

DynaScope 7000 Series

Bedside Monitor

DS-7300 System

Ver.07

Operation Manual

《 General Description 》



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

This operation manual is for the DS-7300 System Version 07.

△CAUTION

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

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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.

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Composition of This Operation Manual

The DS-7300 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-7300 System Main Unit (DSC-7300)

DANGER

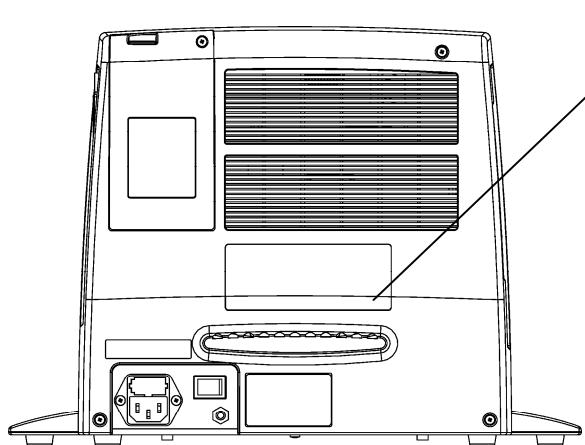
Risk of explosion if used in the presence of flammable anesthetics.

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.



DS-7300 System Super Module

DANGER

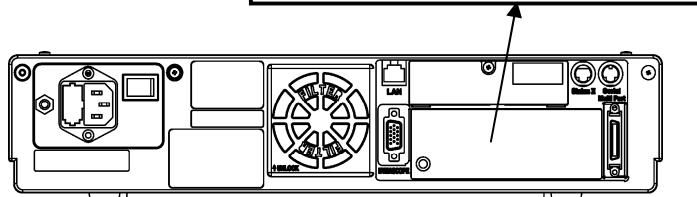
Risk of explosion if used in the presence of flammable anesthetics.

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.



<HS-720E>

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 (beats per minute)	
	Invasive Blood Pressure	PR_IBP	bpm (beats per minute)	
	SpO ₂	PR_SpO ₂	bpm (beats per minute)	
ST Level	ECG	ST	mm, mv	mv
VPC	ECG	VPC	beat/minute	
Respiration Rate	Impedance Respiration	RR_IMP	Bpm (breaths per minute)	
	CO ₂	RR_CO ₂	Bpm (breaths per minute)	
	Ventilator	RR_VENT	Bpm (breaths per minute)	
	Gas Module	RR_GAS	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 ₂ O (CVP only)	mmHg
Non-Invasive Blood Pressure	Non-Invasive Blood Pressure	NIBP	mmHg, kPa	mmHg
Arterial Oxygen Saturation	SpO ₂	SpO ₂	%	
	Perfusion Index	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 ₂ O	
Tidal Volume	Inspiratory Tidal Volume	I-TV	mL	
	Expiratory Tidal Volume	E-TV	mL	
	Tidal Volume	TV	mL	
	Inspiratory/Expiratory Ratio	I:E	(none)	
Minute Ventilation	Minute Ventilation	MV	L/minute	
	Spontaneous Minute Ventilation	SMV	L/minute	
Compliance	Compliance	COMP	mL/cmH ₂ O	
	Static Compliance	S_COMP	mL/cmH ₂ O	
	Dynamic Compliance	D_COMP	mL/cmH ₂ O	
Airway Resistance	Inspiratory Resistance	I-RES	cmH ₂ O/L/Sec	
	Expiratory Resistance	E-RES	cmH ₂ O/L/Sec	
	Static Airway Resistance	S-RES	cmH ₂ O/L/Sec	
	Dynamic Airway Resistance	D-RES	cmH ₂ O/L/Sec	
Airway Pressure	Mean Airway Pressure	MEAN	cmH ₂ O	
	Maximum Airway Pressure	PEAK	cmH ₂ O	
	Pause Airway Pressure	PAUSE	cmH ₂ O	
	Minimum Airway Pressure	P_Min	cmH ₂ O	

Detail	Parameter	Display	Unit	Default
Spontaneous Respiration	Spontaneous Respiration	S_RR	Bpm	
Peak End Expiratory Pressure	Peak End Expiratory Pressure	PEEP	cmH ₂ O	
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 ₂ EI	%	
	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-sec/cm ⁵	
	Systemic Vascular Resistance Index	SVRI	dynes-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	%	
Multigas Data	End-tidal Carbon Dioxide	CO ₂ -E	mmHg, kPa, %	mmHg
	Inspired Carbon Dioxide	CO ₂ -I	mmHg, kPa, %	mmHg
	Expired Oxygen	O ₂ -E	%	
	Inspired Oxygen	O ₂ -I	%	
	Expired Nitrous Oxide	N ₂ O-E	%	
	Inspired Nitrous Oxide	N ₂ O-I	%	
	Expired Agent gas	AGT-E	%	
	Inspired Agent gas	AGT-I	%	

Detail	Parameter	Display	Unit	Default
Multigas Data	Expired Isoflurane	ISO_E	%	
	Inspired Isoflurane	ISO_I	%	
	Expired Halothane	HAL_E	%	
	Inspired Halothane	HAL_I	%	
	Expired Enflurane	ENF_E	%	
	Inspired Enflurane	ENF_I	%	
	Expired Sevoflurane	SEV_E	%	
	Inspired Sevoflurane	SEV_I	%	
	Expired Desflurane	DES_E	%	
	Inspired Desflurane	DES_I	%	
BIS Monitor Data	Minimum Alveolar Concentration	MAC	(no unit)	
	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.
	Protective Earth Indicates the protective earth inside the equipment.
	Alternating Current (Main Power Input Indicator)
	Power ON This indicates that the main power switch is in the ON position.
	Power OFF This indicates that the main power switch is in the OFF position.
	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.

<i>Symbol</i>	<i>Description</i>
	Type BF Applied Part Indicates the degree of protection against electric shock is Type BF Applied Part.
	Signal Output Part
	GAS Output Part
	Signal Input Part
	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

<i>Symbol</i>	<i>Description</i>
	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.
	SEC Alarm Display Indicates the SEC alarm status.
	Scroll Keys These keys will allow to scroll the screen.

Precautions for Safe Operation of Medical Electrical Equipment

 CAUTION	<p>Read the following precautions thoroughly to correctly operate the device.</p> <ul style="list-style-type: none">● Users should have a thorough knowledge of the operation before using this system.● Pay attention to the following when installing and storing the equipment.<ul style="list-style-type: none">• 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.● Before operating the system, verify the following items.<ul style="list-style-type: none">• 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.<ul style="list-style-type: none">• 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.<ul style="list-style-type: none">• 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<ul style="list-style-type: none">• 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.
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Precautions for Safe Operation of Medical Telemetry

 CAUTION	<p>Precautions for Safe Operation of Medical Telemetry</p> <p>To operate the device correctly, read the following precautions carefully.</p> <ul style="list-style-type: none">● 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. <p>In managing, be sure to follow the precautions below.</p> <ul style="list-style-type: none">● 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.
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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.



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-7300 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"
In the USA, 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.
[October 14, 1998 (Letter: www.fda.gov/cdrh/safety.html) – FDA]
- 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 "11 Technical Information" for disclosure of the pacemaker pulse rejection capability of this equipment.

Non-Explosion Proof



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



- When using the defibrillator, keep away from the electrodes or medicament applied to the patient chest. If this is not possible, remove the electrodes or medicament before using it. If the defibrillator paddles are directly in contact with the electrodes or medicament, electrical shock may result by the discharged energy.
- When using the defibrillator, 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 using the defibrillator, do not touch the patient and the metal part of the device or cables. Electric shock may result by the discharged energy.

Electrosurgery Safety



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:

Location

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.

Power Supply

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.

Electrode Placement

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.

Ground Plate

When using electrosurgical instruments, make sure the contact between the patient and the ground plate is secure. If the connection is incomplete, the patient may suffer a burn at the electrode site.

Precautions about Magnetic Resonance Imaging



- 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-7300 system are isolated from the power supply, but the peripheral devices are not isolated. To prevent danger of electric shock, always position the peripheral devices away from the patient.

When connecting peripheral devices to DS-7300 system, it is the user's responsibility to verify that the overall system complies with IEC60601-1-1, "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.
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Accessories and Optional Accessories

⚠ WARNING	Use only the cables specified by Fukuda Denshi. <ul style="list-style-type: none">• Use of other cables may result in increase in emission or decrease in immunity.• We are not liable of the performance if product other than specified is used.
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Precautions about the DS-7300 System

 DANGER	<p>When connecting to other device, contact Fukuda Denshi service representative. Danger such as electric shock may result to the patient and operator.</p>
 WARNING	<ul style="list-style-type: none">● Do not connect unit or cable not authorized by Fukuda Denshi to any I/O connector. If done so by mistake, the DS-7300 system cannot deliver its maximum performance and the connected units may be damaged, resulting in a safety hazard.● If the DS-7300 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 accompanying 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.● The patient type 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 pulse mask function is set to <input type="checkbox"/> OFF, <input type="checkbox"/> 10ms or <input type="checkbox"/> 20ms, a decrease in heart rate may not generate HR or ASYSTOLE alarms due to erroneously detected QRS. Set this function to <input type="checkbox"/> OFF, <input type="checkbox"/> 10ms or <input type="checkbox"/> 20ms only if you are sure that pacing failure will not occur, or when the patient can be constantly monitored.● When measuring the SpO₂ of patient with high fever or peripheral circulatory insufficiency, check the sensor attachment periodically and change the attachment site. The temperature of 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 SpO₂ may not be possible.<ul style="list-style-type: none">• Patient with excessive abnormal hemoglobin (COHb, MetHb)• Patient with the pigment injected to the blood• Patient receiving CPR treatment• When a sensor is applied to a limb with NIBP cuff, arterial catheter, or intracatheter• When measuring at site with venous pulse• Patient with body motion• Patient with small pulse● Before the NIBP measurement, make sure the patient type (<input type="checkbox"/> Adult / <input type="checkbox"/> Child / <input type="checkbox"/> Neonate) is properly selected. Otherwise, correct measurement cannot be performed, and congestion or other injury may result.● Use only the specified accessories.● For HS-710E, 720E, 702E, and HC-500, always consider the circumference of the intubation tube when using the airway adapter. If inappropriate airway adapter is used for a patient with low ventilation, CO₂ may mix in to the inspired air resulting in incorrect measurement, or apnea detection may become difficult.

 WARNING	<ul style="list-style-type: none"> ● 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. 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 alarm for the parameter not selected for the "HR/PR Alarm Source" (ECG/SPO₂/BP) will be set to OFF on the DS-7600 Central Monitor. <ul style="list-style-type: none"> • 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-7300, HR alarm will be set to OFF on the central monitor. ● 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. ● If PURITAN-BENNETT Ventilator is used, APNEA alarm will not generate when ventilator is the RR/APNEA alarm source. ● When selecting Silence or Time Only for the night mode, pay attention not to miss any important alarm by simultaneously monitoring the bed on other monitors such as central monitor. ● 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. ● Fix the monitor on an adapter before setting on the trolley. Verify it is securely locked. Fixing on with 2 screws will ensure more safe use. If not securely fixed, the monitor may fall off the trolley which may damage the monitor or cause injury. ● When lifting this device, hold the bottom part of the main unit and not the display unit. ● When attaching the display unit to the main unit, insert the display unit to the attaching guide on the main unit from top and push in until a click sound can be heard. Verify that it is securely locked. ● About the Air Filter for Cooling Fan (Super Module, Input Box) <ul style="list-style-type: none"> • When the air filter is washed with neutral detergent, dry it completely before reattaching. If the moisture is remained on the air filter, it may damage the equipment. • The air filter must be attached. If the equipment is used with the air filter detached, it may damage the equipment.
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 CAUTION	<ul style="list-style-type: none"> ● Systems <ul style="list-style-type: none"> • This equipment is intended to be used for only one patient. • The installation of this equipment should be performed by our service representative or a person who is well acquainted with this equipment. • Use only the accessories specified for this device. Otherwise, proper function cannot be executed. • For quality improvement, specifications are subject to change without prior notice. • When the product is used in regions whose voltage is other than 220-240V, a cable appropriate to the regulations and voltage of the country in which the product is being used shall be used.
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 CAUTION

- 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.
- 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 whole or part of the panel for a prolonged time.
- Do not use the touch panel with the film 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.
- Turning off the power of the LC-7315T/LC-7319T Display Unit will also turn off the power of the Input Box.
- As the Super Module and DSC-7300 communicates via Input Box, the power of the Input Box must be always turned ON even if the module is not inserted in the Input Box.
- There are following restrictions when recording on the HR-500 Module.
 - Only manual recording, periodic recording, alarm recording, recall recording can be performed on the HR-500.
 - If the measurement unit of BP is "kPa", BP waveform, BP numeric data, and NIBP numeric data will be treated as non-measured data.
 - If the TEMP measurement unit is "°F", the TEMP numeric data will be treated as non-measured data.
 - For the non-measured parameter, the waveform will not be printed, and numeric data will be printed as "— —" or left blank.
 - The numeric data displayed as "xxx" will be printed as "— —".
 - The QRS classification symbol of "S" will be printed as "N" on the HR-500.
 - The waveform recording is not possible for some scale depending on the parameter.
 - If the HR alarm source is BP, ECG will not be recorded. PR_IBP data will be printed for the HR data instead.
 - If the RR/APNEA alarm source is other than impedance respiration, the respiration waveform will not be recorded.
 - If the RR/APNEA alarm source is other than CO₂/GAS, the CO₂ waveform will not be recorded.
- When connecting the BIS monitor, make sure that the power of the patient monitor and the BIS monitor is turned OFF.
- 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.
 - The indication for continuous use of the electrode is about one day.
 - Replace the electrode if the skin contact gets loosen due to perspiring, etc.
 - When an electrode is attached at the same location for a long time, some patients may develop a 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.

CAUTION

- If different types of electrodes are used at the same time, the difference between the polarization potential from each electrode may interfere monitoring. Make sure to use electrodes of the same type.
- 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 $\times 1/4$, $\times 1/2$, or $\times 1$, the detection threshold is $250\mu V$. When the waveform size is $\times 2$ or $\times 4$, the detection threshold is $150\mu V$.
- 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 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 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 spontaneous QRS and pacemaker pulse overlap (ex. fusion beat, etc.), QRS detection cannot be performed properly. In this case, the heart rate is degraded.
- When continuously detecting AC noise artifact as pacemaker pulses, QRS detection stops and heart rate is extremely degraded. Also arrhythmia cannot be detected.
- Respiration Monitoring
 - When the following relay cables are used, respiration cannot be measured.
 - Relay Cable CI-700E_3 (FA) (Electrosurgery-proof, 3-electrode)
 - Relay Cable CI-700E_4 (FA) (Electrosurgery-proof, 4-electrode)
 - Relay Cable CI-700E_5 (FA) (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.
- SpO₂ Monitoring
 - If the sensor site is too thick, thin, deeply pigmented, or deeply colored (ex. nail polish, dye, or pigmented cream), it may lead to inaccurate measurements. In such case, reposition the sensor or choose an alternate sensor for use on a different site.
 - 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 intervals (about 4 hours). The temperature of attachment site will rise 2 to $3^{\circ}C$ 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. Direct sunlight to the sensor area can cause a measurement error. Place a black or dark cloth over the sensor.
 - Excessive light may cause inaccurate measurements. In such cases, cover the sensor with opaque material.

⚠ CAUTION	<ul style="list-style-type: none"> • When not performing the measurement, unplug the relay cable and sensor from the SpO₂ connector. Otherwise, the measurement data may be erroneously displayed by the ambient light. • Precautions for Reusable Type Sensors <ul style="list-style-type: none"> ▪ 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-Use Type Sensors <ul style="list-style-type: none"> ▪ 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® sensor OXISENSOR™ MAX Fast 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. ▪ For the Nellcor® single-use type sensors, the site must be inspected every 8 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. • NIBP Monitoring <ul style="list-style-type: none"> ▪ 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. ▪ 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 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. ▪ 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. ▪ If the air hose is twisted, or weighed down, the cuff air cannot be exhausted. Properly arrange the cuff and air 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. <ul style="list-style-type: none"> ▪ Body motion, arrhythmia, convulsion ▪ Continuous noise such as cardiac massage ▪ Periodic electromagnetic noise ▪ For the following situation, measurements will be terminated. <ul style="list-style-type: none"> When the measurement time has exceeded 120 seconds for adult, 90 seconds for child, 60 seconds for neonate. When the inflation value has exceeded 310mmHg for adult, 210mmHg for child, 160mmHg for neonate.
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 CAUTION	<ul style="list-style-type: none"> • If used with the incorrect patient type, 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 10 minutes and returns to the previous interval mode setup. • The alarm function will be ineffective for the BP value measured by Quick SYS regardless of the ON/OFF selection of NIBP alarm. • 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 <ul style="list-style-type: none"> • 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 BP value will be displayed. If HB-500 BP Module is used, the balance information will be maintained for 1 minute. • 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 cocks 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 cock of pressure transducers are opened to air. The zero balance procedure is required for the following case. <ul style="list-style-type: none"> • 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. • Note that 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. • When HB-500 is used, do not set the BP label to IAP. PDP will not be calculated and displayed as “—”. S/D/M will not be displayed either. • The BP data (SYS/DIA/Mean) not displayed will not generate the BP alarm or be displayed for the tabular trend function. Select the appropriate display type according to the monitoring purpose. ● Temperature Monitoring <ul style="list-style-type: none"> • Do not reuse the probe cover. It is intended for single patient use only. ● CO₂ Monitoring (HS-710E, 720E, 702E) <ul style="list-style-type: none"> • If the Super Module and the HC-500 (CO₂ Module) are simultaneously used, the CO₂ measurement priority will be according to the “CO₂ Module Priority” set on the “Input Box Setup” (Monitor Setup). With the default setting, the HC-500 will be prioritized. • Perform calibration after 20 minutes when the main power of the Super Module is turned ON. • Do not disconnect the sampling tube during calibration. If disconnected, calibration will cease. • Conduct CO₂ calibration for the following case. <ul style="list-style-type: none"> • When 4,000 operating hours has elapsed from the last calibration date or once a year whichever comes first. • When EtCO₂ measurement is not stable or accuracy is degraded compared with other measuring device. • When the patient monitor was not used for a while, or when EtCO₂ was not measured for a while.
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 CAUTION

- CO₂ Monitoring (HS-720C, 702C: Respirationics® Capnostat5)
 - If the Super Module and the HC-500 (CO₂ Module) are simultaneously used, the CO₂ measurement priority will be according to the "CO₂ Module Priority" set on the "Input Box Setup" (Monitor Setup). With the default setting, the HC-500 will be prioritized.
 - 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.
- CO₂ Monitoring (HC-500)
 - The airway adapter should be attached with the thicker side facing to the patient. If attached oppositely, it may damage the CO₂ sensor or airway adapter. If the Super Module and the HC-500 (CO₂ Module) are simultaneously used, the CO₂ measurement priority will be according to the "CO₂ Module Priority" set on the "Input Box Setup" (Monitor Setup). With the default setting, the HC-500 will be prioritized.
- Multigas Monitoring (Poet IQ 8500A)
 - When performing the O₂ cell drift check and calibration, read and follow the instructions listed on the gas cylinder labels. Do not use the calibration gas cylinder if it is beyond the expiration date.
 - Use only the specified calibration gas. Proper calibration is not possible if unapproved calibration gas is used.
 - Make sure to restart the Poet IQ 8500A after the calibration. Otherwise, Poet IQ 8500A will not function properly.
 - If O₂ gain adjustment is started without supplying the calibration gas, the message, "Check calibration gas." will be displayed and O₂ gain adjustment will cease.
 - If O₂ offset adjustment is started without opening to air, the message, "Check calibration gas." will be displayed and O₂ offset adjustment will cease.
 - If O₂ offset is adjusted, it is necessary to readjust the O₂ gain. If O₂ offset adjustment was not necessary, O₂ gain readjusting screen will not be displayed.
- 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.
 - 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.
 - For HS-710E, 720E, 702E, and HC-500 Module, the upper EtCO₂ alarm will not generate if the upper limit is set to 100mmHg/13.4kPa and above as the measurement range is 0 to 99mmHg / 0 to 13.3kPa.
 - 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.
 - For the SpO₂ 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® SpO₂ unit)
 - If the SpO₂ alarm and SEC alarm setup is set to OFF, the SEC alarm integral value will be set to 0. (For Nellcor® SpO₂ unit)
 - The alarm silence 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.

 CAUTION

- System Configuration
 - When waveform and numeric data display is set to OFF, the alarm generation and tabular/graphic trend data input will also cease.
 - If the display of waveform / numeric data labeled as BP1 or ART is set to OFF, the BP pulse rate will not be displayed.
 - When the waveform and numeric data display for SpO₂ is set to OFF, the pulse rate measured by SpO₂ will not be displayed either.
 - When the waveform and numeric data display for CO₂ is set to OFF, RR measured by CO₂ will not be displayed either.
 - When the waveform and numeric data display for the gas module is set to OFF, RR measured by the gas module will not be displayed.
 - If the time/date is not correctly set, or changed during monitoring, malfunction may occur to NIBP measurement, periodic recording, trend, NIBP list data.
 - If the time/date is changed during monitoring, patient's age will not be recalculated.
- 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 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.
 - Resuming monitoring will resume the alarm in suspension.
- 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.
- 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.



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| CAUTION | <ul style="list-style-type: none">• Do not open the housing.• If you accidentally wet the device, dry it completely and verify it operates safely before usage.• Replace the components periodically as specified. |
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Precautions about the Wired Network System (DS-LANII/DS-LANIII)

⚠ WARNING	<ul style="list-style-type: none">● 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.
⚠ CAUTION	<ul style="list-style-type: none">● 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 connecting to the wired network, verify that the Bed ID does not duplicate with other bedside monitors. Otherwise, monitoring on the central monitor for both bedside monitors will not be possible.● Make sure to set the bed ID in the following range.<ul style="list-style-type: none">• For DS-LANII network: 001 to 048• For DS-LANIII network: 001 to 100● As the DS-7300 do 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-7300 system, it will be corrected to the time/date of the central monitor.● The setups for "HR Low Limit for VT" and "HR Low Limit for Run" cannot be performed on some central monitors.● On a wired network, the alarm generated on the DS-7300 will be transmitted to the central monitor with 2.5 seconds delay.● If ECG lead (ECG1 or ECG 2) is changed on the DS-7300 while monitoring ST display on the central monitor, the ST display will be distorted. Redrawing the ST display will return the display to normal.● The respiration waveform and RR value based on the RR/APNEA alarm source selected on the DS-7300 will be displayed on the central monitor. The monitoring RR and APNEA will be the same as the one monitored on the DS-7300.● If the measurement unit of CO₂ concentration is "mmHg", and 99mmHg is selected for "CO₂ (mmHg) Upper Limit for LAN, Telemetry" on the monitor setup menu, the CO₂ value of 100mmHg or above will be transmitted as 99mmHg.● If BP is selected for "HR/PR source" (Or, if Auto selects BP for HR/PR Source), ECG waveform will not be transmitted on the DS-LANII wired network. PR_IBP value will be displayed for the HR value on the central monitor. However, HR value from ECG will be displayed for the ST measurement list. In case of DS-LANIII network, refer to the operation manual for the central monitor.● There are following restrictions when connecting the DS-7300 system to the DS-LANII network.<ul style="list-style-type: none">• 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.• On 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-7300.• 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.• 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.

 CAUTION

- Arrhythmia alarm of TACHY, BRADY, COUPLET, PAUSE, TRIGEMINY will not be transmitted.
- Arrhythmia alarm of "SLOW_VT" will be transmitted as "VT".
- On the DS-LANII network, waveform, numeric data, alarm of BP7, BP8, TEMP3–8 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.
- If DS-7600 system is used as the central monitor, O₂, N₂O, AGENT alarm will not be generated on the central monitor.
- If the HR/PR source is BP, ECG waveform will not be transmitted on a wired network. On the central monitor, PR_IBP value will be displayed for HR. However, HR value from ECG will be displayed for the NIBP list and ST measurement list.
- If the RR/APNEA alarm source is other than impedance respiration, respiration waveform will not be transmitted on a wired network.
- If the RR/APNEA alarm source is other than CO₂/GAS, CO₂ waveform will not be transmitted on a wired network.
- For numeric data displayed as "xxx", maximum or minimum value of measurable range will be transmitted.
- The numeric data displayed as "——" will be treated as not measured data.
- There are following restrictions when connecting the DS-7300 system to the DS-LANIII network.
 - When connecting to the DS-LANIII network, select **DS-LANIII** under "DS-LAN Setup" in the Monitor Setup menu and restart the system before connecting the LAN cable.
 - 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 network construction, use the HUB recommended by Fukuda Denshi.
 - The displayable waveform, numeric data, alarm will differ depending on the central monitor. Please also refer to the operation manual of the central monitor.
- There are following restrictions when recording the DS-7300 data on the central monitor recorder or the AU-5500N 8ch Recorder.
 - The AU-5500N can be connected to DS-LANII network only. Do not connect it to DS-LANIII network. Malfunction may occur to the network.
 - Only manual recording, alarm recording, periodic recording, and recall recording can be performed on the AU-5500N.
 - 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 "xxx" will be recorded as "——" on the central monitor recorder.
 - The "S" (QRS symbol) printed on the HS built-in recorder will be printed as "N" on the central recorder, AU-5500N, and HR-500 Recorder Module.
 - 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 BP is the 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 respiration, respiration waveform will not be output on the central recorder.



(Continued from previous page)

- If the RR/APNEA alarm source is other than CO₂/GAS, CO₂ 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-7300, HR measurement value from ECG will be recorded for the HR value and ST trend.

Precautions about the Wired Network System (AU-5500N 1:N Network)



- The AU-5500N can be connected to DS-LANII network only. Do not connect it to DS-LANIII network. Malfunction may occur to the network.
- The bed ID is factory set to "000". If used on a wired network with the default ID unchanged, recording on the AU-5500N will not be possible.
- When using on a wired network, make sure that there are no other bedside monitors with the same ID. If there are more than one bedside monitors with the same bed ID, the duplicated bedside monitors cannot record on the AU-5500N.
- For 1:N network, set the bed ID in the range from 001 to 016.
- When connecting the AU-5500N to a 1:N network, internal switch setting of the AU-5500N is required. For details, refer to our service representative.

Precautions about the Wireless Network System

DANGER

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

WARNING

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

CAUTION

- On a wireless network, the alarm generated on the DS-7300 will be transmitted to the central monitor with 15 seconds delay.
- 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.
- If the measurement unit is “°F” and “kPa” on the DS-7300 system, it will be converted to “°C” and “mmHg” respectively when transmitted to the central monitor. If the measurement unit “°F” and “kPa” are set on the central monitor, it will be reconverted to the value in “°F” and “kPa” after transmitted to the central monitor.
- On a wireless network system, O₂, N₂O, AGT alarm generation will not be transmitted to the central monitor.
- For the alarm generation on the bedside monitor, maximum of 15 seconds delay will occur for the alarm generation on the central monitor.
- 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 CO₂ concentration is “mmHg”, and 99mmHg is selected for “CO₂(mmHg) Upper Limit for LAN, Telemetry” on the monitor setup menu, the CO₂ value of 100mmHg or above will be transmitted as 99mmHg.

Precautions about Ventilator Monitoring

<p>⚠ WARNING</p>	<ul style="list-style-type: none">● 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-7300 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-7300 system, cable, and replace the cable if necessary. If the malfunction persists, stop using the device.● When a ventilator is connected to the DS-7300, verify that "Vent. Online" message is displayed for the connection status. The DS-7300 will not detect the ventilator alarm unless the "Vent. Online" condition is achieved.● The alarm generation on the DS-7300 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 P2-27 "2. Basic Operation Ventilator Alarm Input".● The Evita 2 dura / Evita 4 / Evita XL / 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-7300 system will not correspond to the following alarms generated on the Evita 4 / Evita XL / Evita 2 dura.<ul style="list-style-type: none">• O₂ monitoring disabled alarm, CO₂ alarm disabled alarm, Oximeter alarm disabled alarm, Neo. volume measurement inoperable alarm, Minute volume alarm disabled alarm, Minute volume alarm low off alarm, Tidal volume alarm high off alarm, Apnea alarm off alarm, Nebulizer active alarm● The DS-7300 system will not correspond to the following alarms generated on the Savina.<ul style="list-style-type: none">• O₂ 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● For the Evita 4 / Evita XL / Evita 2 dura / Savina, there is a communication delay of 3 seconds between the DS-7300 system and the ventilator. Therefore, if the alarm generated at the ventilator is resolved within 3 seconds, the ventilator alarm may not be generated at the DS-7300 system.
<p>⚠ CAUTION</p>	<ul style="list-style-type: none">● The ventilator operation should be performed by well-trained and authorized personnel.● For connecting the DS-7300 system and ventilator, use only the specified connection cable.● Verify that the DS-7300 system and the ventilator are properly connected.● When connecting the cable, verify that the main power of the DS-7300 system and the ventilator is OFF.● For the SV-900, PB, Evita, Savina ventilator, ventilator alarm factor cannot be transmitted to the central monitor.● The ventilator alarm factor will not be displayed on the bedside monitor.● Check occasionally the communication status of the DS-7300 and the ventilator.● Verify that the ventilator alarm is not generated, and the "Vent. Online" message is displayed.● The confirmation display 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-7300, 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.

