Dyna Alert Function".) Therefore, if the photoplethysmogram (SpO_2) is measured on the toe, the Dyna Alert may not function depending on the patient's condition.

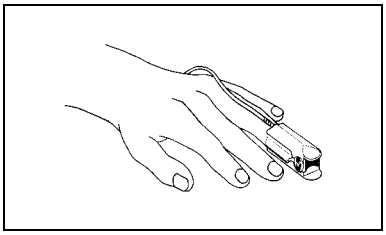
【For Reusable Type: LNOP® DCI】



(1) Press the hinge to open the sensor. Place the selected finger inside the opening of LNOP® DCI sensor. Fleshed part of the finger should cover the detecting element located at the lower part of the sensor. The upper half of the sensor connects to the cable. The fingertip should touch the finger stop (arched part) inside the sensor. If the nail is too long, it may go beyond the finger stop.



(2) Release the hinge and adjust it so that the sensor force is equally applied to the entire finger. To acquire correct data, the detecting element should be completely covered.

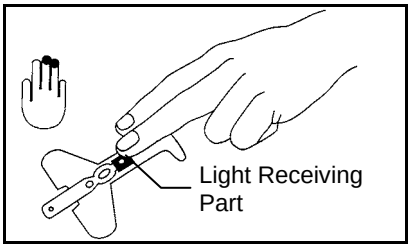


(3) Pass the sensor cable over the back of the hand.

【For Single-Patient-Use Type: LNOP® Adt】

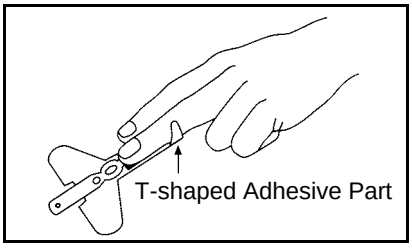
(1) Take out the sensor from the bag, and face the yellow-brown printed-side downward.
(2) Bend the sensor backward and peel off the adhesive backing.

(3) Position the sensor so that the light receiving part touches the finger.



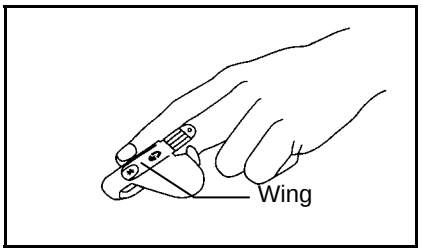
(4) Place the light receiving part of the sensor to the fleshed part of the fingertip.

(5) Press the T-shaped adhesive part to the side of the finger.

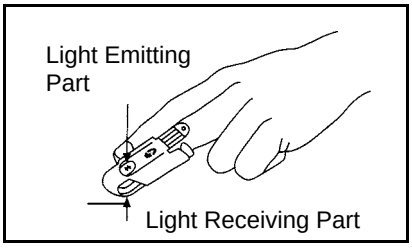


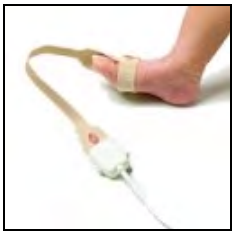
(6) Wrap the light emitting part and finger-printed part around the nail.

(7) Fold the wings (adhesive) one at a time, and attach them around the finger.



(8) The light emitting part and light receiving part of the sensor should be aligned.

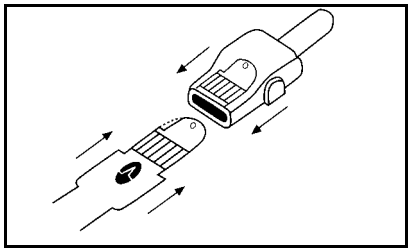




Attachment to the toe

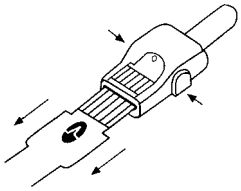
Attachment to the finger

5 Connect the patient cable and the sensor.



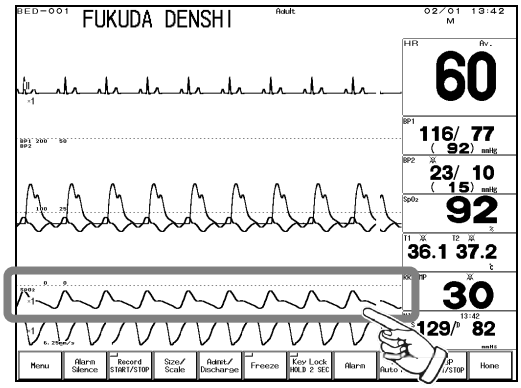
Face the metallic side of the sensor upward and align the logo with that of the patient cable.
Insert the sensor connector to the patient cable until a click sound is heard.

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



When disconnecting the patient cable and sensor, pull slowly while pressing the lock buttons on the patient cable.

6 Verify that the SpO_2 data is displayed.



Press the [Home] key on the lower part of the display. Verify that the SpO_2 measurement and pulse wave are displayed on the home display.

Average SpO_2 value for the duration selected for "SpO_2 Averaging" will be displayed.

⚠WARNING	● Be cautious when setting the "SpO_2 Averaging" duration as the SpO_2 alarm is based on the displayed SpO_2 value which is averaged from the duration set in "SpO_2 Averaging". The alarm occurrence time will be affected or may not occur for the transient value of SpO_2 depending on the set duration. ● When measuring the SpO_2 of patient with high fever or peripheral circulatory insufficiency, check the sensor attachment periodically and change the attachment site. The temperature of the attachment site will rise 2 to 3°C due to the sensor heat which may result in compression necrosis and burn injury. ● For the following case, accurate measurement may not be possible. • Patient with excessive abnormal hemoglobin (COHb, MetHb) • Patient with the pigment injected to the blood • Patient receiving CPR treatment • When a sensor is applied to a limb with NIBP cuff, arterial catheter, or intracatheter • When measuring at site with venous pulse • Patient with body motion • Patient with small pulse

⚠CAUTION	● If irritation such as skin reddening appears with the sensor use, change the attachment site or stop using the sensor. ● When fixing the sensor with a tape, do not wind the tape too tight. At the same time, check the blood flow constantly so that congestion is not generated at the peripheral. ● Even a short duration of attachment may inhibit the blood flow and generate compression necrosis and burn injury. ● Change the sensor attachment site every 4 hours for the reusable sensor, and every 8 hours for the single patient use type sensor. Exercise extreme caution with poorly perfused patients; skin erosion and pressure necrosis can be caused when the sensor is not frequently moved. Assess site at least every 2 hours with poorly perfused patients. ● As the skin of neonate / low birth weight infant is immature, change the sensor attachment site more frequently depending on the condition. ● Excessive light may cause inaccurate measurements. In such cases, cover the sensor with opaque material. ● When not performing the measurement, unplug the relay cable and sensor from the SpO_2 connector. Otherwise, the measurement data may be erroneously displayed by the ambient light. ● The pulse wave is normalized for SpO_2 measurement. It does not indicate perfused blood volume. Check proper probe attachment by observing the pulse wave. ● The measurable pulse rate range is 25 to 240bpm. "×××" will be displayed if 25bpm and below or 240bpm and above is measured. ● If "– – –" is displayed for the SpO_2 numeric data, make sure that the sensor is properly attached.

⚠CAUTION	Precautions for Reusable Type Sensor (LNOP® DCI) • The light-emitting part of the sensor should be over the root of the fingernail. Do not insert the finger too far into the sensor as it may hurt the patient. • For additional warnings, cautions, or contraindications when using sensors with DS-7210M Masimo® model, refer to each SpO_2 sensor instruction manual. Precautions for Single-Patient-Use Type Sensors • Do not wind the tape too strong. It may obstruct the blood flow. • The sensor is contraindicated for use on patients who exhibit allergic reactions to the adhesive tape. • The Masimo ®LNOP sensor can be reused on the same patient as long as the light emitting and receiving part is clean, and if it is still adhesive to the skin. But do not reuse it on other patients. It is intended for single patient use only. • Do not reuse the sensor by resterilizing it. • Dispose the sensor after use. In the event of damage to the sterile packaging, do not use it. • For additional warnings, cautions, or contraindications when using sensors with DS-7210M Masimo® model, refer to each SpO_2 sensor instruction manual.