 CAUTION	<ul style="list-style-type: none"> When connecting the PURITAN-BENNETT ventilator, follow the precautions below. <ul style="list-style-type: none"> The serial port (RS-232C) of the ventilator should be set as follows. Refer to the service representative of the ventilator manufacturer. <table border="0"> <tr><td>Baud Rate</td><td>:</td><td>9600bit/s</td></tr> <tr><td>Data Bit</td><td>:</td><td>8bit</td></tr> <tr><td>Parity Bit</td><td>:</td><td>none</td></tr> <tr><td>(Stop Bit)</td><td>:</td><td>(1bit)</td></tr> </table> The DS-7300 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. <table border="0"> <tr><td>For Evita2dura / Evita4 / Evita XL</td></tr> <tr><td>Protocol</td><td>:</td><td>Medibus</td></tr> <tr><td>Baud Rate</td><td>:</td><td>19200bps</td></tr> <tr><td>Data Bit</td><td>:</td><td>8bit</td></tr> <tr><td>Parity Bit</td><td>:</td><td>Even</td></tr> <tr><td>Stop Bit</td><td>:</td><td>1bit</td></tr> <tr><td>For Savina</td></tr> <tr><td>Protocol</td><td>:</td><td>Medibus</td></tr> <tr><td>Baud Rate</td><td>:</td><td>9600bps</td></tr> <tr><td>Data Bit</td><td>:</td><td>8bit</td></tr> <tr><td>Parity Bit</td><td>:</td><td>None</td></tr> <tr><td>Stop Bit</td><td>:</td><td>1bit</td></tr> </table> For PURITAN-BENNETT ventilator, AWP and AWF waveform cannot be displayed or recorded. Only the numeric data will be displayed. For PURITAN-BENNETT ventilator, P-V curve and F-V curve cannot be displayed or recorded. Only the numeric data will be displayed. 	Baud Rate	:	9600bit/s	Data Bit	:	8bit	Parity Bit	:	none	(Stop Bit)	:	(1bit)	For Evita2dura / Evita4 / 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
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Parity Bit	:	None																																											
Stop Bit	:	1bit																																											

Precautions for Use of SpO₂ Sensor

 DANGER	<p>Burn Risk in Using SpO₂ Sensor</p> <p>In SpO₂ 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 SpO₂ measurements of this device, please contact Fukuda Denshi service representative.</p>
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Precautions for Use of NIBP Cuff

 CAUTION	<p>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.)</p>
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Disposing of Equipment, Accessories, or Components

 CAUTION	<p>When disposing of the equipment, accessories, or components, use an industrial waste distributor. Do not dispose of as ordinary waste.</p>
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Precautions about Transportation

For transporting the DS-7300 system, pack with specified packing materials.



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

Precautions about RTC or Data Backup

CAUTION

- The DS-7300 system is equipped with a built-in clock. When the power of the DS-7300 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.

To Prepare for Emergency Use

Accessories / Optional Accessories

- (1) The ECG electrodes are consumables. Always prepare extra supplies of electrodes.
- (2) Check if any wire break on the patient cables once a week.

Electromagnetic Compatibility

The performance of this device under electromagnetic environment complies with IEC60601-1-2 (2001).

Precautions for Safe Operation under Electromagnetic Influence

 CAUTION	<p>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.</p> <p>The following are examples of the common cause and countermeasures.</p> <ul style="list-style-type: none">● <u>Cellular Phone</u> 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.● <u>Static Electricity</u> In a dry environment (room), static electricity is likely to occur. Take the following countermeasures.<ul style="list-style-type: none">• Both operator and patient should remove any static electricity before entering the room.• Humidify the room.● <u>Lightning</u><ul style="list-style-type: none">• A lightning nearby may induce excessive voltage to the equipment. If any danger is suspected, use the uninterruptible power supply system.● <u>High frequency noise interference from other device through the power outlet</u><ul style="list-style-type: none">• 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 (2001). 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-7300 system is intended for use in the electromagnetic environment specified below. The customer or the user of the DS-7300 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-7300 system uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF Emissions CISPR 11	Class A	
Harmonic Emissions IEC61000-3-2	Class A	
Voltage Fluctuations/ Flicker Emissions IEC61000-3-3	Complies	The DS-7300 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.

●Compliance to the Electromagnetic Immunity (1)

The DS-7300 system is intended for use in the electromagnetic environment specified below. The customer or the user of the DS-7300 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) IEC61000-4-2	±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 IEC61000-4-4	±2kV for power supply lines ±1kV for input/output lines	±2kV for power supply lines ±1kV input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC61000-4-5	±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. IEC61000-4-11	<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-7300 system requires continued operation during power mains interruptions, it is recommended that the DS-7300 system is powered from an uninterruptible power supply.
Power Frequency (50/60Hz) Magnetic Field IEC61000-4-8	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-7300 system is intended for use in the electromagnetic environment specified below. The customer or the user of the DS-7300 system should assure that it is used in such an environment.

Immunity Test	IEC60601-1-2 Test Level	Compliance Level	Electromagnetic Environment - Guidance
Conducted RF IEC61000-4-6	3Vrms 150kHz to 80MHz	3Vrms	Portable and mobile RF communications equipment should be used no closer to any part of the DS-7300 system, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended Separation Distance $d = 1.2 \sqrt{P}$

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 can not be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the DS-7300 system is used exceeds the applicable RF compliance level above, the DS-7300 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-7300 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-7300 System

The DS-7300 system is intended for use in an environment in which radiated RF disturbances are controlled. The customer or the user of the DS-7300 system can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the DS-7300 system as recommended below, according to the maximum output power of the communications equipment.

<i>Rated Maximum Output Power of Transmitter (W)</i>	<i>Separation Distance according to Frequency of Transmitter (m)</i>		
	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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Chapter 1

General Description

This chapter explains the general description of this equipment.

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General Description

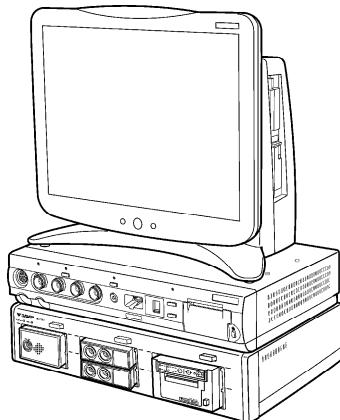
The DS-7300 system consists of the main unit (DSC-7300), touch panel color display unit (LC-7315T/LC-7319T), and Super Module (HS-700 series).

15-inch display (LC-7315T) or 19-inch display (LC-7319T) can be selected for the display unit.

The Super Module is capable of measuring ECG, respiration, SpO₂, BP, NIBP, temperature, and CO. The SpO₂ measurement is performed using the NELLCOR® unit.. By using the parameter modules inserted to the Input Box (IB-7300), monitoring parameters can be extended.

Depending on the model type, CO₂, O₂, N₂O, anesthetic agent measurement and 3ch recorder output can be also performed.

Network connection with the central monitor using the Ethernet LAN and telemetry transmitter module is also possible.



<Composition of DSC-7300, LC-7315T, HS-720E, IB-7300 and parameter modules>

Super Module Types

Model Type	Basic Measurement		CO ₂ Measurement* ¹	Recording
	Fixed	Multiparameter		
HS-710			×	×
HS-710E	ECG RESP×1	4 ports TEMP×8	○	×
HS-720	NIBP×1	BP×8	×	○
HS-720E	SpO ₂ ×1	Cardiac Output×1	○	○
HS-720C			△	○
HS-702C	ECG RESP×1 NIBP×1	2 ports TEMP×4 BP×4	△	○
HS-702E	SpO ₂ ×1 BP×2	Cardiac Output×1	○	○

*¹ CO₂ measurement

△: Mainstream Method

(Optional RESPIRONICS® sensor can be connected)

○: Microstream Method (Oridion®)

NOTE	<ul style="list-style-type: none">The illustration in this operation manual includes the CO₂ measurement key and recording key, but please note that CO₂ measurement function is not supported for the HS-710, HS-720, and recording function is not supported for the HS-710, HS-710E.The display example of the LC-7315T will be used in this operation manual unless the display layout of the LC-7315T and LC-7319T largely differs.
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Features

- It is a detachable type patient monitor which consists of patient monitor, touch panel display unit, and Super Module.
- A lineup of 15-inch (LC-7315T) and 19-inch (LC-7319T) color LCD display units are available, of which maximum of 15 waveforms and 20 waveforms can be displayed respectively. Also, numeric data display can be enlarged, and graphic trend, ventilator data can be displayed. All the operations are performed through the touch screen controls, and frequently used keys can be programmed as user keys. (Maximum 8 keys for LC-7315T, and 10 keys for LC-7319T)
- For the LC-7319T, an optional mouse can be connected allowing touch key control using the mouse.
- The monitor is equipped with an alarm pole which the flash pattern can be set corresponding to each alarm level.
- By using the multiparameter amplifier, the Super Module is capable of monitoring maximum of 8 channels (4 channels for HS-702C, HS-702E, but 6 channels for BP) in any combination of BP, temperature, and CO₂.
- Two types of CO₂ measurement method can be selected by the Super Module types. One is the microstream method (Oridion[®]) which is less influenced by the anesthetic gas (HS-710E, , HS-720E, HS-702E), and the other is the mainstream method (RESPIRONICS[®]) which allows long stable measurement (HS-720C, HS-702C).
- 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.
- 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 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.
- By connecting the optional Input Box (IB-7300), various parameter modules can be used to monitor extended numbers of parameters.
 - HB-500 Invasive Blood Pressure Module
 - HF-500 Cardiac Output Module
 - HC-500 CO₂ Module
 - HR-500 Recorder Module
- By connecting an oximeter to the Super Module, SvO₂, CO, etc, can be monitored. The following device can be connected.
 - Oximeter / CCO Measurement Device; Vigilance, Vigilance CEDV, Vigilance II, Vigileo
 - SO₂/CO Computer; OXIMETRIX3
 - CCO/CO Computer; Q-vue
 - CCO/SO₂ Monitor; Q2 Computer

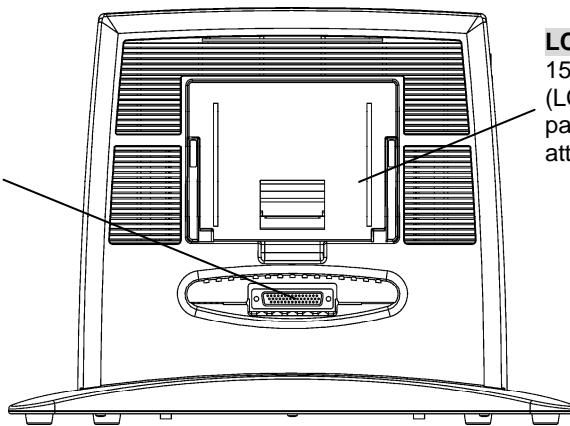
- By connecting the Poet IQ 8500A series analyzer (Criticare Systems Inc.) to the Super Module, CO₂ concentration, anesthetic gas concentration, O₂ concentration, N₂O concentration can be measured. The anesthetic gas that can be measured are halothane, isoflurane, sevoflurane, desflurane, and enflurane.
- 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

DSC-7300 Main Unit

【Front Side】

Display Unit Connector
Connects the LCD display unit.



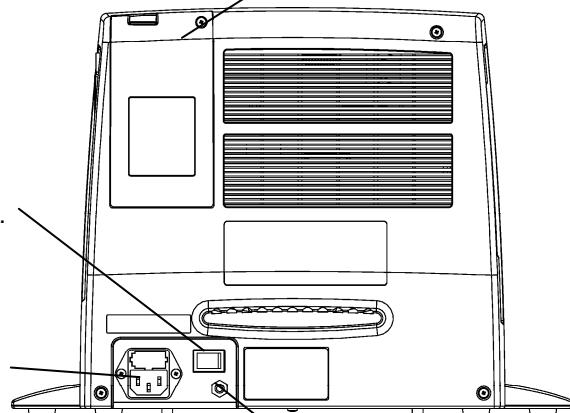
LCD Attaching Position

15-inch touch panel display unit (LC-7315T) or 19-inch touch panel display unit (LC-7319T) is attached here.

【Rear Side】

Power Supply Switch
Turns ON/OFF the monitor power.

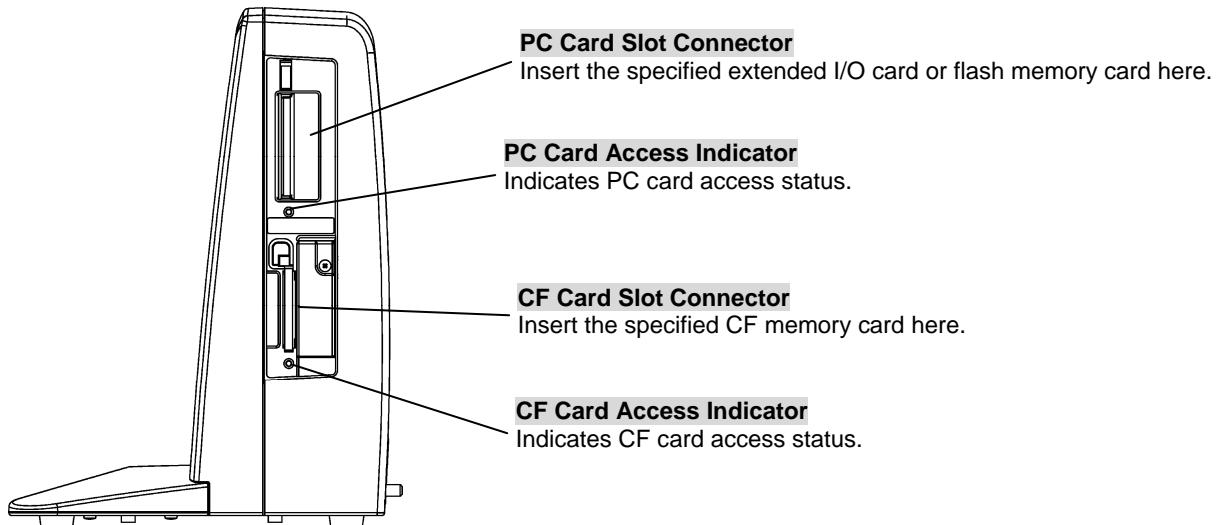
**Power Supply Connector
(with fuse holder)**
Connects the power supply cable.
(Fuse is installed inside the holder.)



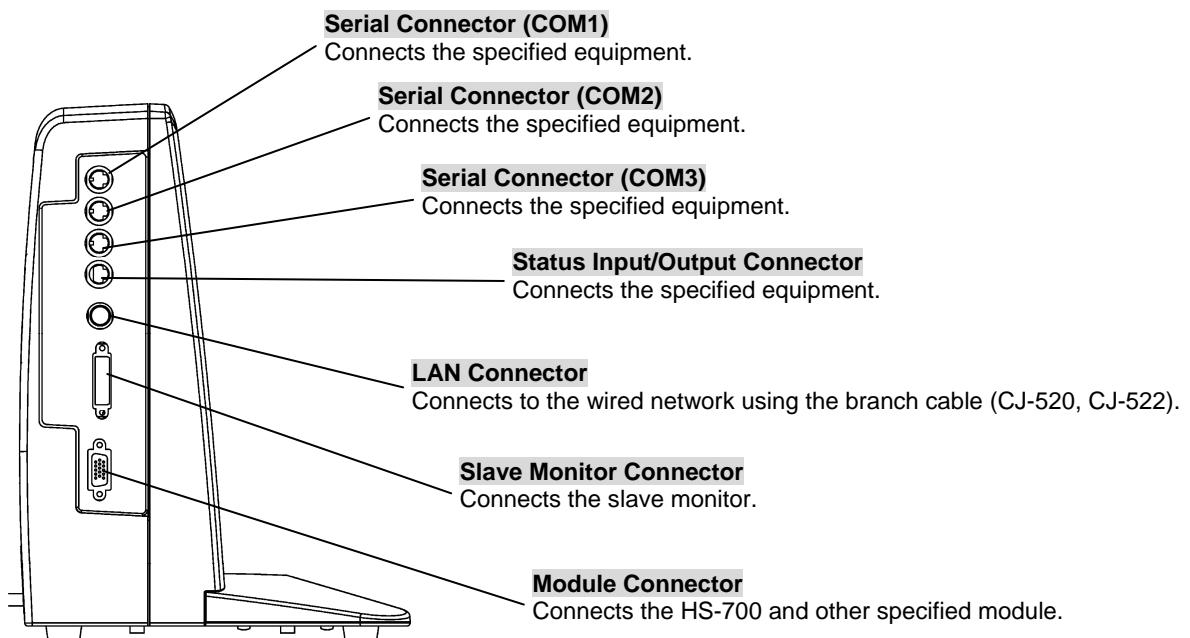
HLX Storage Cover
Stores the telemetry transmitter module.

Equipotential Ground Terminal
Use for equipotential grounding.

【Left Side】



【Right Side】

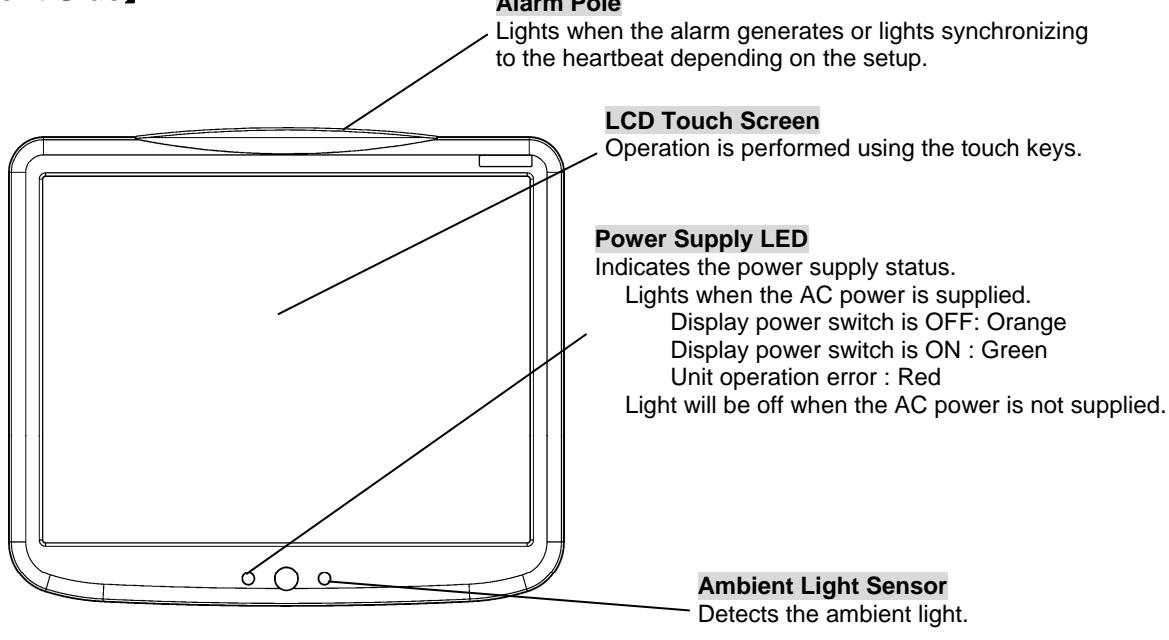


⚠️ WARNING

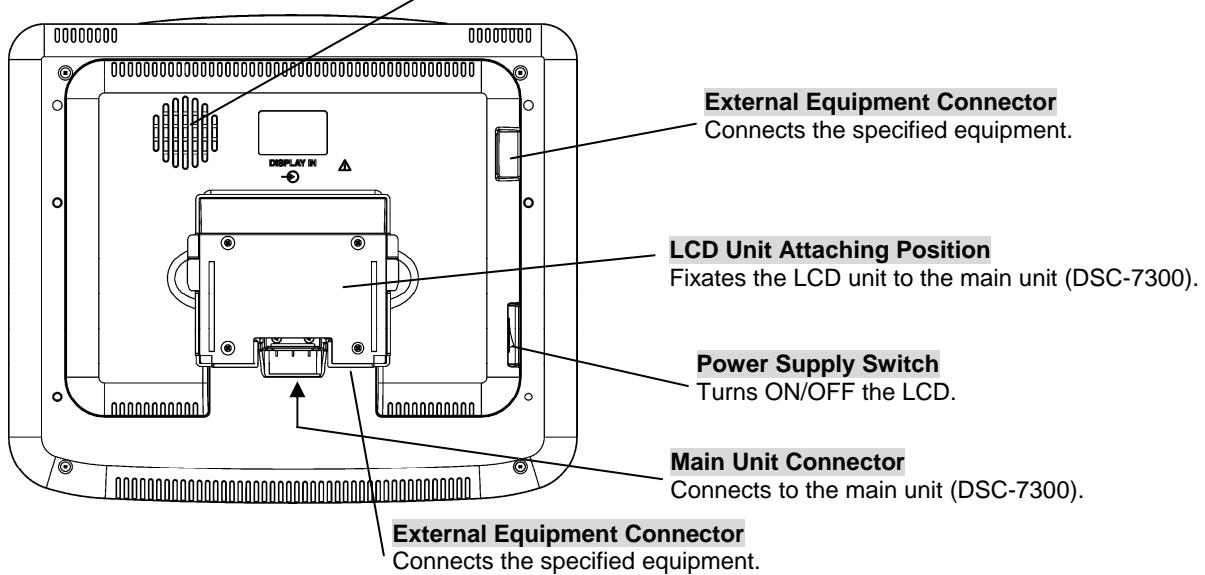
Do not connect unit or cable not authorized by Fukuda Denshi to any I/O connector. If done so by mistake, the device cannot deliver its maximum performance and the connected units may be damaged, resulting in a safety hazard.

LC-7315T (15-inch) Touch Panel Display Unit

【Front Side】



【Rear Side】



WARNING

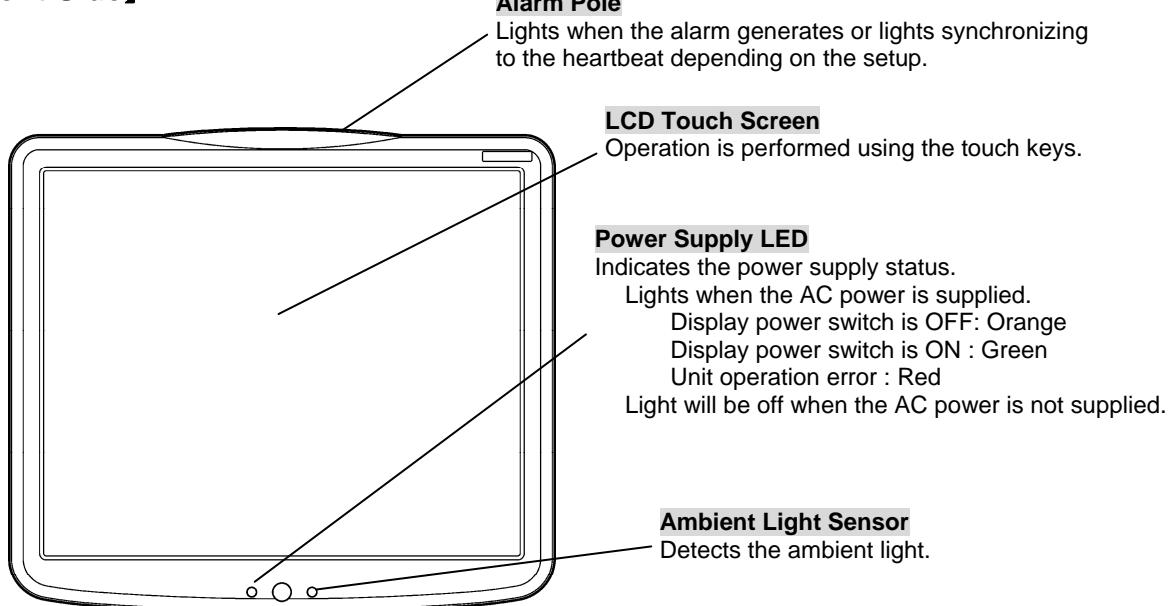
Do not connect unit or cable not authorized by Fukuda Denshi to any I/O connector. If done so by mistake, the device cannot deliver its maximum performance and the connected units may be damaged, resulting in a safety hazard.

NOTE

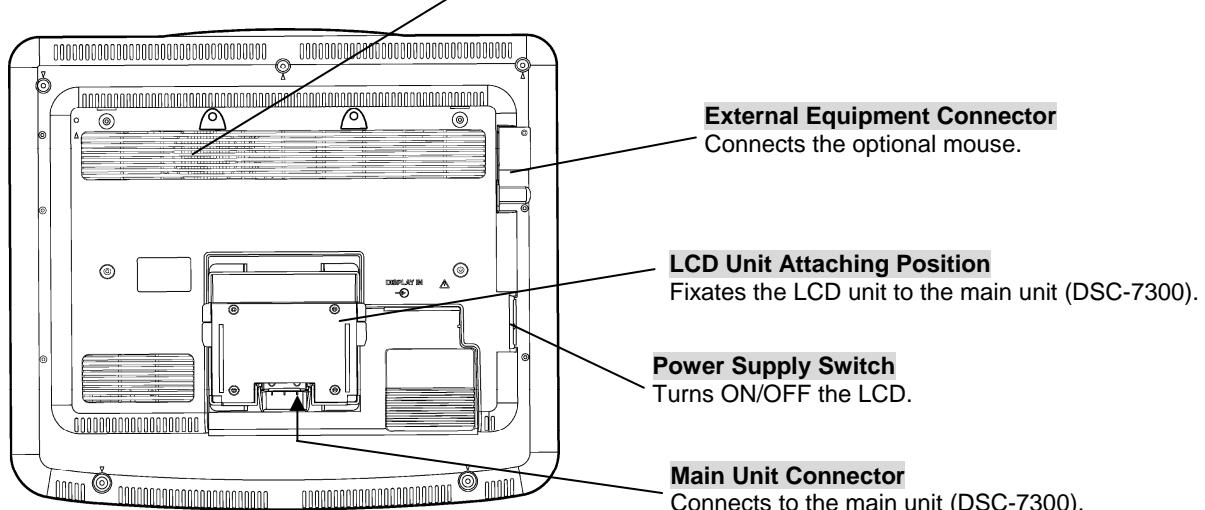
The display panel utilizes exclusive fluorescent light for the backlight. Since this fluorescent light deteriorates with its life cycle, the display may become dark, flicker, or may not light in long term use. In such case, contact your nearest service representative.

LC-7319T (19-inch) Touch Panel Display Unit

【Front Side】



【Rear Side】



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.

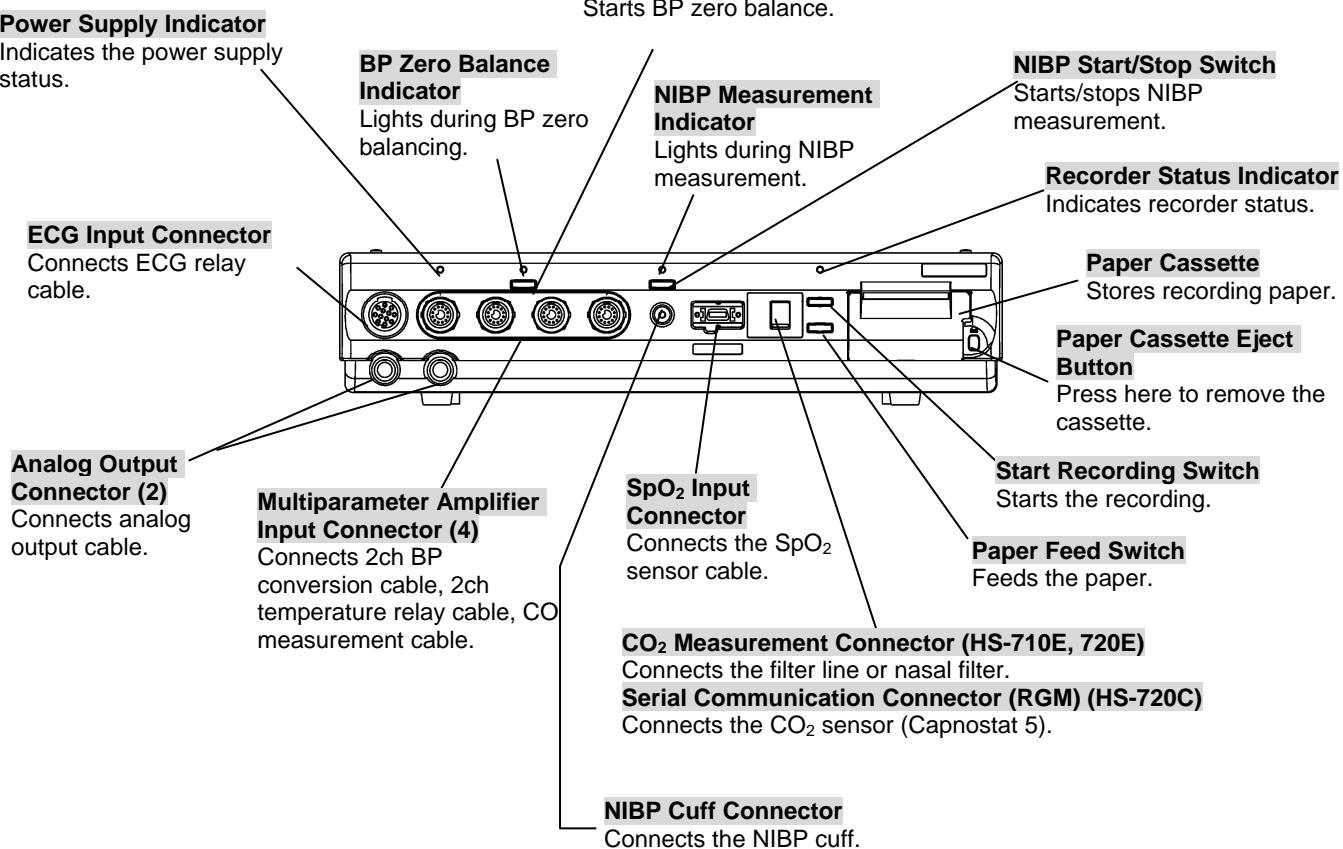
NOTE

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

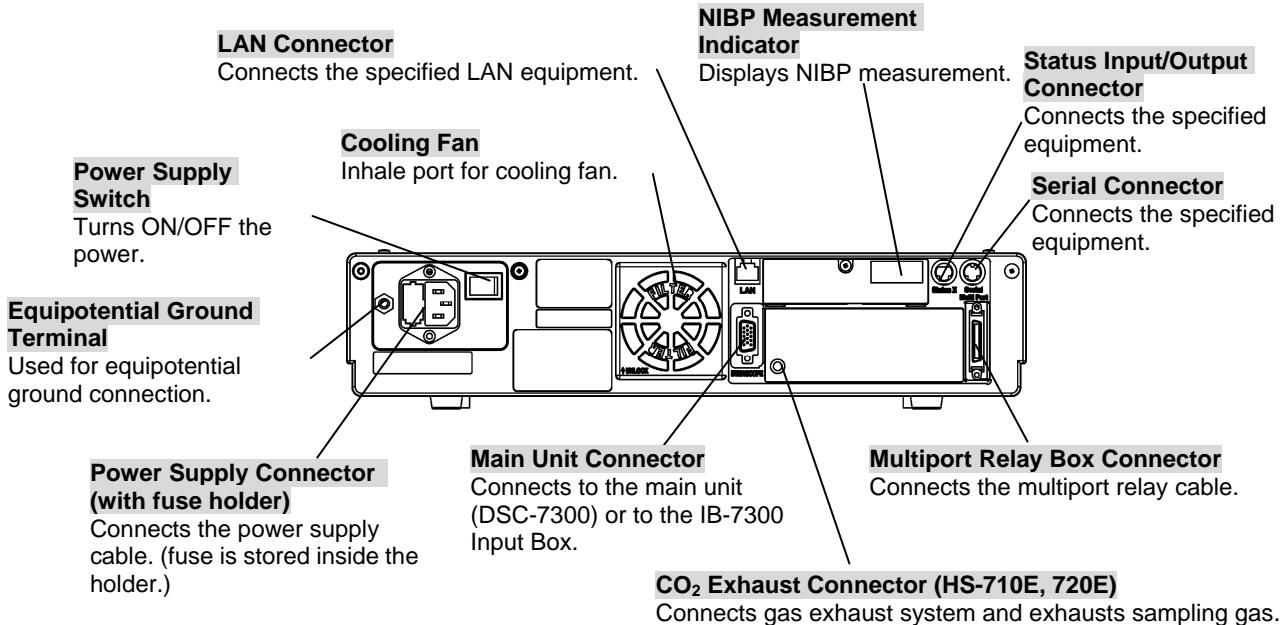
Super Module (HS-710, 710E, 720, 720E, 720C)

The illustration is HS-720E.

【Front Side】



【Rear Side】



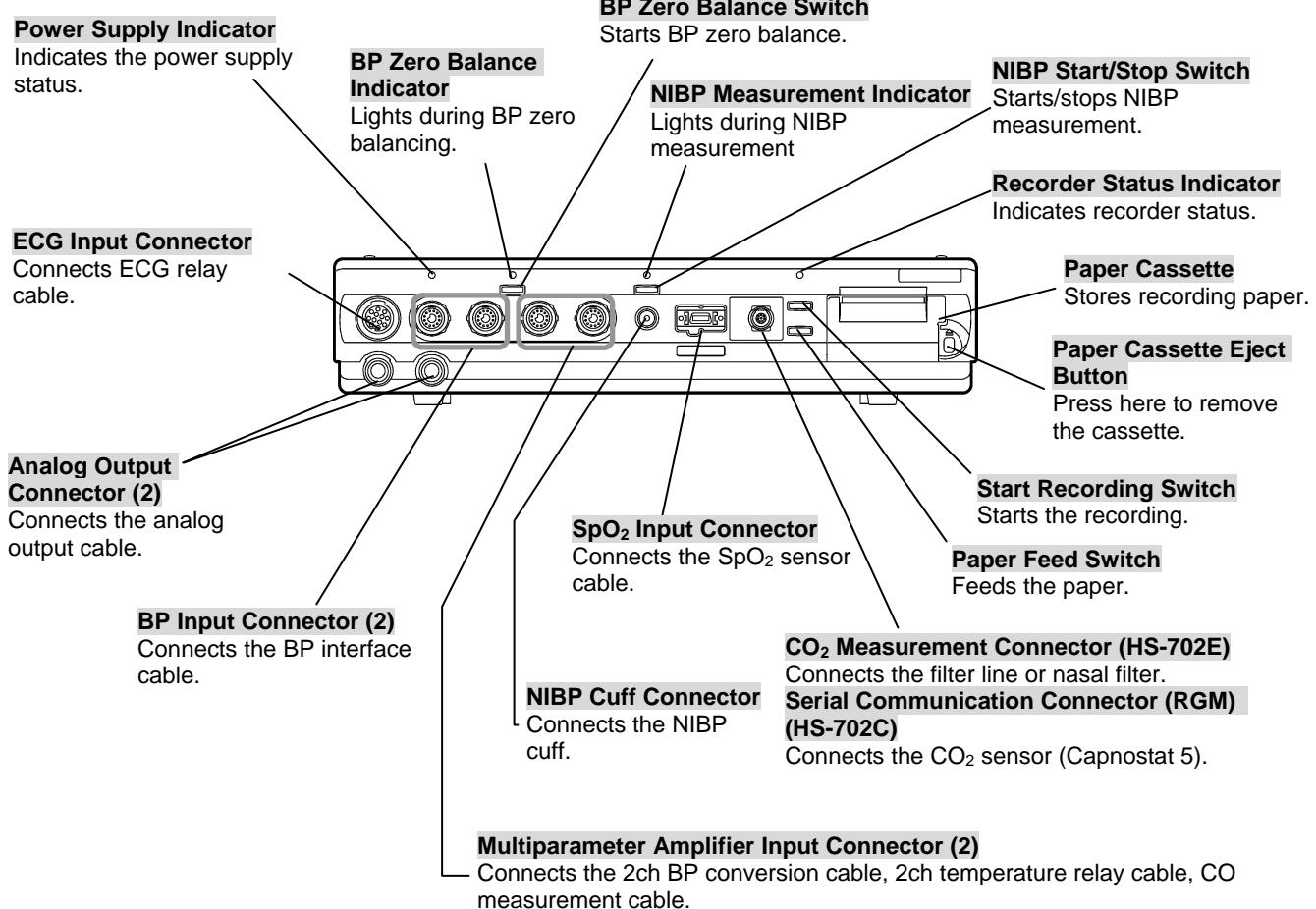
WARNING

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.

Super Module (HS-702C, 702E)

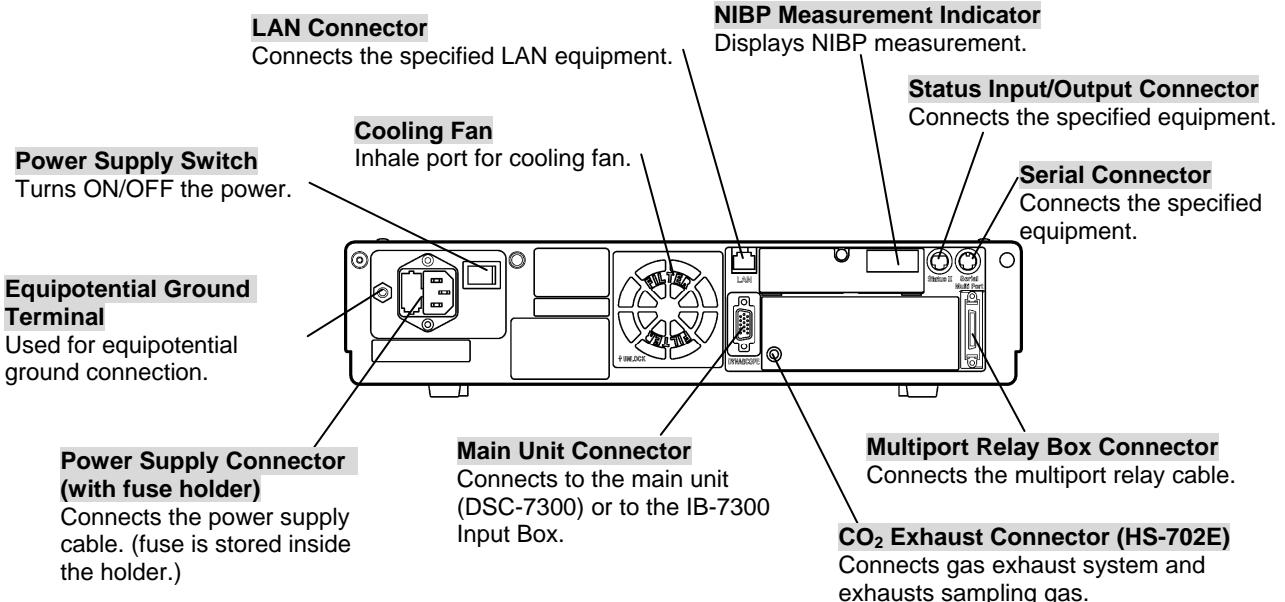
The illustration is HS-702C.

【Front Side】



【Rear Side】

The illustration is HS-702E.



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.

IB-7300 Input Box

【Front Side】

Power Supply Indicator

Indicates the power supply status.

- power supply switch OFF (AC connected) : Orange
- power supply switch ON (in operation) : Green

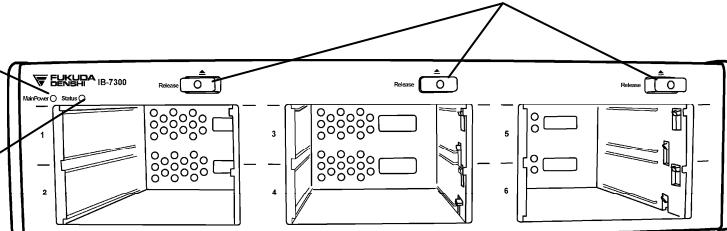
Lock Release Button

Press this button to remove the parameter module from the input box.

Status Indicator

Indicates the input box communication status.

- Communication error with Super Module: red
- Communicating with all device (DSC-7300, module): green
- No device is connected: no light



【Rear Side】

Power Supply Switch

Turns ON/OFF the power. When the power of the LC-7315T/LC-7319T is turned OFF, IB-7300 will be also turned OFF.

Maintenance Cover

Internal switch for maintenance is inside this cover

Fuse Holder

Stores the fuse.

Cooling Fan

Inhale port for cooling fan.

Serial Connector

Connects the specified equipment.

Equipotential Ground Terminal
Used for equipotential ground connection.

Power Supply Connector

Connects the power supply cable.

Main Unit Connector
Connects to the main unit (DSC-7300).

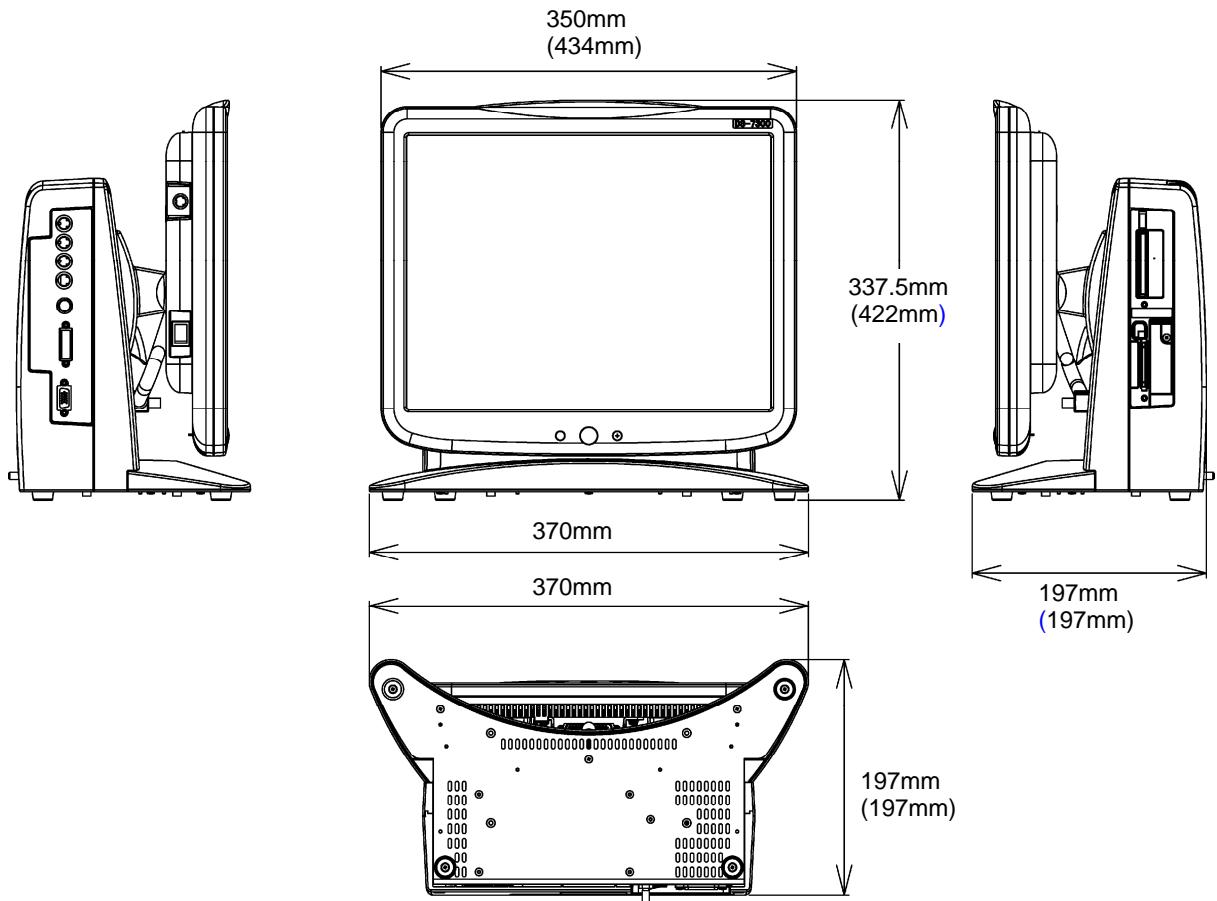
Module LAN Connector
Connect the HS-700 series Super Module.



The internal switch setting will be performed by our service representative.
Users should not open the maintenance cover.

External Appearance

(): For LC-7319T



Weight: 9kg (11kg)

Chapter 2

Basic Operation

This chapter describes the basic operation for monitoring.

2

Basic Operation

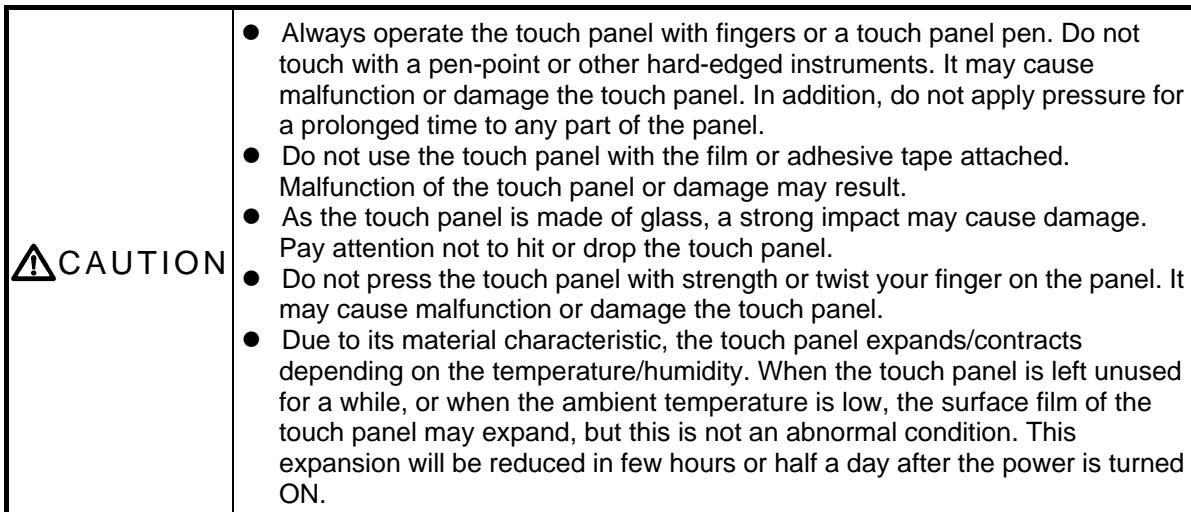
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Before Use

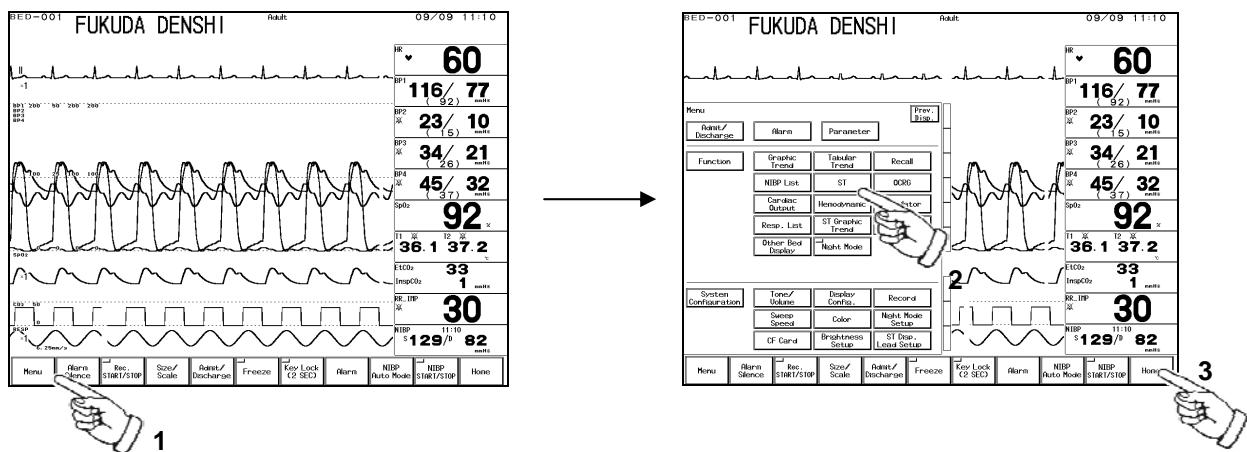
Basic Operation for Monitoring

Touch Keys

All operation of this equipment is performed using touch keys.

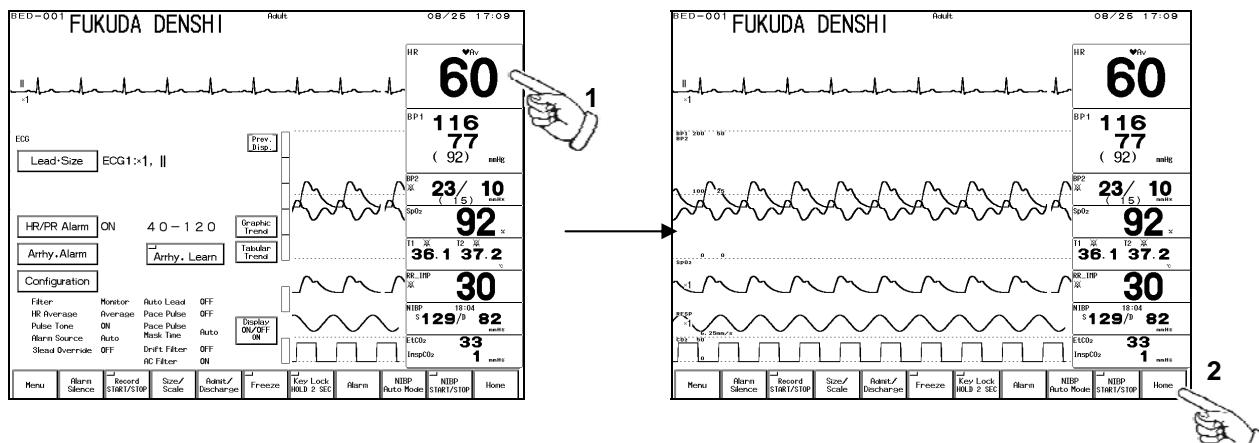


● General Key Control



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.



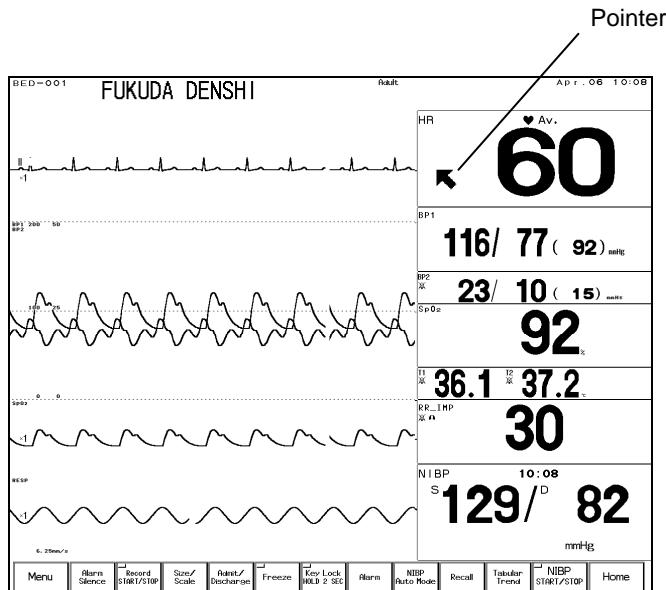
Frequently used keys can be set as user key.
(Maximum of 8 keys for LC-7315T, 10 keys for LC-7319T)
Refer to "4. Monitoring Setup Key Setup To Set the User Keys" for details.

Mouse Control

(For LC-7319T)

When the 19-inch display, LC-7319T is used, an optional mouse can be connected allowing touch key control using the mouse.

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



It is necessary to set the mouse function (ON/OFF, pointer shape, moving speed) in advance.
For details, refer to "4. Monitoring Setup Mouse Operation".

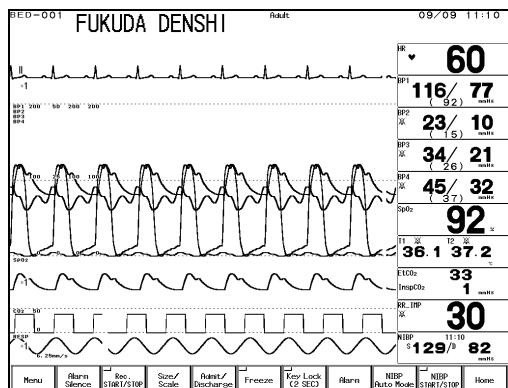
About the Home Display

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.

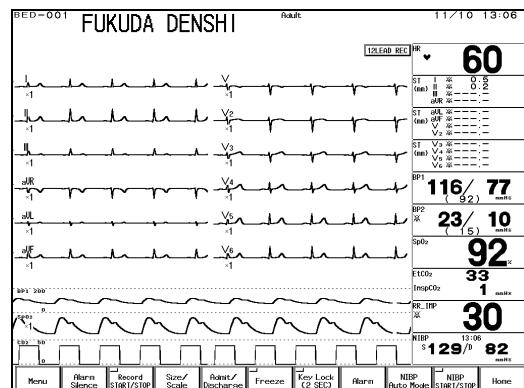
NOTE

For the LC-7319T (19-inch display unit), the display mode of "Extended 1" and "Extended 2" cannot be configured.

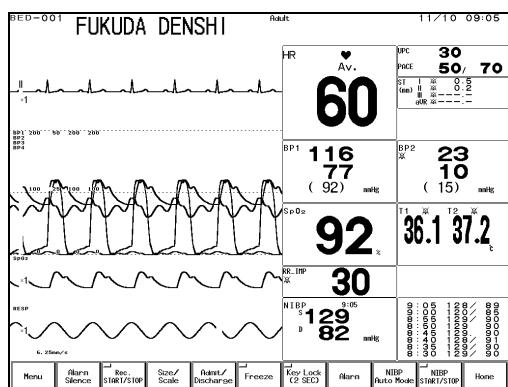
[Display Example of LC-7315T]



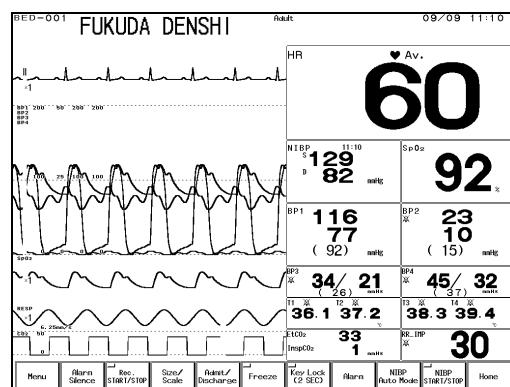
<Standard>



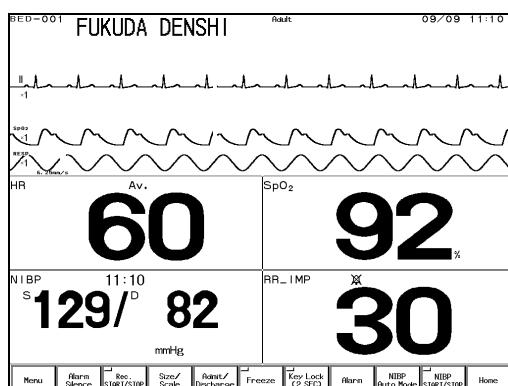
<12-lead>



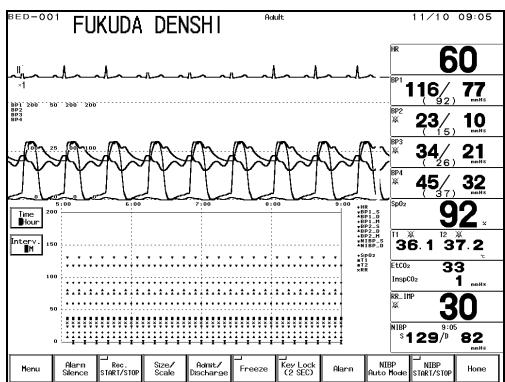
<Extended 1>



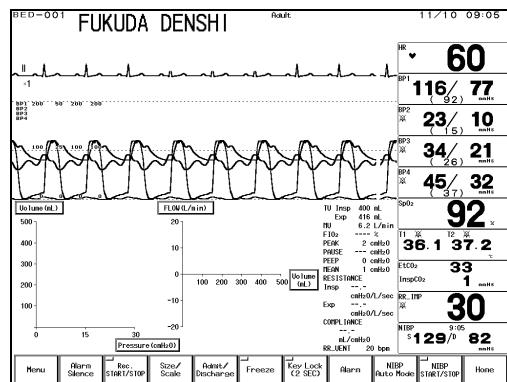
<Extended 2>



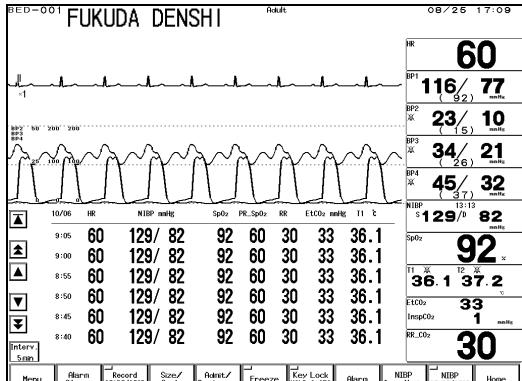
<Enlarged Numeric Data>



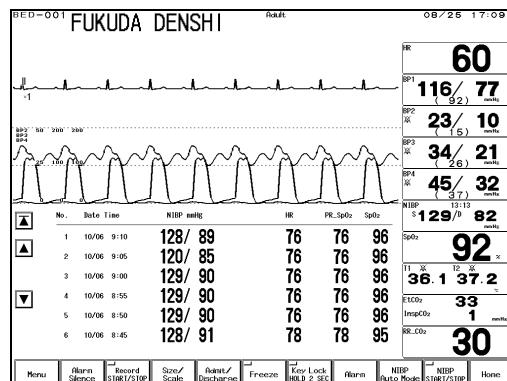
<Standard (Graphic Trend)>



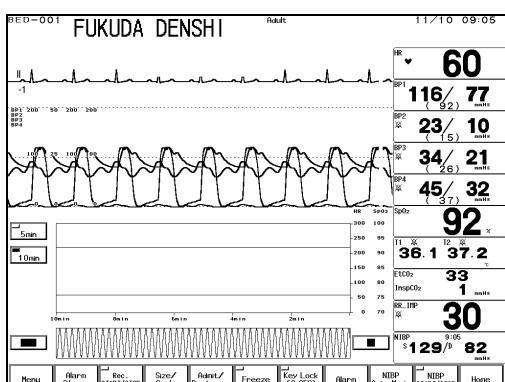
<Standard (Ventilator)>



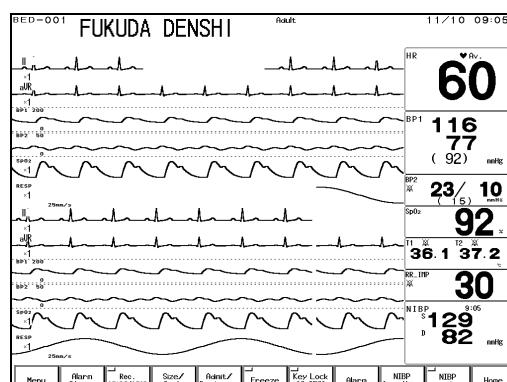
< Standard (Tabular Trend) >



<Standard (NIBP List)>

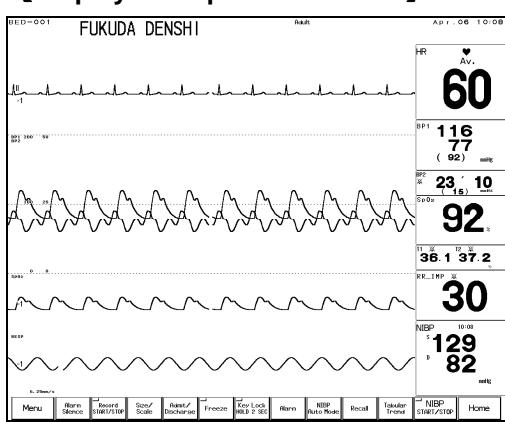


<Standard (OCRG)>

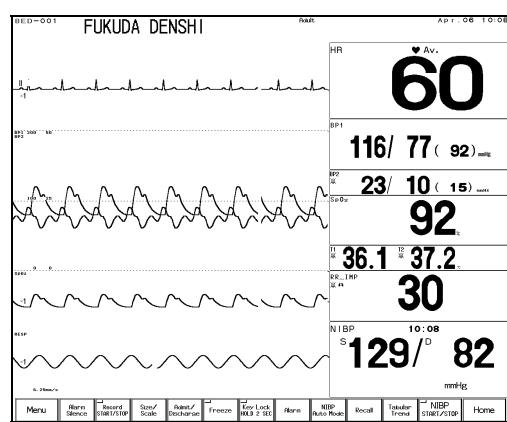


< Block Cascade >

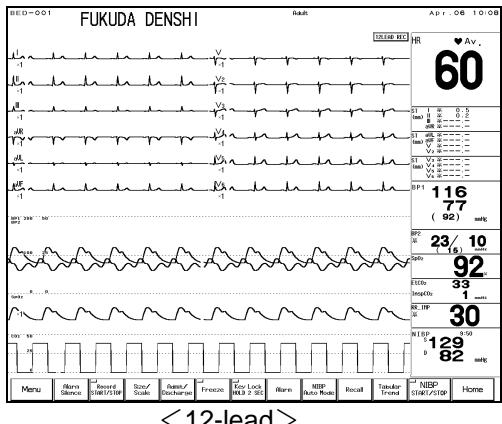
[Display Example of LC-7319T]