NOTE	The pulse wave for the Masimo® model (DS-7210M) will be displayed with approximately 630msec delay from the actual pulse.

To Measure the NIBP

This device measures the non-invasive pressure using the oscillometric method.

Cuff Connection and Patient Application

1 Select the appropriate cuff type for the patient.

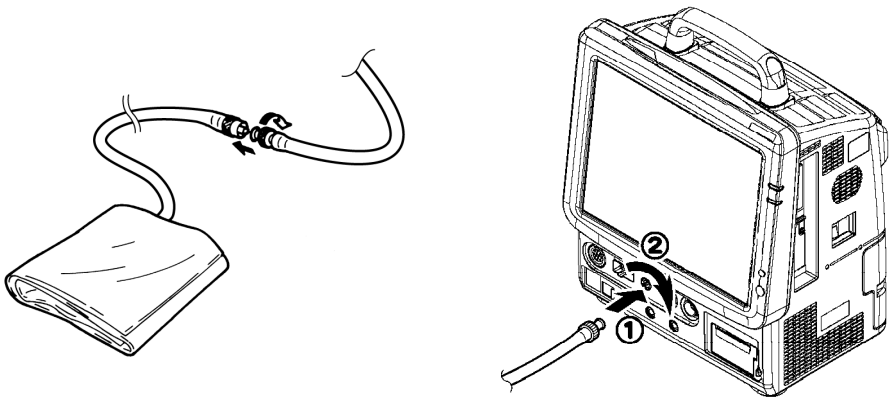
According to the AHA (American Heart Association) guideline, the appropriate cuff width is 40% of the arm circumference. Select the appropriate cuff on “12. Optional Accessories” from the list of specified NIBP cuffs.

⚠WARNING	Use only specified NIBP cuff. Refer to “12. Optional Accessories” for list of specified NIBP cuffs. These accessories may be purchased from Fukuda Denshi or NIBP cuff manufacturer that Fukuda Denshi recommends.

⚠CAUTION	● Select the appropriate cuff size which best fits the arm circumference. If the cuff size is inappropriate, it may cause measurement error. ● Do not use a cuff which is worn out. The cuff may burst during inflation. ● Do not reuse the disposable NIBP cuff.

2 Connect the cuff to the air hose, and then connect the air hose to the cuff connection connector on the monitor.

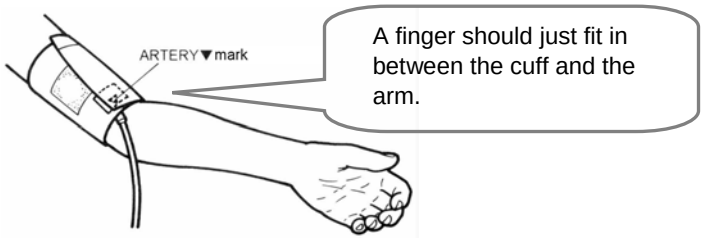
After connecting the air hose to the monitor (**1**), turn it to right (**2**) for secure connection.

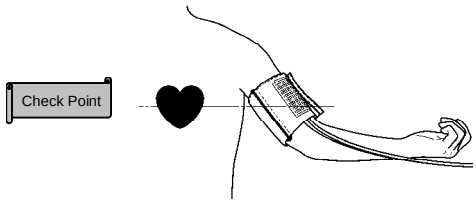


⚠CAUTION	If there is any air leakage, correct NIBP measurement cannot be performed. Make sure that the connection is secure.

3 Apply cuff to the patient.

Position the ARTERY▼mark over the artery on the patient's arm and wrap the cuff around.

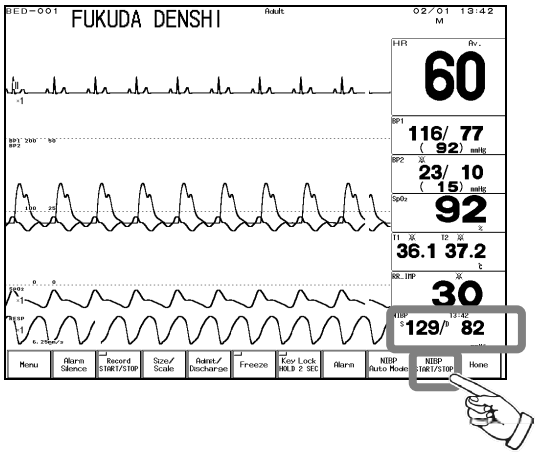


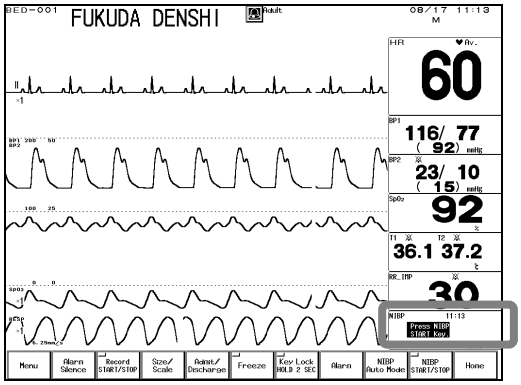


Align the cuff height and heart position to eliminate an error caused by the blood weight.
It is most appropriate to measure with the patient lying down and arms naturally extended.

4 Start the measurement.

Pressing the NIBP START/STOP key will start inflating the cuff pressure and starts the measurement.
Upon completion, the measured value will be displayed inside the NIBP numeric data box.





If Backup (Resume auto mode by manual measurement.) is selected for "NIBP Auto Mode" under "Backup at discharge" (Monitor Setup) and if NIBP measurement has not been performed before, "Press the NIBP START/STOP key." will be displayed inside the NIBP numeric data box when the power is turned ON, or when a patient is admitted.
The first measurement will start by pressing the NIBP START/STOP key or setting the NIBP measurement interval.

When using the DS-LANIII network or TCON system, the NIBP measurement can be started or stopped on the central monitor.

By selecting ON for "Alarm Occurrence at NIBP Failure" on the alarm setup menu, the NIBP measurement failure will be notified by "NIBP measurement failed." message display and alarm sound.

Reference

For details, refer to "4. Monitoring Setup Alarm Setup ON/OFF of Alarm Occurrence at NIBP Failure."

⚠WARNING	Before the measurement, make sure the patient classification (Adult / Child / Neonate) is properly selected. Otherwise, correct measurement cannot be performed, and congestion or other injury may result.

⚠CAUTION	● Correct NIBP measurement cannot be performed if artificial heart lung machine is used or if the pulse is difficult to detect. ● Pay attention when measuring the NIBP of patient with bleeding disorders or hypercoagulation. The cuff inflation may cause petechia or circulatory failure by blood clot. ● Do not apply the cuff to the arm or thigh where vein is secured. The blood may backflow causing the chemical injection to cease. ● Pay attention not to bend the cuff hose. ● Check the condition of cuff-applied part on the patient during measurement so that the blood circulation will not be blocked over a long period of time by the squashed or bent cuff hose. ● Check the patient's condition constantly while measuring over a long period of time with interval of 2.5 minutes or less. Also, periodically check the blood circulation while performing periodic measurement over a long period of time. Congestion or rash may occur at the measuring site. ● The following factors may affect the NIBP value. • Body motion, arrhythmia, convulsion • Continuous noise such as cardiac massage • Periodic electromagnetic noise

NOTE	When the cuff is not applied to the patient, pay attention not to leave the cuff unattended. If periodic or continuous measurement is set, the cuff will automatically inflate and may cause the rubber bag inside the cuff to burst. When not performing NIBP measurement, set the NIBP measurement interval OFF and disconnect the air hose from the NIBP connector.

【About the Oscillometric Method】

The oscillometric method measures the blood pressure by detecting the pulse oscillation change by the cuff pressure. The cuff connects to the NIBP cuff connector on the monitor via the air hose. The air pressure inside the cuff is converted to voltage by the pressure sensor, A/D converted, and transmitted to the CPU.
The measurement process is as follows.

1）The cuff inflates to the set value and inhibits the arterial blood flow at the measured site.

2）The cuff gradually deflates.

3）The arterial blood flow of the patient will return when the cuff pressure is decreased sufficiently.

Memo

4）The oscillation (pulse signal) caused by the restricted blood circulation is transmitted to the pressure sensor via the air hose, and converted to an electric signal.

5）From the pulse signal and cuff pressure detected at the pressure measurement circuit, the systolic, diastolic, average blood pressure and pulse rate will be measured at the CPU.

On the monitor, the value of systolic, diastolic, average blood pressure will be displayed.
The measurement will start with the following factor.

1）When the NIBP Start/Stop key is pressed.

2）At the set measurement interval.

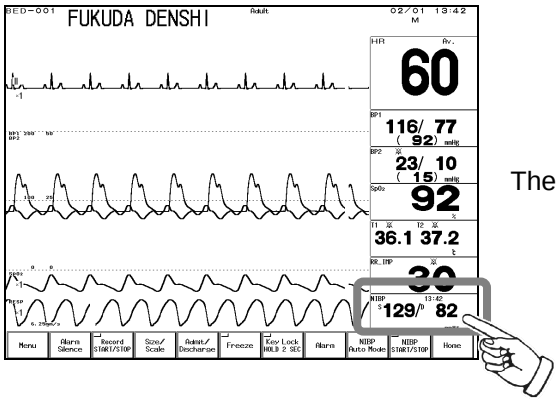
3）When the NIBP continuous measurement key is pressed. (for duration of max. 15 minutes)

4）At alarm occurrence (When "NIBP Measurement at Alarm Occurrence" is set to ON)

5）When change in circulatory state is detected from the time difference of ECG waveform and Pulse wave.

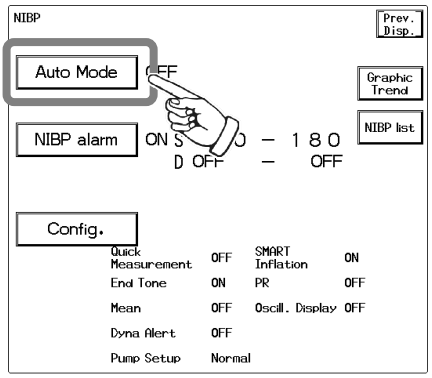
Procedure for Periodic Measurement

1 Press the NIBP parameter key on the home display.



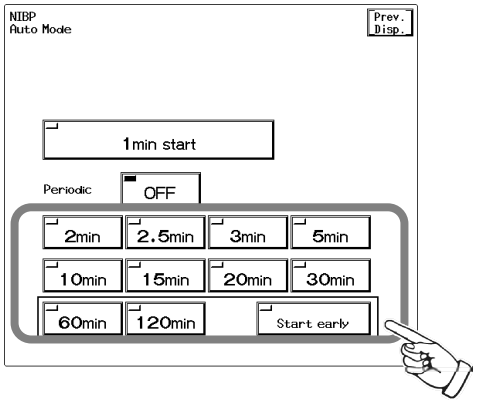
The NIBP setup menu will be displayed.

2 Press the [Auto Mode] key on the NIBP setup menu.



The interval time setup menu will be displayed.

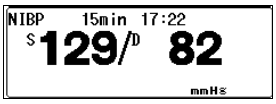
3 Select an interval time.



Press the key for the desired interval. Check that the key LED is lighted for the selected interval.

The measurement will automatically start at the selected interval.

The selected interval will be displayed inside the NIBP numeric data box.



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

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

2 min. : 13:16, 13:18, 13:20, …
2.5 min. : 13:15, 13:17:30, 13:20, …
3 min. : 13:15, 13:18, 13:21, …
5 min. : 13:15, 13:20, 13:25, …

When using the DS-LANIII network or TCON system, measurement interval for NIBP periodic measurement can be changed on the central monitor.

NOTE	If “Timer” is set for NIBP measurement on the central monitor, “Auto Mode” will be set to OFF on the DS-7200, but the measurement will start according to the central monitor setting.

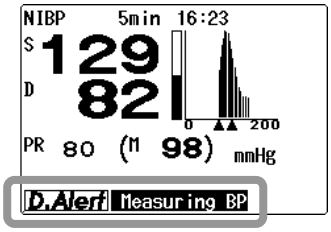
Dyna Alert Function Status

The Dyna Alert function is a technology to prevent accidents which may occur by sudden BP change during the non-measured duration by estimating the variation of circulatory dynamics using the parameters obtained from ECG and pulse wave, and initiating a new NIBP measurement if a change in the circulatory dynamics is detected. It will operate on the following measurement condition.

Patient Classification : Adult (20kg or above)
Cuff Applied Site : Upper arm
SpO_2 Sensor Applied Site : Fingertip
NIBP Measurement Interval : 5 to 60 minutes

⚠CAUTION	When a PTG (SpO_2) sensor is applied to the toe or forehead, the Dyna Alert may not function depending on the patient's condition.

In the NIBP numeric data box, the following mark and message indicating the status of the Dyna Alert function will be displayed.



Reference

For setup procedure and theory of Dyna Alert function, refer to " 6. Parameter Setup Non-Invasive Blood Pressure NIBP Setup ●Dyna Alert Function".

Color of D.Alert	***Message***	***Description***	***Dyna Alert Function Status*** *※1*
Gray	DA Setup: OFF	Dyna Alert (DA) is set to OFF.	Invalid
	Patient: Child	NIBP measurement is performed on child.	Invalid
	Patient: Neonate	NIBP measurement is performed on neonate.	Invalid
	Pacemaker: ON	Pacemaker setting is set to ON.	Invalid
	Interv.: <5min.	NIBP interval is set to Cont., 1min, 2min, or 2.5min.	Suspended
	Interv.: >60min.	NIBP interval is set to 120min.	Suspended
	Interv.: OFF	NIBP interval is set to OFF.	Suspended
	Measuring BP	Invasive blood pressure is measured.	Suspended
Yellow	Measure NIBP	Initializiation of Dyna Alert is complete, and the NIBP measurement has not been performed since the power is turned ON.	Suspended
	Poor ECG Signal	ECG signal failure due to lead-off, noise, etc.	Invalid
	Poor PTG Signal	PTG (Plethysmogram) signal failure due to sensor off, noise, severe low perfusion, etc.	Invalid
	DA-NIBP Suspended	Within 2.5 minutes from previous Dyna Alert NIBP measurement.	Suspended
	Measuring NIBP	NIBP measurement other than Dyna Alert is in progress.	Invalid
	Initializing	Waiting for stable signal after starting Dyna Alert.	Invalid
Green	PTG Low Perfusion	PTG amplitude is 200unit or above, and below 800unit.	Valid
	Mon. Variation	Dyna Alert is properly monitoring circulatory dynamics variation.	Valid
Pink	Measuring DA-NIBP	Dyna Alert NIBP measurement is in progress.	Invalid

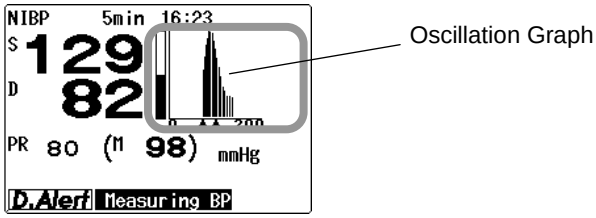
*1 Invalid : Circulatory dynamics variation is not monitored.
Suspended : Circulatory dynamics variation is monitored. But the display suspends the measurement when NIBP measurement is requested. When the suspending factor is resolved, the measurement will resume as quickly as possible.
Valid : Circulatory dynamics variation is monitored. The display responds to NIBP measurement request as quickly as possible.