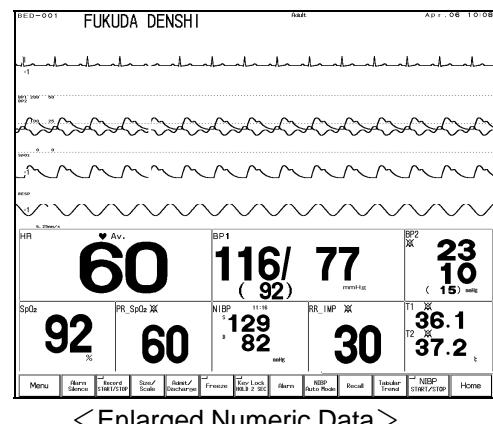
< Standard: Numeric Data Width Normal



< Standard: Numeric Data Width Wide >



<12-lead>



<Enlarged Numeric Data>

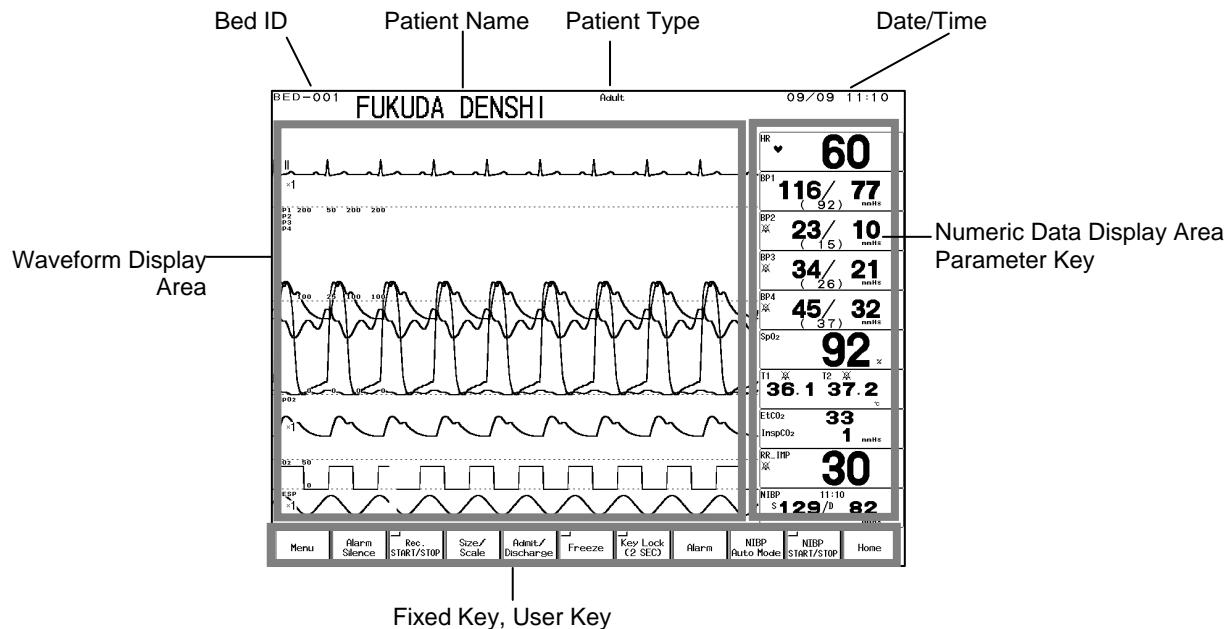


The display can be configured by selecting the waveform and numeric data to be displayed. The configured display can be programmed.
Refer to "4. Monitoring Setup Display Configuration" for details.

The Description of the Display

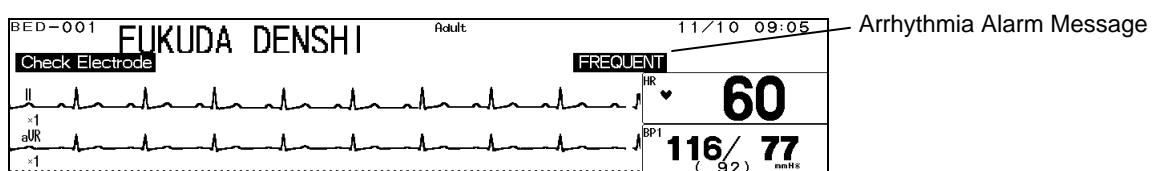
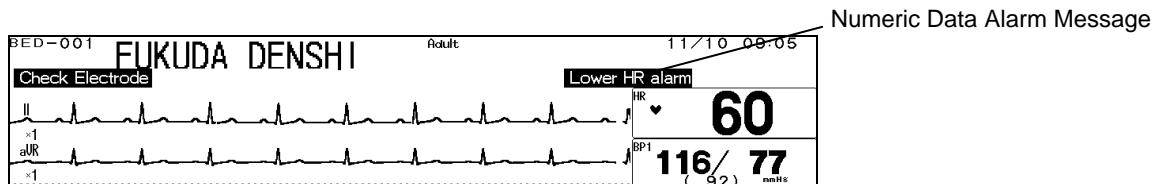
Other than waveforms and numeric data, patient name, alarm message, status message, etc. will be displayed on the screen.

● Numeric Data, Waveform, Patient Name, etc.



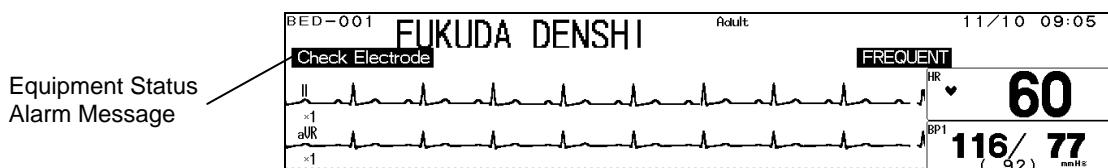
● Alarm Message for Numeric Data / Arrhythmia

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.



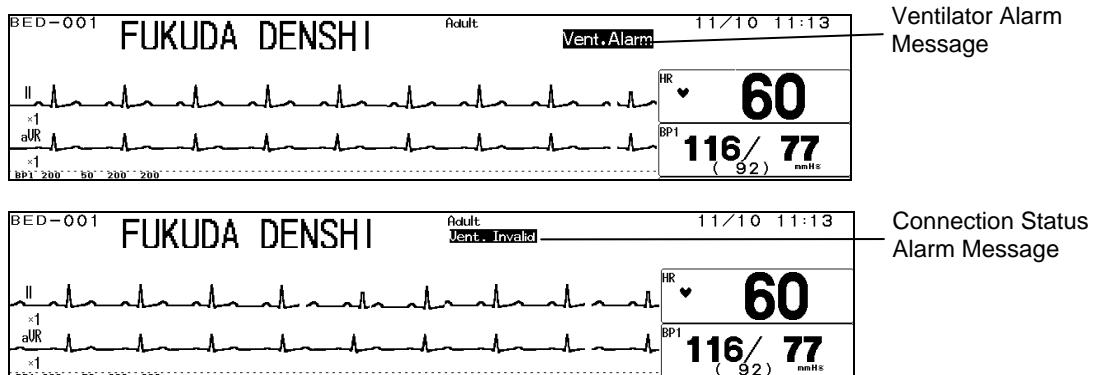
● Equipment Status Alarm Message

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



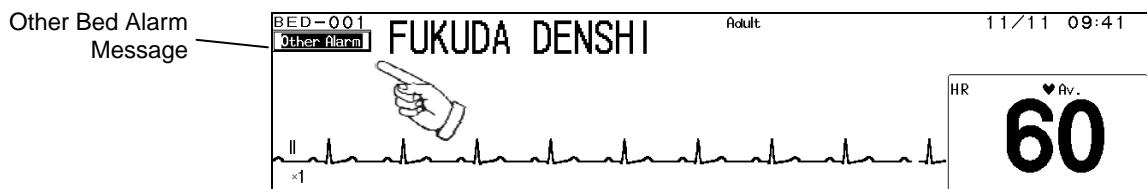
● Ventilator Alarm Message

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

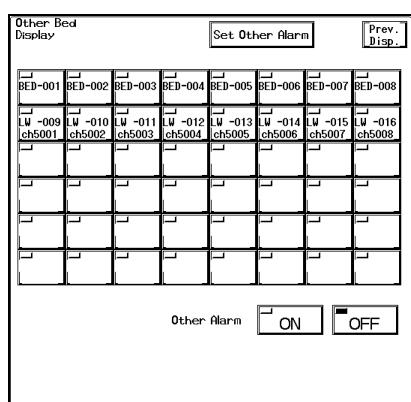


● Other Bed Alarm Message

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.



Refer to "7. Function Other Bed Display" for details.

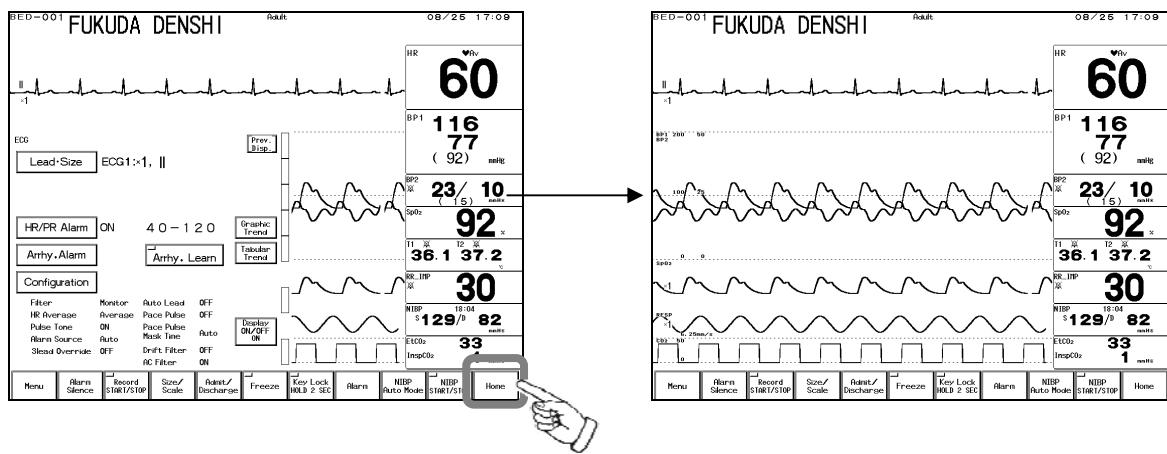
NOTE

Other bed display function is not available if the DS-LANII network of AU-5500N 8ch Recorder set as administrator (1:N network) is constructed.

To Return the Display

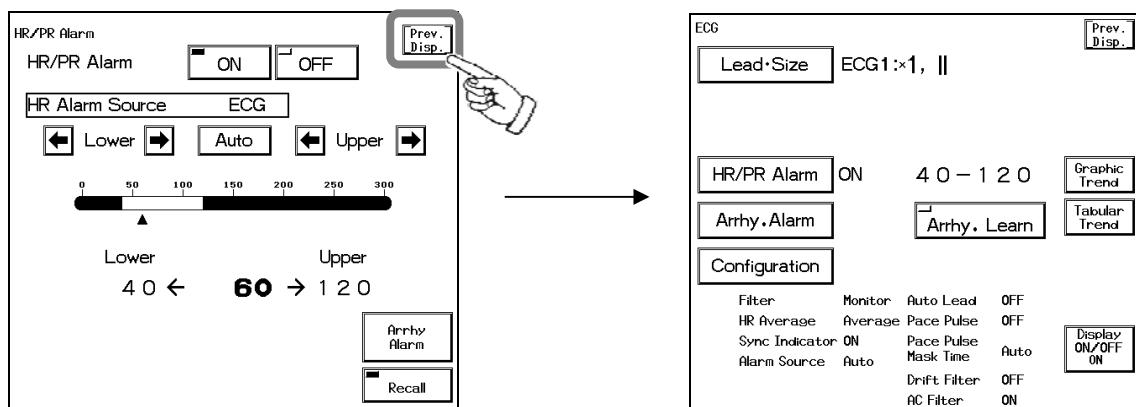
[To Return to the Home Display]

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.



Preparation for Monitoring

To Turn On the Power

WARNING	<ul style="list-style-type: none">● Use only the accompanying 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.
----------------	---

NOTE	<p>Equipotential Grounding</p> <p>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 equipotential terminal to the same ground terminal. This is called equipotential grounding.</p>
-------------	--

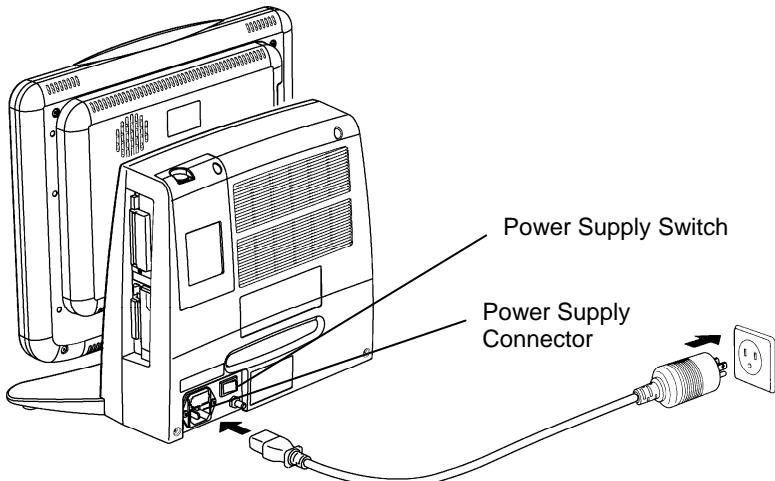


For procedures to connect each part, refer to "9. Installation System Construction".

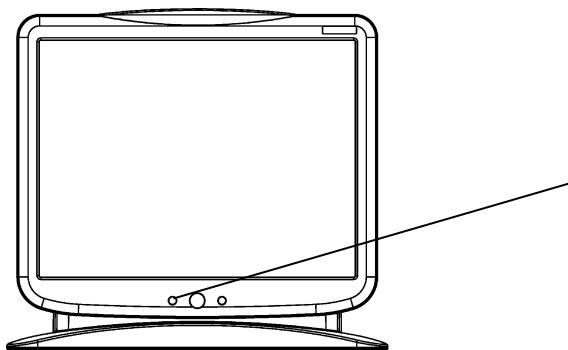
Connecting the Power Cable

● Main Unit

Connect the accessory power cable (CS-24) 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, and the power supply switch is turned ON, power supply LED will light to notify that the AC power is supplied.



Power Supply LED

Lights when the AC power is supplied.

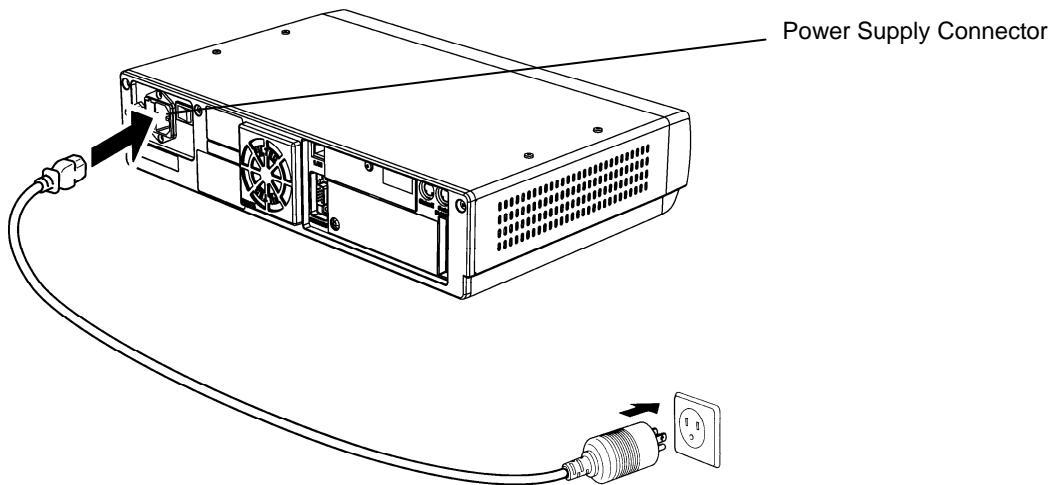
When the power switch is OFF: Orange

When the power switch is ON: Green

Extinguishes when the AC power is not supplied.

●Super Module

Connect the accessory power cable (CS-24) to the power supply connector on the rear side of the Super Module. Connect the other end of the power cable to the 3-way outlet with ground terminal.



When the power cable is connected and the power supply switch is turned ON, the main power supply indicator on the front side will light to notify that the AC power is supplied.

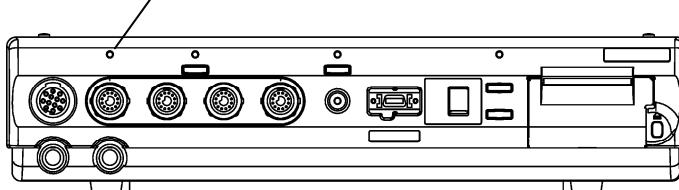
Power Supply Indicator

Lights when the AC power is supplied.

When the Super Module is turned ON, and display unit is turned OFF: Orange

When the display unit is turned ON: Green

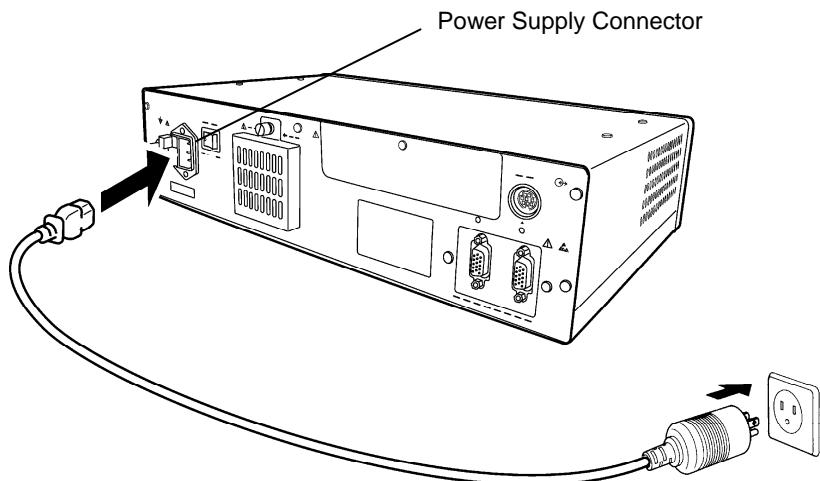
Extinguishes when the AC power is not supplied.



●Input Box

Connect the Input Box to the AC power source.

Connect the accessory power cable (CS-24) to the hospital grade outlet with ground terminal.



When the power cable is connected and the power supply switch is turned ON, the main power supply indicator on the front side will light to notify that the AC power is supplied.

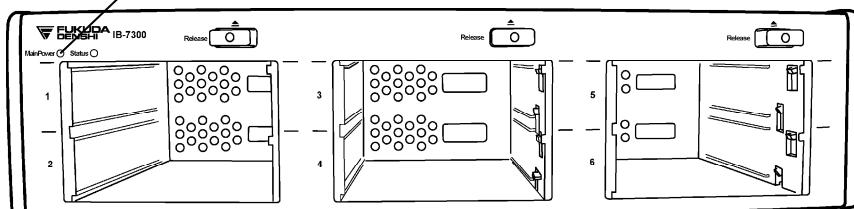
Power Supply LED

Lights when the AC power is supplied.

When the Input Box is turned ON, and display unit is turned OFF: Orange

When the display unit is turned ON: Green

Extinguishes when the AC power is not supplied.



Connection of Main Unit, Super Module, and Input Box

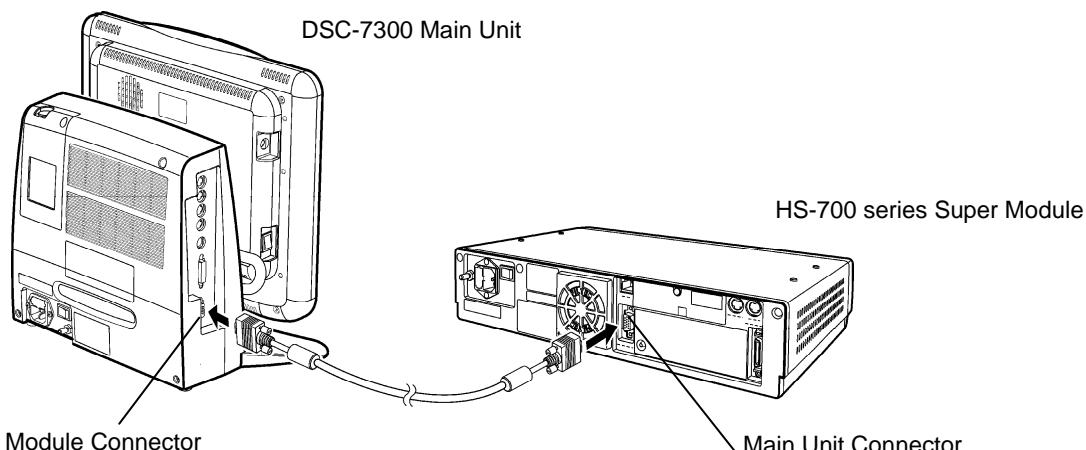
Connect the main unit (DSC-7300) and Super Module (HS-700 series) with module connection cable (CJ-732B).

When using the Input Box (IB-7300), connect the Super Module and Input Box with module connection cable.

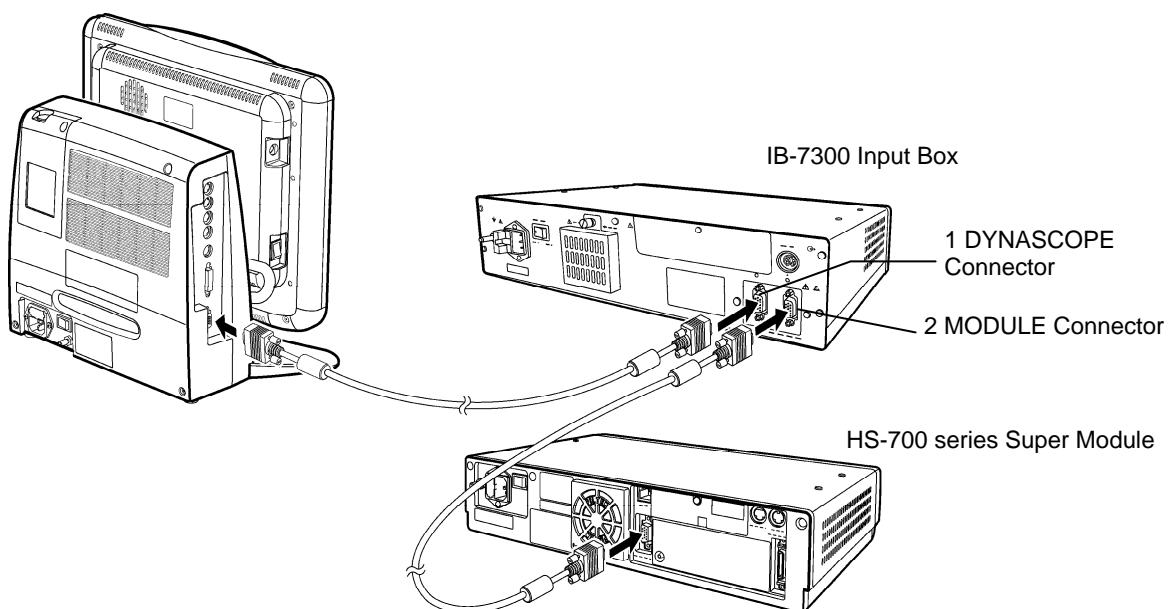
The following cables of different length are available according to the different arrangement of main unit, Super Module and Input Box.

<i>Model Type</i>	<i>Length</i>
CJ-732A	0.3m
CJ-732B	0.7m (Standard Accessory)
CJ-732C	5m
CJ-732D	10m
CJ-732E	20m

● Connection of Main Unit and Super Module

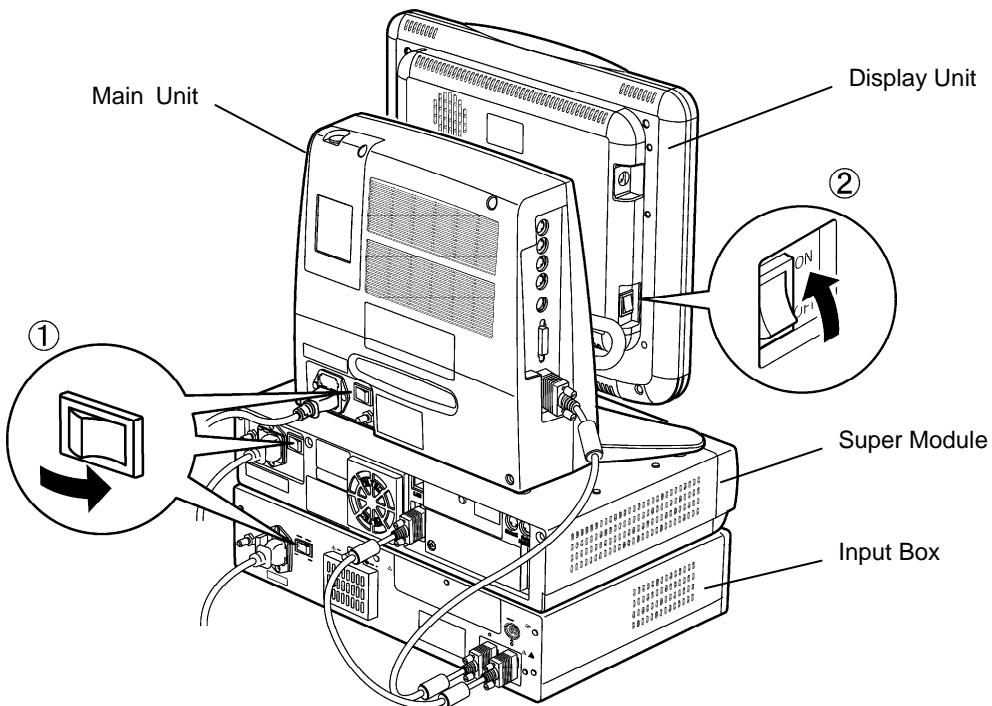


● Connection of Main Unit, Super Module, and Input Box



To Turn On the Power Switch

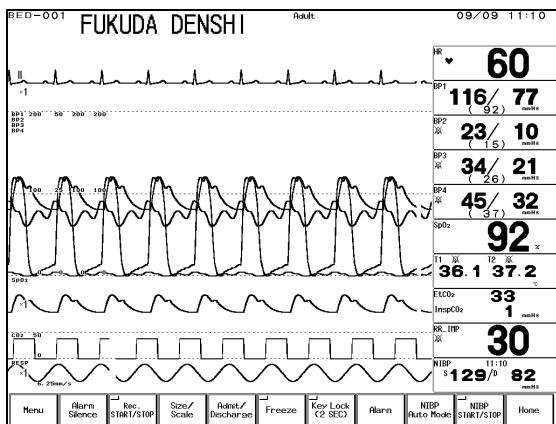
First, turn ON the power switch of the main unit, Super Module, and Input Box. Then, turn ON the power switch of the display unit. The screen will be displayed, and monitoring will start.



The power of the main unit, Super Module, and Input Box interlocks with the power switch (②) operation (ON/OFF) on the display unit.

During normal usage, the power switch (①) of the main unit, Super Module, Input Box should be left ON.