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

⚠CAUTION	● After the Dyna Alert NIBP measurement, the next Dyna Alert NIBP measurement cannot be performed for 2.5 minutes. ● The Dyna Alert will not properly function for the following cases. • If peripheral circulatory insufficiency or very low BP is developed. • If highly-frequent arrhythmia is generated. • If an artificial heart lung machine is used. • If a large noise from body movement or electric surgery equipment is interfering. • If autonomic nerve or circulatory dynamics is largely affected by medication. ● When using the Dyna Alert function, be aware of these risks and do not increase the NIBP interval time by relying only on the Dyna Alert function.

Oscillation Graph Display

When the NIBP numeric data box size is 2-box size or larger, and "Oscillograph" is set to ON on the NIBP setup menu, the oscillation graph will be displayed inside the NIBP numeric data box.

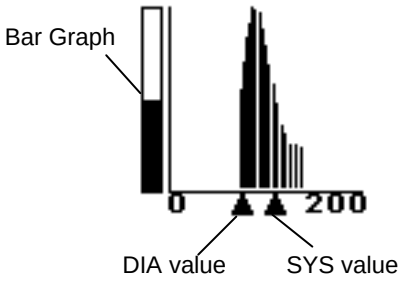


Reference

For setup procedure, refer to "6. Parameter Setup –Non-Invasive Blood Pressure– NIBP Setup ●Oscillation Graph Display".

The description of the oscillation graph is as follows.

The horizontal axis shows the cuff pressure, and vertical axis shows the pulse amplitude with reference to maximum pulse amplitude.
The bar graph shown at left indicates the size of maximum pulse amplitude compared with the reference value. For example, if the maximum pulse amplitude at measurement is 1/2 of the reference value, the bar graph will be half filled in.



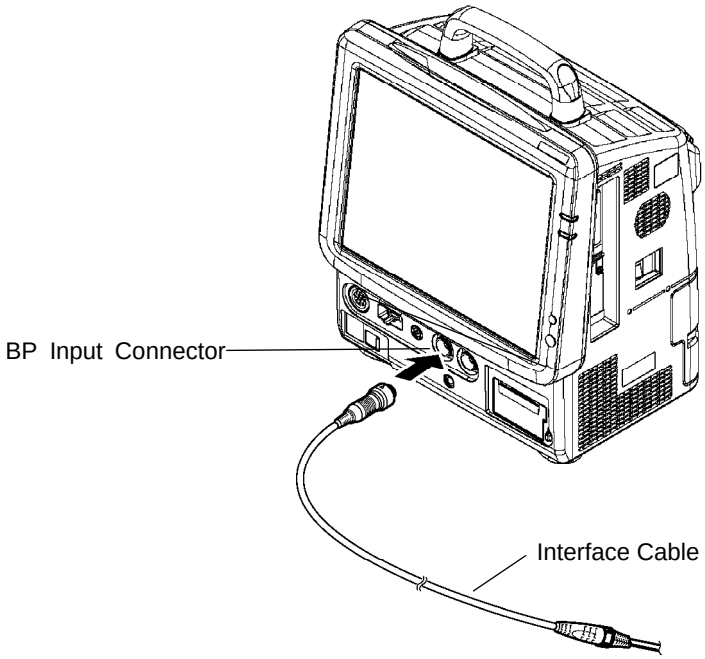
To Measure the BP

⚠WARNING	Use nonconductive parts for the BP circuit other than the transducer. Otherwise, the operator may get an electric shock if he/she touches a conductive part during defibrillation.

⚠CAUTION	Do not reuse a disposable product.

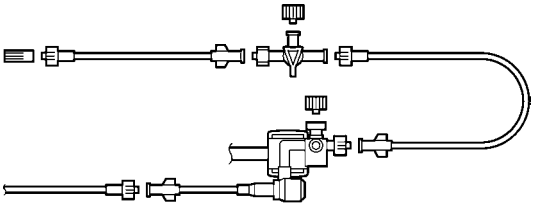
1 Connect the BP interface cable to DS-7200.

The interface cable can be directly connected to the BP input connector (orange).

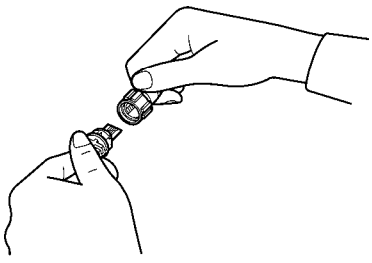


2 Assemble the BP measurement device.

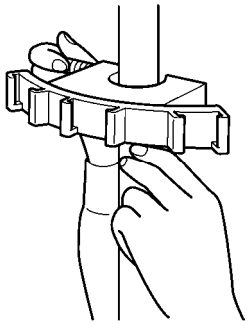
The following procedure explains the case when a BP transducer (CDX Press) is used.
If using other transducers, refer to the operation manual for the corresponded transducer.



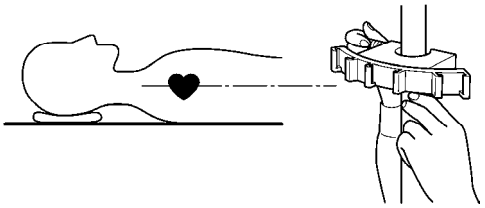
(1) Inspect transducer packaging for damage prior to opening.
Verify that each connector is securely connected.

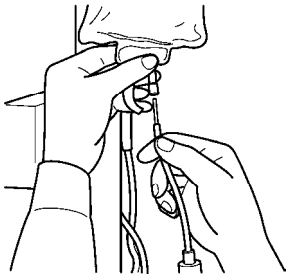


(2) Connect the interface cable to the BP input connector (orange), and then to the transducer.

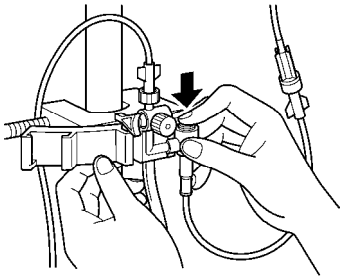


(3) Align the bracket to patient's heart position (about 1/2 of the chest depth).

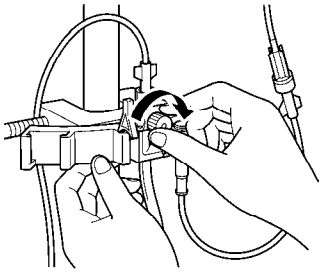




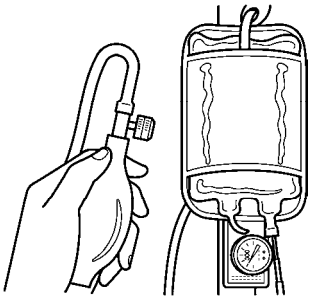
(4) Inject 1000 units of heparin into the saline bag, mix thoroughly and puncture the infusion line through the same hole. Set the saline bag to pressure bag, and hang it from the infusion device. Fill saline to about 1/3 of the drip.



(5) After loosening the zero-port cap, push the flash button to perform priming to remove air bubbles.

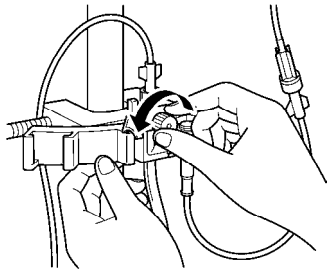


(6) Verify that all air bubbles are removed, and tighten the zero-port cap.
Close the 3-way valve to the patient (patient side OFF).

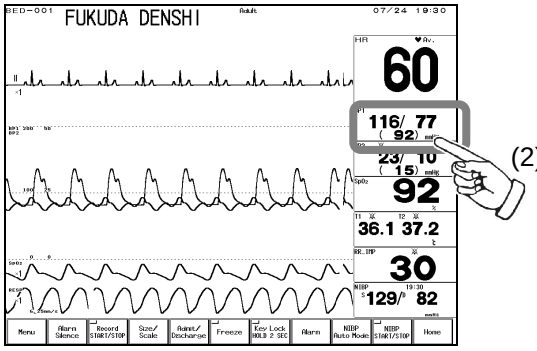


(7) Inflate the pressure bag to 300mmHg.

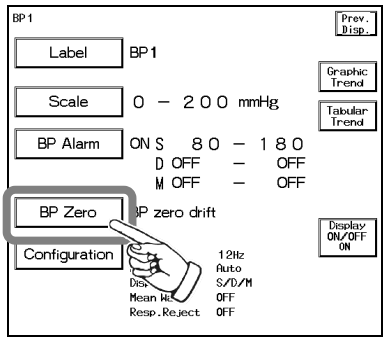
3 Perform zero balance.



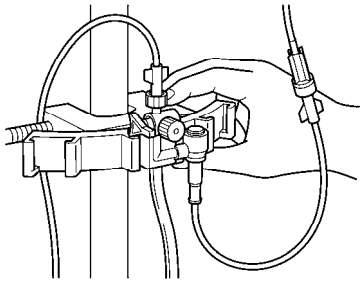
(1) Loosen the zero-port cap half a turn.



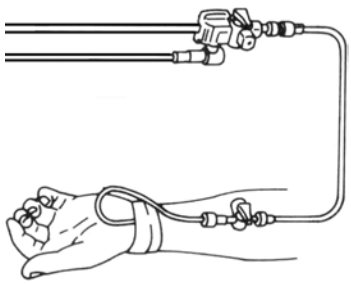
(2) Press the BP numeric data box on the home display. The display will proceed to BP setup menu.



(3) Press the BP Zero key on the BP setup menu. Zero balance will start.

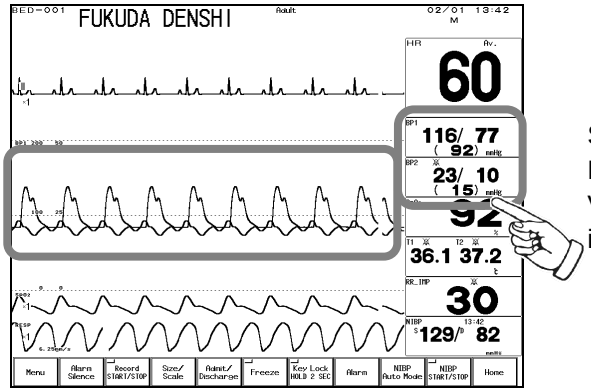


(4) Close the 3-way valve to the zero-port cap (zero-port cap side OFF).



(5) Connect the catheter to the end of the monitoring line. The preparation for measurement is complete.

4 Start the BP monitoring.



Start the BP measurement.
Press the [Home] key.
Verify that the BP waveform and measurement value is displayed on the home display.

⚠CAUTION	The zero balance procedure is required for the following case. • When starting a measurement. • When the heart position has changed due to body movement. • When the transducer position has changed. • When measuring for a long period of time and there is a possibility of measurement error due to change in ambient temperature, etc. • When a connector is connected / disconnected, or a transducer is replaced. • When the power has been turned OFF for more than 5 minutes.

To Measure the CO_2 (Option Unit: MGU-721)

This section describes the procedure to measure the CO_2 concentration when MGU-721 RGM Interface Unit (Mainstream CO_2 Interface Unit) is used.
The MGU-721 measures the CO_2 using the RESPIRONICS® Capnostat 5 (Mainstream method).

Patient Application and Display

1 Connect the CO_2 sensor (Capnostat 5) to the CO_2 input connector.

CO_2 sensor will automatically begin warming up.

The sensor requires a warming up process to achieve stable operating temperature. This process is performed automatically in any of the following situation:

- When the power of the monitor is turned on.
- When the CO_2 sensor is plugged into the monitor.

During the warm up period, the message "CO_2 warm up" will be displayed on the monitor.
Warm up process will require 2 minutes or more.
When the warm up completes, the message will disappear.

2 Prepare an airway adapter suitable for the patient.

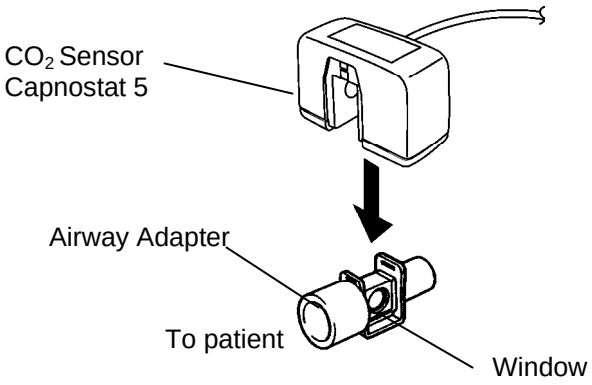
There are 4 types of airway adapters. Select the appropriate adapter from "12. Optional Accessories" according to the used endo-tracheal tube size.

⚠WARNING	● Use only specified airway adapter manufactured by "Respironics Novametrix, LLC". Refer to "12. Optional Accessories"), for list of specified "Respironics Novametrix, LLC" airway adapters. These accessories may be purchased from Fukuda Denshi or any authorized "Respironics Novametrix, LLC" distributor. ● Always consider the circumference of the intubation tube when using the airway adapter. If inappropriate airway adapter is used for a patient with low ventilation, CO_2 may mix in to the inspired air resulting in incorrect measurement, or apnea detection may become difficult.

⚠CAUTION	● The disposable airway adapter should be opened just before use. Do not sterilize it. ● Do not reuse the disposable airway adapter.

3 Verify that the warm up is complete, and attach the CO_2 sensor to the airway adapter until a "click" sound is heard.

⚠CAUTION	The airway adapter should be attached with the thicker side facing to the patient. If attached oppositely, it may damage the CO_2 sensor or airway adapter.



4 Input the following data.

- **O_2 Compensation**

  Input the oxygen concentration value to be applied to the patient.

- **N_2O Compensation**

  Select ON if N_2O is supplied to the patient.
  Select OFF if not supplied.

- **Anesthetic Gas Compensation**

  Input the anesthetic gas concentration value if supplied.
  If not supplied, input "0 (zero)".

- **Atmospheric Pressure**

  Input the current atmospheric pressure.

NOTE	Set these items each time the condition changes.

Reference For details of setup procedure, refer to "6. Parameter CO_2 Concentration (MGU-721)".

5 Calibrate the airway adapter.

The airway adapter calibration must be performed before connecting to the respiration circuit.
Calibration must be also performed for the following case.

- When the airway adapter is replaced
- When "CO_2 cal required" or "CO_2 adapter check" message is displayed on the monitor

Use a clean airway adapter.
When reusing, wash the adapter, wipe the window with a swab after air dry, and sterilize (EOG, etc.) before use.

NOTE	During the calibration, the measurement data will be displayed as "– – –". The measurement data during calibration may be included in the trend data causing discontinuity.