CAUTION	<ul style="list-style-type: none">If not using for a long period of time, turn OFF the power of the main unit, Super Module, and Input Box.As the Super Module and DSC-7300 communicates via Input Box, the power of the Input Box must be turned ON even if the module is not inserted in the Input Box.
----------------	--



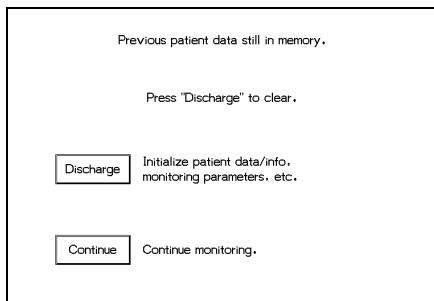
To Turn Off the Power

Turn OFF the power supply switch of the display unit. The display will be turned OFF, and monitoring will stop. The operation of the Super Module and the Input Box will also stop. If not monitoring for a long period of time, the power supply switch of the main unit, Super Module, Input Box should be also turned OFF.

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.

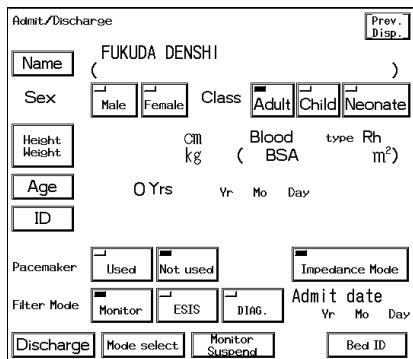


ON/OFF of this confirmation display can be selected.
Refer to "8. System Configuration Monitor Setup" for details.

To Admit a Patient

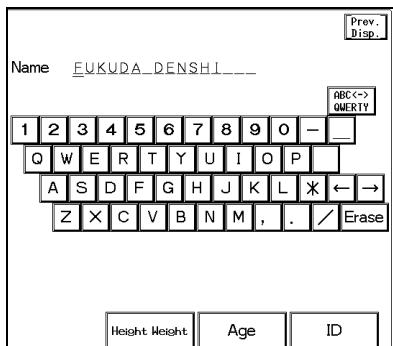
Enter the patient information on the patient admit / discharge menu.

●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 numeric keypad.
The entered name will be displayed large on the upper part of the display.

● Enter the patient ID.

The keypad interface shows the numeric keypad (0-9) with additional keys for 'Prev. Disp.', 'ABC↔QWERTY', 'Erase', and a cursor key. Below the keypad are buttons for 'Name', 'Height Weight', and 'Age'.

Press the **ID** key.
Enter the ID number using the numeric keypad.

● Enter the patient's birth date.

The screen displays 'Age' (44 Yrs) and 'Birthday' (1960 Yr, 2 Mo, 24 Dy). To the right is a numeric keypad for entering the birth date. Below the keypad are buttons for 'Name', 'Height Weight', and 'ID'.

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

● Enter the patient's height and weight.

The screen shows 'Height' (180.0 cm), 'Weight' (75.0 kg), 'BSA' (1.94 m²), 'Blood' (A+, B-, O-, AB-), and 'Rh' (+/-). To the right is a numeric keypad. Below the keypad are buttons for 'Name', 'Age', and 'ID'.

Press the **Height Weight** key
Enter the height and weight from the 10-keys.
BSA will be automatically calculated.
Select the blood type and "+" or "-" for Rh.

● Select the patient type, and pacemaker use.

The screen displays 'Admit/Discharge' (FUKUDA DENSHI), 'Name' (FUKUDA DENSHI), 'Sex' (Male/Female), 'Class' (Adult/Child/Neonate), 'Height Weight' (cm/kg), 'Age' (0 Yrs), 'Pacemaker' (Used/Not used), 'Filter Mode' (Monitor/ESIS/DIAG.), 'Admit date' (Yr/Mo/Day), 'Discharge' (Mode select/Monitor Suspend), and 'Bed ID'. Buttons for 'Prev. Disp.' and 'Impedance Mode' are also present.

Select the patient type from **Adult**, **Child**, or **Neonate**.
Select the pacemaker use from **Used**, **Not used**.



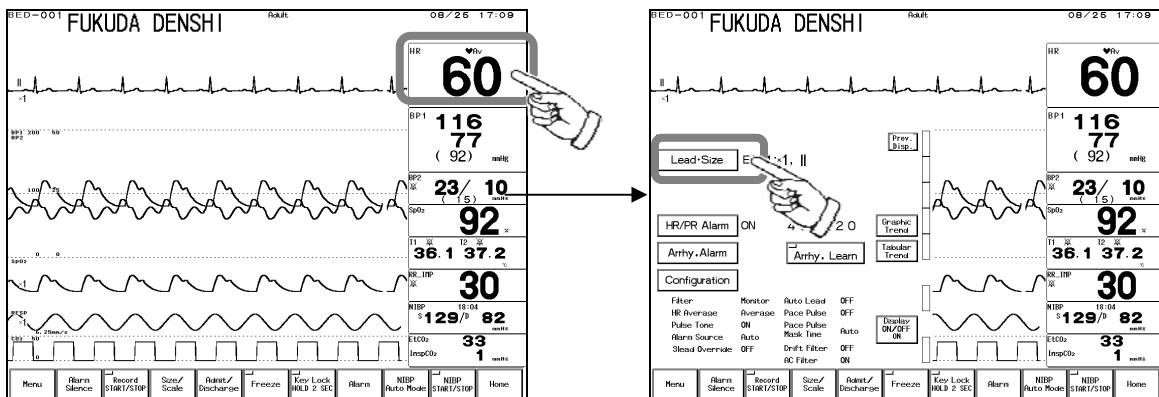
The patient type and pacemaker use must be selected. The patient type selection influences the precision of the QRS detection and NIBP measurement. Make sure the correct selection is made.

Basic Operation

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

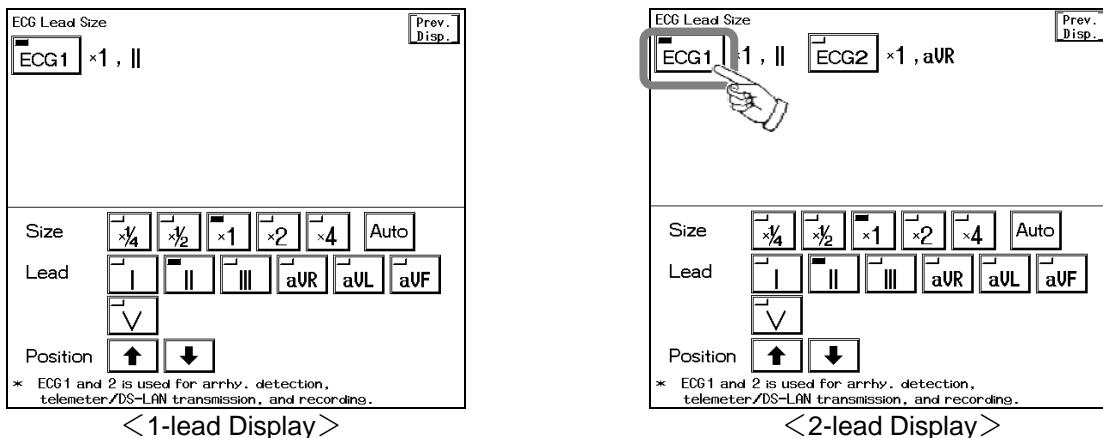
1 Select the parameter to perform the setup. (Ex.: ECG)

Press the parameter key where heart rate is displayed.



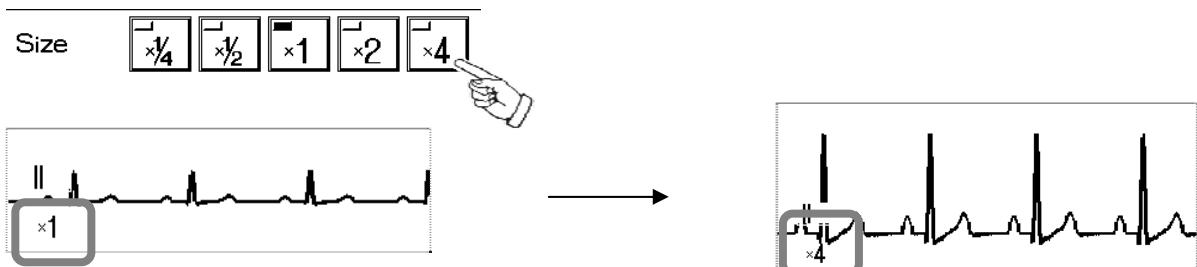
2 Adjust the waveform size and baseline position.

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



3 Adjust the waveform size.

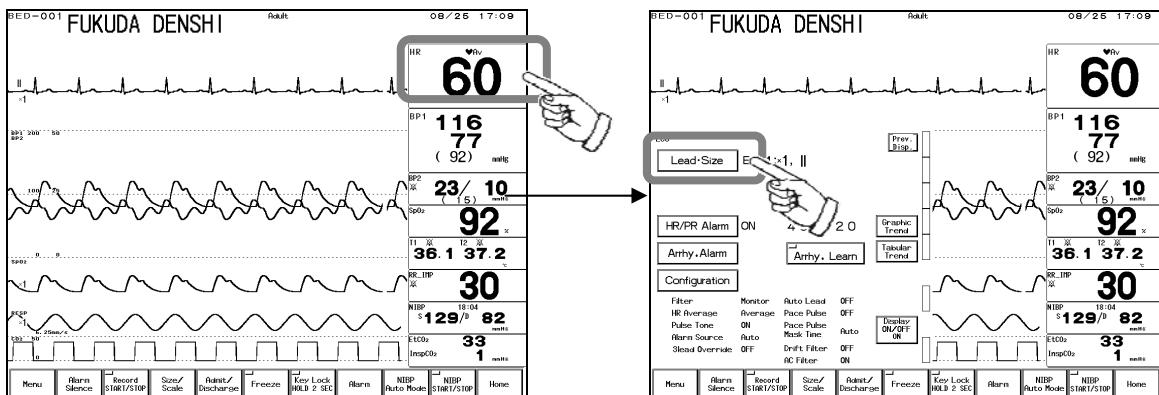
Select an appropriate waveform size for monitoring.



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

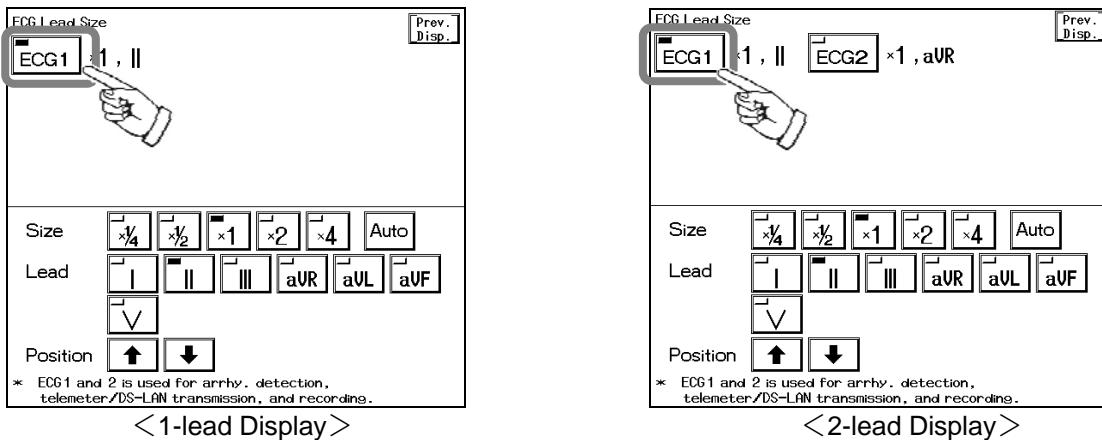
Selecting the ECG Lead (Parameter Key Operation)

1 Press the ECG parameter key.

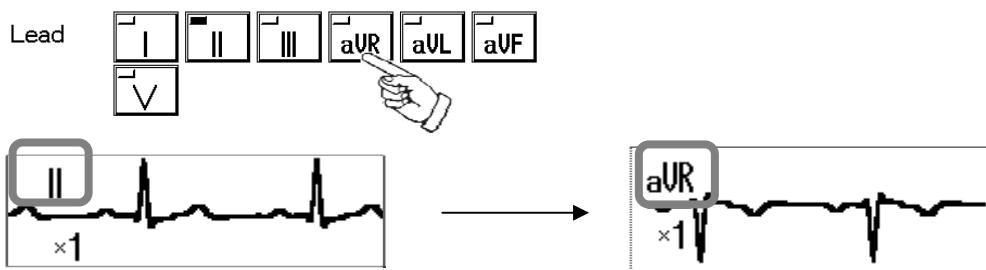


2 Press the [Lead · Size] key to display the lead, size setup menu.

Select the ECG channel to perform the setup.



3 Select the appropriate lead for monitoring.

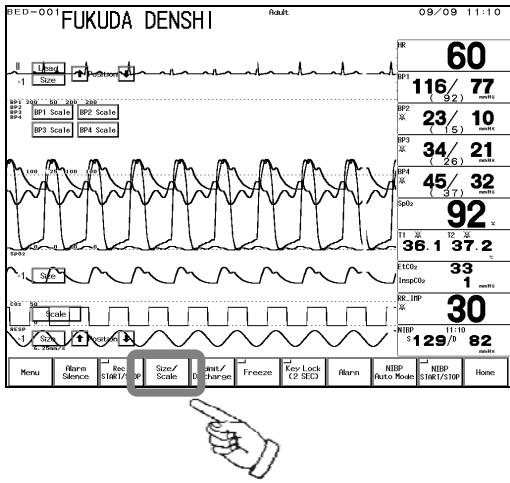


CAUTION	<ul style="list-style-type: none">The ECG lead selection will be applied to arrhythmia detection, telemetry / wired network transmission, and recording.The ECG lead selection will be applied to recall waveform and recording waveform as well as arrhythmia detection.
----------------	--



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 waveform size, scale, lead, baseline position.

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

Adjust the waveform suitable for monitoring.

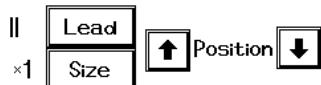
Pressing the **Lead** key will sequentially change the lead in the following order.

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

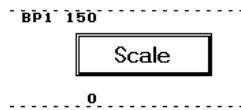


Pressing the **Size** key will sequentially change the size in the following order.

$\times 1/4 \rightarrow \times 1/2 \rightarrow \times 1 \rightarrow \times 2 \rightarrow \times 4 \rightarrow \times 1/4$

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

2 Select the scale for BP, CO₂ waveform.



Pressing the **Scale** key will sequentially switch the scale.

3 Select the waveform size for impedance respiration waveform, SpO₂ waveform.



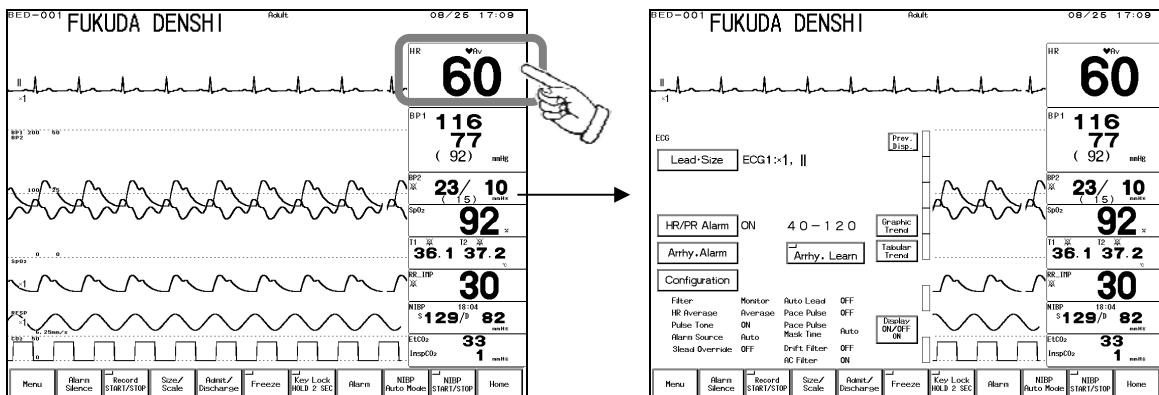
Pressing the **Size** key will sequentially change the size in the following order.

$\times 1/4 \rightarrow \times 1/2 \rightarrow \times 1 \rightarrow \times 2 \rightarrow \times 4 \rightarrow \times 1/4$

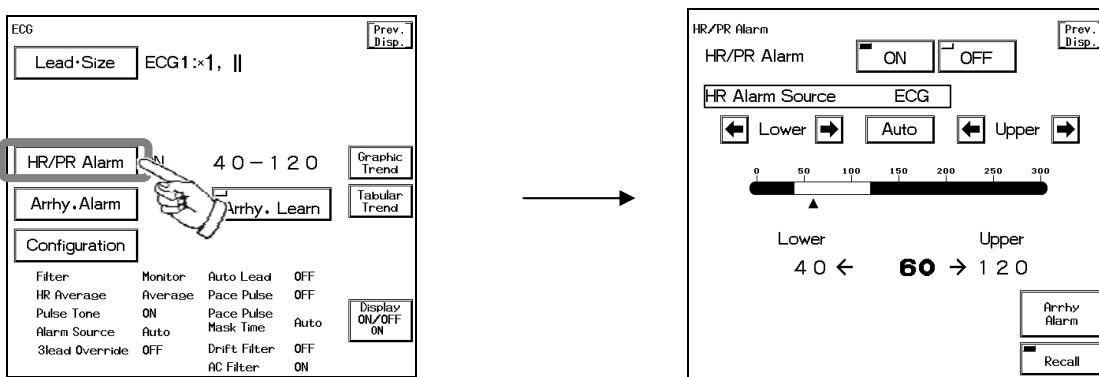
Alarm Setup for Each Parameter

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.

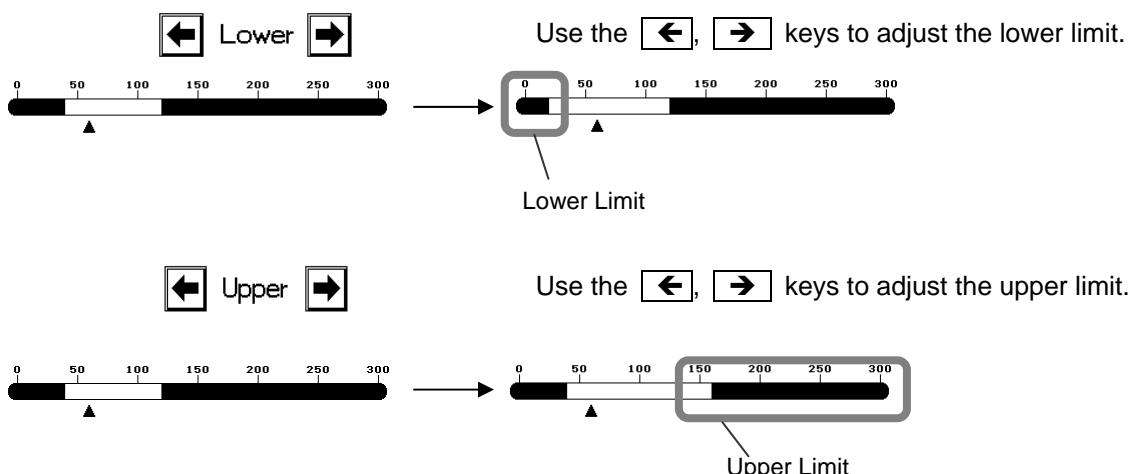
1 Select the parameter to set the alarm. (Ex.: HR alarm)



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



3 Set the upper and lower alarm limit.



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

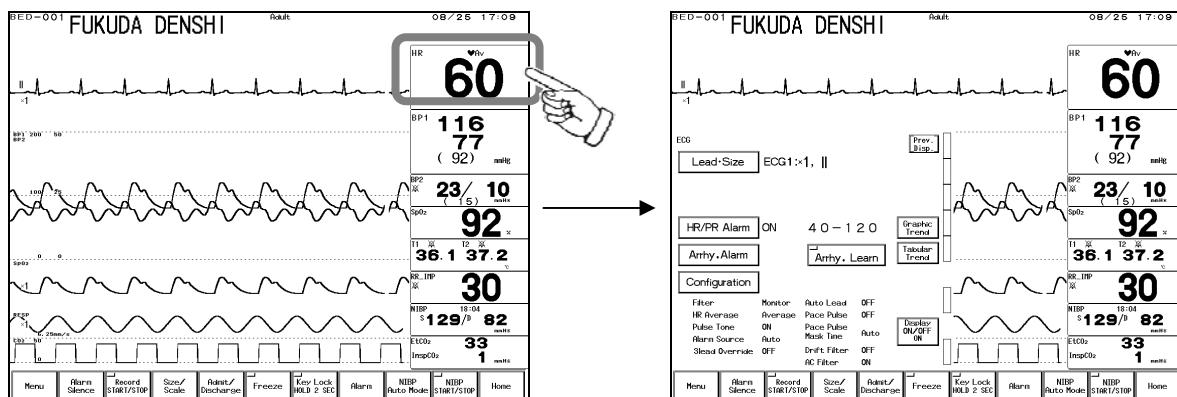
ON/OFF of Parameter Display

Waveform/Numeric Data Display

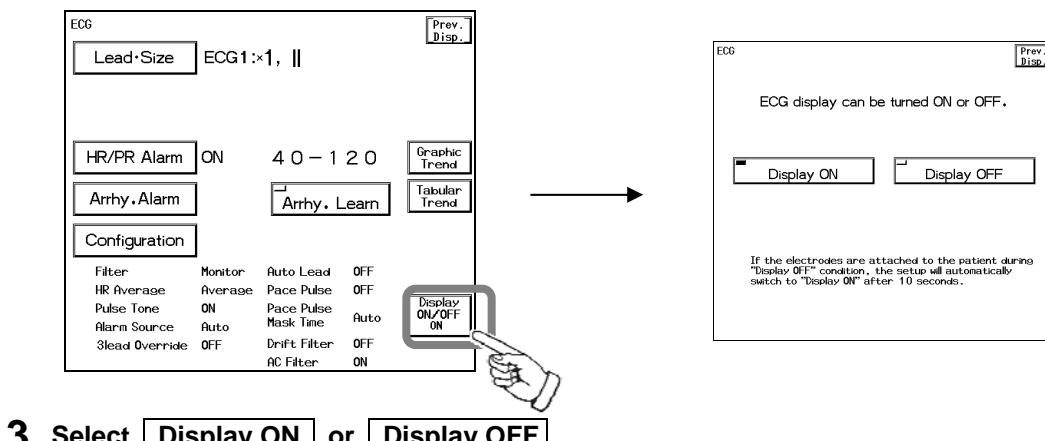
The waveform and numeric data display for each parameter can be turned ON or OFF without changing the display configuration.

If not performing the ECG or SpO₂ measurement while the ECG cable or SpO₂ sensor is connected to the monitor, the equipment status alarm such as "Lead Off" will generate. Removing ECG or SpO₂ 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)

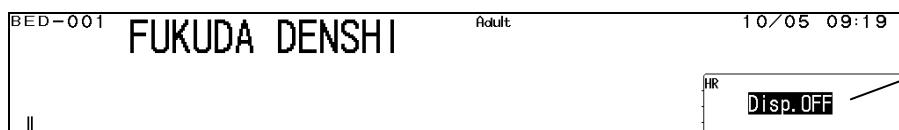


2 Press the **Display ON/OFF** key. The confirmation display for ON/OFF of ECG display will appear.



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

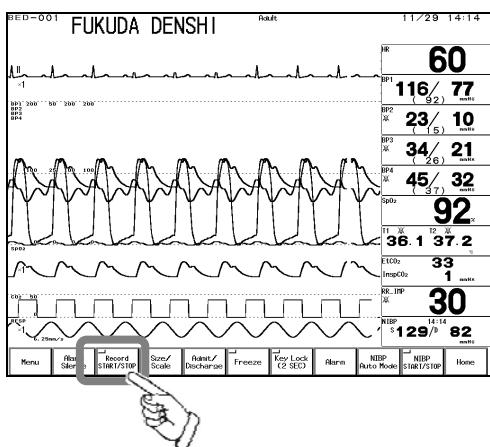
For ECG, impedance RESP, SpO₂, CO₂, properly connecting the electrode or sensor will automatically set the display ON/OFF function to "Display ON".



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

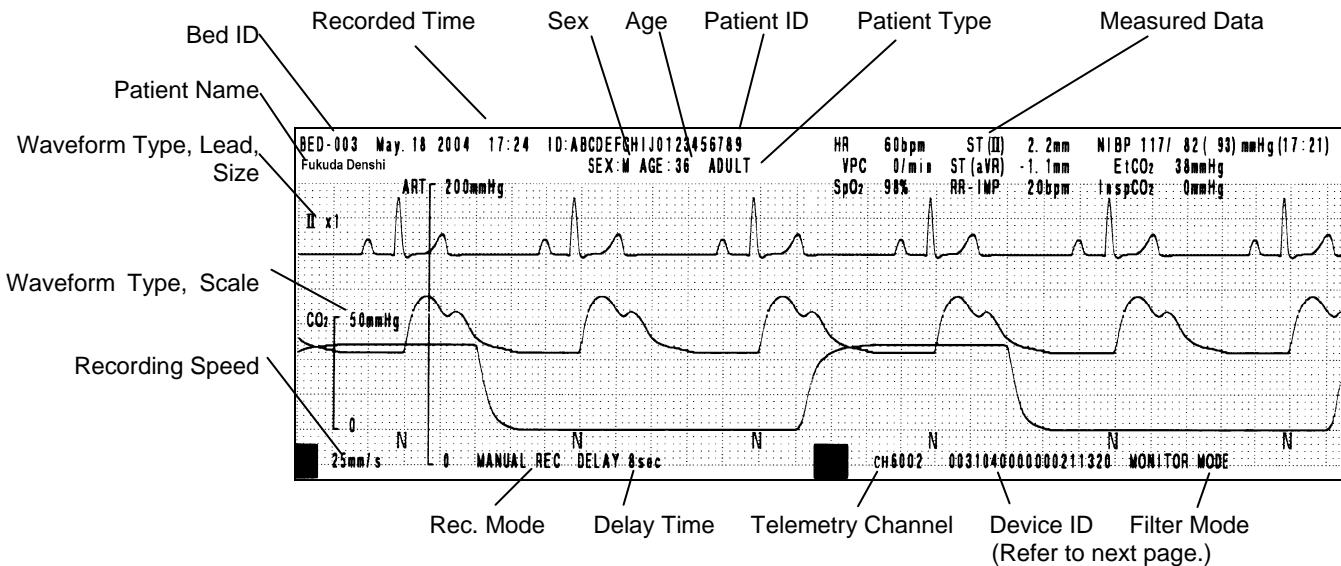
Recording

● 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 the manual recording, number of recording waveforms and recording duration can be set.
Refer to "4. Monitoring Setup Manual Recording" for details.

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

Refer to "4. Monitoring Setup Alarm Recording" for details

For the 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 recorded.
Refer to sections on graphic trend and tabular trend in "7. Function".



【Device ID】

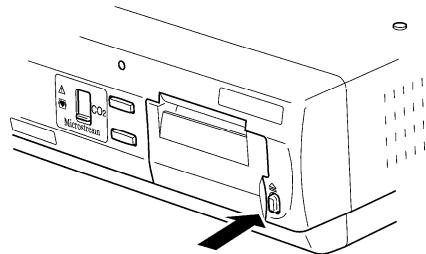
The 19-digit value printed at the bottom of the recording paper indicates the Super Module setup in codes, which are described as follows.

0	0	3	1	0	4	0	0	0	0	0	2	1	1	3	2	0	
(1)	(2)	(3)	(4)	(5)	(6)	(7)											

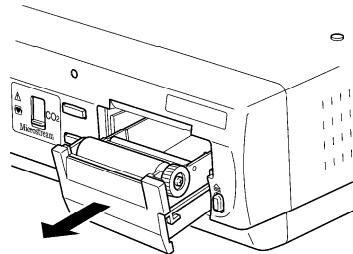
	<i>Digits</i>		<i>Description</i>					
(1)	1 to 4		Indicates the software information of the Super Module in 4 digits.					
(2)	5 to 6		Indicates the ECG lead type. '00' : not connected '01' : 3-electrode '02' : 4-electrode '03' : 5-electrode '04' : 10-electrode '81' : 3-electrode (electrosurgery-proof) '82' : 4-electrode (electrosurgery-proof) '83' : 5-electrode (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			
	D0	LL	LL	LL	LL			
	D1	RA	RA	RA	RA			
	D2	LA	LA	LA	LA			
	D3	—	—	V	V1			
	D4	—	—	—	V2			
	D5	—	—	—	V3			
	D6	—	—	—	V4			
	D7	—	—	—	V5			
	D8	—	—	—	V6			
	D9	—	RL	RL	RL			
(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. D1 : AC filter ON/OFF D3 : ECG drift filter ON/OFF D0, D2, D4–D15: OFF					
(6)	15 to 18		Indicates probe type connected to multiparameter amplifier input connector (4ch) in codes. '0' : Not connected '1' : IBP Probe '2' : TEMP Probe '3' : CO Catheter Relay Cable '4' : CO In-line Sensor Relay Cable '5' : CO Flow-Through Sensor Relay Cable '6' : CO Injectate Probe Relay Cable					
(7)	19		Indicates arrhythmia setup information in codes. D0: "Arrhy. Analysis Filter" '0' : Disp. Waveform, '1' : Fixed D1: "Suspend Arrhy. Analysis During Noise Interference" '0'= OFF '1'= ON D2 to D7: OFF					

To Install the Paper

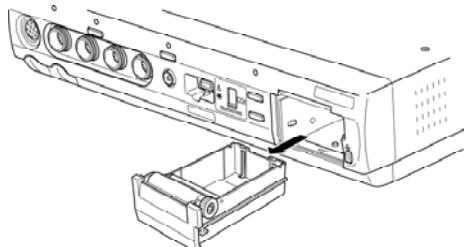
- 1 Press the button located at the right side of the recorder cassette.