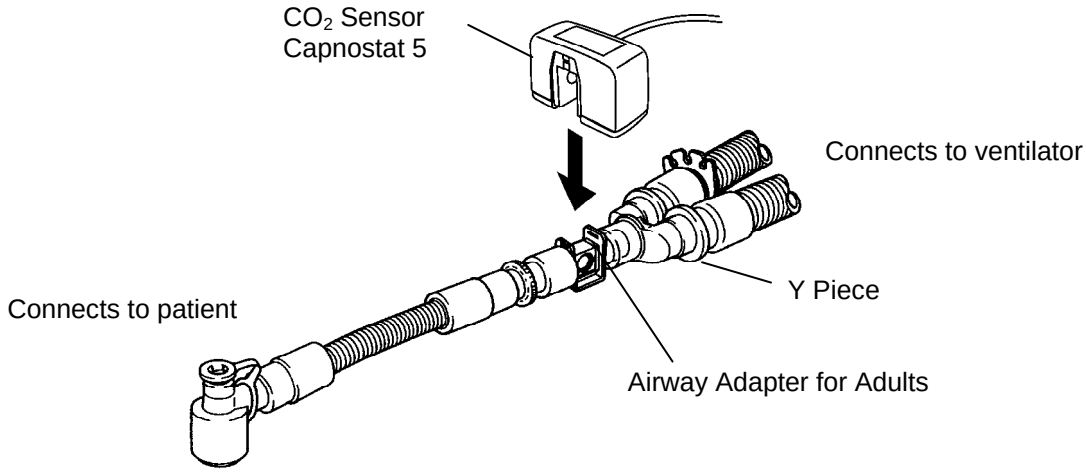
6 Press the [Menu] → [Parameter] → [CO_2] keys and display the CO_2 menu.
Press the [Cal. Airway Adpt] key to start the calibration.

The calibration process will start.
During calibration, "Zeroing CO_2" message will be displayed.
Upon completion of calibration, a tone will be generated and "Cal complete" message will be displayed.
If the calibration fails, an error tone will be generated and "Cal error" message will be displayed.
In such case, start the calibration process again.

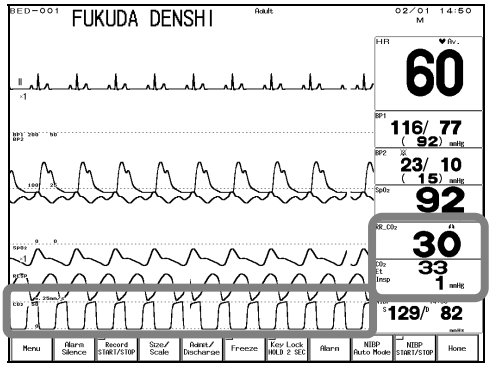
NOTE	Calibration cannot be performed if respiration is detected within 20 seconds before calibration. In such case, wait for next 20 seconds and perform calibration again. The airway adapter should be attached to the sensor when performing calibration.

7 Verify that the airway adapter calibration is properly completed, and attach the airway adapter to the patient's respiration circuit. Then, attach the CO_2 sensor to the airway adapter.

Attach the airway adapter between the patient's circuit wye and intubation tube. The CO_2 sensor should be facing upward.



8 Verify that the CO_2 waveform, EtCO_2 value, InspCO_2 value are displayed.



Adjust the scale, set the measurement unit, alarm, etc. as necessary.

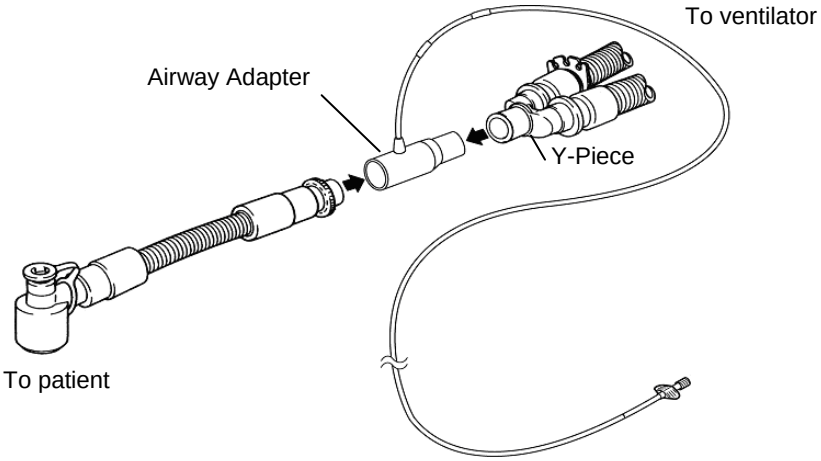
To Measure the CO_2 (Option Unit: MGU-722)

The MGU-722 measures the CO_2 using the Microstream® technology developed by Oridion Medical 1987 Ltd.

Patient Application and Display

1 For intubated patient

(1) Attach the airway adapter to respiration circuit.
(2) Remove the protective cap on the airway adapter, and connect to the sampling tube. Connect the other end of the sampling tube to the CO_2 measurement connector on the monitor. Verify that all the tubes are properly connected.



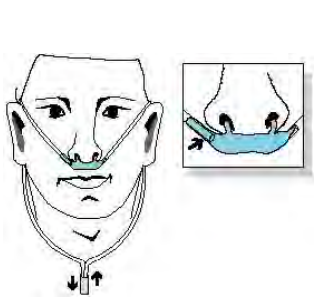
⚠WARNING	● Use only specified breath sampling products manufactured by "Oridion Medical 1987 Ltd.". Refer to "12. Optional Accessories", for list of specified "Oridion Medical 1987 Ltd." FilterLine® sampling products. These accessories may be purchased from Fukuda Denshi or any authorized "Oridion Medical 1987 Ltd." distributor. ● Always consider the circumference of the intubation tube when using the airway adapter. If inappropriate airway adapter is used for a patient with low ventilation, CO_2 may mix in to the inspired air resulting in incorrect measurement, or apnea detection may become difficult.

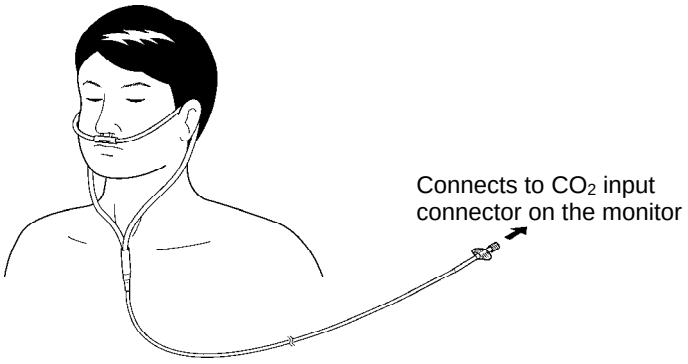
⚠CAUTION	All FilterLine® sampling products are for single patient use only.

2 For patient using the nasal prong

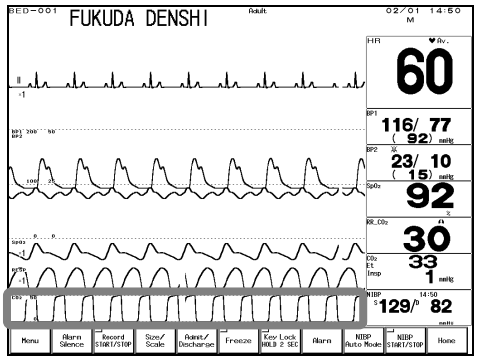
(1) Attach the sampling line to the patient.

(2) Connect the sampling line to the CO_2 measurement connector on the monitor. Verify that it is properly connected.





3 Start the CO_2 measurement.



Press the [Home] key.
Verify that the CO_2 waveform and $EtCO_2$ numeric data are displayed on the monitor.

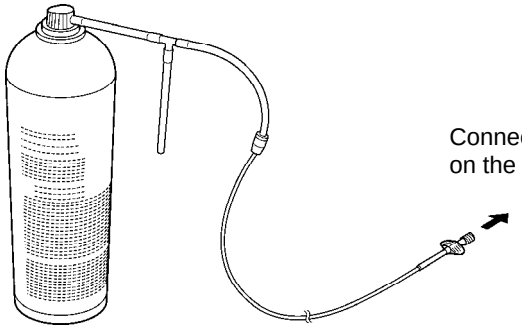
Stable measurement (full accuracy) can be achieved when CO_2 numeric data and waveform appears.

NOTE	Connecting a sampling line or nasal prong to the patient monitor will automatically start the sampling pump. To prevent the pump from deteriorating, disconnect the sampling tube and nasal prong from the patient monitor when not measuring the CO_2 concentration.

Procedure for Calibration

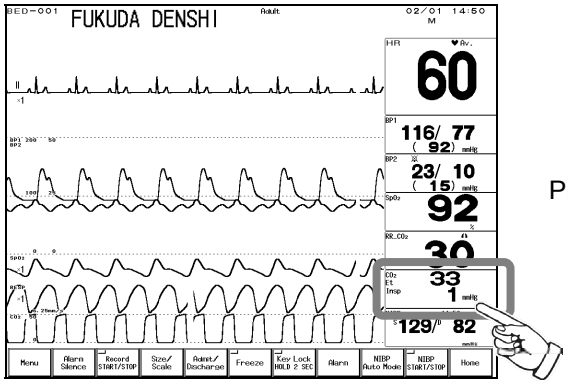
⚠CAUTION	● Perform calibration after Initialization Time (max. 180 seconds) has elapsed since the power is turned ON. ● Do not disconnect the sampling tube during calibration. Calibration will cease when the sampling tube is disconnected.

1 Connect the calibration gas cylinder to the monitor.



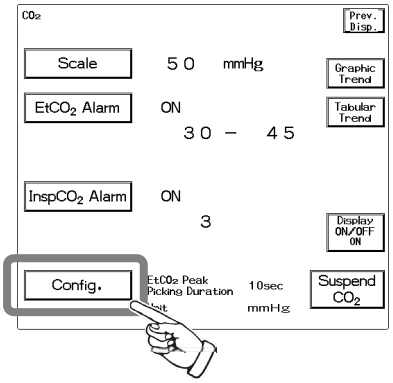
Connects to the CO_2 input connector on the monitor

2 Press the CO_2 parameter key on the home display.



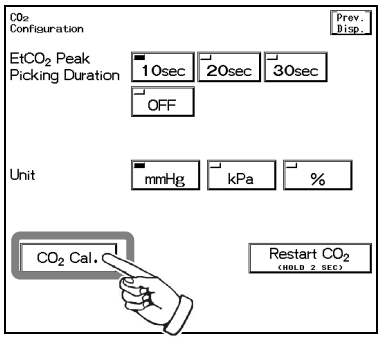
Proceed to the CO_2 setup menu.

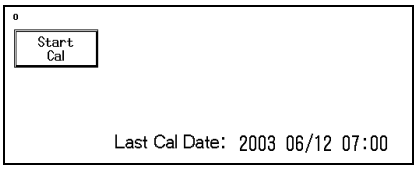
3 Press the [Config.] key on the CO_2 setup menu.



Proceed to the CO_2 configuration menu.

4 Press the [CO_2 Cal.] key on the CO_2 configuration menu and display the calibration menu.





＜Start calibration＞

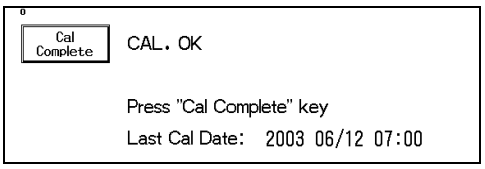
5 Press the [Start Cal] key and conduct calibration according to the displayed messages.

6 The message, "Feed CAL. GAS" will be displayed. Press the injection button and inject the calibration gas.

7 The message, "Calc. Gas can be removed" will be displayed. Stop pressing the injection button and cease the injection.

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

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



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

⚠CAUTION	Conduct CO_2 calibration for the following case. If the CO_2 gas calibration is not performed at a specified interval, CO_2 measurement accuracy may be affected and also subsequent gas calibration may not be possible. ● For the following case, a message, “Calibrate the CO_2 unit (MGU-722)” or “The periodic calibration of the CO_2 unit (MGU-722) is approaching” will be displayed at power ON. Conduct CO_2 calibration. • When the accumulated measurement time exceeds 1200 hours from first use. • When 1 year has elapsed from the last calibration date. • When the accumulated measurement time exceeds 4000 hours from the last calibration date. ● When $EtCO_2$ measurement is not stable or accuracy is degraded compared with other measuring device, conduct CO_2 calibration.

To Measure the Temperature

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

Probe Type

Reusable Type

Rectal Probe (adult) 401

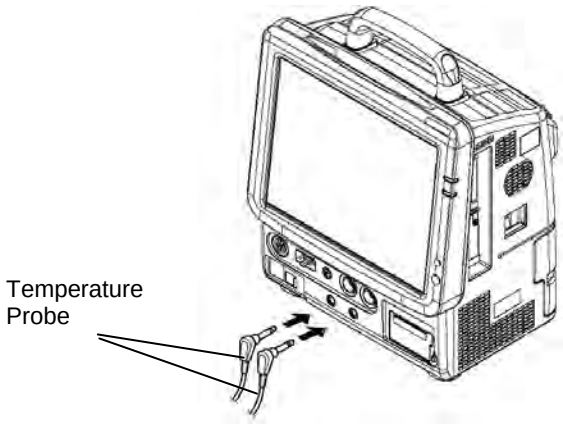
Rectal Probe (pediatric) 402

Body Surface Probe 409B

* 400 series general purpose temperature probe, manufactured by Measurement Specialties, Inc.

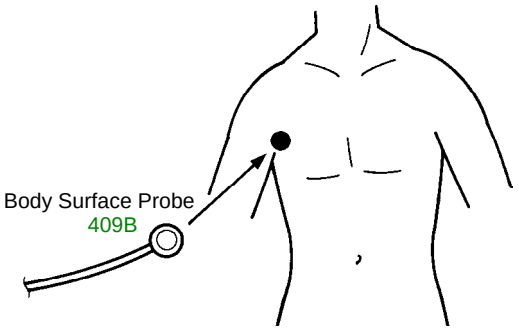
NOTE	For the DS-7200 system, the 700 series temperature probe (Measurement Specialties, Inc) cannot be used.

2 **Connect the probe to the TEMP input connector on the monitor or on the option unit.**



3 Attach the probe to the patient.

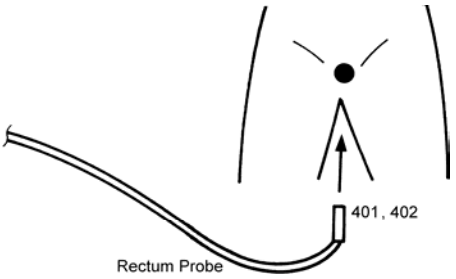
●Body Surface



Attach the probe to the body surface, and secure with surgical tape.

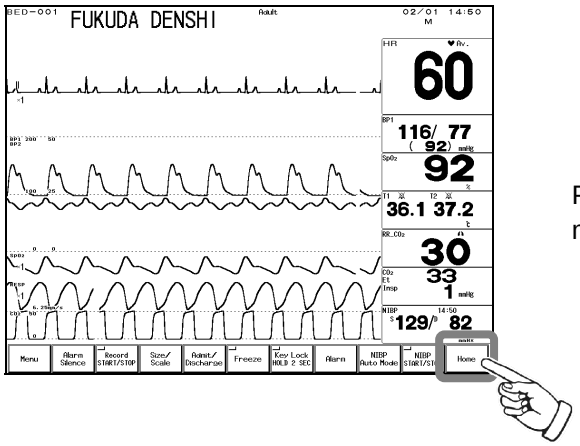
NOTE	The probe location shown above is an example. Adjust the probe location according to the patient's condition.

●Rectum



(1) Clean/Disinfect/Sterilize the probe according to the guidelines provided with the probe product.
(2) Insert the probe into the rectum about 3 to 7 cm deep.
(3) Secure the probe to the inner thigh with surgical tape.

4 Check that the temperature is displayed.



Press the Home key to check the temperature measurement on the home display.

To Measure the Cardiac Output (HU-73)

The CO measurement can be performed using the HU-73 Option Unit.

Reference Refer to “7. Function CO Measurement” for procedure to measure and edit the CO data.