- 2 The cassette will come out.

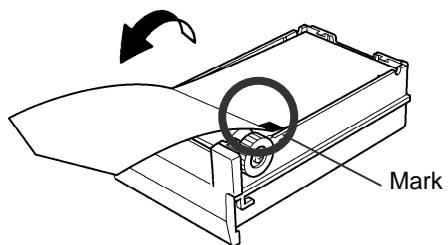
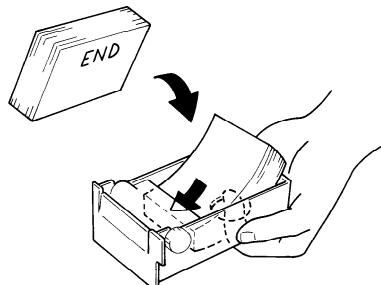


- 3 Pull out the cassette from the Super Module.

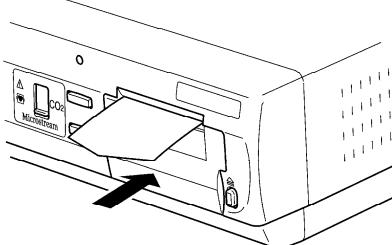


- 4 Set the recording paper.

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



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

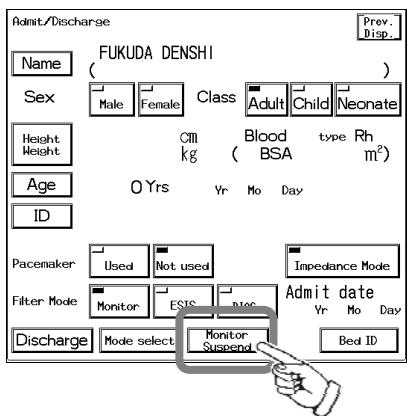


To Suspend Monitoring

When not monitoring for a while, turning OFF the power will erase the recall data, ST measurement, OCG data.

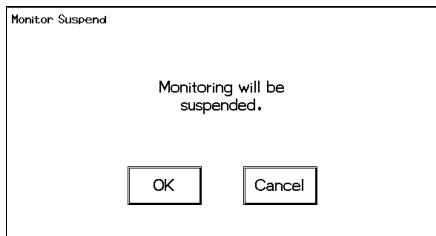
However, using the cease monitoring function allows suspension of data measurement, alarm generation, automatic measurement, automatic recording without erasing the data or setup details.

- 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 interrupt 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.

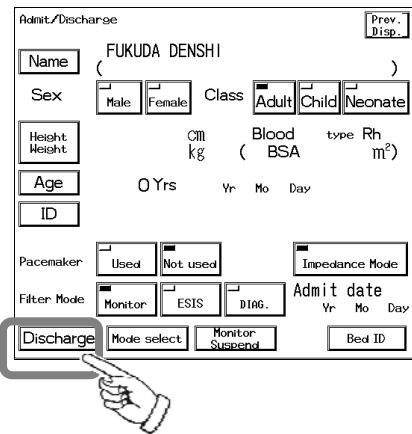
NOTE

When the optional telemetry transmitter module is used, suspending the monitoring will cease the telemetry transmission. Note that the square wave will be displayed on the central monitor indicating the too far condition of the telemetry transmission.

Discharging Procedure

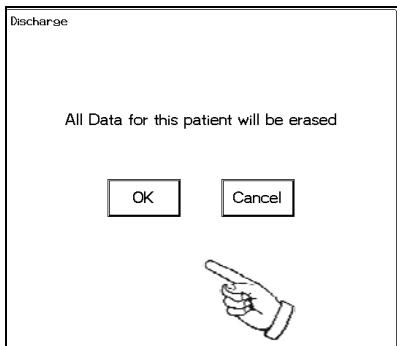
This procedure will erase the past data, such as patient name, ID, age, tabular / graphic trend, and recall.

- 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.

Ventilator Alarm Input

Ventilator Connection

By connecting a ventilator to the Super Module with multiport relay cable or serial connector on the Super Module, the DS-7300 is capable of monitoring ventilator measurements and notifying the ventilator alarm to the central monitor via telemetry or wired network.

⚠ WARNING	<ul style="list-style-type: none">● 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-7300 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-7300 system, cable, and replace the cable if necessary. If the malfunction persists, stop using the device.● The alarm generation on the DS-7300 system is not assured if the alarm other than the following generates at the ventilator.<ul style="list-style-type: none">• SV-300 airway pressure upper limit alarm, high continuous pressure alarm, O₂ concentration lower limit alarm, expiratory minute volume upper/lower limit alarm, apnea alarm, gas supply alarm, air supply alarm, O₂ supply alarm, battery alarm, limited battery alarm, no battery alarm, overrange alarm• Servo-i airway pressure upper limit alarm, high continuous pressure alarm, O₂ concentration lower limit alarm, expiratory minute volume upper/lower limit alarm, apnea alarm, gas supply alarm, O₂ 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, EtCO₂ upper limit alarm, EtCO₂ lower limit alarm• Servo-s airway pressure upper limit alarm, high continuous pressure alarm, O₂ concentration lower limit alarm, expiratory minute volume upper/lower limit alarm, apnea alarm, gas supply alarm, air supply alarm, O₂ supply alarm, backup ventilation alarm, respiratory rate alarm, PEEP low alarm● The DS-7300 system will not correspond to the following alarms generated on the Evita 4 / Evita XL / Evita 2 dura.<ul style="list-style-type: none">• O₂ monitoring disabled alarm, CO₂ alarm disabled alarm, Oximeter alarm disabled alarm, Neo. volume measurement inoperable alarm, Minute volume alarm disabled alarm, Minute volume alarm low off alarm, Tidal volume alarm high off alarm, Apnea alarm off alarm, Nebulizer active alarm● The DS-7300 system will not correspond to the following alarms generated on the Savina.<ul style="list-style-type: none">• O₂ 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● For the Evita 4 / Evita XL / Evita 2 dura / Savina, there is a communication delay of 3 seconds between the DS-7300 system and the ventilator. Therefore, if the alarm generated at the ventilator is resolved within 3 seconds, the ventilator alarm may not be generated at the DS-7300 system.
------------------	--

⚠ CAUTION	<ul style="list-style-type: none">● The ventilator operation should be performed by well-trained and authorized personnel.● For connecting the DS-7300 system and ventilator, use only the specified connection cable.● Verify that the DS-7300 system and the ventilator are properly connected.● When connecting the cable, verify that the main power of the DS-7300 system and the ventilator is OFF.
------------------	--

●Multiport Relay Cable Connection

Connect the multiport relay cable (optional accessory) to the Super Module.

●Ventilator Connection

Connect the ventilator cable (optional accessory) to port A or B of the multiport relay cable and the ventilator.

Ventilator	Ventilator Cable	
	Multipoint Relay Cable	Super Module Serial Connector
300/300A Servo Ventilator	CJ-514 (Q'ty: 1)	CJ-501
Servo-i / Servo-s Ventilator	CJ-584 (Q'ty: 1)	CJ-502
PURITAN-BENNETT Ventilator 7200ae/7200e	CJ-518, CJ-525A (Q'ty: 1 each)	(connection not possible)
PURITAN-BENNETT Ventilator 740/760	CJ-527, CJO-02RR4 (Q'ty: 1 each)	CJ-504
PURITAN-BENNETT Ventilator 840	CJ-527, CJO-02RR4 (Q'ty: 1 each)	CJ-504
Dräger Medical® Ventilator Evita 4 / Evita XL / Evita 2 dura / Savina	CJ-583 (Q'ty: 1)	CJ-502



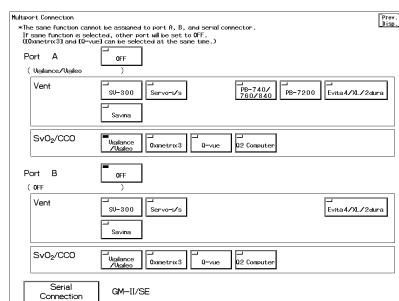
For connecting procedure, refer to "9. Installation Ventilator Data and Alarm".

NOTE

Only one ventilator can be connected for each DS-7300 system.

●Ventilator Selection

- 1 Press the **Menu** → **System Configuration** → **Pre-Set** → **Monitor Setup** → **Multipoint Connection** keys.

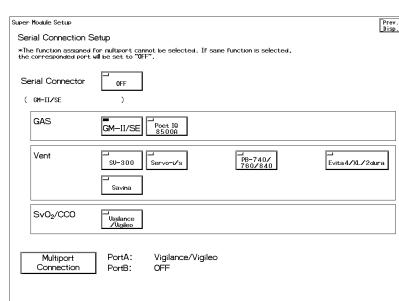


The multiport connection setup menu will be displayed.
Select the ventilator from **SV-300**, **Servo-i/s**,
PB-740/760/840, **PB-7200**, **Evita4/XL/2dura**,
Savina.

NOTE

If communication with ventilator is already established through the corresponding port, it is necessary to disconnect the communication in order to change the selection on this menu.

- 2 If connecting the ventilator to the serial connector on the Super Module, press the **Serial Connection** key on the multiport connection setup menu.



The serial connection setup menu will be displayed.
Select the ventilator from **SV-300**, **Servo-i/s**,
PB-740/760/840, **Evita4/XL/2dura**, **Savina**.

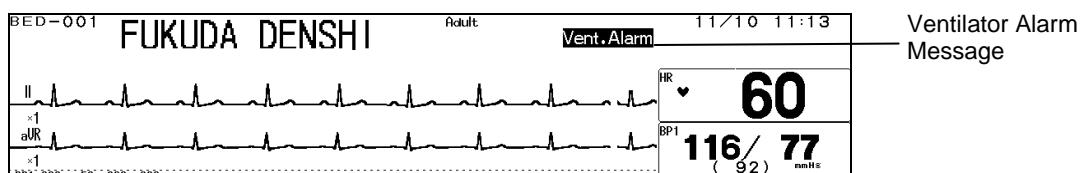
NOTE	If communication with ventilator is already established through the serial connector, it is necessary to disconnect the communication in order to change the selection on this menu.
-------------	--

● Ventilator Alarm Message

Ventilator alarm and ventilator connection status alarm will be generated.

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】

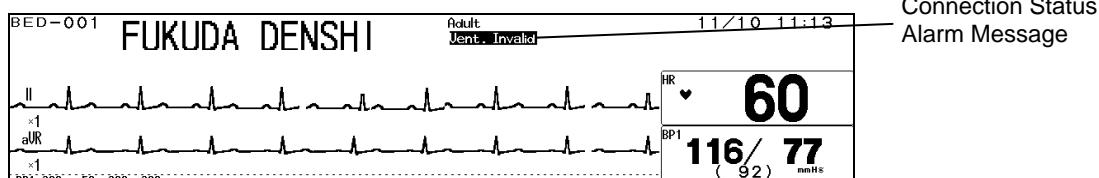


Life Threatening Alarm (Alarm Level 1)

<i>Equipment</i>	<i>Message</i>
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)

<i>Equipment</i>	<i>Message</i>
Ventilator	"Vent. Invalid"

Notification Alarm (Alarm Level 4)

<i>Equipment</i>	<i>Message</i>
Ventilator	"Vent. Disable"
	"Vent. Online"

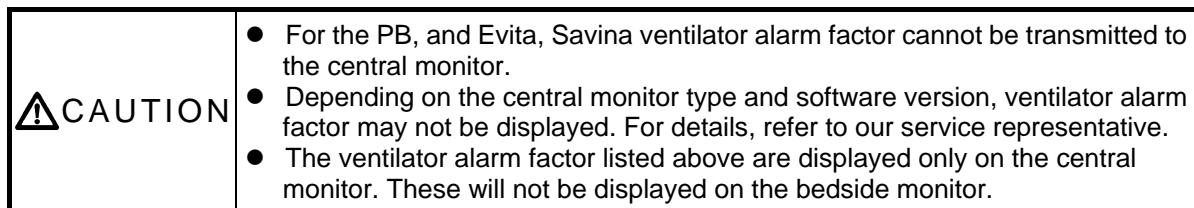
WARNING	After connecting the ventilator and the DS-7300, ensure that "Vent. Online" message is displayed for the connection status. Otherwise, the DS-7300 will not detect the ventilator alarm.
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【Ventilator Alarm Factor】

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

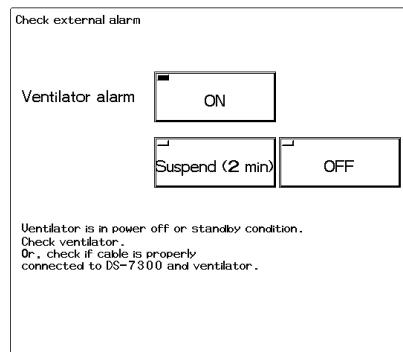
Displayed Alarm Message	Description
VENT AWP	Airway Pressure Alarm
VENT MV	Minute Ventilation Alarm
VENT APNEA	Apnea Alarm
VENT CONT. HP	Continuous High Pressure Alarm

Displayed Alarm Message	Description
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

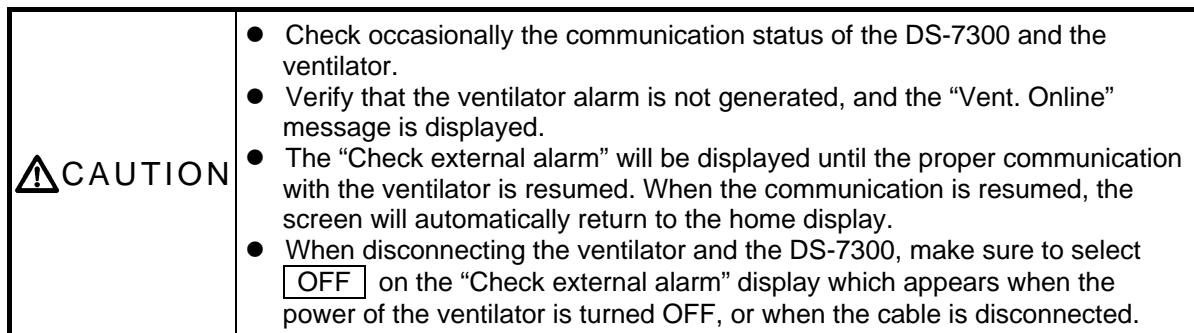


●Check External Alarm

A confirmation display will appear when ventilator cable is disconnected from the multiport relay cable or ventilator, or when 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 ventilator alarm condition remains after 2 minutes, alarm will generate again.
- OFF** will cancel the ventilator alarm until ventilator connection condition returns to normal condition.



Operation Flow

The operation flow of this system is as follows.

【Menu】

Admit / Discharge	Patient Name, Patient ID, Patient Type, Sex, Age, Height, Weight, Blood Type
	Discharge
	Cease
	Mode Select
	Room / Bed ID
Alarm	Alarm Suspend
	Alarm Mode Configuration
	Alarm Record Setup
	HR/PR, ST, Arrhythmia, CO ₂ , SpO ₂ , RESP, BP, TEMP, NIBP
	BP Alarm, Temp Alarm, Setup
Parameter	Zero Balance
	ECG, SpO ₂ , RESP, BP1–8, TEMP1–8, Ventilator, CO ₂ , NIBP, STOPWATCH, Vigilance/Vigileo
	Function
	18 functions can be selected to display on the menu.
	Function Menu
System Configuration	9 functions can be selected to display on the menu.
	System Config. Menu

【Function Menu】

Graphic Trend	Graphic Trend
	Group Setup
Tabular Trend	Tabular Trend
	List Setup
NIBP List	
Recall	Recall Zoom Display
	Display Selection, Recall Setup
OCRG	
ST	ST Waveform, ST Graphic Trend
	Reference Waveform Setup
	ST Alarm
ST Graphic Trend	ST Graphic Trend
	Group Setup
ST Tabular Trend	
Respiration List	Respiration List
	Respiration List Setup
Hemodynamic	
Cardiac Output	CO measurement, CO edit, CO measurement configuration
Ventilator	P-V Curve, F-V Curve, Numeric Data
Night Mode	
Other Bed Display	Other Bed Display
	Set Other Alarm
Vigilance/Vigileo List	Vigilance/Vigileo List Setup

【System Configuration】

Display Configuration	Standard, 12-lead, Extended 1, Extended 2, Enlarge
Sweep Speed	ECG, BP, SpO ₂ , Respiration
Tone / Volume	Pulse, Key, Alarm, Other Bed, Other, Ventilator Alarm
Record	Manual Record, Alarm Record, Periodic Record, Setup
Color	
Brightness Setup	
Night Mode Setup	Manual/Auto, Auto Start Time, Auto End Time, Vol., Display, Alarm Pole
Graphic Trend Setup	Group A, Group B, Group C
Tabular Trend Setup	
Respiration List Setup	
Recall Setup	Wave, Numeric, Arrhythmia
ST Graphic Trend Setup	Group A, Group B, Group C
ST Display Lead Setup	ST-A, ST-B, ST-C
Set Other Alarm	
Bed ID	Room ID, Bed ID
Vigilance List Setup	
BP User Label	
TEMP User Label	
CF Card	CF Card Format, DS-7300→CF Card, CF Card→DS-7300
Telemetry Wave Setup	
Preset	

【Preset Menu】

Alarm Mode Setup	
Display Mode Setup	
Hospital Setup	Date, Alarm Silence, Arrhythmia Analysis Filter, Serial Communication Setup, NIBP Data Erase Time, Status Output Setup, Unit, Telemeter Setup, Trend Clip, BP Record Scale, Suspend Arrhy. Analysis during Noise Interference, HR Lower Limit for VT, MAP Calculation, Night Mode Cancel, Arrhythmia Setup (Asystole, VF, VT), DS_LAN Pat. ID Tx, Admit/Discharge Key Setup, Mixed Agents Alarm Level
Monitor Setup	Time/Date, Set Password, Program Version, Super Module Setup, Multiport Connection, Key Mask, User Key, Alarm Pole Setup, Menu Setup, Display Optim. Setup, Input Box Setup, Backup at Discharge, Mouse Set (only for LC-7319T), Message Icon, Check Discharge at Power ON, Password, Discharge Mode, Event Key, Drift Filter display / Exp clock display, HR/PR Source, Input Box (IB-7300), Freeze Mode Cursor, Device Configuration Icon, Parameter Key Operation, BP Alarm Increment, CO ₂ (mmHg) upper limit for LAN, telemetry, AU-5500N Administrator Mode, NIBP measurement interval at power ON, NIBP Measurement at Power ON, Built-in Rec. Status Display, Vigilance/Vigileo SVR, SVRI Calc., DS-LAN Setup, Auditory Alarm Signal
Test Menu	for maintenance

Chapter 3

Vital Application

This chapter describes the procedure for vital application.

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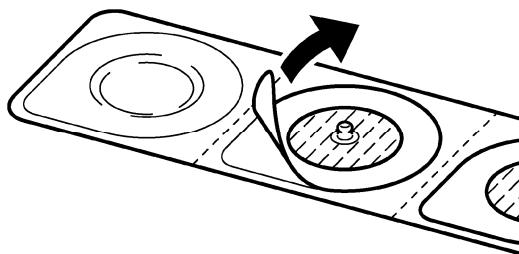
To Acquire ECG Waveform

Before Attaching the Electrodes

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



- 2 Peel off the backing of disposable electrode.



Pay attention not to touch the electrode jelly.

Lead Cable Types

There are various combinations of lead cable connecting type and electrode material. Contact our service representative for details and select the appropriate electrode.

【for 3-electrode】	ECG Relay Cable (defibrillation-proof)	CI-700D-3 (FA)
	ECG Relay Cable (electrosurgery-proof)	CI-700E-3 (FA)
	ECG Lead Cable (hook type)	3380.0648.13
【for 4-electrode】	ECG Relay Cable (defibrillation-proof)	CI-700D-4 (FA)
	ECG Relay Cable (electrosurgery-proof)	CI-700E-4 (FA)
	ECG Lead Cable (hook type)	500398800
【for 5-electrode】	ECG Relay Cable (defibrillation-proof)	CI-700D-5 (FA)
	ECG Relay Cable (electrosurgery-proof)	CI-700E-5 (FA)
	ECG Lead Cable	3380.0661.13 (for limb, 60cm)
	ECG Lead Cable	3380.0661.15 (for limb, 90/150cm)
【for 10-electrode】	ECG Relay Cable (defibrillation-proof)	500403000
	ECG Lead Cable	3380.0661.13 (for limb, 60cm)
	ECG Lead Cable	3380.0661.15 (for limb, 90/150cm)
	ECG Lead Cable	500403200 (for chest, 90cm)

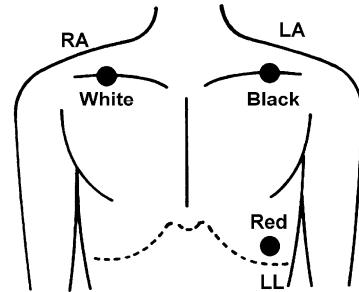
Electrode Placement

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

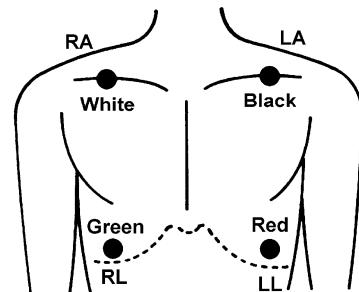
Symbol	Color	Electrode Site
RA	White	On the right infraclavicular fossa
LA	Black	On the left infraclavicular fossa
LL	Red	On the left midclavicular line, near the suprarectal line.



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

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

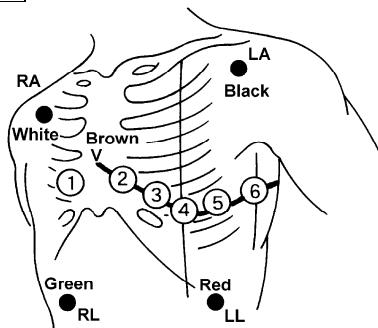
Symbol	Color	Electrode Site
RA	White	On the right infraclavicular fossa
LA	Black	On the left infraclavicular fossa
LL	Red	On the left midclavicular line, near the suprarectal line.
RL	Green	On the right midclavicular line at the same height as LL.



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

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

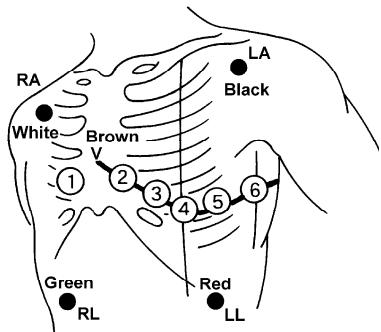
Symbol	Color	Electrode Site
RA	White	On the right infraclavicular fossa
LA	Black	On the left infraclavicular fossa
LL	Red	On the left midclavicular line, near the suprarectal line.
RL	Green	On the right midclavicular line at the same height as F.
V	Brown	Chest Lead (V1-V6)



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 suprarectal line.
RL	Green	On the right midclavicular line at the same height as F.
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	On the midway between V2 and V4.
V4	Blue/Brown	The fifth intercostal space on the left midclavicular line.
V5	Orange/Brown	On the left anterior axillary line at the same horizontal level as V4.
V6	Violet/Brown	On the left midaxillary line at the same horizontal level as V4 and V5.

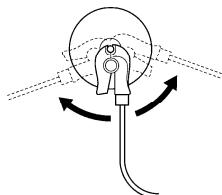


Connection to the Patient Monitor

CAUTION

- Use only the specified relay cables, lead cables, and electrodes.
- The conductive parts of electrodes and associated connectors for applied parts, including the neutral electrode, should not contact other conductive parts including earth.

1 Connect the lead cable to the electrode.

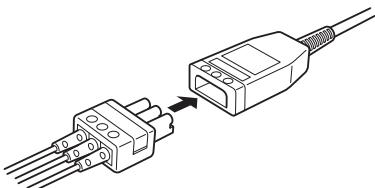


Clip on the lead cable end to the electrode convex part.
Turn to right and left and verify that it is securely connected.

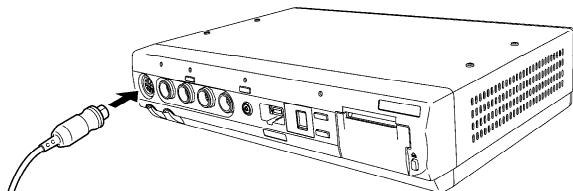
CAUTION

- The indication for continuous use of the electrode is about one day.
- Replace the electrode if the skin contact gets loosen due to perspiring, etc.
- When an electrode is attached at the same location for a long time, some patients may develop a skin irritation. Check the patient's skin condition periodically and change the electrode site as required.
- If different types of electrodes are used at the same time, the difference between the polarization potential from each electrode may interfere monitoring. Make sure to use electrodes of the same type.

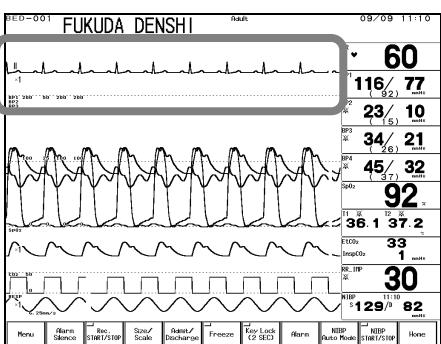
2 Connect the lead cable to the relay cable.



3 Plug in the relay cable to the ECG input connector (green) of the Super Module.



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 the 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 preprogrammed time.
VF	Ventricular Fibrillation	A random, rapid electrical activity of the heart is detected.
VT	Ventricular Tachycardia	9 or more continuous ventricular beats are detected and HR is same or above the preprogrammed value (140bpm or 120bpm).
SLOW_VT		9 or more continuous ventricular beats are detected. (HR: 100–140bpm or 100–120bpm)
TACHY	Tachycardia	HR is over the upper alarm limit.
BRADY	Bradycardia	HR is below the lower alarm limit.
RUN	Consecutive VPC	Continuous VPC exceeding the preprogrammed value (2 to 8 beats) is detected and HR is same or above the preprogrammed value (0 to 100bpm).
COUPLET	Couplet Ventricular Extrasystole	2 continuous beats of VPC is 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.

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 / Child: 0.5–40Hz Neonate: 1.6–40Hz

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 / Child: 1.6–15Hz Neonate: 1.6–15Hz

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



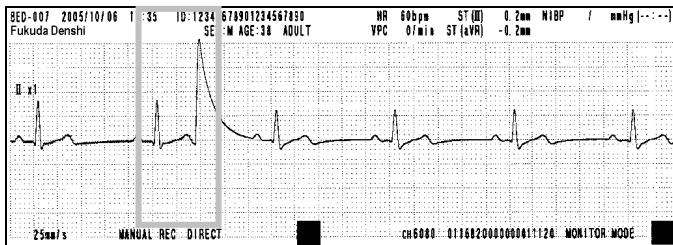
The ESIS mode can largely reduce the artifact such as electrosurgery noise and EMG, but it may also reduce the QRS amplitude. The ESIS mode should be selected only during electrosurgery.

3. Diagnosis Mode Frequency Characteristic Adult / Child: 0.05–100Hz Neonate: 1.6–100Hz

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.

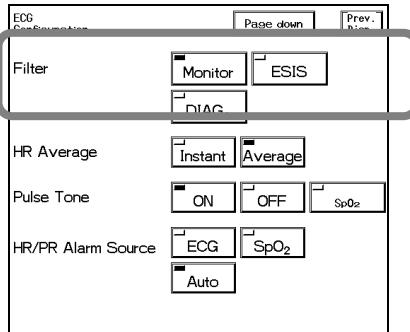


Reference

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

● Procedure for Filter Mode Selection

- 1 Press the ECG parameter key and display the ECG setup menu.
- 2 Press the **Configuration** key.



- 3 Select the filter mode from 3 selections.

● AC Filter

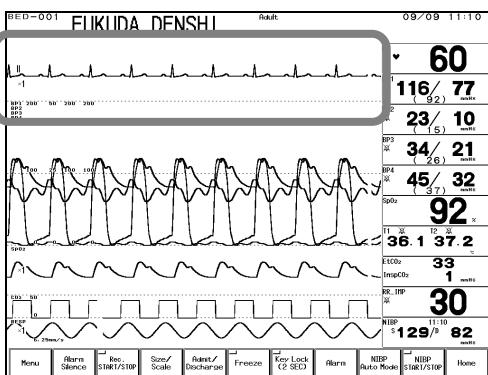
If the ECG waveform is interfered with AC noise, the AC filter cuts off the frequency component (50Hz or 60Hz).

Respiration (Impedance Measurement)

CAUTION

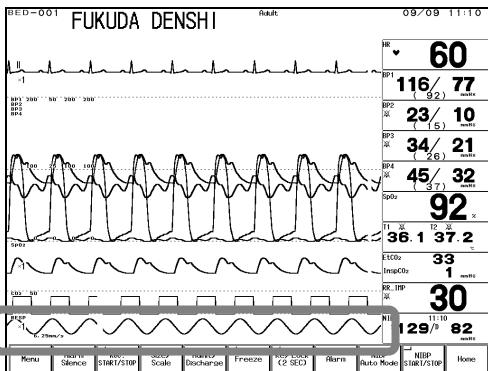
- When the following relay cables are used, respiration cannot be measured.
 - Relay Cable CI-700E_3 (FA) (Electrosurgery-proof, 3-electrode)
 - Relay Cable CI-700E_4 (FA) (Electrosurgery-proof, 4-electrode)
 - Relay Cable CI-700E_5 (FA) (Electrosurgery-proof, 5-electrode)
- When a defibrillator is used 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.



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 SpO₂

This section explains the procedure for SpO₂ measurement when the Nellcor® SpO₂ 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 for long period of time, use the following single-use type.