Connecting to the Option Unit

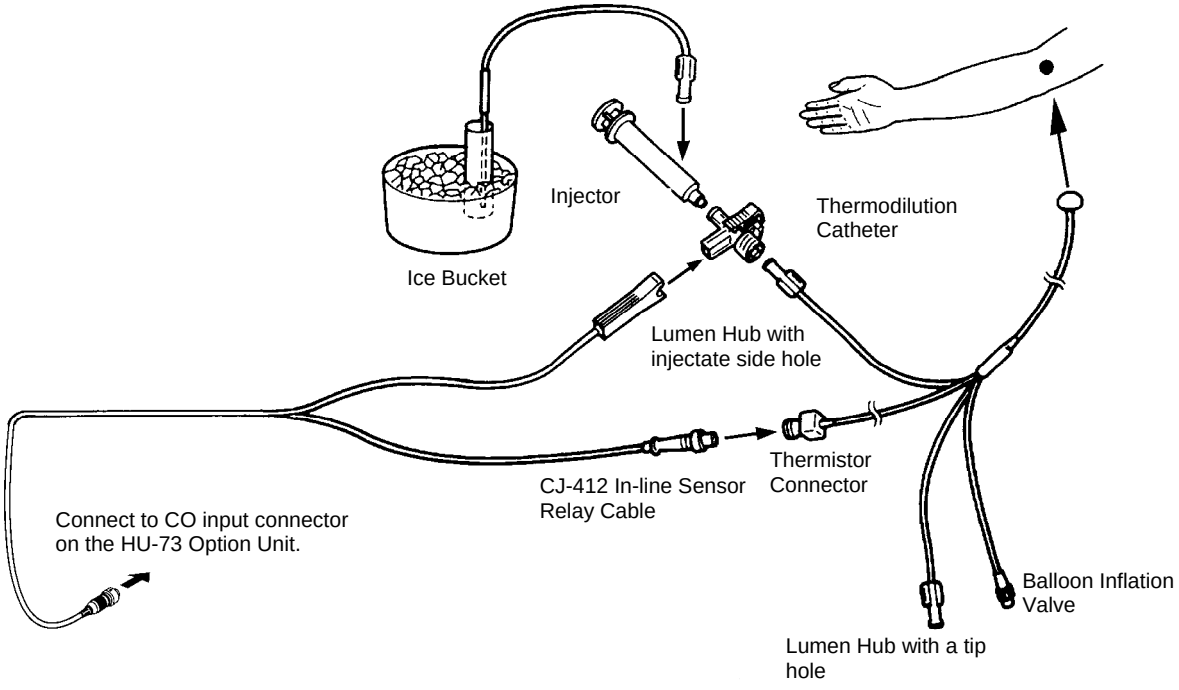
1 Select the catheter relay cable.

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

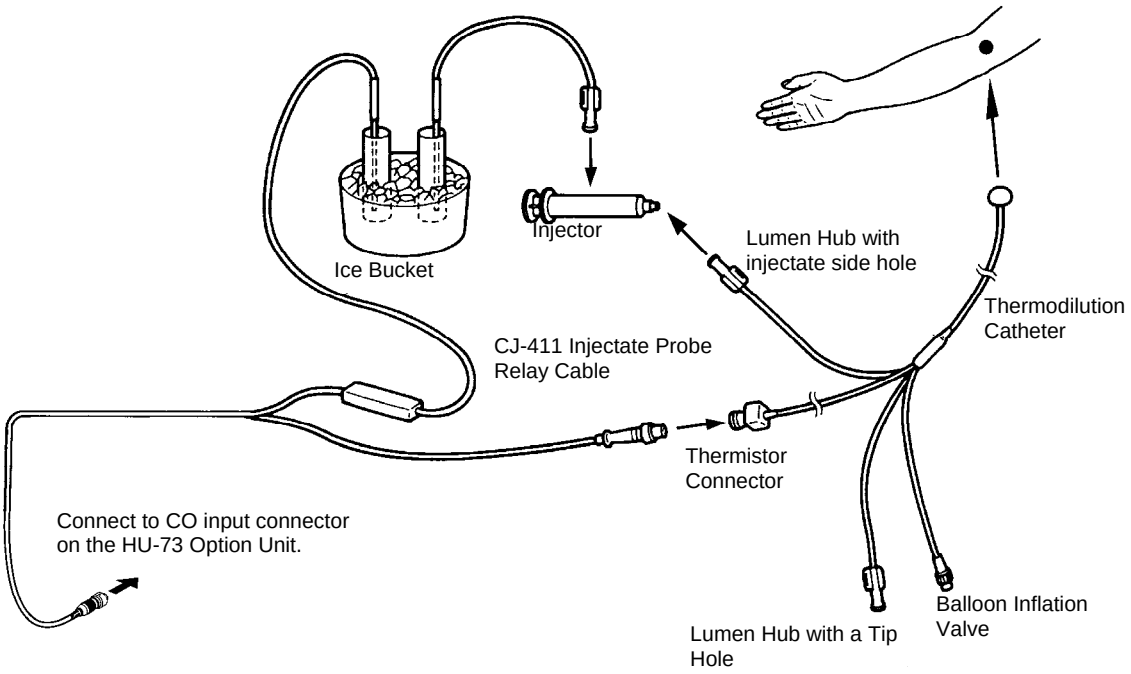
Measurement Method	*Catheter Relay Cable*
0°C/24°C Temperature	CJ-382
Flow-through Sensor	CJ-413
In-line Sensor	CJ-412
Injectate Temperature Probe	CJ-411

2 Connect the catheter relay cable to the CO input connector on the HU-73 Option Unit, and connect the catheter to the catheter relay cable.

【Example of In-line System】



【Example of Injectate Probe】

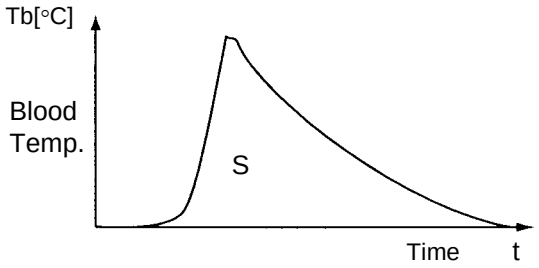


Cardiac Output Measurement Algorithm

Cardiac output is measured using thermodilution method.

Thermodilution Method

The thermodilution catheter is inserted from the vein through the right atrium, right ventricle, and pulmonary artery. From the side hole near the catheter tip, injectate is injected quickly to the right atrium. At this time, the heart contraction and heat diffusion mixes the injectate with blood, and causes blood temperature fall.
Variable initiated by these effects are measured as time function at the pulmonary artery, and the following thermodilution curve can be drawn. Cardiac output is calculated by applying this to the Stewart-Hamilton formula shown below.



$$CO = 60 \cdot Vi \cdot \frac{Si \cdot Ci}{Sb \cdot Cb} \cdot \frac{Ct\,(Tb - Ti)}{S} = CC \cdot \frac{Tb - Ti}{S}$$

CO : Cardiac Output [L/min]
Vi : Injectate Volume [L]
Tb : Blood Temperature [°C]
Ti : Injectate Temperature [°C]
Ct : Correction coefficient for injectate temperature rise inside catheter
60 : seconds
S : Area of thermodilution curve $\int_0^\infty \Delta Tb(t)dt$ [°C・sec]
⊿Tb(t) : Temperature change of Tb after "t" seconds. [°C]
CC : Catheter Constant (Computation Constant: CC value)
Si : Specific Gravity of Injectate [g/cm^3]
Sb : Specific Gravity of Blood [g/cm^3]
Ci : Specific Heat of Injectate [cal/(g・°C)]
Cb : Specific Heat of Blood [cal/(g・°C)]

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

Hematocrit Value

Hematocrit value of 45% (Si・Ci)／(Sb・Cb) = 1.08 is programmed for this device.

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

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