Single Use Type



OXISENSOR III N-25 (for neonate toe)

For neonate with weight of 3kg and over.



OXISENSOR III I-20 (for pediatric toe)

For pediatric with weight of 3 to 20kg



OXISENSOR III D-20 (for pediatric finger)

For pediatric or adult with weight of 10 to 50kg



OXISENSOR III D-25 (for adult finger)

For adult with weight of 30kg and over.

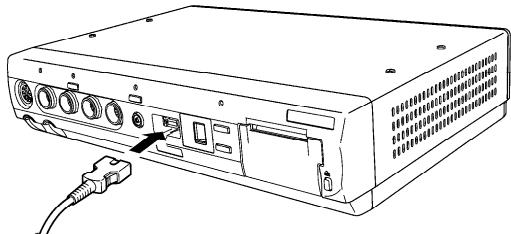


MAX Fast (for adult forehead)

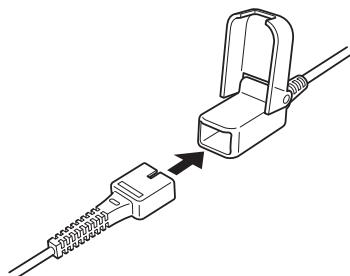
For adult with weight of 40kg and over.

With the use of new technology of NELLCOR®, OXIMAX, stable monitoring during body motion / low perfusion is possible.

2 Connect the sensor to the Super Module.



(1) Connect the SpO₂ relay cable (DOC-10) to the SpO₂ connector on the Super Module.



(2) Insert the sensor into the SpO₂ relay cable connector, and lock with the transparent part.

CAUTION

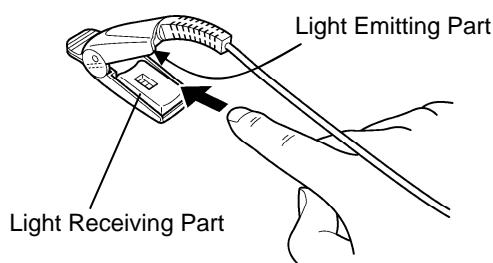
The SpO₂ patient cables (PC04, PC08, PC12) are intended for Masimo® SpO₂ unit only. Do not connect them to Nellcor® SpO₂ unit. If connected, the unit will not function properly.

3 Attach the sensor to the patient.

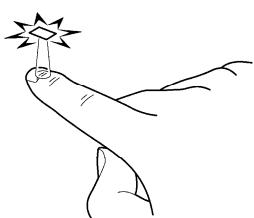
CAUTION

If the sensor site is too thick, thin, deeply pigmented, or deeply colored (ex. nail polish, dye, or pigmented cream), it may lead to inaccurate measurements. In such case, reposition the sensor or choose an alternate sensor for use on a different site.

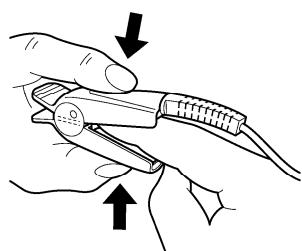
[Probe Type Sensor]



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



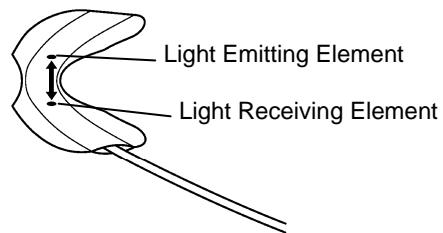
(2) Adjust the sensor so that the light-emitting part (on cable side) touches the root of the nail, and close the probe.



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

[Single-use Type]

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



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

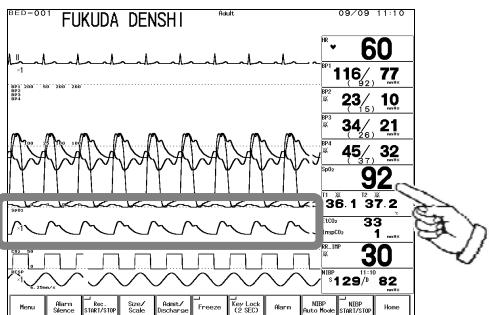


Attachment to the toe



Attachment to the finger

4 Verify that the SpO₂ is displayed.



Press the **HOME** key on the lower part of the display.
Verify that the SpO₂ measurement and pulse wave are displayed on the home display.

⚠ WARNING

- When measuring the SpO₂ of patient with high fever or peripheral circulatory insufficiency, check the sensor attachment periodically and change the attachment site. The temperature of 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 or skin fit appears with the sensor use, change the attachment site or stop using the sensor.
- When fixating the sensor with a tape, do not wind the tape too strong. 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 SpO₂ connector. Otherwise, the measurement data may be erroneously displayed by the ambient light.

 CAUTION	<p>Precautions for Reusable Type Sensor (DS-100A)</p> <ul style="list-style-type: none"> • 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 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 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.
 CAUTION	<p>Precautions for Single-Use Type Sensors</p> <ul style="list-style-type: none"> • 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-use type sensors, the site must be inspected every 8 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.

To Measure the NIBP

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 from the following selections.



Infant Cuff
CUF-7105
Width 8.5cm



Pediatric Cuff
CUF-7104
Width 10.5cm



Adult Cuff (small)
CUF-7103
Width 11cm



Adult Cuff (medium)
CUF-7102A
Width 14.5cm

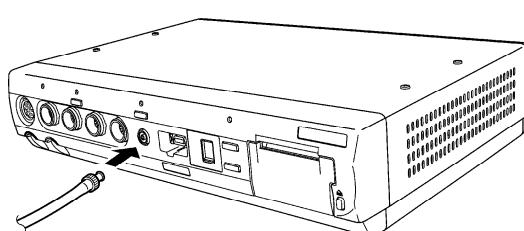
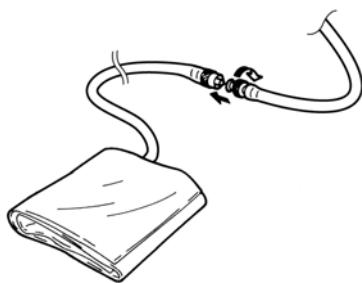


Adult Cuff (large)
CUF-7101
Width 17cm



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

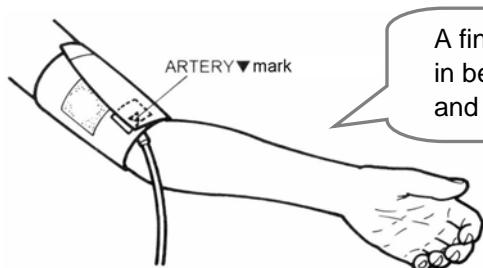
2 Connect the cuff to the air hose, and then connect the air hose to the cuff connection connector on the Super Module.



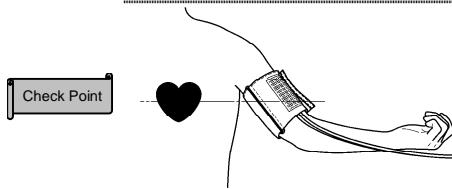
If there is any air leakage, correct NIBP measurement cannot be performed.
Make sure that the connection is secure.

3 Apply cuff to the patient.

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

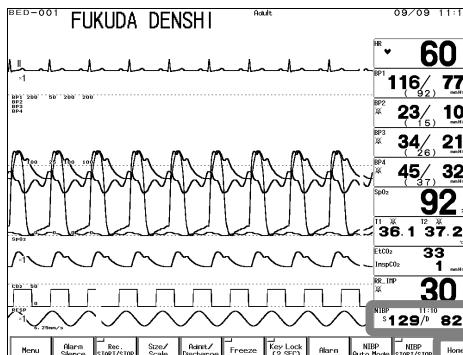


A finger should just fit
in between the cuff
and arm.

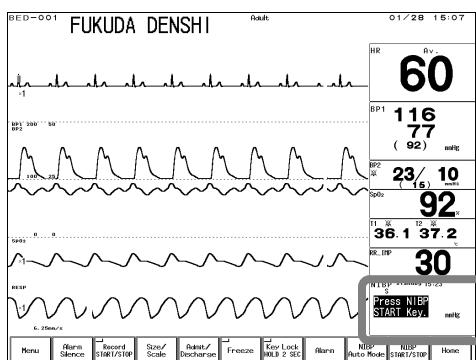


Align the cuff height and heart position to eliminate an error caused by the blood weight.
It is most appropriate to measure with the patient lying down and arms naturally extended.

4 Start the measurement.



Pressing the **NIBP START/STOP** key will start inflating the cuff and starts the measurement.
Upon completion, the measured value will be displayed inside the NIBP parameter key.



By selecting

Backup (Resume auto mode by manual measurement)
for "NIBP Auto Mode" under "Backup at Discharge" (Monitor Setup), a message, "Press NIBP START key." can be displayed inside the NIBP numeric data box at power ON or at patient admittance if NIBP measurement has not been performed before.

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



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



- 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.
- If the air hose is twisted, or weighed down, the cuff air cannot be exhausted. Properly arrange the cuff and air hose.
- Check the condition of cuff-applied part on the patient during measurement so that the blood circulation will not be blocked over long period of time by the squashed or bent cuff hose.
- Check the patient's condition constantly while measuring over 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

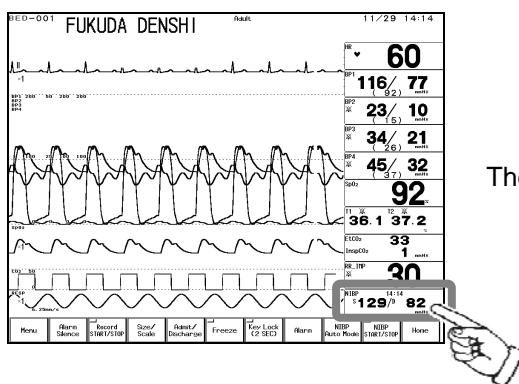
NOTE	<p>When the cuff is not applied to the patient, pay attention not to leave the cuff unattended. If periodic or continuous measurement is set, the cuff will automatically inflate and may cause the rubber bag inside the cuff to burst. When not performing the NIBP measurement, set the NIBP measurement interval OFF and disconnect the air hose from the NIBP connector.</p>
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Whether or not to generate an alarm when the NIBP measurement fails can be set. (ON/OFF of "Alarm Occurrence at NIBP Failure") For details, refer to "4. Monitoring Setup Alarm Setup Alarm Occurrence at NIBP Failure".

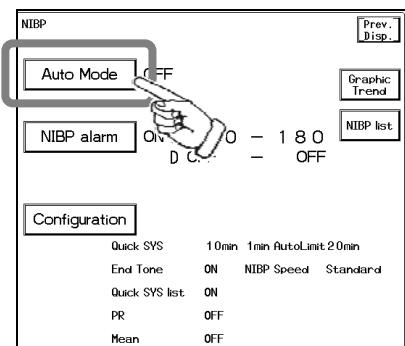
Procedure for Periodic Measurement

- 1 Press the **NIBP parameter key** on the home display.



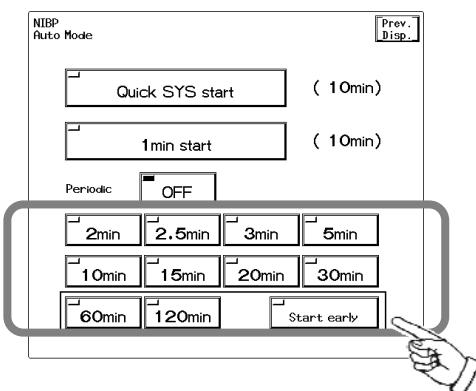
The NIBP setup menu will be displayed.

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

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

2 min. : 13:16, 13:18, 13:20, ...

2.5 min. : 13:15, 13:17:30, 13:20, ...

3 min. : 13:15, 13:18, 13:21,

5 min. : 13:15, 13:20, 13:25, ...

When using the DS-LANIII network, 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-7300, but the measurement will start according to the central monitor setting.

To Measure the BP

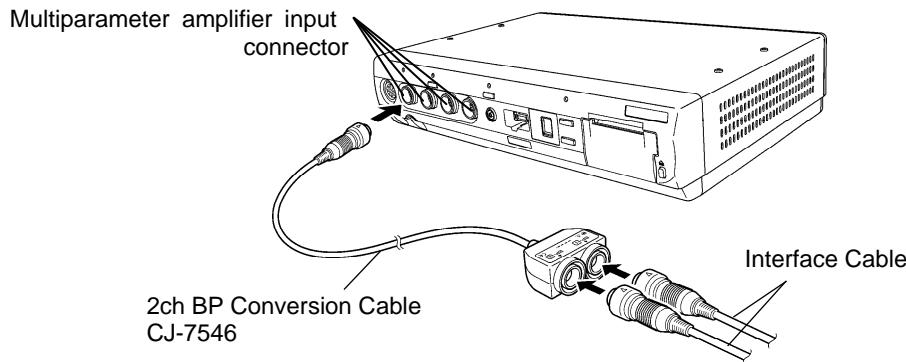
1 Connect the 2ch BP interface cable to the Super Module.

The Super Module utilizes multiparameter amplifier input method which allows monitoring of 2 channels of BP through the 2ch BP conversion cable connected to the Super Module connector.

For HS-702C, 702E, the interface cable can be directly connected to the BP input connector.

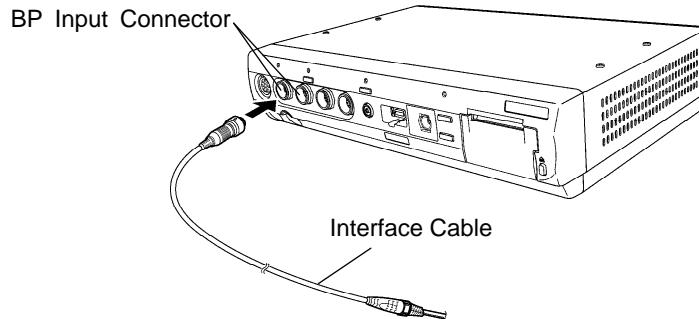
[For HS-710, 710E, 720, 720E, 720C]

Connect the interface cable to the multiparameter amplifier input connector (light blue) via CJ-7546 2ch BP Conversion Cable.

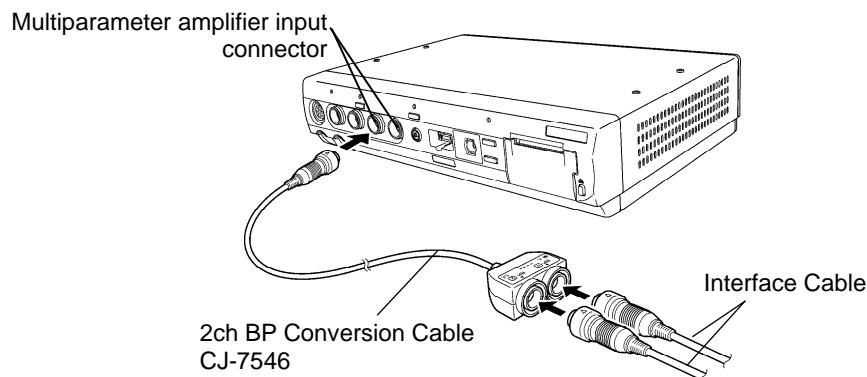


[For HS-702C, 702E]

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

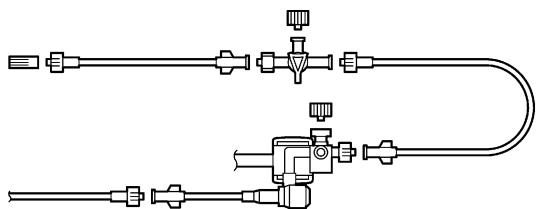


Or, the interface cable can be connected to the multiparameter amplifier input connector (light blue) via CJ-7546 2ch BP Conversion Cable.

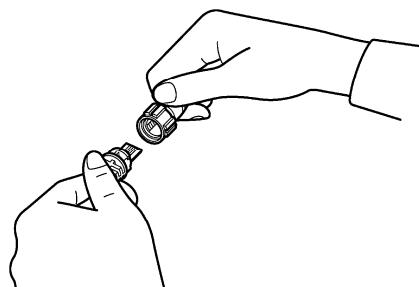


2 Assemble the BP measurement device.

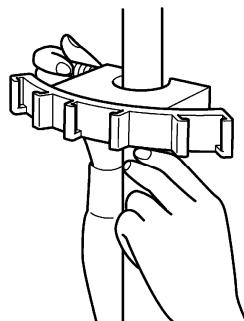
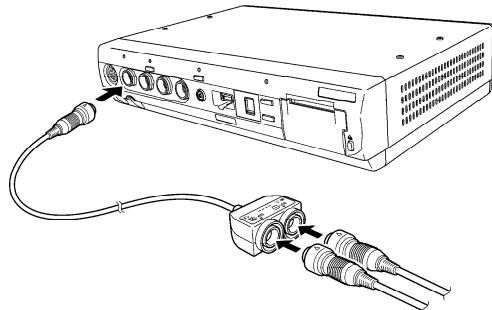
The following procedure explains the case when BP transducer (CDXPress) is used.
If using other transducers, refer to the operation manual for the corresponded transducer.



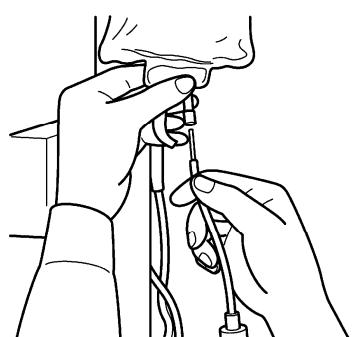
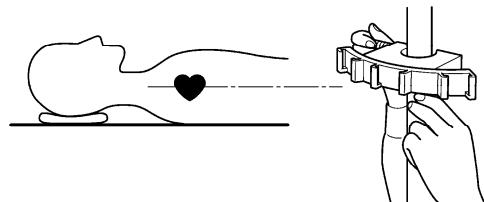
- (1) Inspect transducer packaging for damage prior to opening.
Verify that each connector is securely connected.



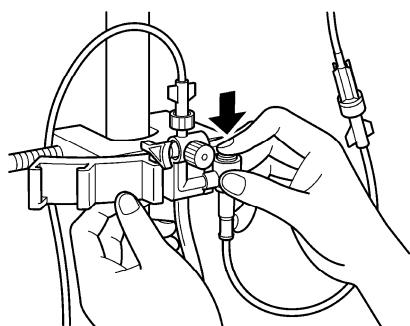
- (2) Connect the interface cable to the 2ch BP conversion cable, and then to the transducer.



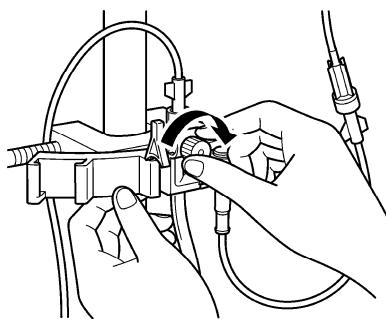
- (3) Align the bracket to patient's heart position (about 1/2 of the chest depth).



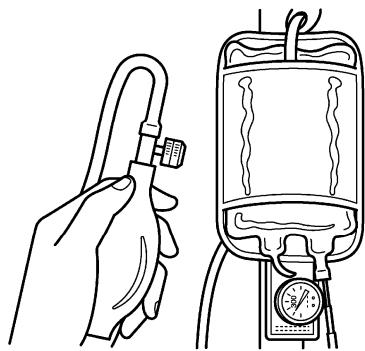
- (4) Inject 1000 units of heparin into the saline bag, mix thoroughly and puncture the infusion line through the same hole. Set the saline bag to pressure bag, and hang from the infusion device. Fill saline to about 1/3 of the drip.



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

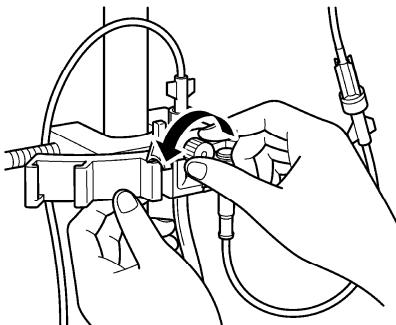


- (6) Verify that all air bubbles are removed, and tighten the zero-port plug.
Turn on the zero-port plug side of the open-air three-way valve.

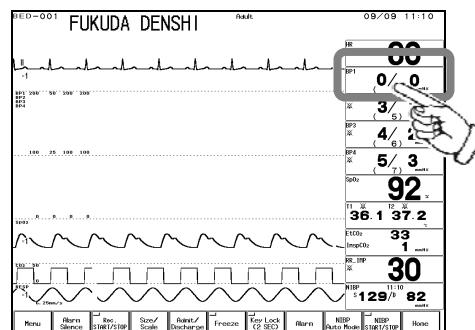


- (7) Inflate the pressure bag to 300mmHg.

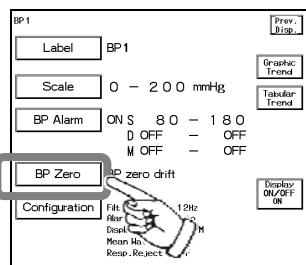
3 Perform zero balance.



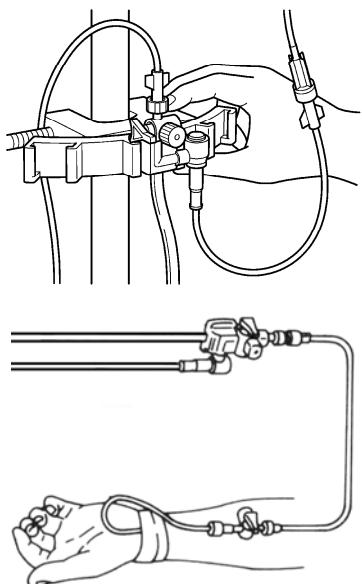
- (1) Loosen the zero-port plug on open-air three-way valve one-half turn.



- (2) Press the BP parameter key on the home display. The display will proceed to BP setup menu.



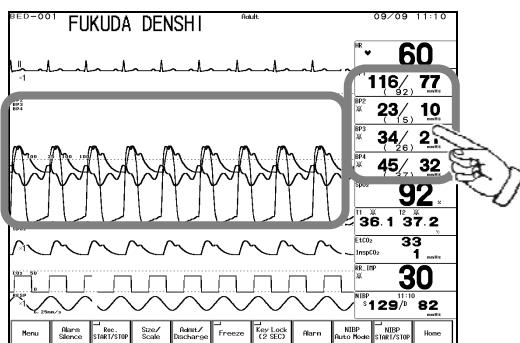
- (3) Press the **BP Zero** key on the BP setup menu. Zero balance will start.



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

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

4 Start the BP monitoring.



Start the BP measurement.

Press the **Home** key.

Verify that the BP waveform and each measurement value is displayed on the home display.

CAUTION	<p>The zero balance procedure is required for the following case.</p> <ul style="list-style-type: none"> 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 seconds.
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To Measure the CO₂

(HS-710E, 720E, 702E)

The Microstream technology developed by Oridion Medical 1987 Ltd. is used for the CO₂ measurement by HS-710E, HS-720E, HS-702E.

CAUTION

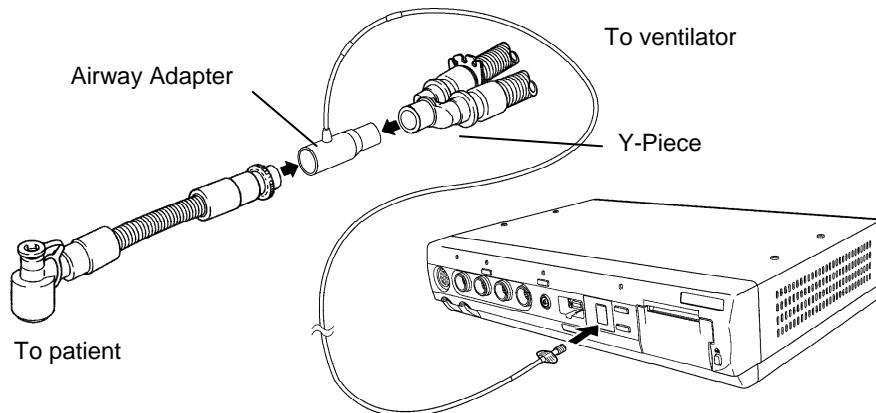
If the HC-500 (CO₂ Module) is simultaneously used, the CO₂ measurement priority will be according to the "CO₂ Module Priority" set on the "Input Box Setup" (Monitor Setup). With the default setting, the HC-500 will be prioritized.

Patient Application and Display

Refer to "12. Accessories" (P12-5) for list of specified "Oridion Medical" airway adapters. These accessories may be purchased from Fukuda Denshi or any authorized "Oridion" distributors.

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 CO₂ measurement connector on the Super Module. Verify that all the tubes are properly connected.

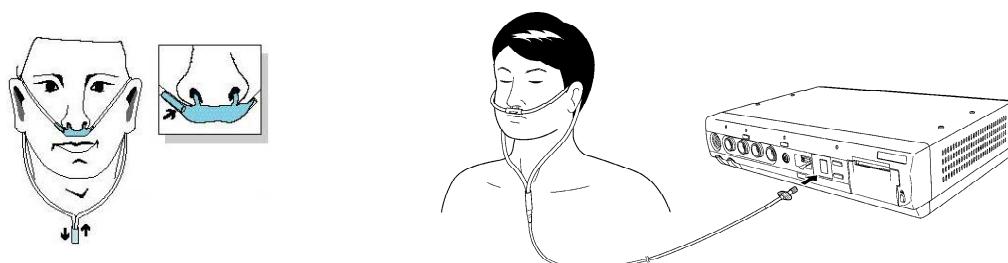


WARNING

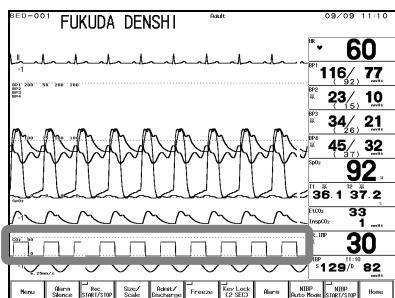
- Use only specified breath sampling products manufactured by "Oridion Medical 1987 Ltd.". Refer to "12. Optional Accessories", for list of specified "Oridion Medical 1987 Ltd." FilterLine® sampling products. These accessories may be purchased from Fukuda Denshi or any authorized "Oridion Medical 1987 Ltd." distributor.
- All FilterLine® sampling products are for single patient use only.
- Always consider the circumference of the intubation tube when using the airway adapter. If inappropriate airway adapter is used for a patient with low ventilation, CO₂ may mix in to the inspired air resulting in incorrect measurement, or apnea detection may become difficult.

2 For patient using the nasal prong

- (1) Attach the nasal prong to the patient.
- (2) Connect the nasal prong to the CO₂ measurement connector on the Super Module. Verify that it is properly connected.



3 Start the CO₂ measurement.



Press the **Home** key.

Verify that the CO₂ waveform and EtCO₂ numeric data are displayed on the monitor.

Stable measurement can be achieved after about 20 minutes from power ON.

NOTE

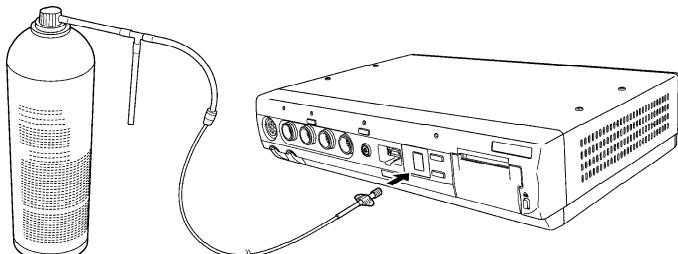
Connecting a sampling tube or nasal prong to the patient monitor will automatically start the sampling pump. To prevent the pump from deteriorating, disconnect the sampling tube and nasal prong from the patient monitor when not measuring the CO₂ concentration.

Procedure for Calibration

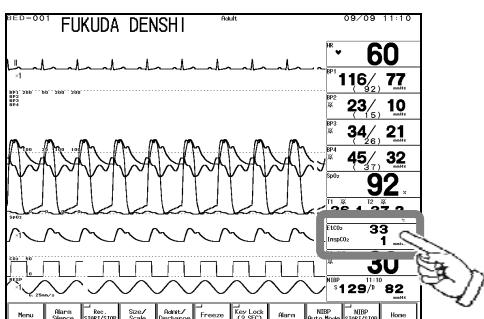


- Perform calibration 20 minutes after the Super Module was turned ON.
- Do not disconnect the sampling tube during calibration. Calibration will cease when the sampling tube is disconnected.

1 Connect the calibration gas cylinder to the Super Module.

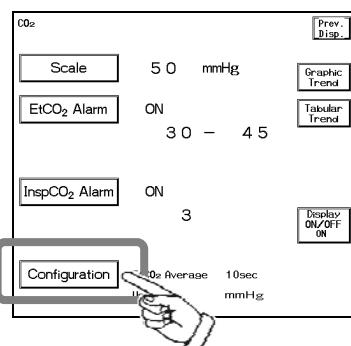


2 Press the CO₂ parameter key on the home display.



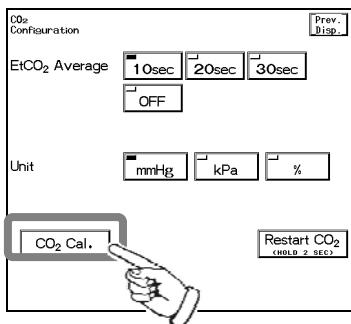
Proceed to the CO₂ setup menu.

3 Press the Configuration key on the CO₂ setup menu.

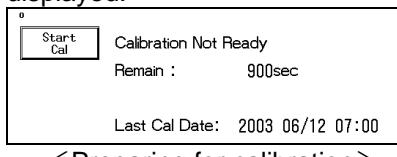


Proceed to the CO₂ configuration menu.

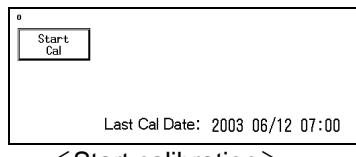
4 Press the **CO₂ Cal. key on the CO₂ configuration menu to display the calibration menu.**



Due to precision matter, CO₂ calibration can not be started before 20 minutes has elapsed once the power is turned ON. During this time, **Start Cal** key will be displayed in gray which indicates that the key is ineffective. The message, "Calibration not ready" and the remaining time for preparation will be displayed.



<Preparing for calibration>



<Start calibration>

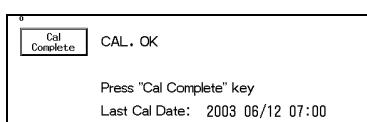
5 Press the **Start Cal key and conduct calibration according to the displayed messages.**

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

7 The message, "Calc. Gas can be removed" will be displayed. Stop pressing the injection button to 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	<p>Conduct CO₂ calibration for the following case.</p> <ul style="list-style-type: none"> Initial calibration after 1,200 operating hours, then once a year or after 4,000 operating hours, whichever comes first. When EtCO₂ measurement is not stable or accuracy is degraded compared with other measuring device. When the patient monitor was not used for a while, or when EtCO₂ was not measured for a while.
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To Measure the CO₂

(HS-720C, 702C: Capnostat 5)

For the HS-720C, HS-702C, the CO₂ measurement is performed by the RESPIRONICS® Capnostat 5 (Mainstream method).

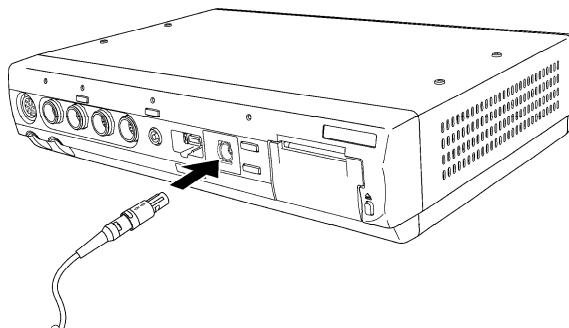
⚠ CAUTION

If the HC-500 (CO₂ Module) is simultaneously used, the CO₂ measurement priority will be according to the "CO₂ Module Priority" set on the "Input Box Setup" (Monitor Setup). With the default setting, the HC-500 will be prioritized.

Patient Application and Display

1 Connect the CO₂ sensor (Capnostat 5) to the serial communication connector (RGM).

CO₂ 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 CO₂ sensor is plugged into the Super Module.

During the warm up period, the message "CO₂ 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.

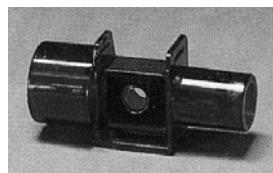
2 Prepare an airway adapter suitable for the patient.

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



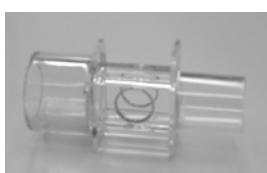
Airway Adapter
(Adult) 7007

For patients using an endo-tracheal tube greater than 4.0 mm in diameter.
Reusable Type



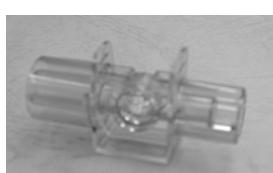
Airway Adapter
(Neonate) 7053

For patients using an endo-tracheal tube less than, or equal to 4.0 mm in diameter. Reusable Type



Airway Adapter
(Disposable, Adult)
6063

For patients using an endo-tracheal tube greater than 4.0 mm in diameter.
Disposable Type



Airway Adapter
(Disposable, Neonate)
6312

For patients using an endo-tracheal tube less than, or equal to 4.0 mm in diameter.
Disposable Type

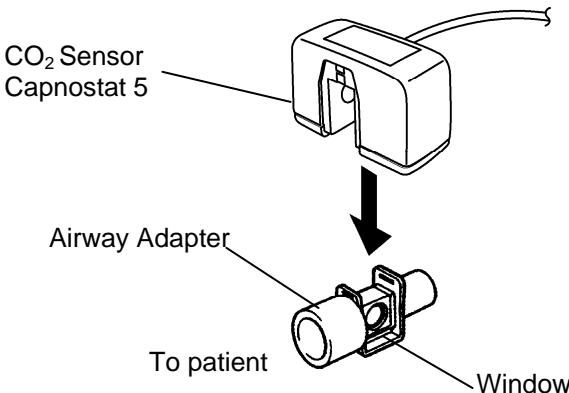
⚠ CAUTION

- 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 CO₂ 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 CO₂ sensor or airway adapter.



4 Input the following data.

• **O₂ Compensation**

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

• **N₂O Compensation**

Select ON if N₂O 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.



For details of setup procedure, refer to “6. Parameter CO₂ Concentration (HS-720C, 702C,)”.

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 “CO₂ cal required” or “CO₂ 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** → **CO₂** keys and display the CO₂ menu.**

Press the **Cal. Airway Adpt key to start the calibration.**

The calibration process will start.

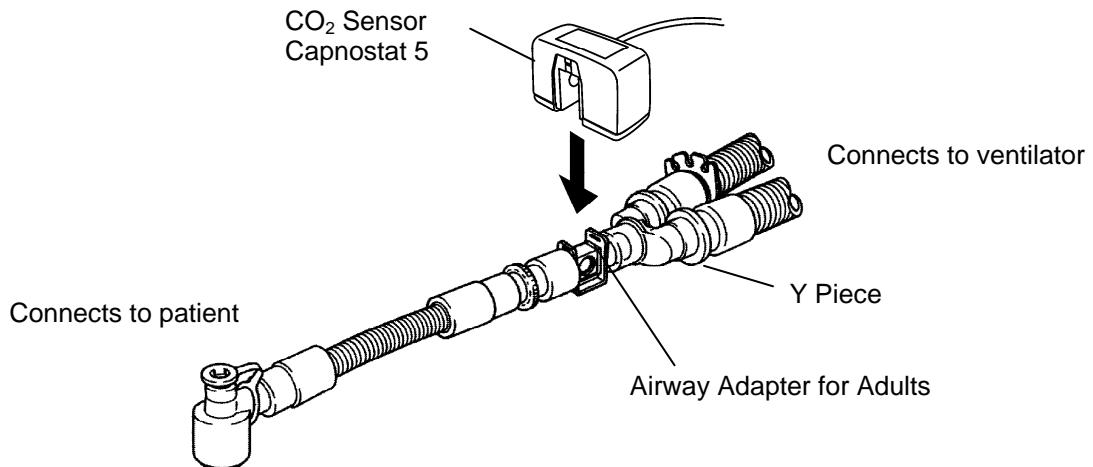
During calibration, “Zeroing CO₂” message will be displayed.

Upon completion of calibration, a tone will be generated and “Cal complete” message will be displayed.

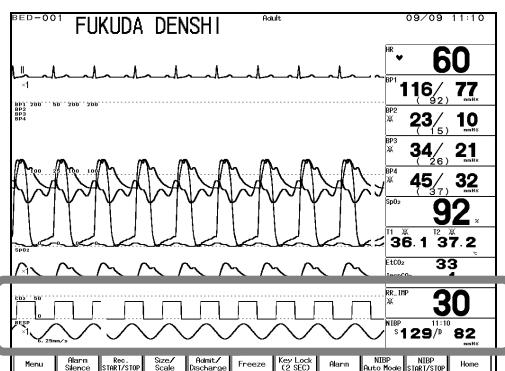
If the calibration fails, an error tone will be generated and “Cal error” message will be displayed. In such case, start the calibration process again.

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.
-------------	--

- 7 Verify that the airway adapter calibration is properly completed, and attach the airway adapter to the patient's respiration circuit. Then, attach the CO₂ sensor to the airway adapter.**
Attach the airway adapter between the patient's circuit wye and intubation tube. The CO₂ sensor should be facing upward.



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



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

To Measure the Temperature

- 1 Select an appropriate type of probe for the patient.

Probe Type

Reusable Type



Rectal Probe (adult) 401J



Rectal Probe (pediatric) 402J



Body Surface Probe 409J

Probe Cover (Single-Use Type)



Probe Cover for 401J (10 covers)



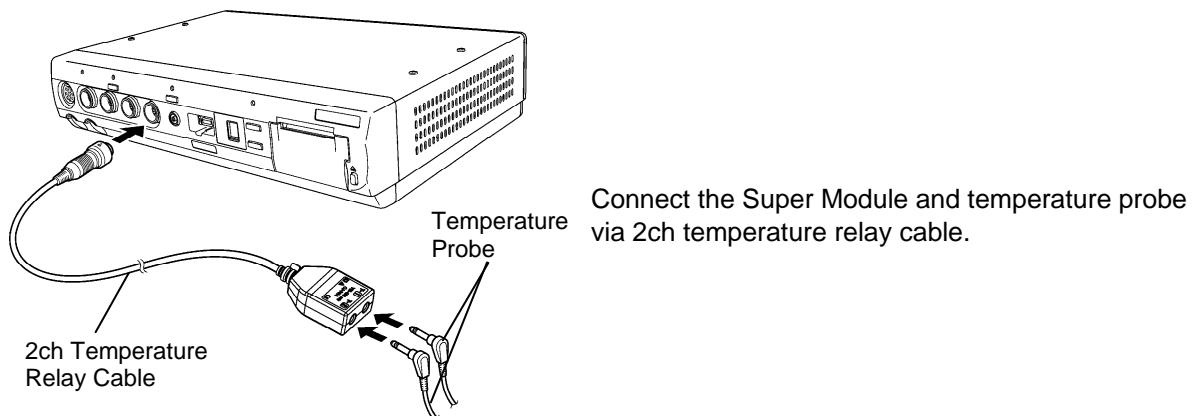
Do not reuse the probe cover. It is intended for single patient use only.

NOTE

For the DS-7300 system, the YSI-700 series temperature probe cannot be used.

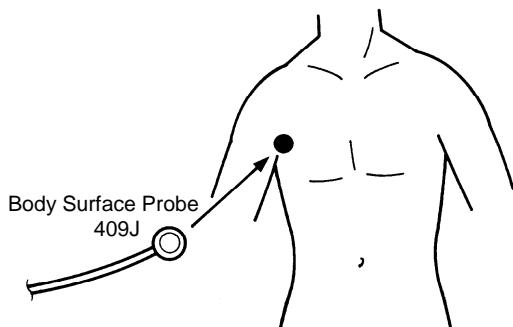
2 Connect the probe to the Super Module.

The Super Module utilizes multiparameter amplifier input method which allows monitoring of 2 channels of temperature through the 2ch temperature relay cable connected to the Super Module connector.



3 Attach the probe to the patient.

●Body Surface

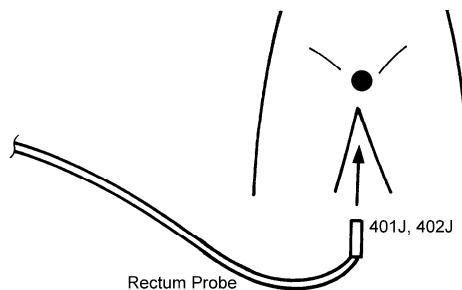


Attach the probe to the body surface, and secure with surgical tape.

NOTE

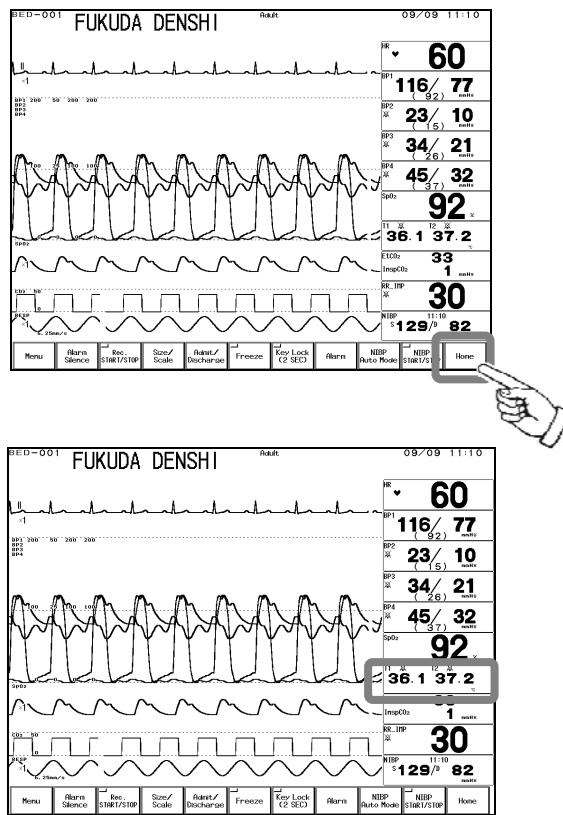
The probe location shown above is an example. Adjust the probe location according to the patient's condition.

●Rectum



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

4 Check that the temperature is displayed.



Press the **Home** key.

Check that the temperature measurement is displayed on the home display.

To Connect the CO Measurement Cable

The multiparameter amplifier connector of the Super Module is used for the cardiac output measurement.

The CO measurement can be also performed using the HF-500 CO Module inserted to the Input Box.

Reference

- Refer to "7. Function CO Measurement" for procedure to measure and edit the CO data.
- When the Super Module and HF-500 are used simultaneously, the priority to perform the CO measurement can be set. (Default: Super Module > HF-500). For procedures, refer to "Input Box Setup" of this chapter.

Connecting to the Super Module

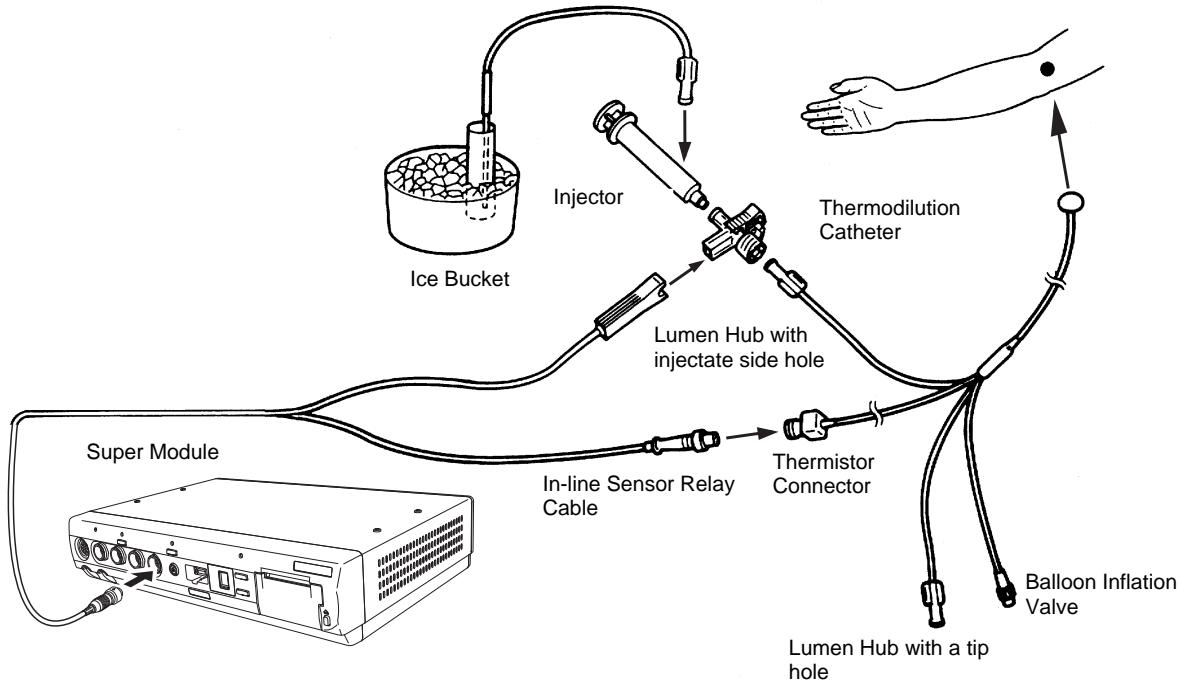
1 Select the catheter relay cable.

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

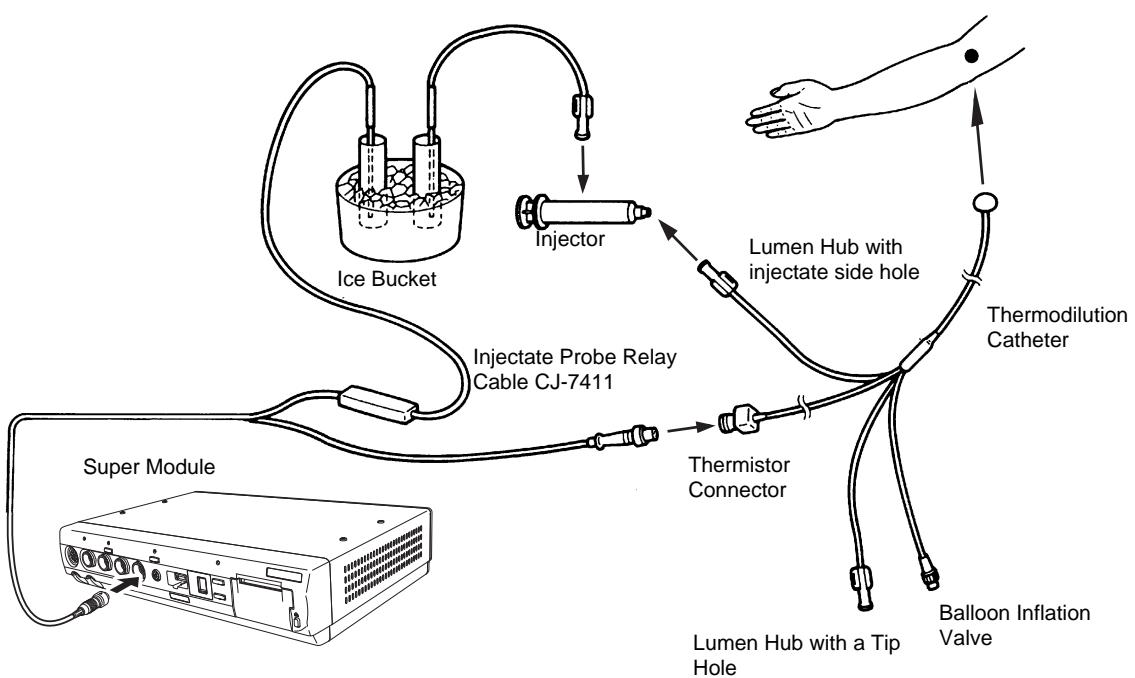
Measurement Method	Catheter Relay Cable
0°C/24°C Temperature	CJ-7382
Flow-through Sensor	CJ-7413
In-line Sensor	CJ-7412
Injectate Temperature Probe	CJ-7411

2 Connect the catheter relay cable to the multiparameter amplifier input connector of the Super Module, and connect the catheter to the catheter relay cable.

[Example of In-line System]



[Example of Injectate Probe]



3

To Connect the CO Measurement Cable

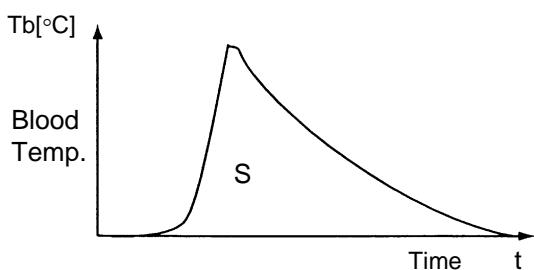
Cardiac Output Measurement Algorithm

Cardiac output is measured using the thermodilution method.

Thermodilution Method

The thermodilution catheter is inserted from the vein through the right atrium, right ventricle, to the 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]

$\Delta Tb(t)$: Temperature change of Tb after "t" seconds. [°C]

CC : Catheter Constant (Computation Constant: CC value)

Si : Specific Gravity of Injectate [g/cm³]

Sb : Specific Gravity of Blood [g/cm³]

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% ($Si \cdot Ci$) / ($Sb \cdot Cb$) = 1.08 is programmed for this device.

NOTE

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

Super Module Setup for BP, TEMP, CO Measurement

The Super Module is equipped with multiparameter connectors. The number of ports for each module type is as follows.

Multiparameter Connectors	Super Module
<u>4 ports</u> TEMP × 8 BP × 8 CO × 1	HS-710, HS-710E, HS-720, HS-720E, HS-720C
<u>2 ports</u> TEMP × 4 BP × 4 CO × 1	HS-702C, HS-702E

Any combination of parameters of temperature, BP, and CO can be connected to the multiparameter connectors.

By using the 2ch BP conversion cable or 2ch temperature relay cable, 2 channels of temperature or 2 channels of BP can be monitored through one multiparameter connector.

【For HS-710, 710E, 720, 720E, 720C】

Combination of BP and Temperature Channel

Connector 1	BP1–8	BP1–6	BP1–4	BP1–2	TEMP1–8
Connector 2				TEMP1–6	
Connector 3				TEMP1–4	
Connector 4		TEMP1–2			

Combination of BP, Temperature, and Cardiac Output Channel

Connector 1	BP1–6	BP1–4	BP1–2	TEMP1–6
Connector 2			TEMP1–4	
Connector 3		TEMP1–2		
Connector 4			Cardiac Output	

【For HS-702C, 702E】

Combination of BP and Temperature Channel

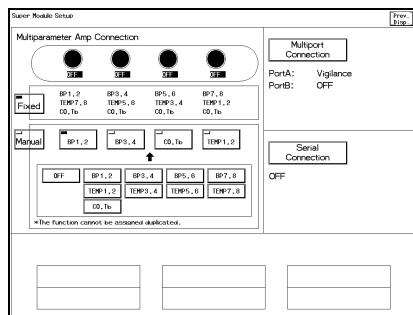
BP Input Connector 1	BP3–6	BP1–2 (fixed)		TEMP1–4
BP Input Connector 2				
Multiparameter Connector 1		BP3–4		
Multiparameter Connector 2		TEMP1–2		

Combination of BP, Temperature, and Cardiac Output Channel.

BP Input Connector 1	BP3–4	BP1–2 (fixed)		Cardiac Output
BP Input Connector 2				
Multiparameter Connector 1		BP3–4	TEMP1–2	
Multiparameter Connector 2				

To perform Super Module setup, follow the procedure below.

- 1 Press the **Menu** → **System Configuration** → **Pre-Set** → **Monitor Setup** → **Super Module Setup** keys.



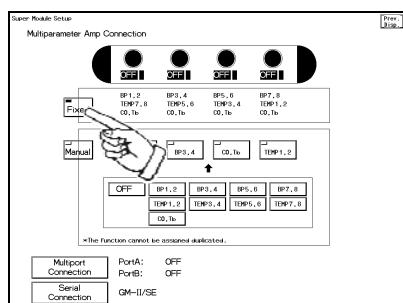
- 2 Select **Fixed** or **Manual**.

Select the multiparameter input connector setup procedure from **Fixed** or **Manual**.

Fixed will automatically set the channels for each connector.

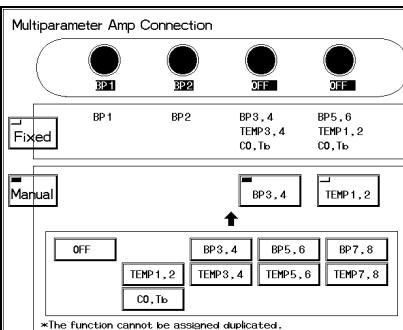
BP1, 2, 3 will be sequentially assigned from the left, and TEMP1, 2, 3 will be sequentially assigned from the right connector.

[For HS-710, 710E, 720, 720E, 720C]



Left		Right	
BP1, 2	BP3, 4	BP5, 6	BP7, 8
TEMP7, 8	TEMP6, 5	TEMP3, 4	TEMP1, 2
CO, Tb	CO, Tb	CO, Tb	CO, Tb

[For HS-702C, 702E]

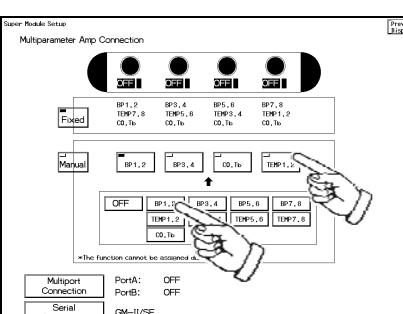


Left		Right	
BP1	BP2	BP3, 4	BP5, 6
		TEMP3, 4	TEMP1, 2
		CO, Tb	CO, Tb

NOTE

If **Yes** is selected for "Input Box (IB-7300)" of the monitor setup menu, the multiparameter amplifier setup will switch to **Manual**. **Fixed** cannot be selected when the Input Box is used.

- 3 For manual setup, select the channel for each connector.



Select from **OFF**, **BP1.2**, **BP3.4**, **BP5.6**, **BP7.8**, **TEMP1.2**, **TEMP3.4**, **TEMP5.6**, **TEMP7.8**, **CO,Tb** to assign for each connector.

The same parameters cannot be selected.

Before selecting a parameter already set for the other connector, set the parameter OFF.

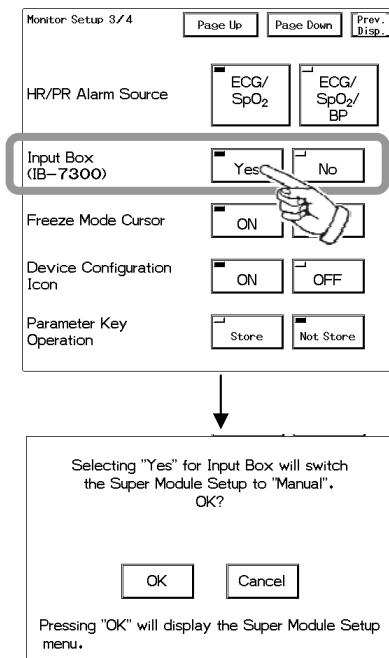
After assigning the channel for each connector, press the **Manual** key to finalize the setup.

Input Box Setup

By inserting the parameter modules to the IB-7300 Input Box, the monitoring parameters can be extended.

- 1 First, it is necessary to select Yes for “Input Box (IB-7300)” on the Monitor Setup menu.**

Press the **Menu** → **System Configuration** → **Pre-Set** → **Monitor Setup** → **Page Down** → **Page Down** and display the third page of the Monitor Setup menu.



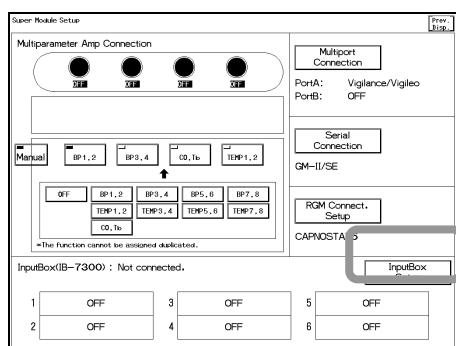
Select Yes for “Input Box (IB-7300)”.

If Fixed is selected for “Multiparameter Amplifier Connection” on the Super Module Setup display (Monitor Setup), a confirmation message will be displayed. Select OK to use the input box.

NOTE

If Yes is not selected for “Input Box (IB-7300)”, a message, “IB-7300 not configured” will be displayed when the Input Box is connected.

- 2 Pressing OK key on the above display will display the Super Module Setup menu.**

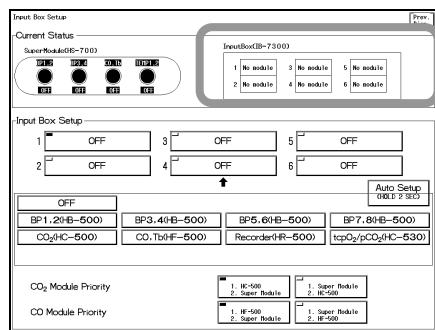


Check the current setup on the display.

< Super Module Setup Display >

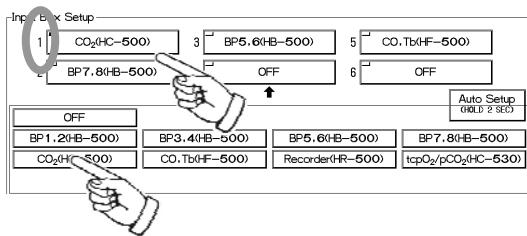
3 Open the Input Box Setup display.

Press the **Input Box Setup** key on the Super Module Setup Display, or press the **Menu** → **System Configuration** → **Pre-Set** → **Monitor Setup** → **Input Box Setup** keys.



On the upper right of the display, the parameter modules currently recognized by the main unit will be displayed. "No module" will be displayed for the empty slot.

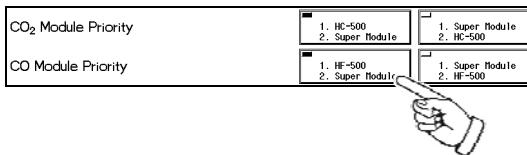
4 Set the modules to use with the input box.



The numbers such as "1", "2" indicates the slot number of the Input Box. First, select the module, then, select the slot to insert that module.

Pressing the **Auto Setup** keys for more than 2 seconds will automatically identify and set the modules inserted in the input box.

5 Set the priority to perform the measurement for CO₂ concentration and cardiac output.



For CO₂ measurement, set the priority between HC-500 (EtCO₂ Module) and Super Module.

For CO measurement, set the priority between HF-500 (CO Module) and Super Module.

To use the HR-500 Recorder Module, **No** should be selected for "HS Recorder" on the second page of the Recorder Setup.



Manual, Alarm, and Periodic Recording can be performed on the HR-500 Recorder Module. To perform Recall Recording, select **Manual Recording** for "Recall Recording" on the second page of the Recorder Setup.

→"4. Monitoring Setup Recording Setup"



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